

BMA Hardbottom Cell-Wide Monitoring Plan 2015 Update

Cheryl Miller, President, Coastal Eco-Group Inc.

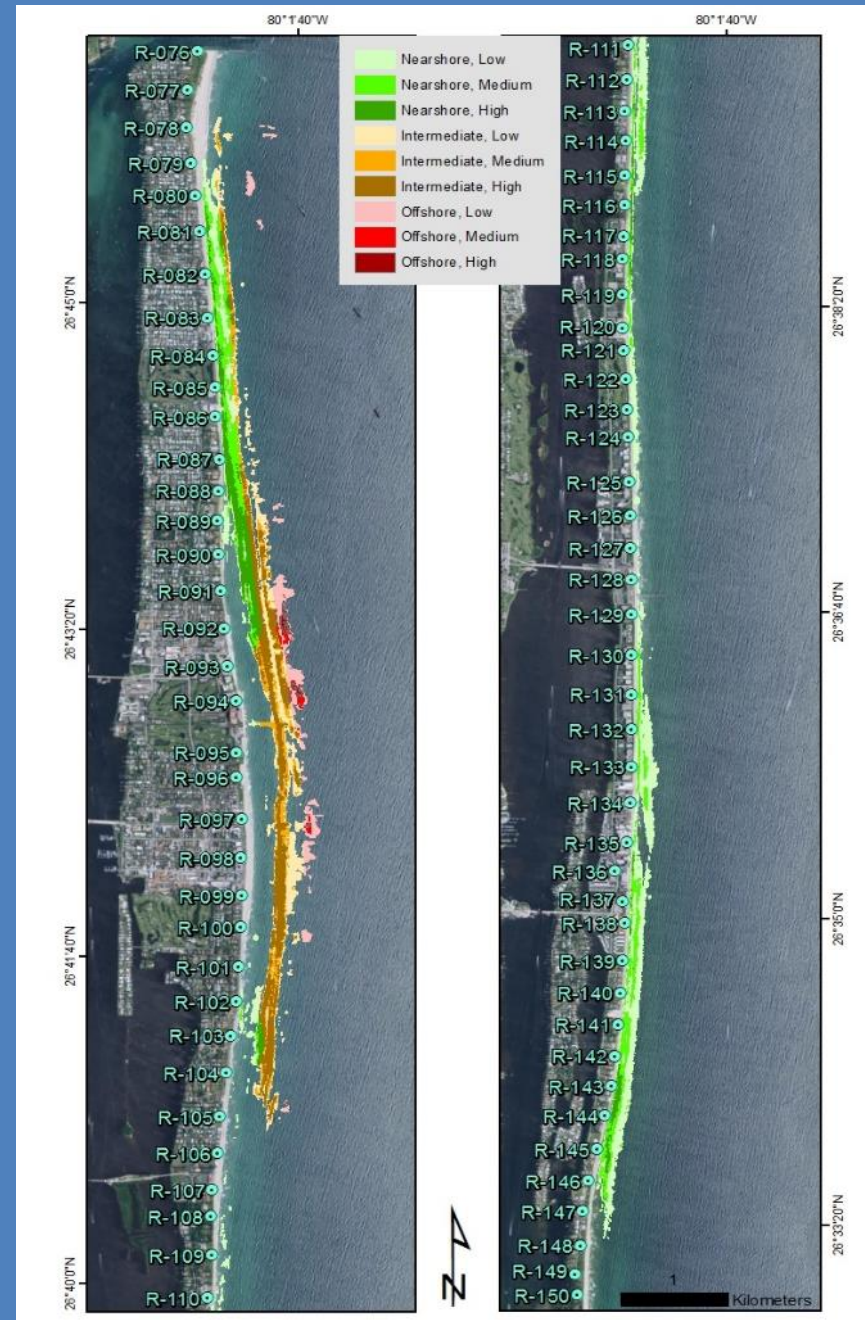
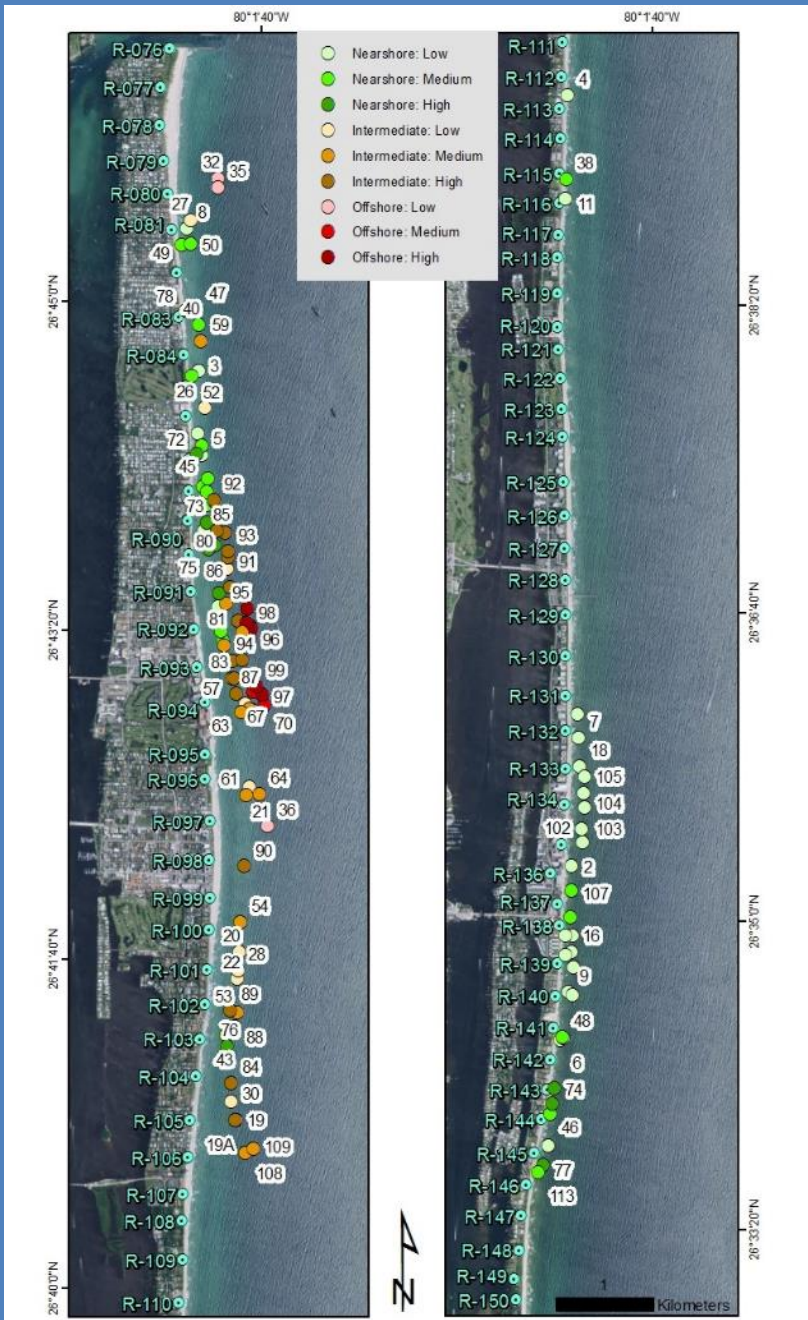


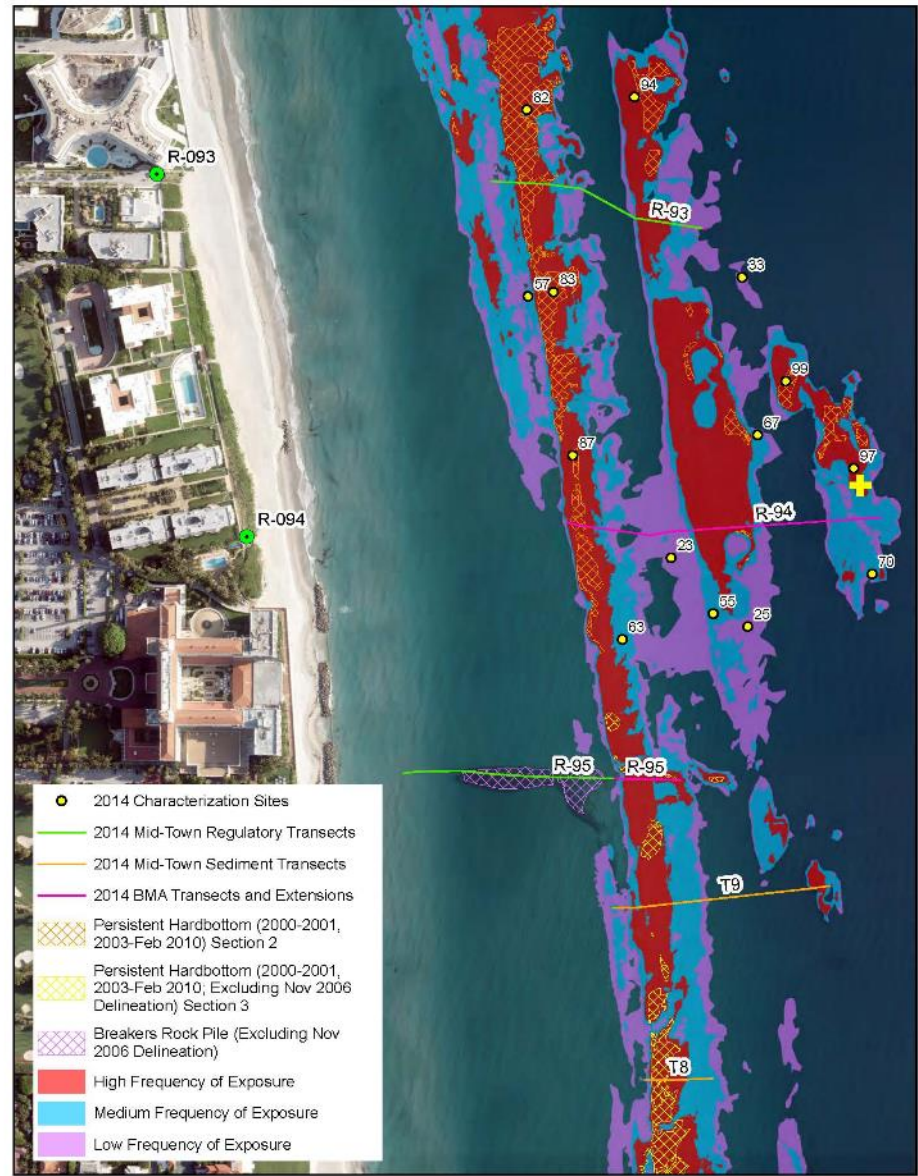
2015 BMA Survey Timeline and Progress

Start Date	End Date	Event Name
