

PHYSICAL MONITORING APPROACHES FROM AROUND THE STATE AND BEYOND

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COASTAL
PROTECTION
ENGINEERING

REFRESHER ON FLORIDA'S MONITORING PROGRAM

Florida Statutes

- Section 161.041: authorizes FDEP to require monitoring as a condition to granting a joint coastal permit (JCP). Monitoring conditions included in the permit must be based on clearly defined scientific principles.
- Section 161.101: authorizes FDEP to cost share for monitoring expenses.

Observe
and
Assess

Monitoring is used to observe and assess, with quantitative measurements, the performance of the project

Plan,
Design, and
Optimize

Monitoring provides the department and project sponsors with information necessary to plan, design, and optimize subsequent follow-up projects

WHAT TYPES OF MONITORING ARE REQUIRED?

- Pre-, During-, & Post-Construction
- Physical Monitoring (Beach and Borrow Areas; Topography & Bathymetry)
- Aerial Photography
- Biological Monitoring (Hardbottom, SAV)
- Marine Turtle Nesting Monitoring
- Compaction Monitoring
- Sand Quality Sampling
- Water Quality Sampling
- Scarp & Lighting Surveys

PHYSICAL MONITORING FREQUENCY

Example Monitoring Schedule for an Initial Restoration

- Pre-Construction
- Post-Construction
- 1-yr Post-Construction
- 2-yr Post-Construction
- 3-yr Post-Construction
- Every other year until the next construction event

- Monitoring surveys of the initial beach restoration project are generally conducted on a more frequent basis than subsequent beach renourishment projects
- Projects with beach erosion control structures may have additional surveying requirements
- Some local sponsors choose to survey the beach more frequently than permits require to support management



PHYSICAL MONITORING DATA ACQUISITION

- Topographic and bathymetric profile surveys of the beach and nearshore
- Bathymetric surveys of the borrow sites
- Aerial photography



SURVEYING

Monitoring Standards for Beach Erosion Control Projects

- October 2014
- Beach Profile Topo Survey
- Beach Profile Offshore Survey
- Borrow Site, Shoal, and Other Bathymetric Survey
- Aerial Photography
- Environmental Photography

