St. Lucie County
South County Beach & Dune Restoration Project - Mitigation Reef

Lessons Learned

2016 FSBPA
National Conference
on
Beach
Preservation
Technology

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February 4, 2016

Overview
South County Beach & Dune Restoration – Mitigation Reef

- South County Beach and Dune Restoration Project
- Mitigation Reef Design and Permitting
- Initial 2013 Construction
- 2015 Construction
- Lessons Learned

Beach Fill – Project Purpose
South County Beach & Dune Restoration – Mitigation Reef

- R-98 to R-115 + 1,000 / Martin County Line

<u>Beach Fill Project Purpose</u>

- Offset historical erosion
- Restore recreational beach
- Provide storm protection to upland properties, and
- Restore coastal habitat

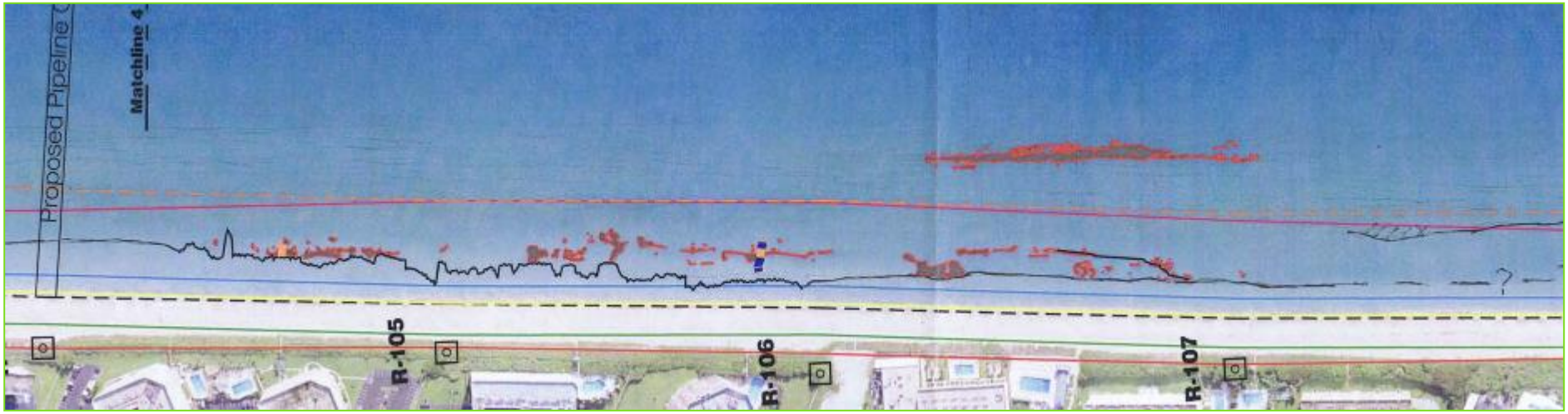
Beach Fill Project
South County Beach & Dune Restoration – Mitigation Reef

- Constructed

March to May 2013

- 635,164 cubic yards placed over 3.3 miles of shoreline

Required Mitigation
South County Beach & Dune Restoration – Mitigation Reef



Required Mitigation

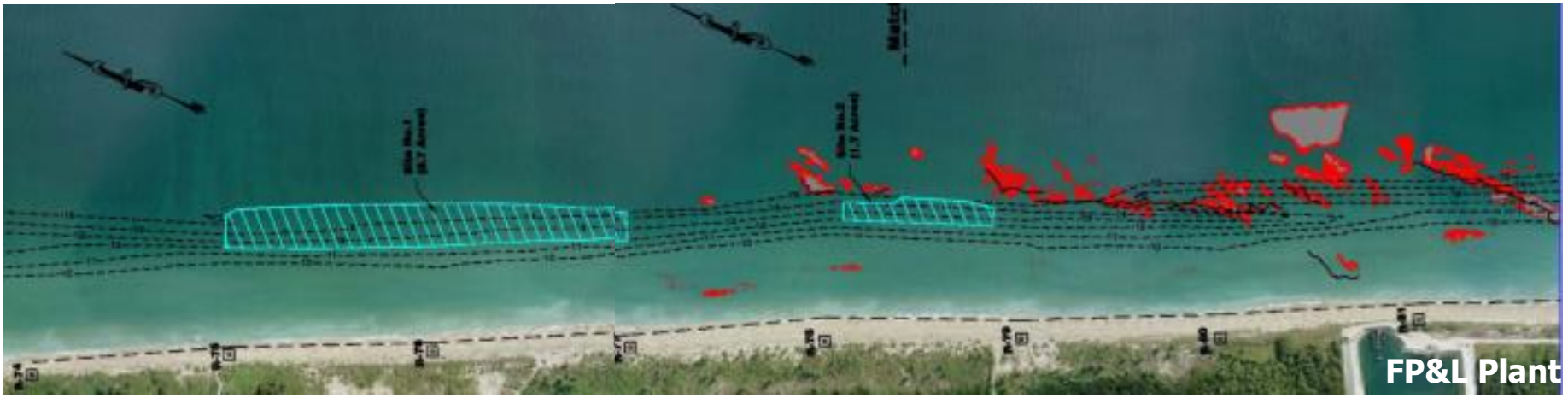
- To offset burial of hardbottom and pipeline corridor impacts from beach fill
- Hardbottom Mapped in 2010 – via Diver-verified aerial photography
  0.97 acres expected to be buried by beach fill
- FDEP UMAM analysis » 1.34 acres of mitigation reef required
- USACE/NOAA differing UMAM analysis » 1.89 acres of mitigation reef required

Reference: "Hardbottom Impacts: Bridging the Gap Between Science and Regulatory, A Case Study: South St. Lucie County Beach Restoration Project" by Kimberly Colstad and Lois Edwards – FSBPA Tech 2013

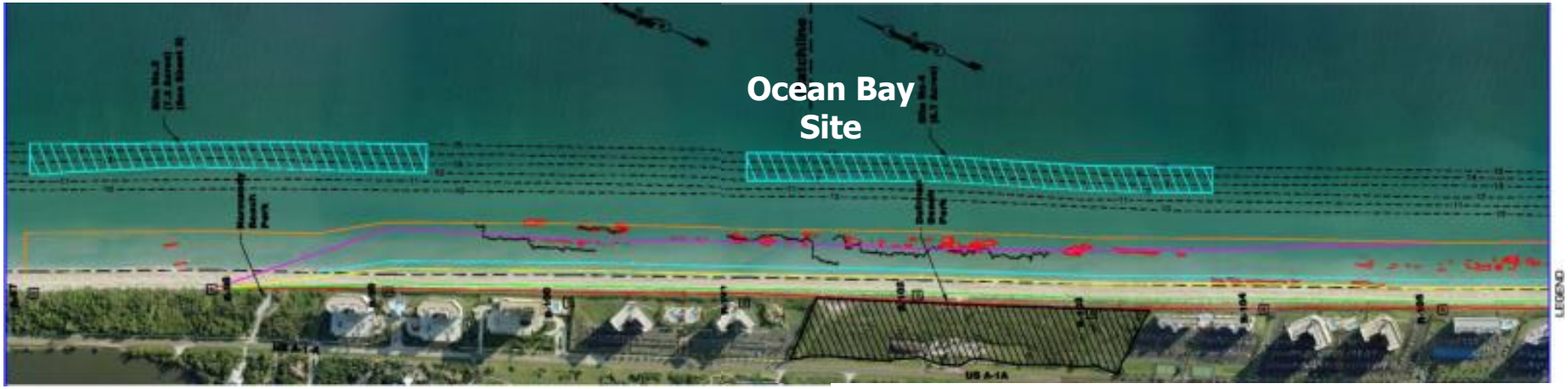
Targeted Site Criteria
South County Beach & Dune Restoration – Mitigation Reef