7/3/2014	7/3/2014	Aerial Photography of Town of Palm Beach Limits (R-76 to R-138)
7/22/2014	7/24/2014	2014 Nearshore Hardbottom Edge Mapping
9/30/2014	10/22/2014	Installation of the 'Sediment Only' Transects and the Landward and Seaward Extensions of the 200-m Mid-Town Regulatory Transects
11/11/2014	11/11/2014	Cell-Wide Aerial Photography (Lake Worth Inlet to Boynton Inlet)
12/15/2014	12/18/2014	Pre-Construction Transect Biological Monitoring
1/20/2015	4/30/2015	Construction of the Mid-Town Beach Nourishment Project

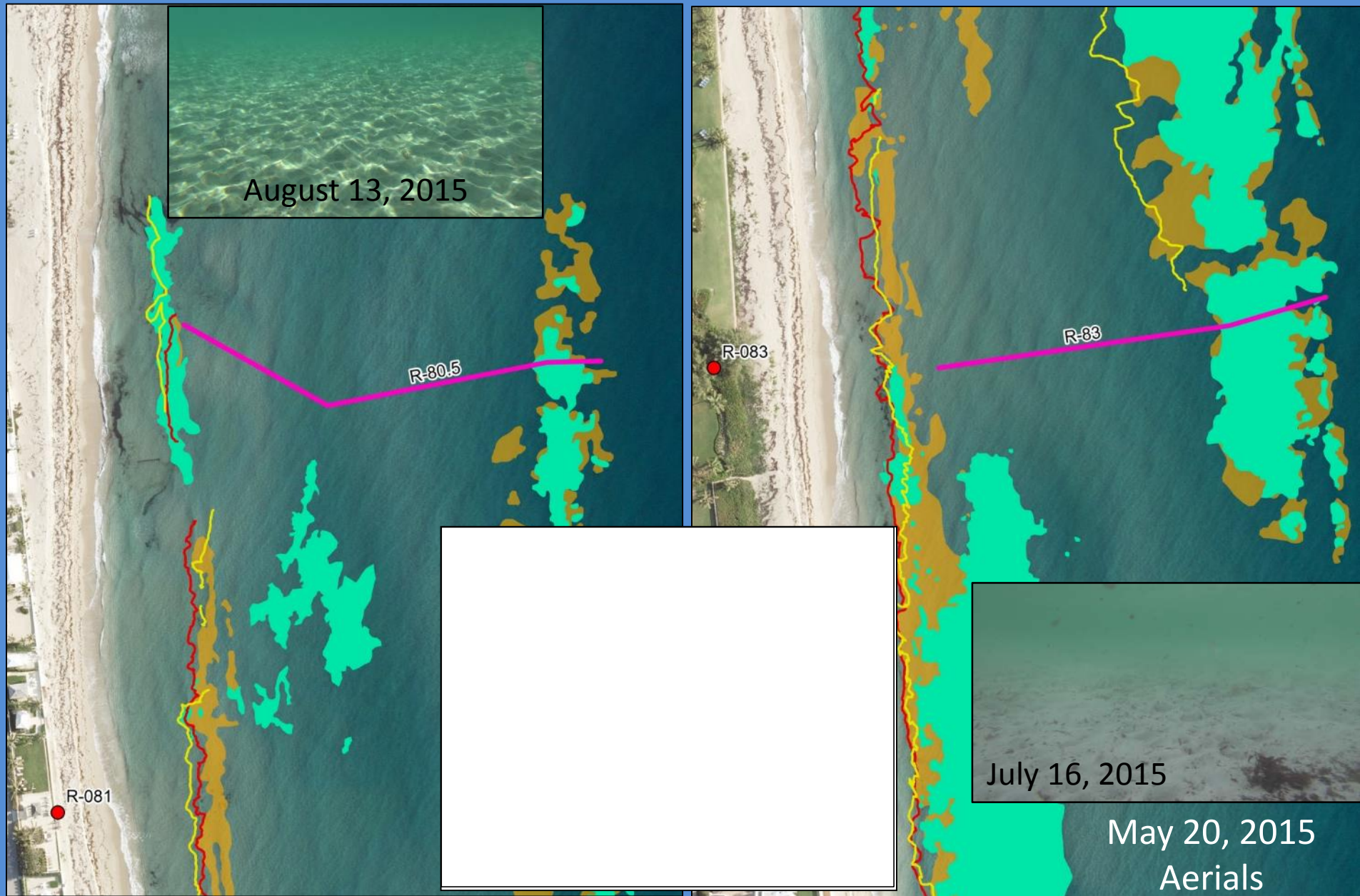
Start Date	End Date	Event Name