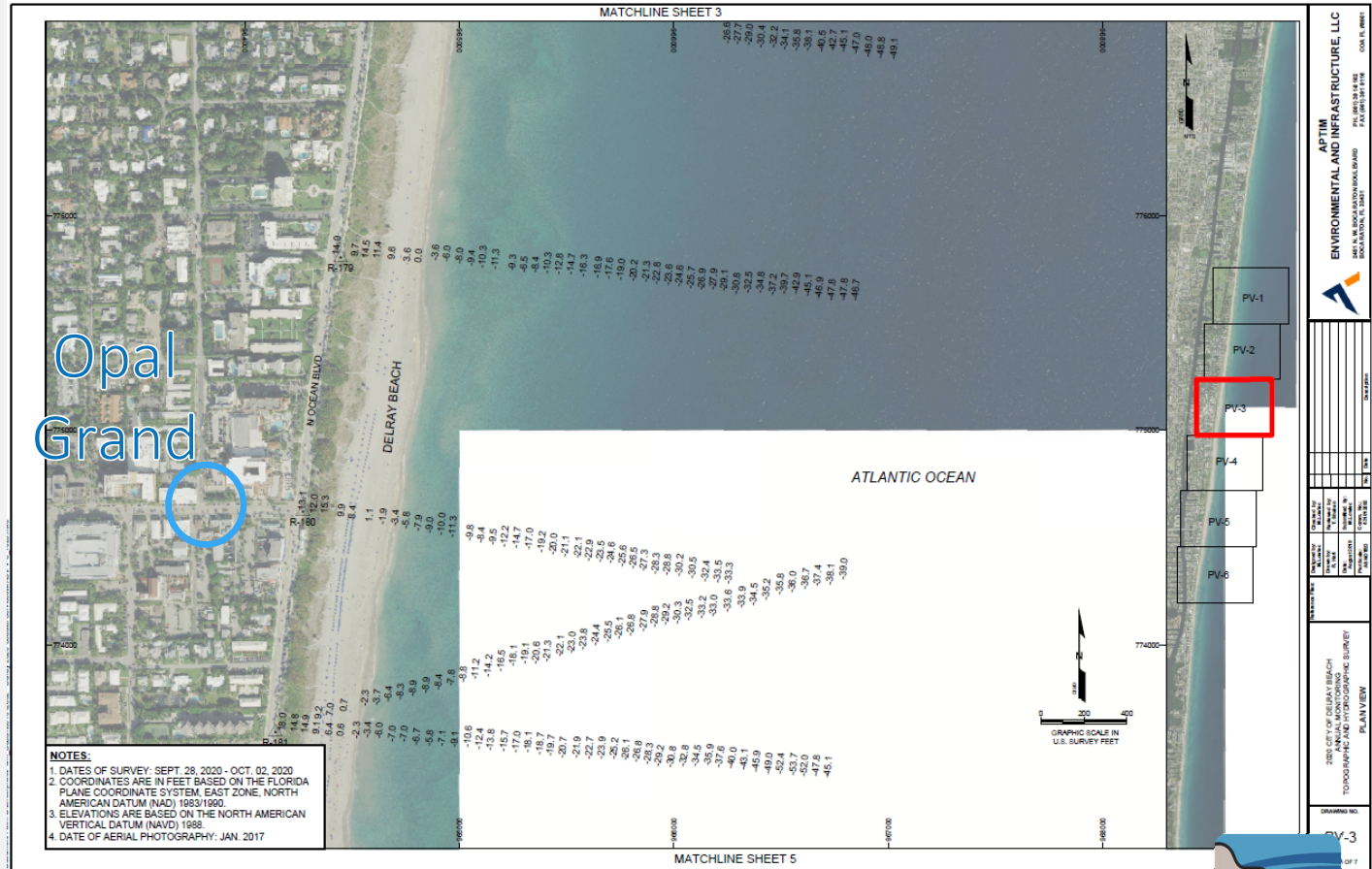


SURVEY DATA

X,Y,Z

Easting, Northing, Elevation

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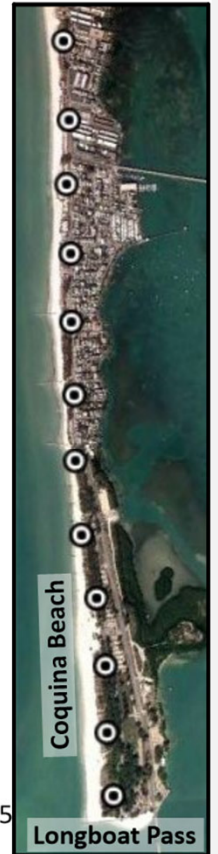
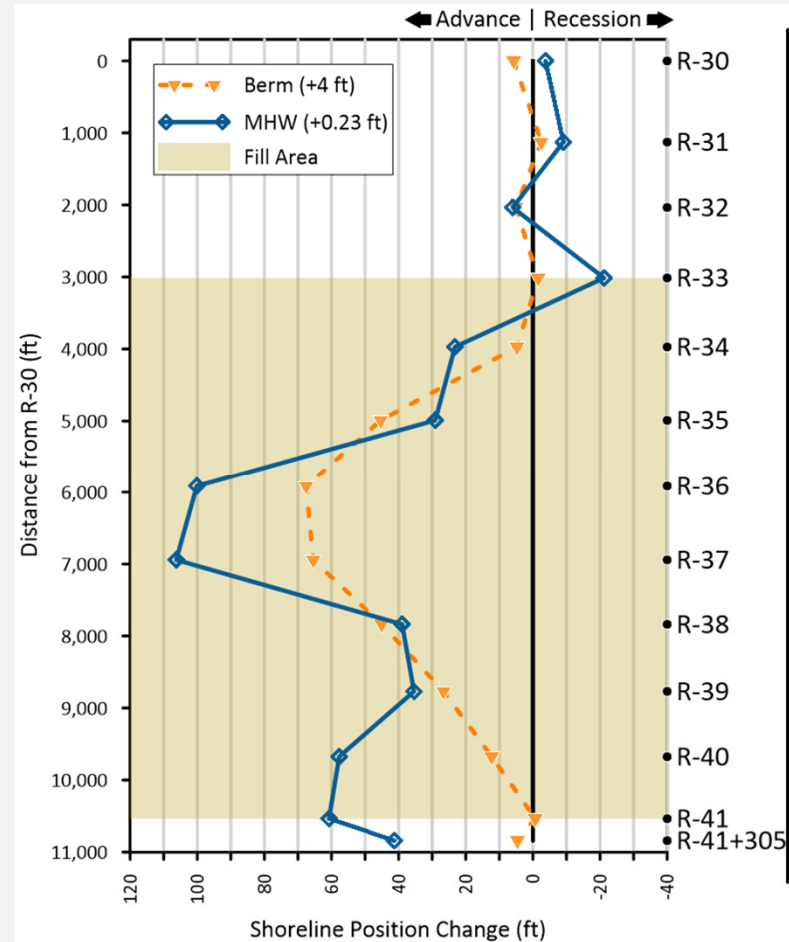
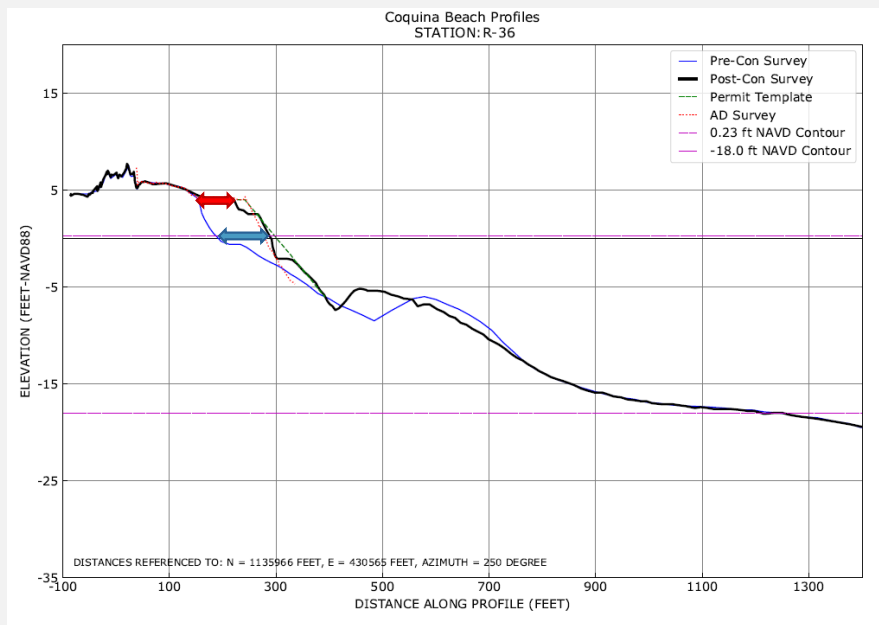
DATA ANALYSIS

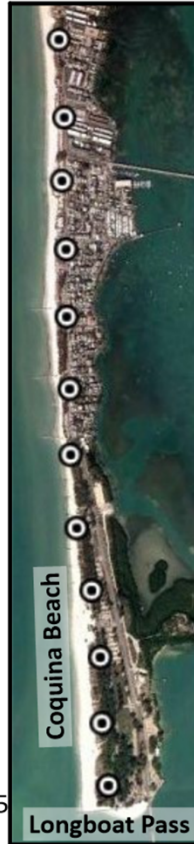
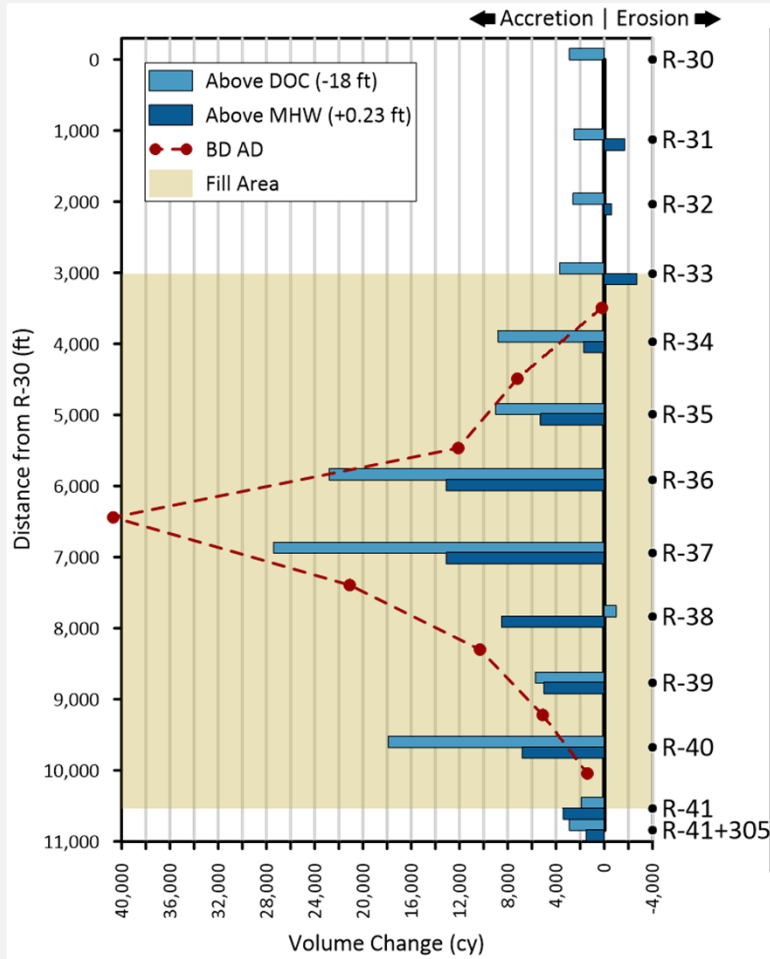
- How beach monitoring data is used
- Examples from Florida and beyond