- ≥ 15 meter (~ 50 ft) buffer between surrounding hardbottom
- Thin veneer of sand (≤ 2 ft) over rock substrate
  - for minimal settlement
- Within ¼ mile of County parks to facilitate public recreational use
- No historic resources
- ≈ Near hardbottom impacts
  - to facilitate recruitment from impacted areas
- Water Depths at 10 to 16 feet
  - FDEP criteria

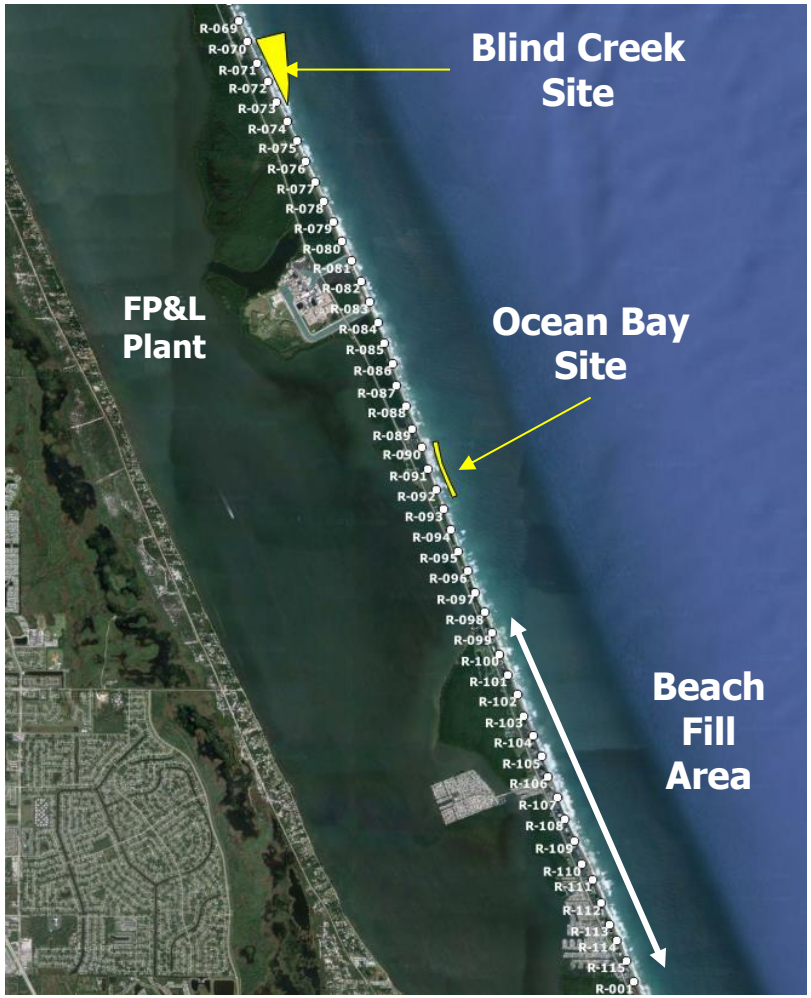
Investigated Sites
South County Beach & Dune Restoration – Mitigation Reef



- 2011 surveys and jet probes
  - Only portion of Ocean Bay Site met all targeted FDEP site criteria
- NMFS later required more mitigation and water depths at 4 meters (13.1 ft)
  - Ocean Bay Site has insufficient area to meet all requirements

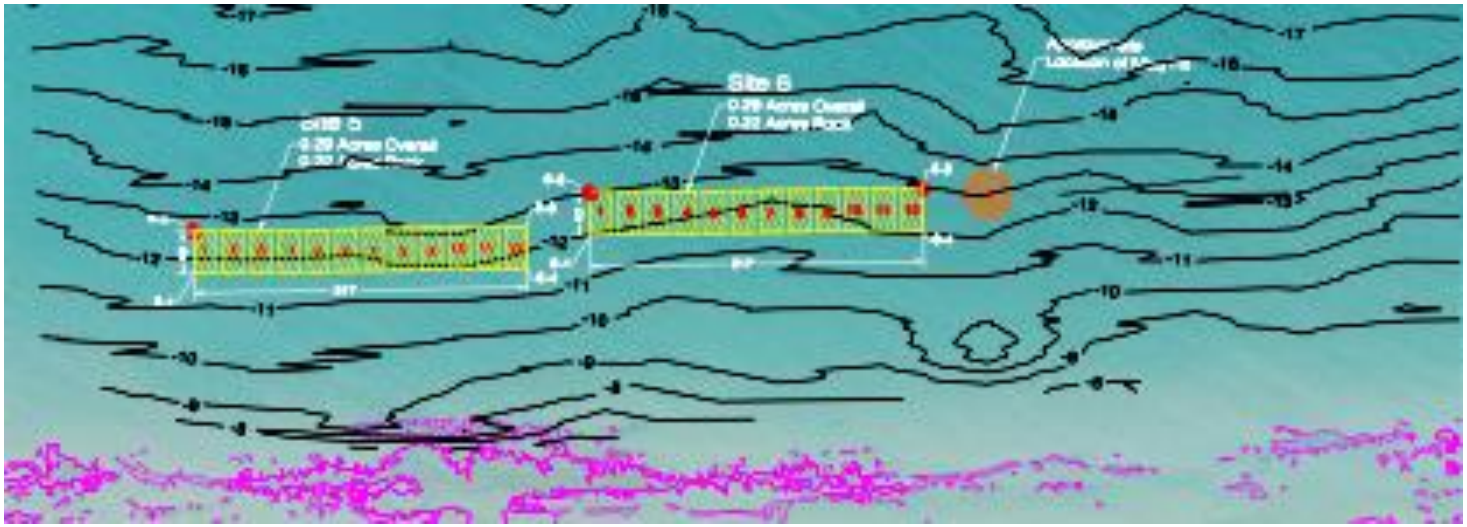


Initial Proposed Mitigation Reef Sites
South County Beach & Dune Restoration – Mitigation Reef



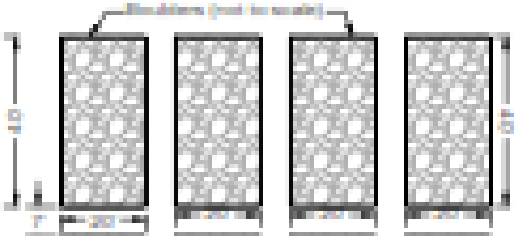
- Blind Creek site added (R-70 to R-73)
  - previously investigated by County for artificial reef program » < 2 feet veneer
  - CTC-G.E.C. determined sand depth > 5 feet
- Geo-textile fabric
  - proposed to deter settlement

Initial Proposed Construction - Cells
South County Beach & Dune Restoration – Mitigation Reef



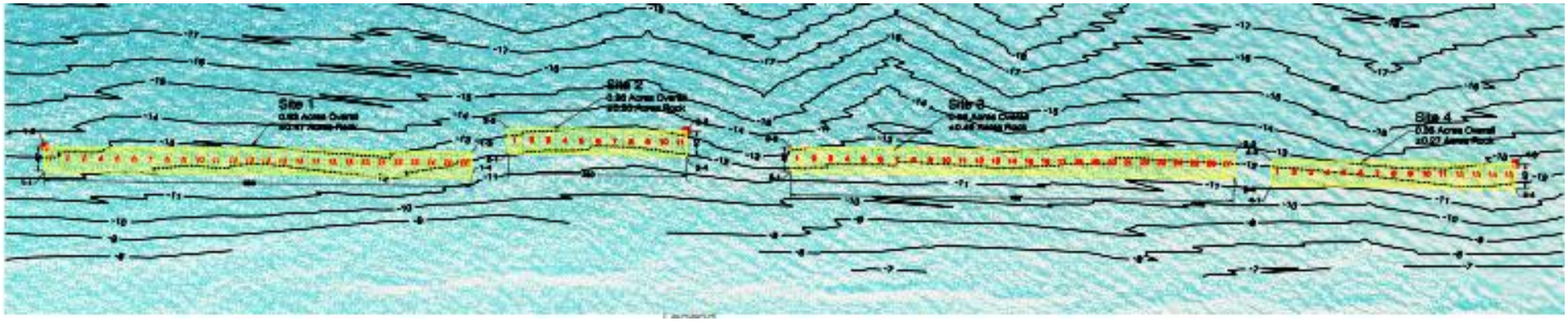
Ocean Bay – 24 cells

Typical Plan View
Mitigation Reef Layout



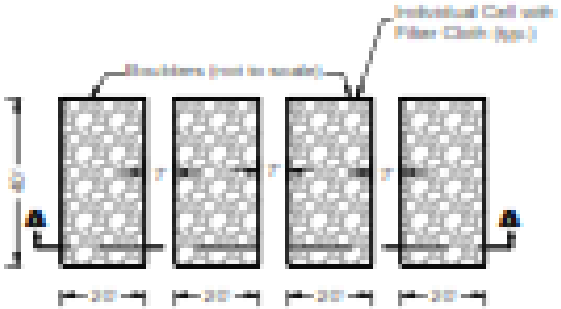
Typical Section A-A
Mitigation Reef Layout