HOW PHYSICAL MONITORING IS USED

- Informs management decisions with current conditions and trends
- Identify any adverse effects or need to modify the design
- Evaluation of proposed design modifications or enhancements
- Updates to governing boards and commissioners
- Responding to questions from the public and other interested parties
- Planning for the long-term sand needs for beach nourishment
- Ranking projects for the local government funding requests (LGFR)

EXAMPLES FROM AROUND THE STATE – COQUINA BEACH

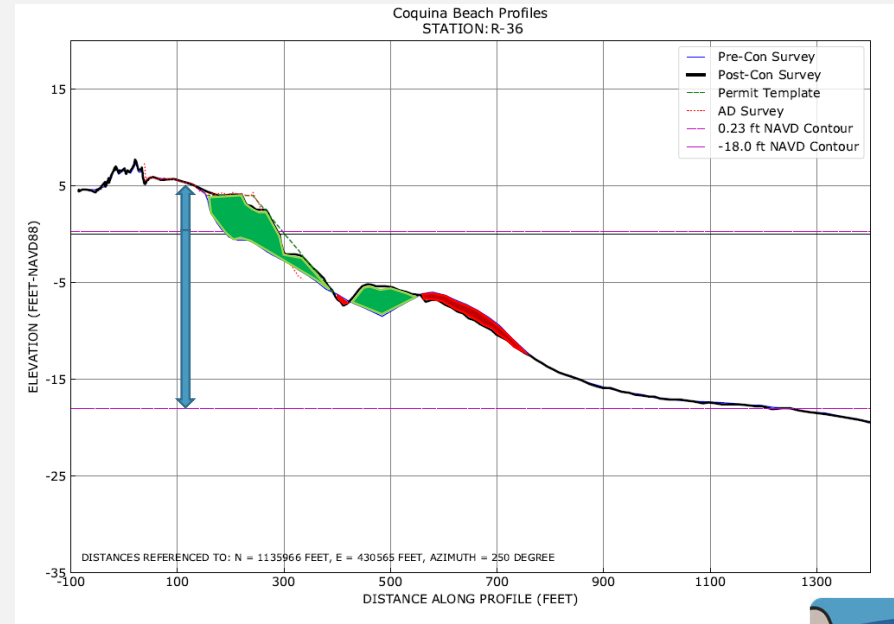




EXAMPLES FROM AROUND THE STATE – COQUINA BEACH

The Basics

- Volume changes



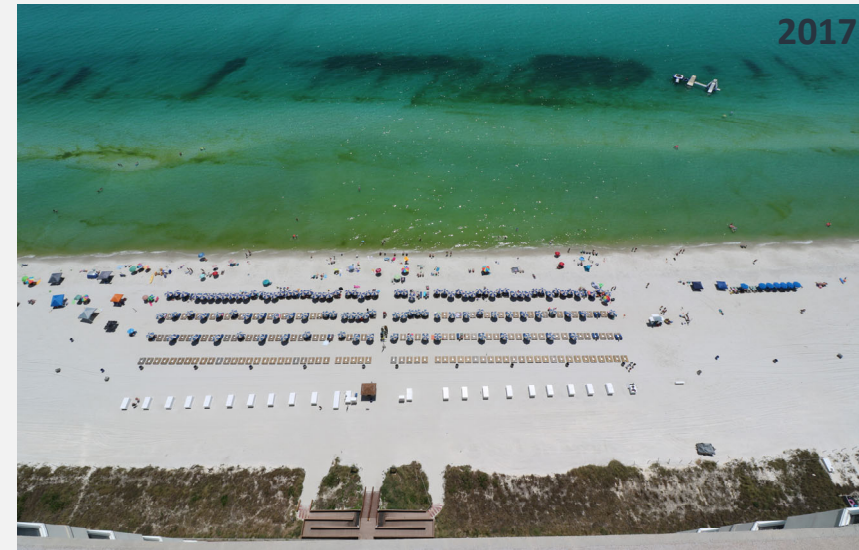
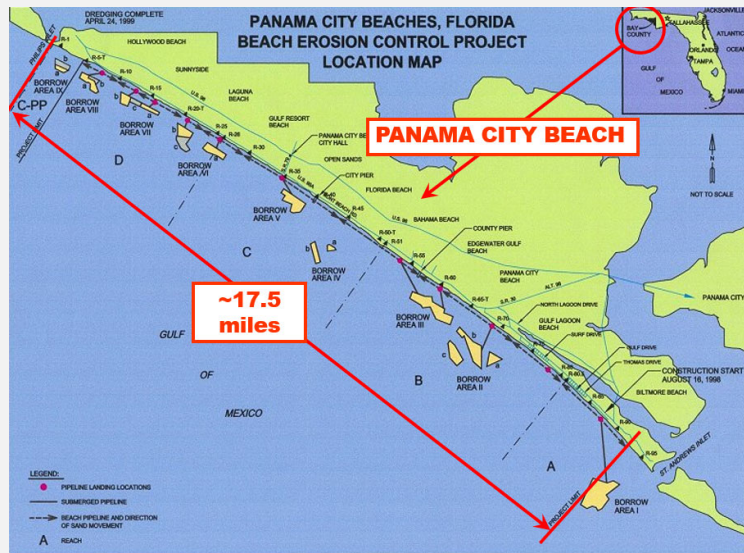
EXAMPLES FROM AROUND THE STATE – COLLIER COUNTY