Initial Proposed Construction - Cells
South County Beach & Dune Restoration – Mitigation Reef



Blind Creek – 79 Cells

Typical Plan View
Mitigation Reef Layout



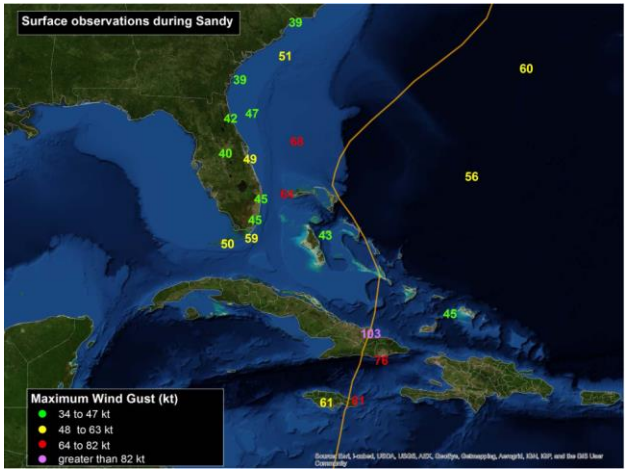
Typical Section A-A
Mitigation Reef Layout

Initial 2013 Construction
South County Beach & Dune Restoration – Mitigation Reef

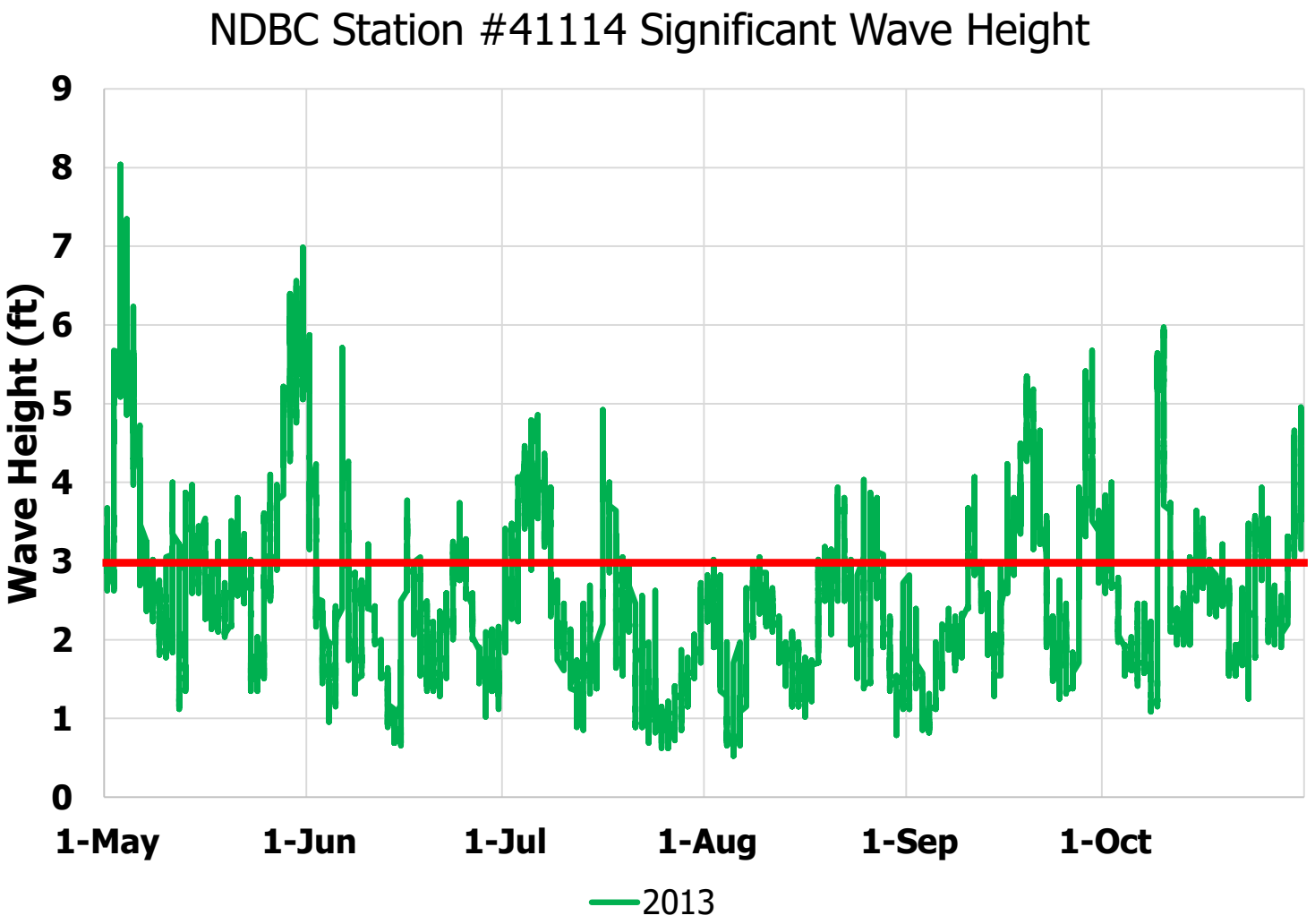
- September 19, 2012 - bids received
- October 2012 – Hurricane Sandy passes
- January 8, 2013 - NTP issued
- May 8, 2013 - Contractor delivered 1st load of rock to the Staging Area
- June 10, 2013 - 1st attempt to place rock

Changed Field Conditions
South County Beach & Dune Restoration – Mitigation Reef

- October 5, 2012 survey depicted on construction plans
- Sand deposition ≈ 2 feet
  - Attributed to Hurricane Sandy – changed water depths
- Filter cloth for all reef cells

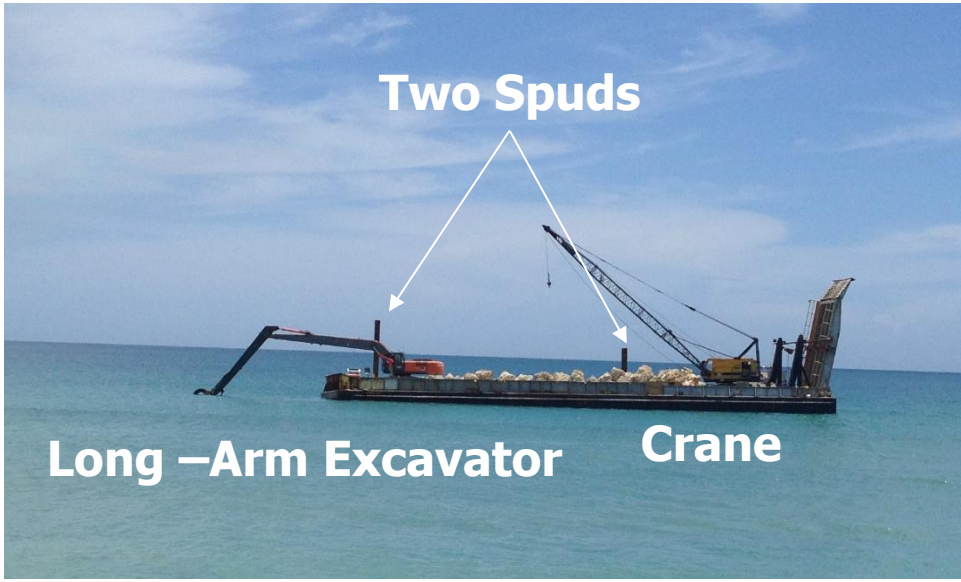


Weather Delays – Sea Conditions
South County Beach & Dune Restoration – Mitigation Reef