- The planning and implementation of beach nourishment is guided by the project monitoring
- Reduced overall cost and intensity using a review of annual surveys to guide decision making and prep for the next construction event
- Ongoing management with placement at discreet locations to maintain the design beach width



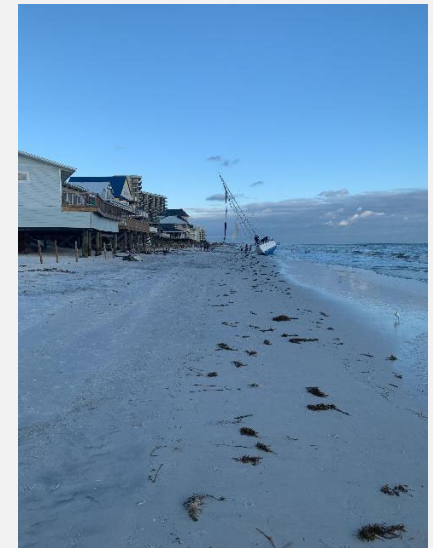
EXAMPLES FROM AROUND THE STATE – PANAMA CITY BEACH

- Initial beach restoration in 1999 and 1st beach nourishment in 2006
- Reduced the fill placement length to 7.5 miles for the 2011 beach nourishment
- Further reduced to 4 miles of construction in 2017 at areas of greatest need

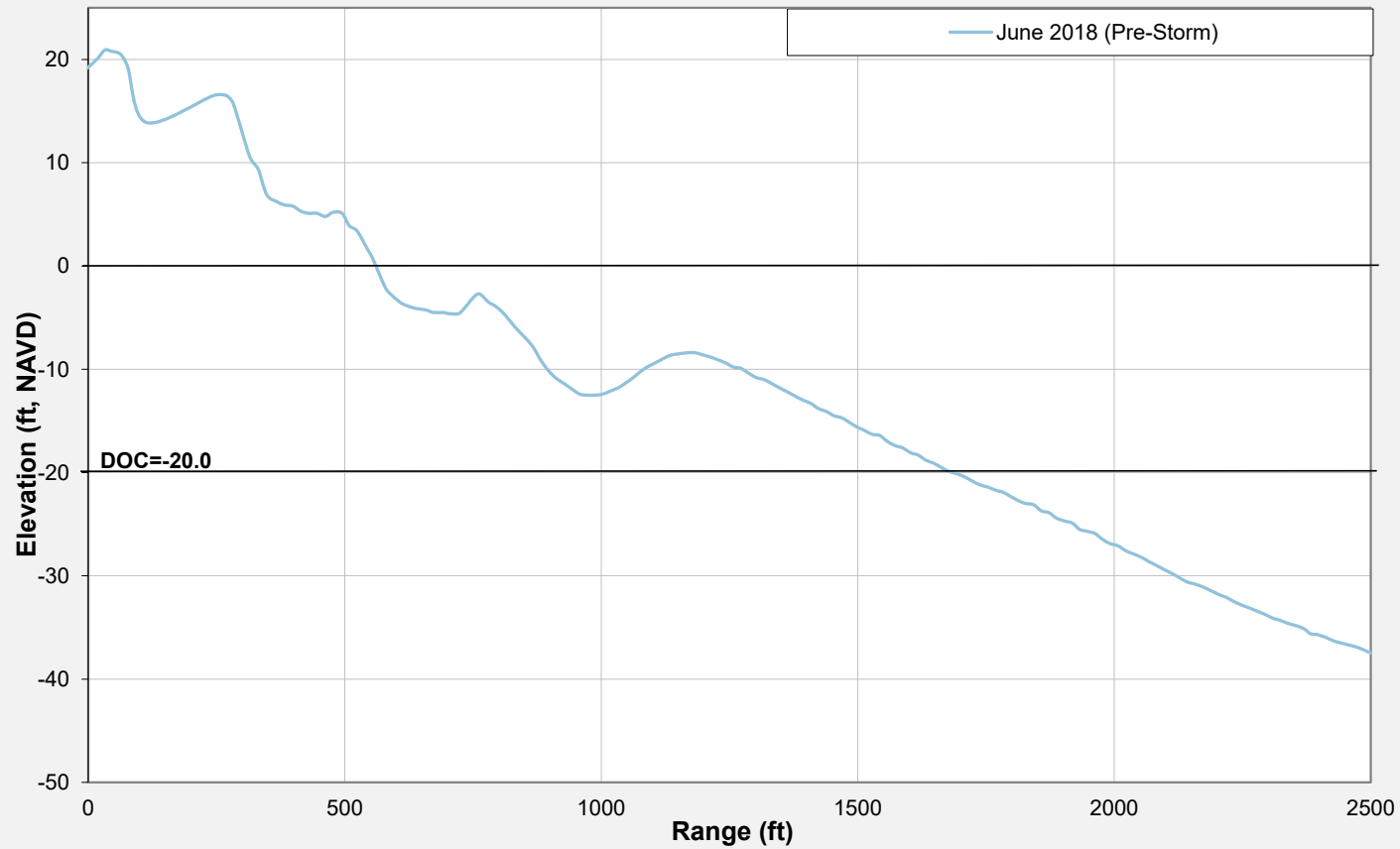


EXAMPLES FROM AROUND THE STATE– PANAMA CITY BEACH

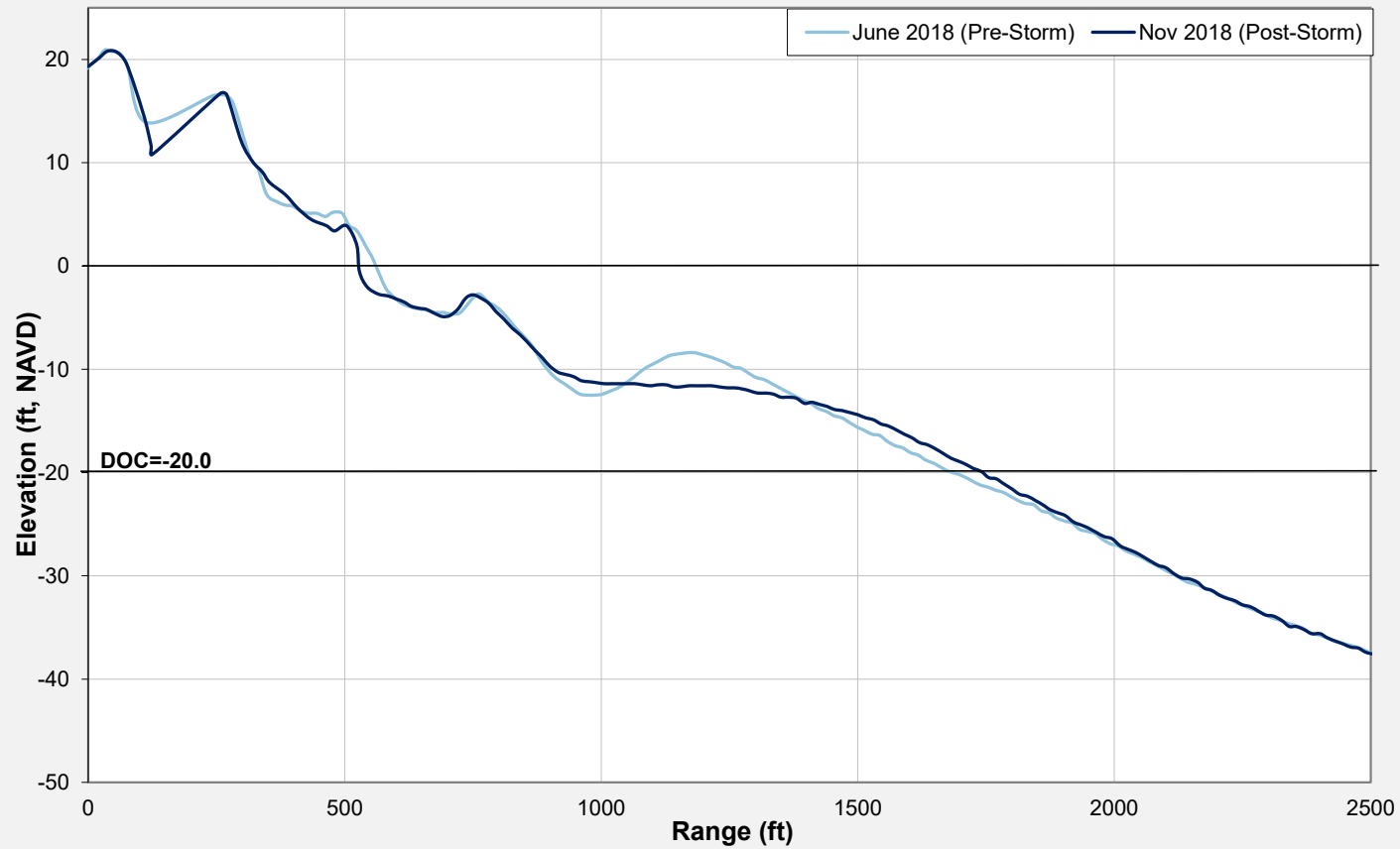
- Monitoring history provided support for rapid post-storm damage assessments
- Major recent storm events: Hurricane Michael (2018) and Hurricane Sally (2020)
- Coastal Storm Risk Management (CSRM) Project starting this week