Initial 2013 Construction Methods
South County Beach & Dune Restoration – Mitigation Reef

- Each Day:
  - Load rocks onto the barge at staging area and transport to reef
  - Locate next to target cell, lower welded frame w/ filter cloth into place w/ RTK guided crane
  - Rocks placed with long-arm excavator
    - Initially RTK on excavator used
    - Eventually diver assisted to position rocks
  - Completed ~ 0.35 acres over ~ 5 months



Barge and Tug

Initial 2013 Construction Deficiencies
South County Beach & Dune Restoration – Mitigation Reef

Deficiencies

- Excessive spacing between rocks
  - Specs Required
    1 ft ≤ spacing ≤ 2 ft
- Filter cloth without rock
- Rocks not on filter cloth
- No remedy
- Insufficient Progress

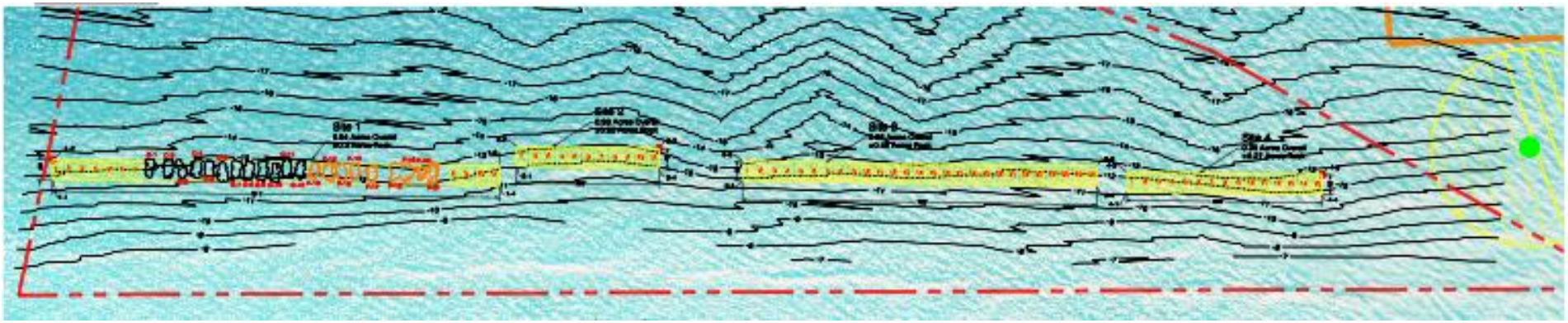
Initial 2013 Construction - Termination
South County Beach & Dune Restoration – Mitigation Reef

- May 2014: St. Lucie County and the Contractor mutually agreed "that the Contract for construction of the Project shall be terminated for convenience".
- Provisions for the County to keep and use the ~3,800 tons of rock and 61 pieces of filter cloth left at the staging area

2015 Construction Timeline
South County Beach & Dune Restoration – Mitigation Reef

- May 20, 2014 – termination of original contractor
- August 2014 – County pre-qualifies contractors
- February 18, 2015 – Sole bid received
- June 1, 2015 – NTP issued
- June 4, 2015 - 1st rock placed / cell constructed
- July 18, 2015 – All cells completed

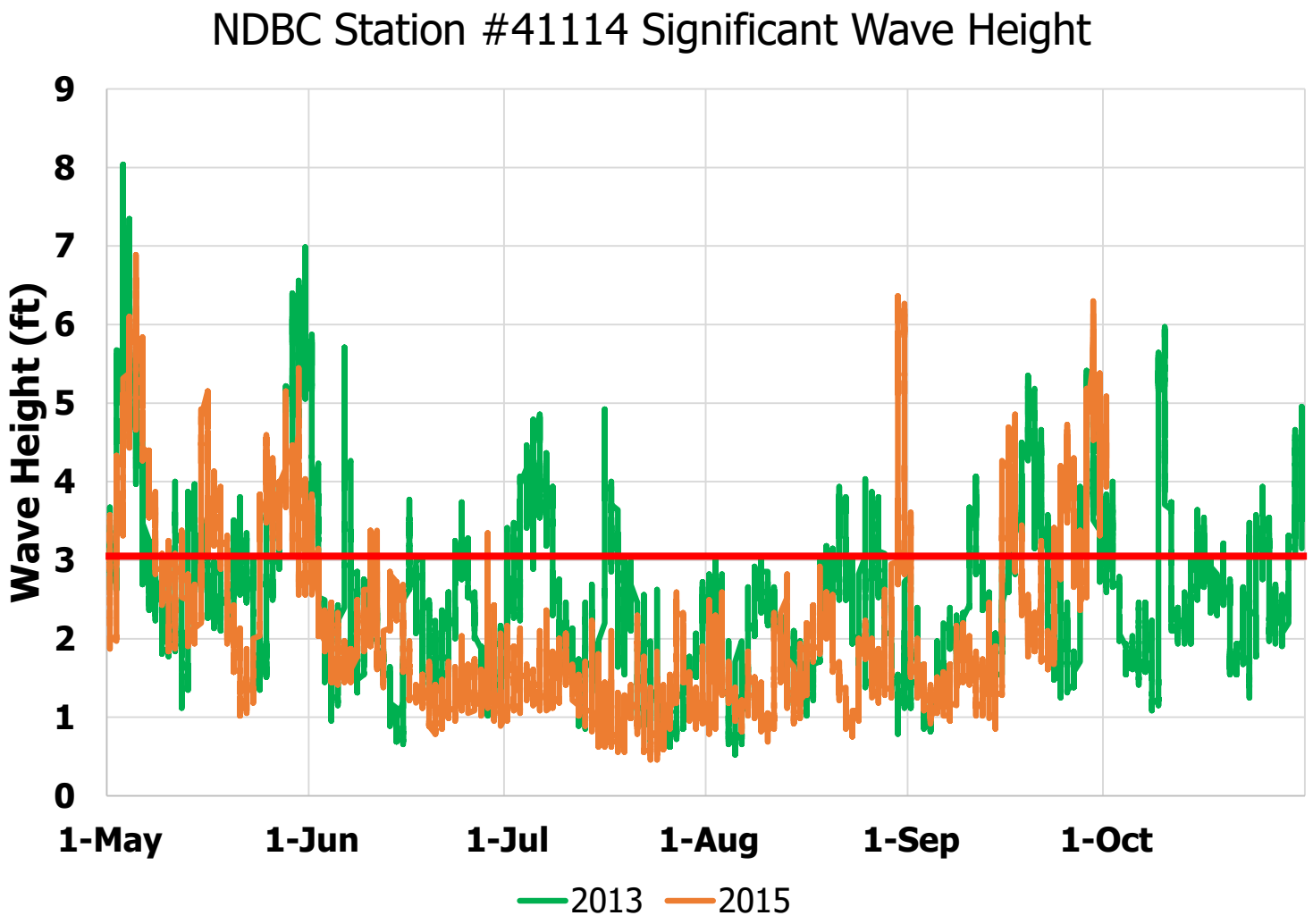
2015 Construction Plans
South County Beach & Dune Restoration – Mitigation Reef



Blind Creek – 64 cells

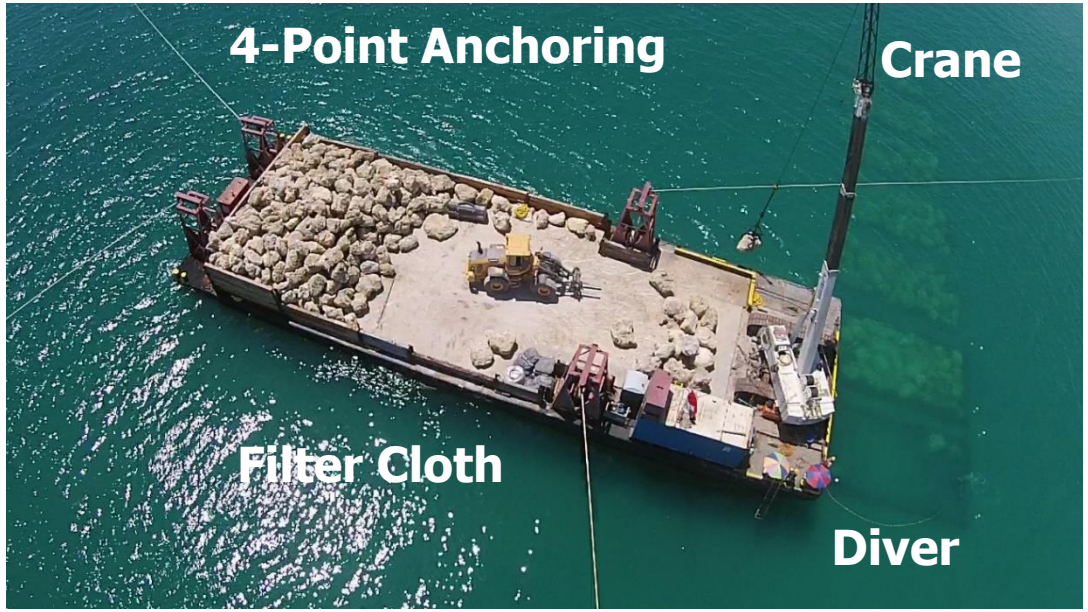
Ocean Bay - 20 cells

2015 Construction – Sea Conditions
South County Beach & Dune Restoration – Mitigation Reef



2015 Construction Methods
South County Beach & Dune Restoration – Mitigation Reef

- Every 3 – 4 days:
  - Load barge with approximately 500 tons of rock
- Each Day:
  - Transport divers/crew to reef site to meet barge
  - Locate target cell with RTK and place frame and filter cloth
  - Place rocks in water with crane – diver assisted
  - Remove frame and relocate barge



2015 Construction – Challenges
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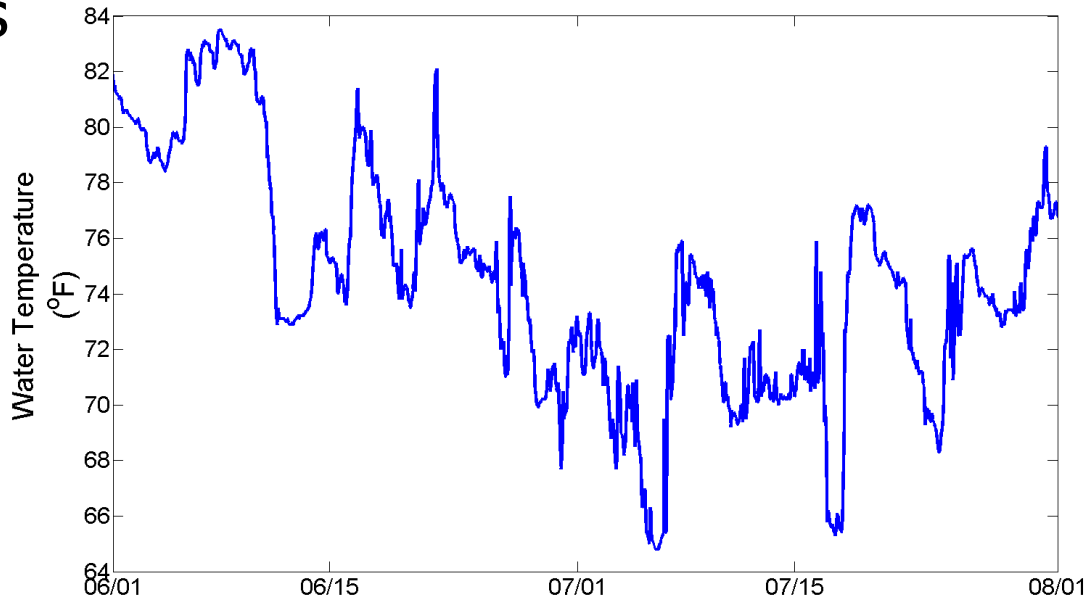
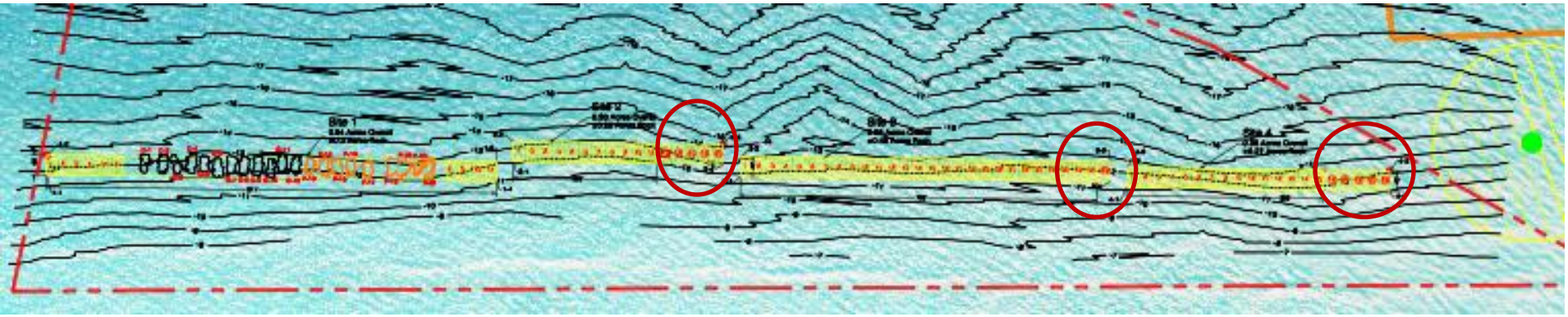
- Changes to site conditions
- Relocation of cells
- Snakes and scorpions
- Cold water upwelling!
- All minor issues
  - Minimal delays