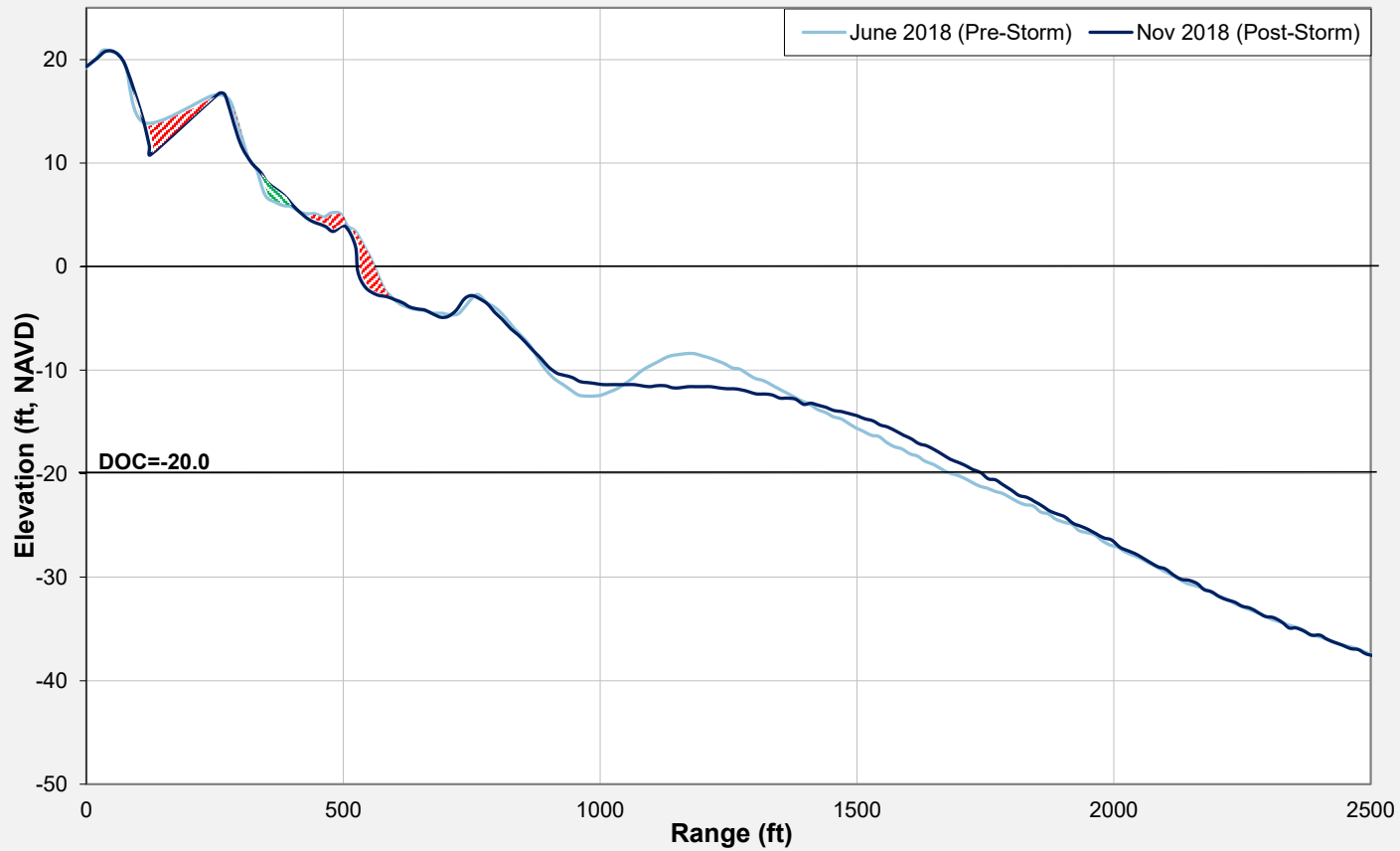
EXAMPLE POST-STORM ANALYSIS



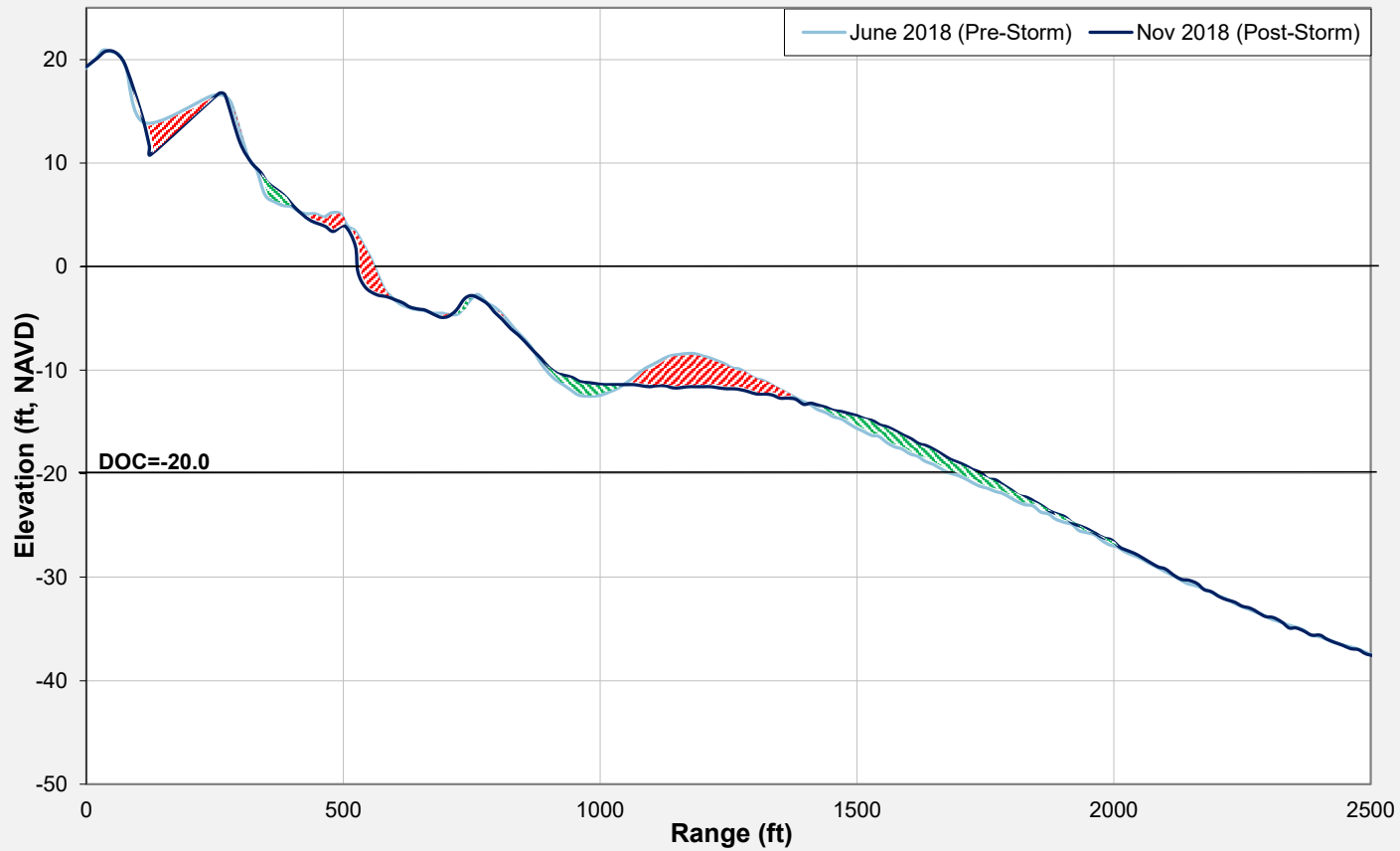
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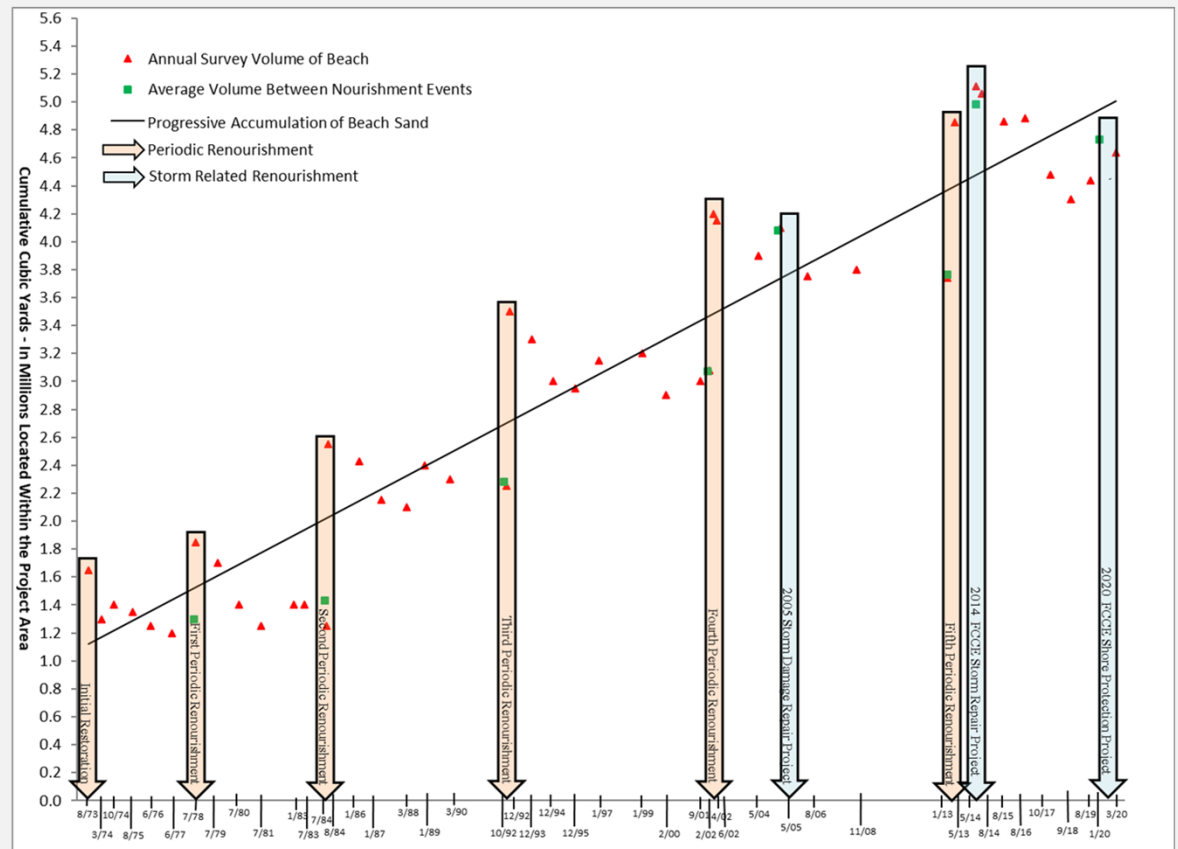


EXAMPLES FROM AROUND THE STATE – DELRAY BEACH

- Initial project in 1973 – 1.6 MCY
- 5 Periodic Renourishments
- 3 Storm Repair Projects
- 8.2 MCY Placed to Date

EXAMPLES FROM AROUND THE STATE – DELRAY BEACH

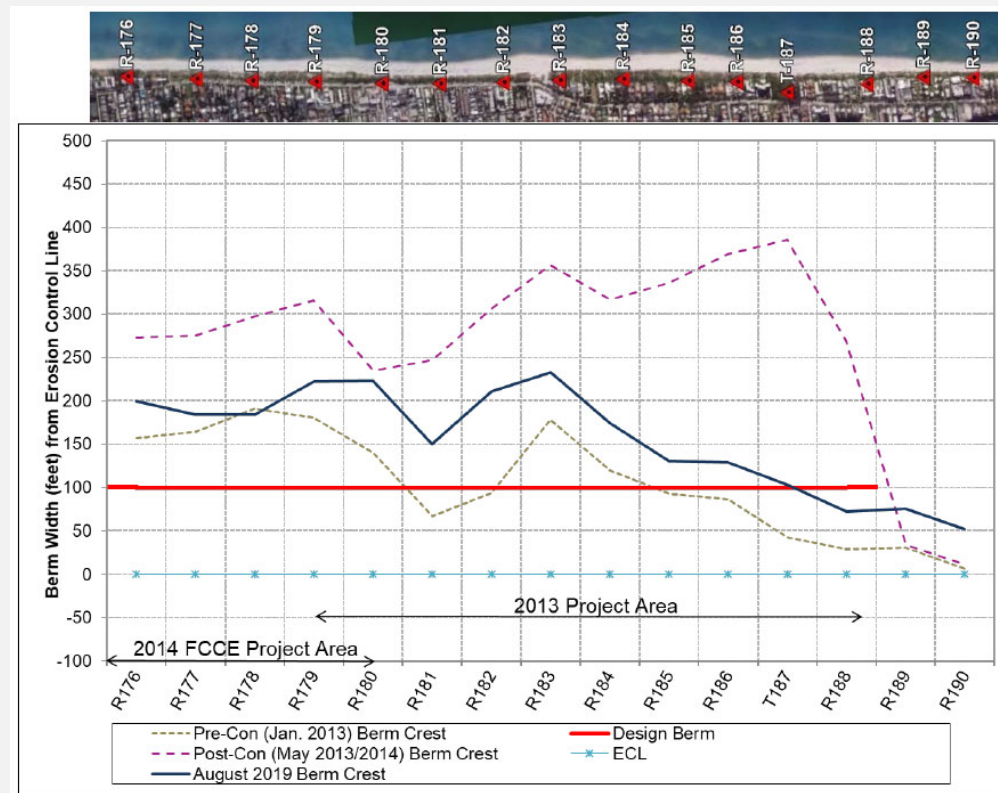
- Cumulative benefits of a managed renourishment program
- Nourishment interval has increased



Source: APTIM, City of Delray Beach 2020 Post-Construction Engineering Monitoring Report

EXAMPLES FROM AROUND THE STATE – DELRAY BEACH

- To aid project planning, the berm width is monitored in relation to the design berm width
- Rate of change monitored at each profile
- Changes were exacerbated by the active 2017 storm season



Source: APTIM, City of Delray Beach 2019 Post-Construction Engineering Monitoring Report

EXAMPLES FROM AROUND THE STATE – DELRAY BEACH

- Full profile surveys pre- and post-storm provided information on how the sand moved
- Significant volume losses were measured underwater in Delray after Hurricane Irma
- Monitoring data guided sand placement extents in the resulting 2020 FCCE project