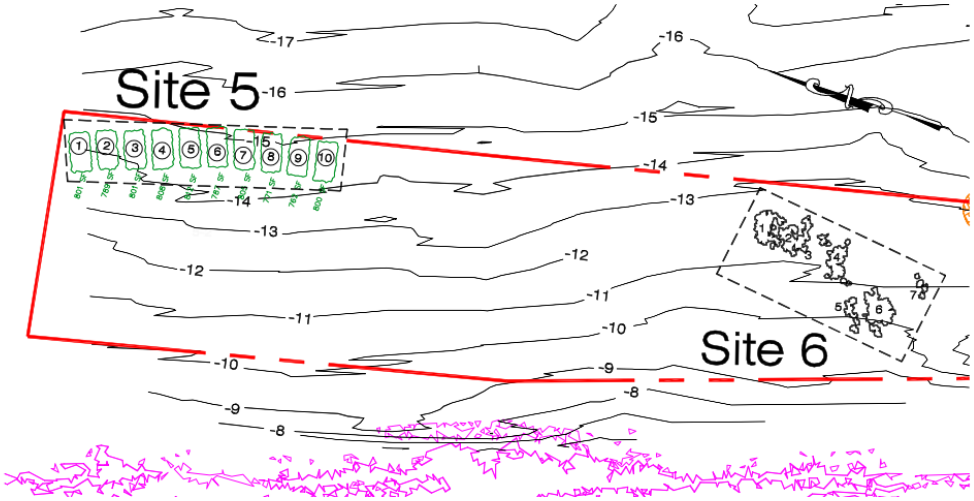


Courtesy of CheckTheWaves
Jensen Beach, Martin County

2015 Construction - Field Revisions
South County Beach & Dune Restoration – Mitigation Reef

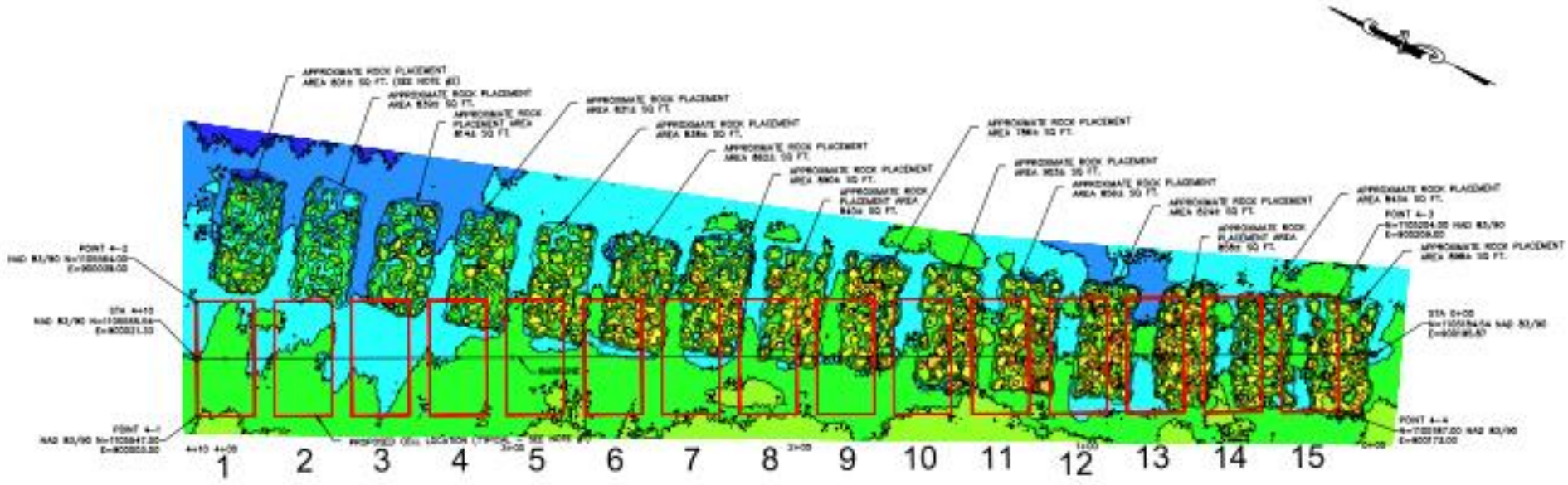
Blind Creek – 74 cells





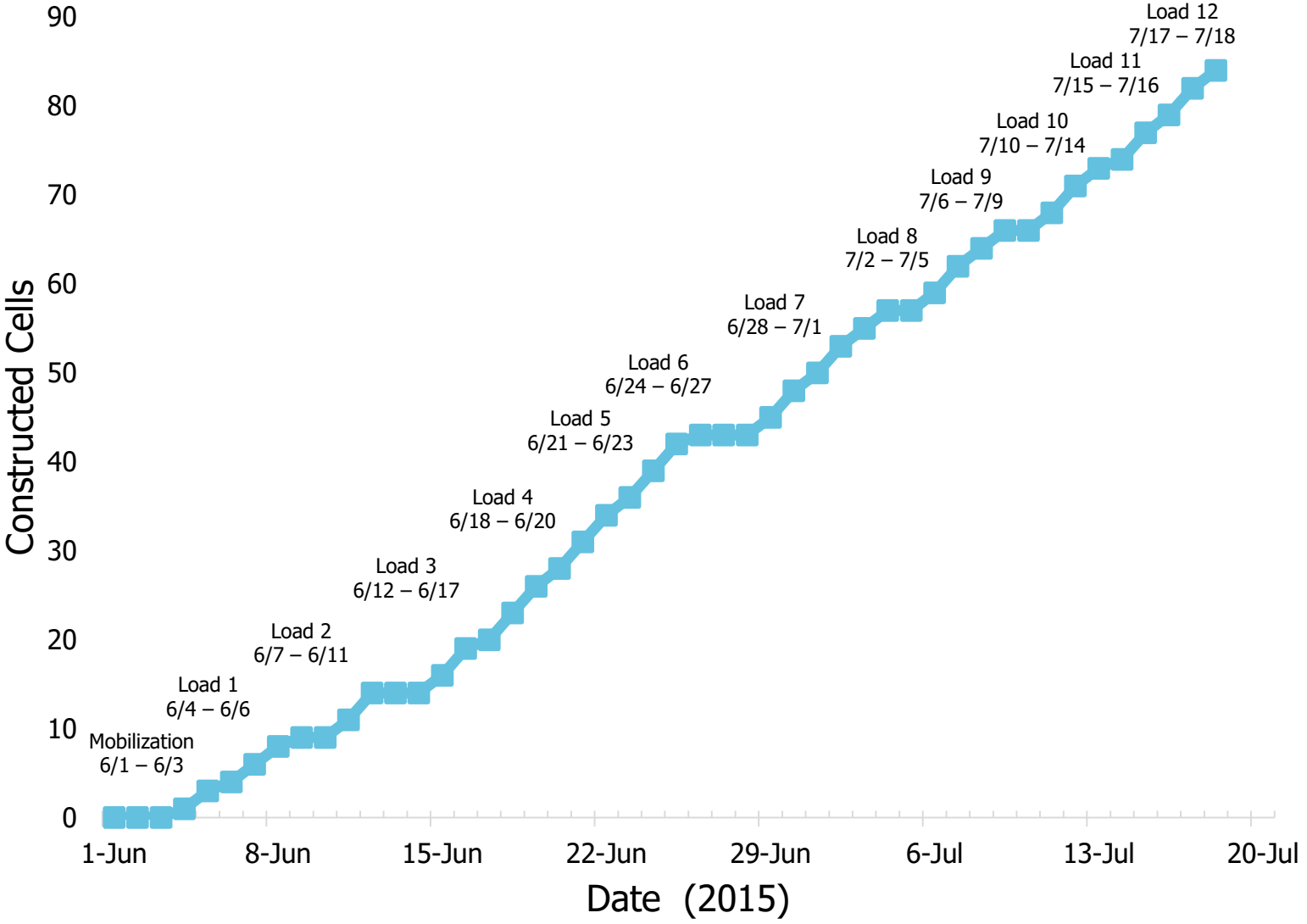
Ocean Bay – 10 cells

2015 Construction - Field Revisions
South County Beach & Dune Restoration – Mitigation Reef

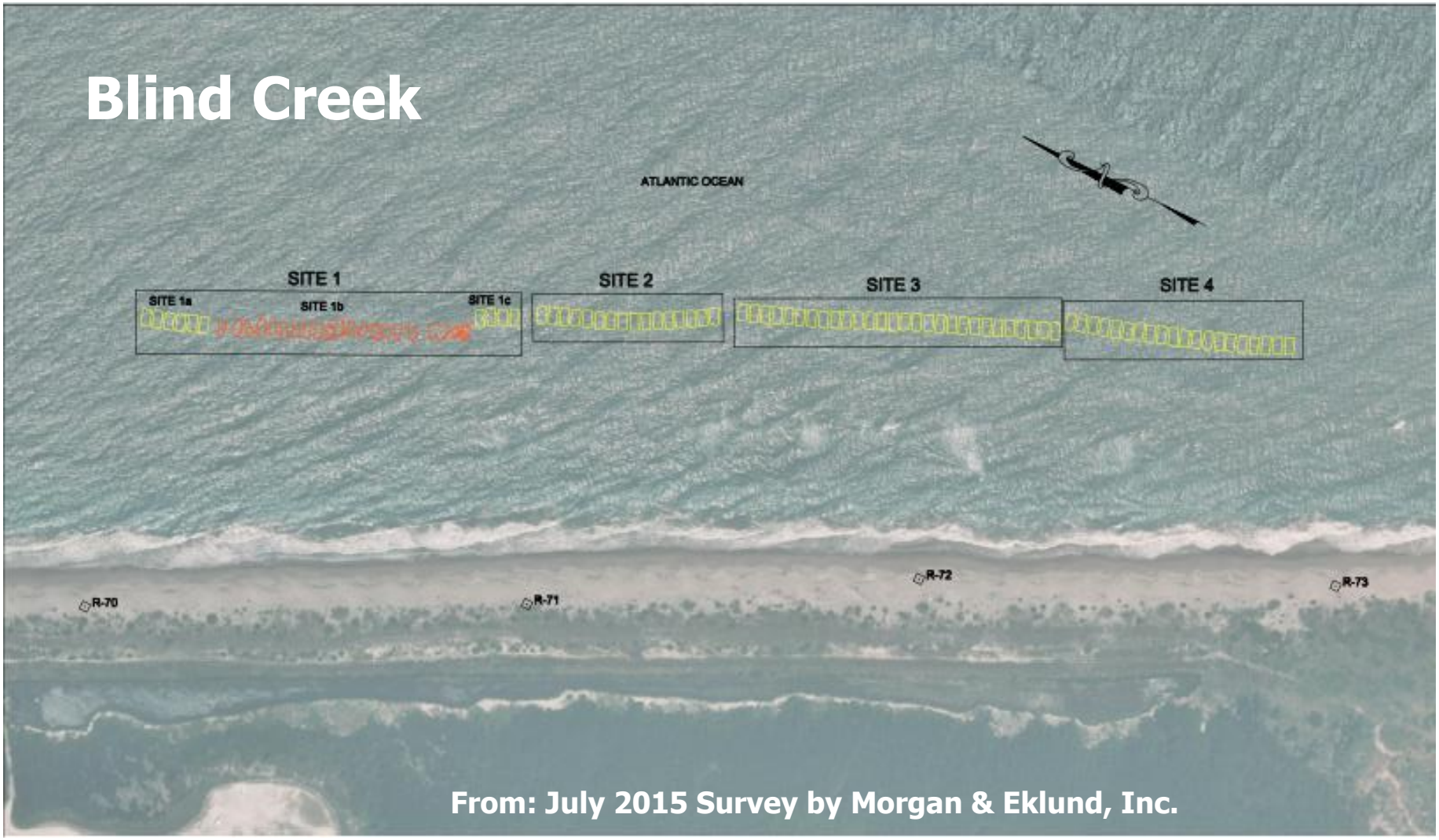


ELEVATION TABLE – NAVD 88			
Number	Minimum Elevation	Maximum Elevation	Color
1	-16.000	-15.000	
2	-15.000	-14.000	
3	-14.000	-13.000	
4	-13.000	-12.000	
5	-12.000	-11.000	
6	-11.000	-10.000	
7	-10.000	-9.000	
8	-9.000	-8.000	
9	-8.000	-7.000	
10	-7.000	-6.000	

2015 Construction - Completion
South County Beach & Dune Restoration – Mitigation Reef

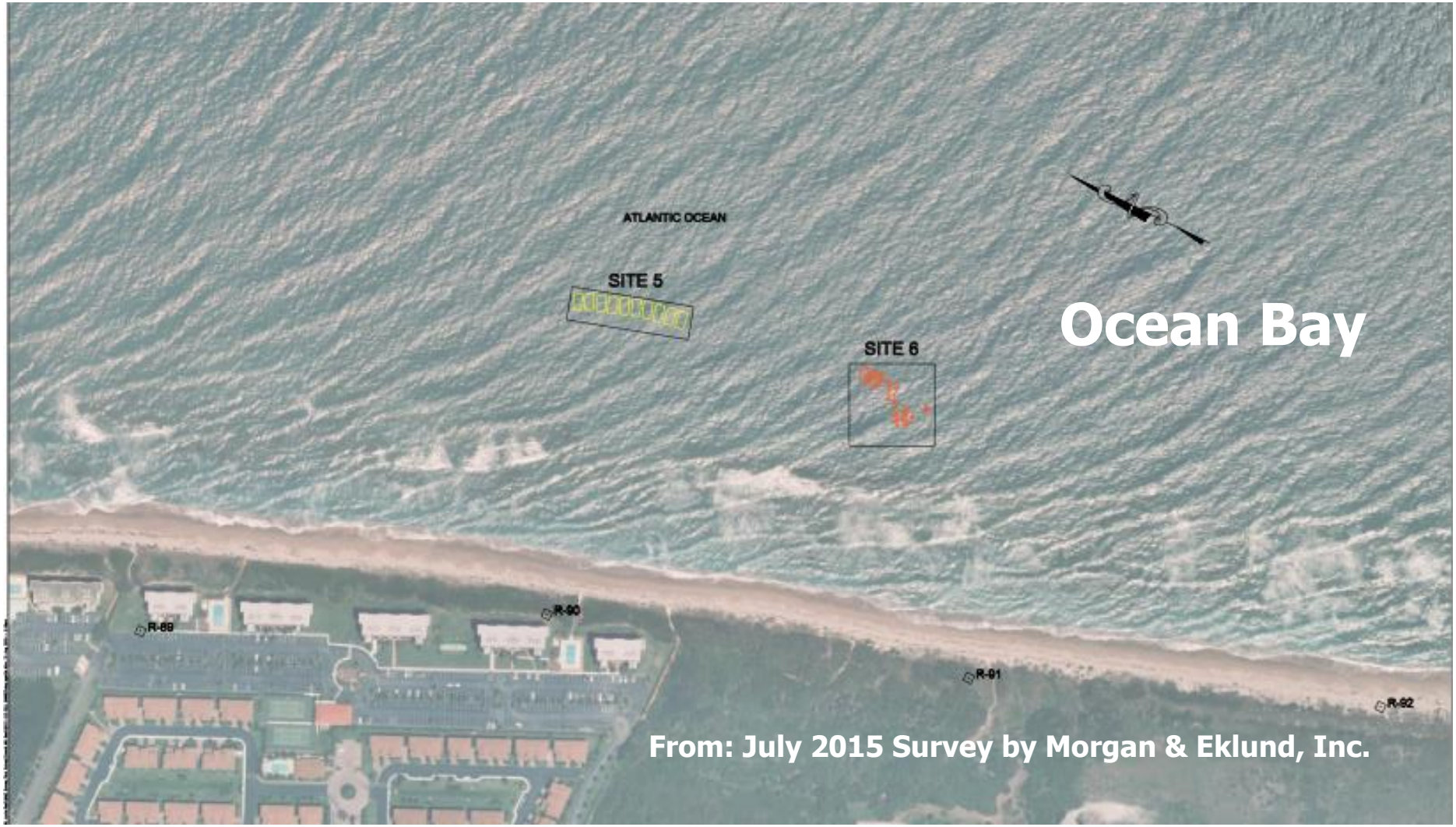


2015 Construction - Completion
South County Beach & Dune Restoration – Mitigation Reef

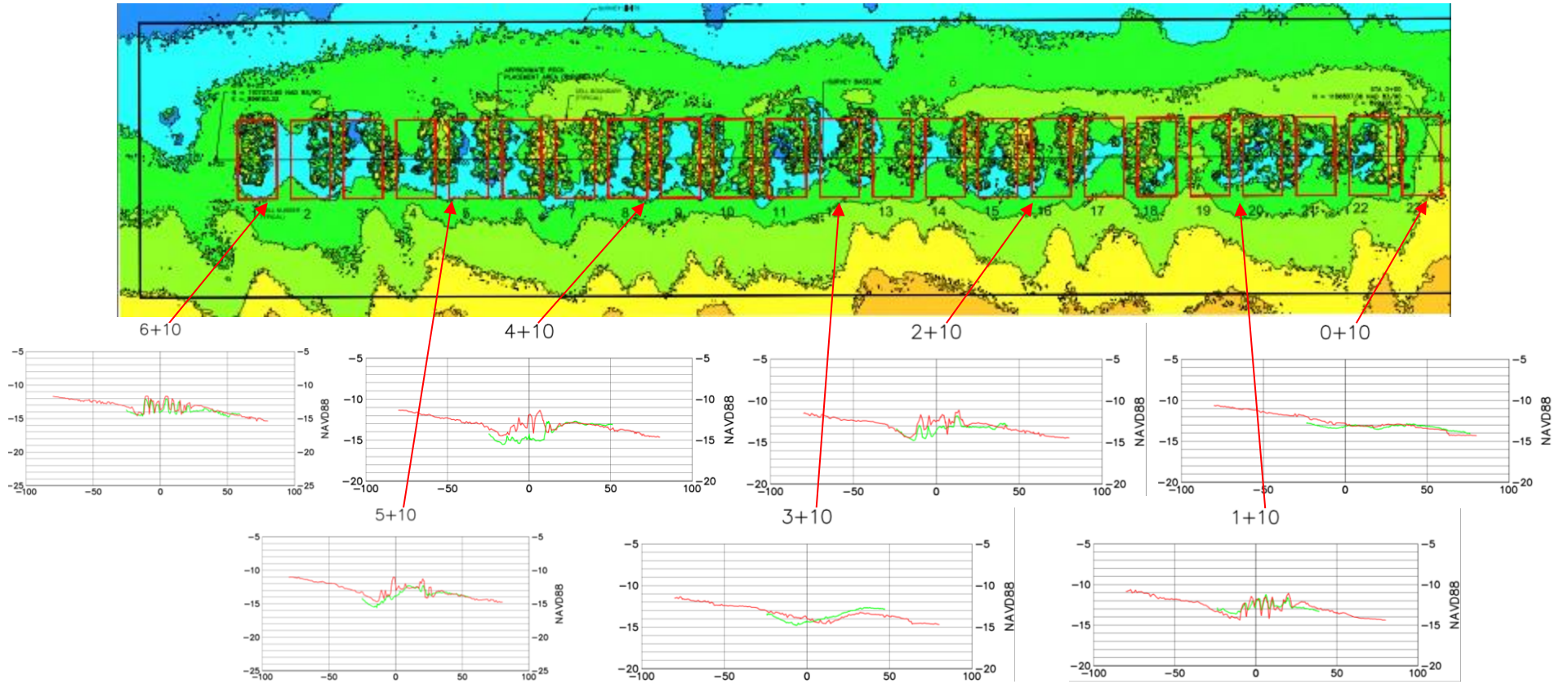


From: July 2015 Survey by Morgan & Eklund, Inc.

2015 Construction - Completion
South County Beach & Dune Restoration – Mitigation Reef



2015 Construction – Filter Cloth
South County Beach & Dune Restoration – Mitigation Reef



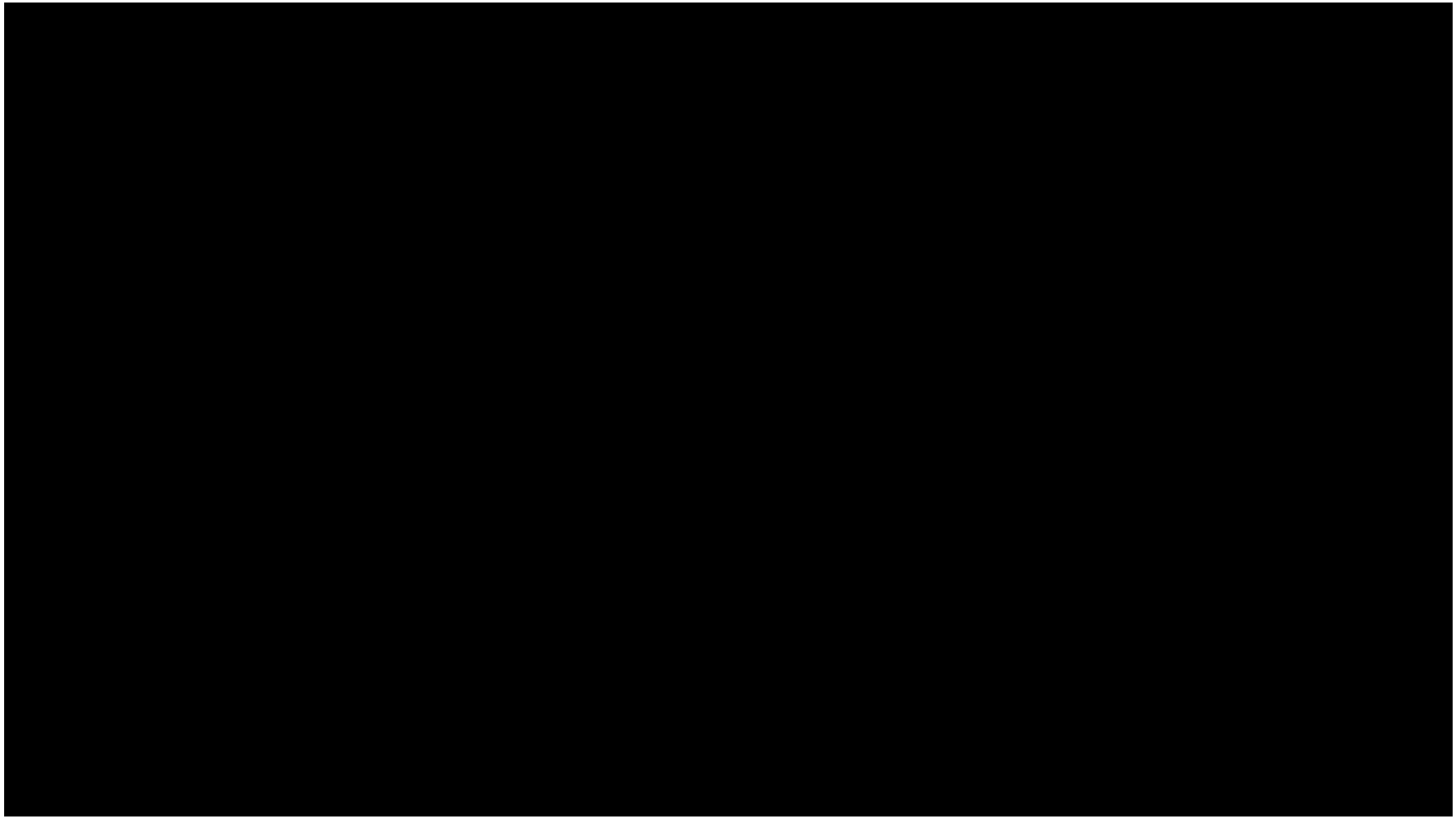
2015 Construction Field Survey
South County Beach & Dune Restoration – Mitigation Reef

Photos from
CSA
Ocean Sciences

Lessons Learned
South County Beach & Dune Restoration – Mitigation Reef

- Anticipate differing USACE and FDEP criteria
- Lowest qualified bidder is not always the best
  - ~3% difference in initial bids – between original and final contractors
- Provide for changed site conditions
- Construction methodology can lead to success (or failure)
  - In-water divers and communication are crucial
  - Coordinate site visits with Contractor – to facilitate construction
- Filter cloth posed challenges, but appears successful
- Good luck (and weather) never hurts

Video – Provided By St. Lucie County



Thank You

Questions?

acondon@coastaltechcorp.com

COASTAL TECH | GEC

Local Firm….National Reach

END

Original Beach Fill Project Area
South County Beach & Dune Restoration – Mitigation Reef

- Consisted of 2 segments:
  - R-87.7 to R-90.3 and
  - R-98 to the SLC/MC line (R-115+1000)
  - COBRA Zones between segments and to north and not critically eroded

- North Segment deleted
  in Dec. 2011 due to HB impacts and condos opted out of project