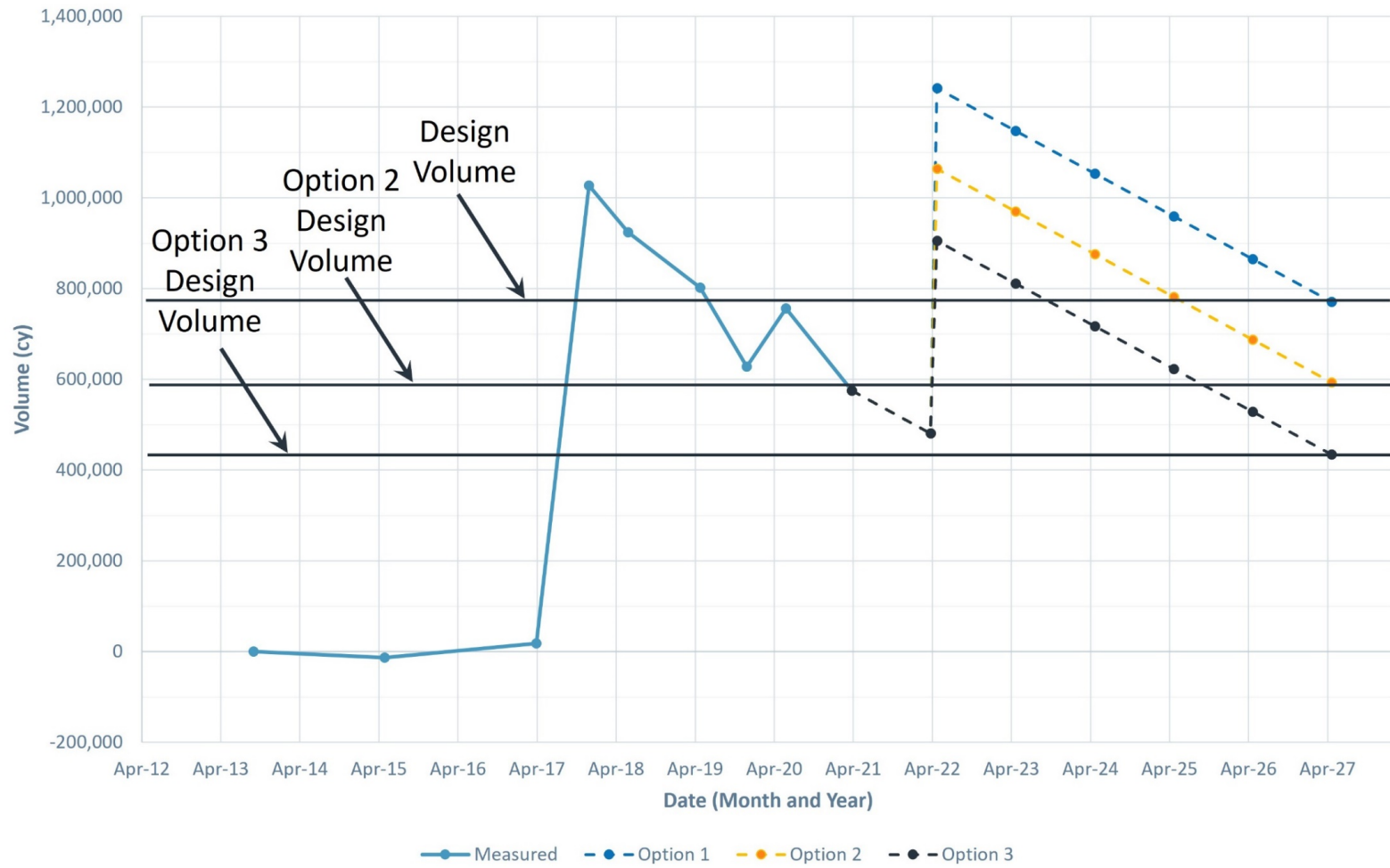




AND BEYOND – TOWN OF DUCK, NC

- First project in 2017
- Monitoring data was used to design the project
- Post-construction monitoring data is being used for planning of the first renourishment project

Town of Duck Cumulative Volume Change



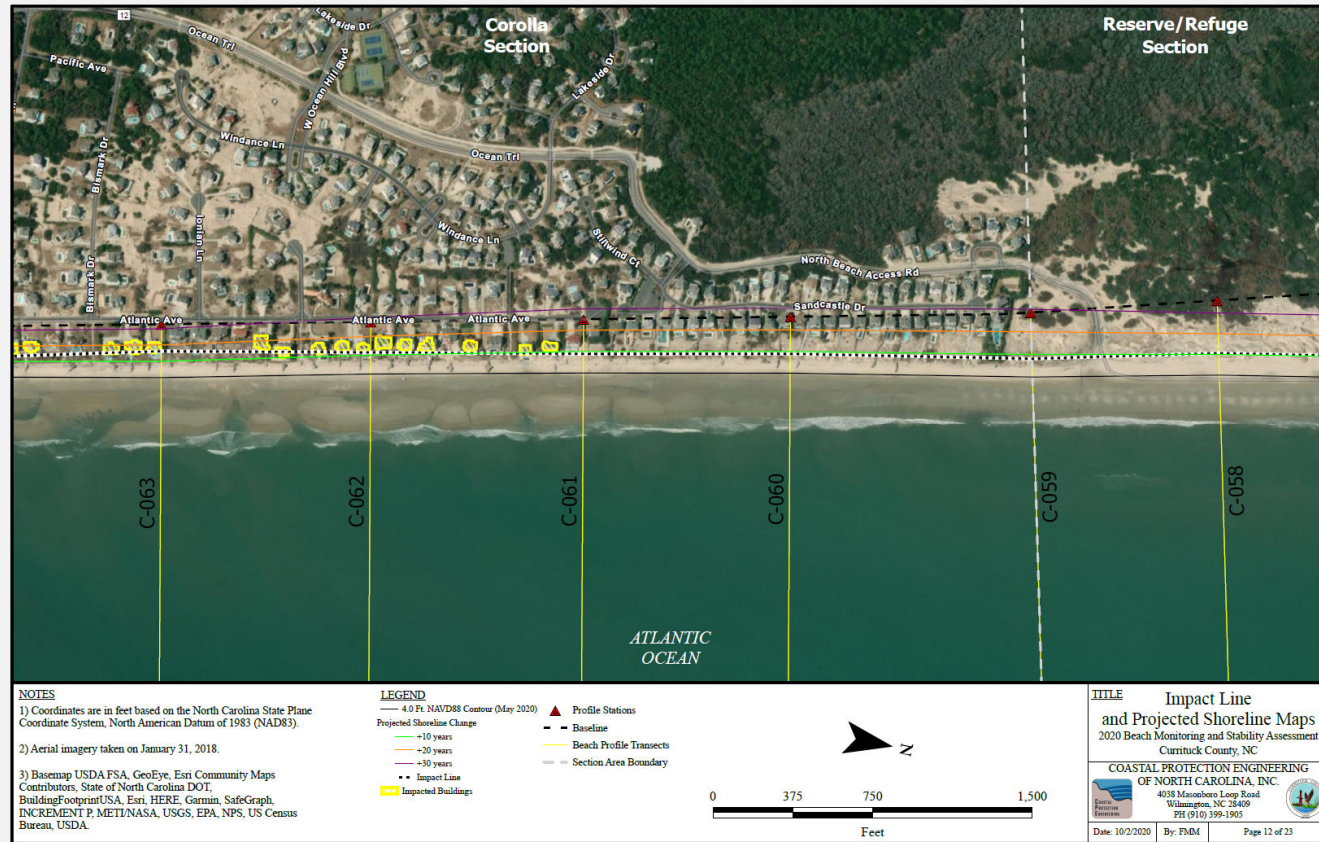
AND BEYOND – CURRITUCK COUNTY, NC

- Brand new countywide monitoring program along 25-miles to determine baseline for coastal management
- 3-yr initial monitoring study
- Mixed uses along the coast
- Change rates and vulnerability



AND BEYOND – CURRITUCK COUNTY, NC

- Used projected shoreline change rates and storm vulnerability model to evaluate relative vulnerability of oceanfront development



BENEFITS OF LONG-TERM MONITORING

- Ability to project performance and support planning
- Guide design refinements
- Potential for cost savings
- Basis for measuring storm impacts
- Support for regional management
- Community education

Questions?



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ENJOY DELRAY!



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