5/20/2015	5/20/2015	Immediate Post-Construction Aerial Photography (BMA Year 1) of Town of Palm Beach Limits (R-76 to R-138)
6/19/2015	6/22/2015	Installation of 6 Remaining BMA Monitoring Transects and 2 Offshore Monitoring Stations
7/15/2015	8/13/2015	Baseline Survey of 6 BMA Transects Installed in 2015
7/16/2015	7/16/2015	Baseline Survey of 2 Offshore Stations
8/13/2015	9/20/2015	2015 Year 1 Cell-Wide Nearshore Hardbottom Edge Mapping
9/8/2015	12/10/2015	Monitoring of 9 Mid-Town Regulatory Benthic Transects - Immediate Post-Construction
9/8/2015	9/10/2015	Monitoring of 8 Mid-Town Regulatory Sediment Transects - Immediate Post-Construction
9/4/2015	11/3/2015	2015 Year 1 Survey of 9 BMA Transects
11/13/2015	12/10/2015	2015 Year 1 Survey of Mid-Town BMA Transect Extensions

Completion of the 2014 Baseline Benthic Habitat Map

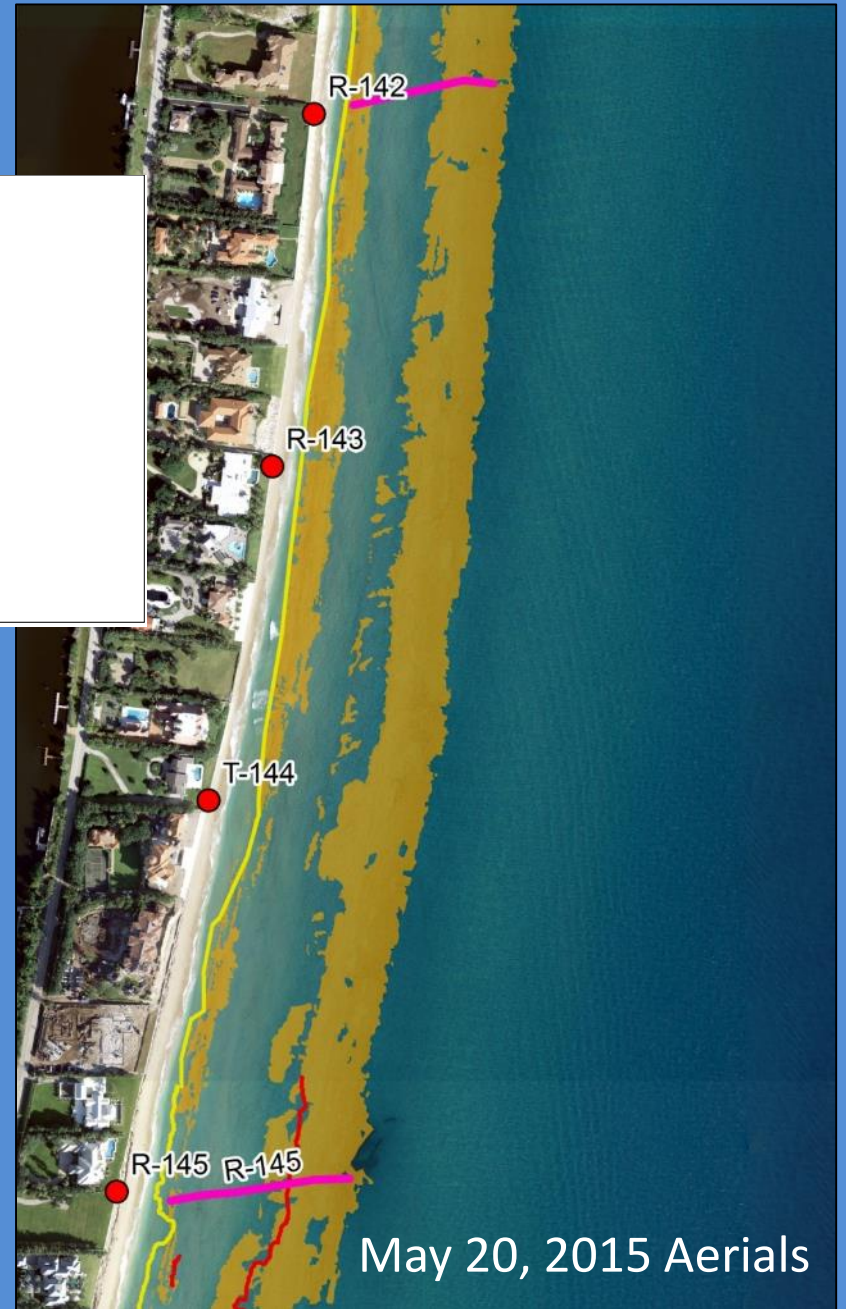
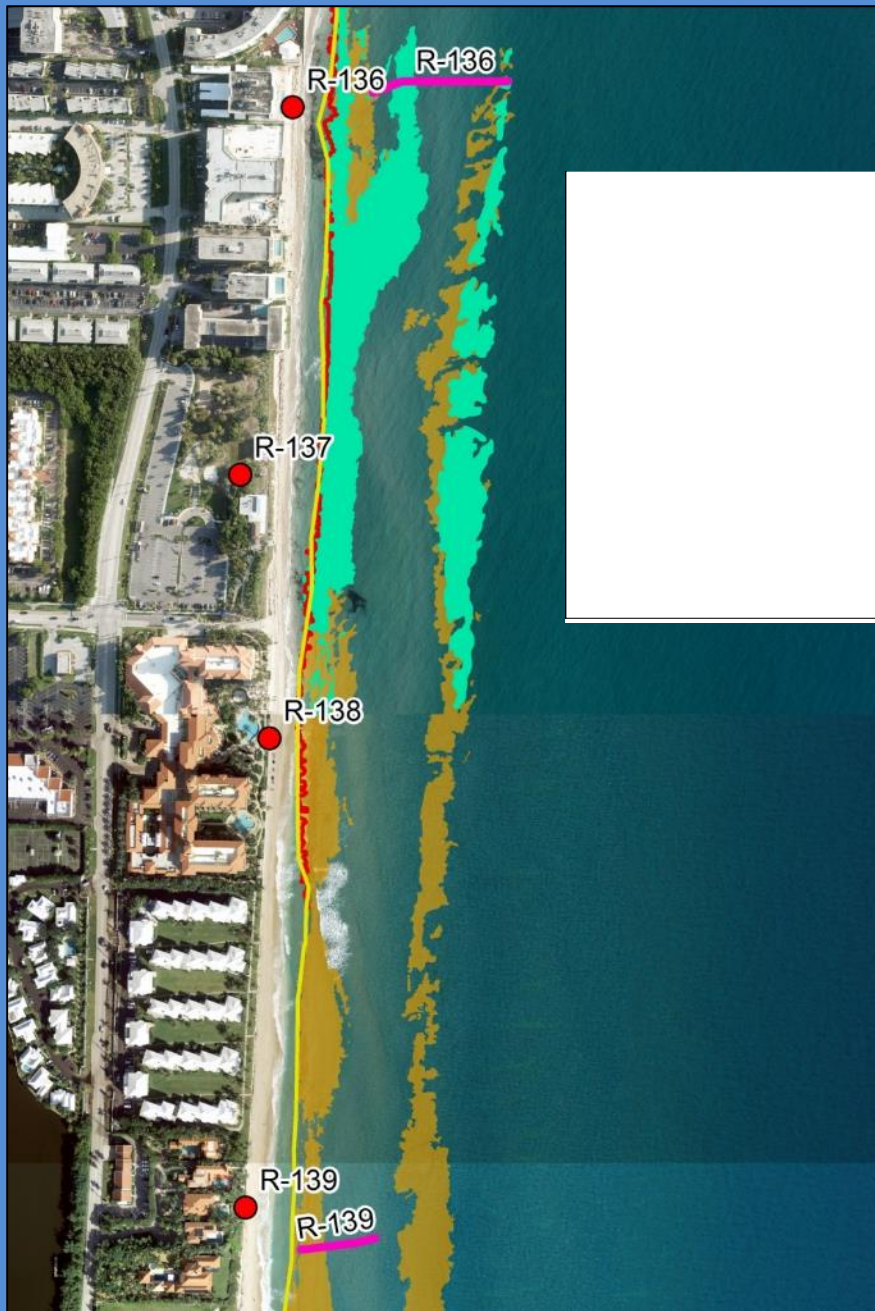




Reach 2 Transects Installed in June 2015

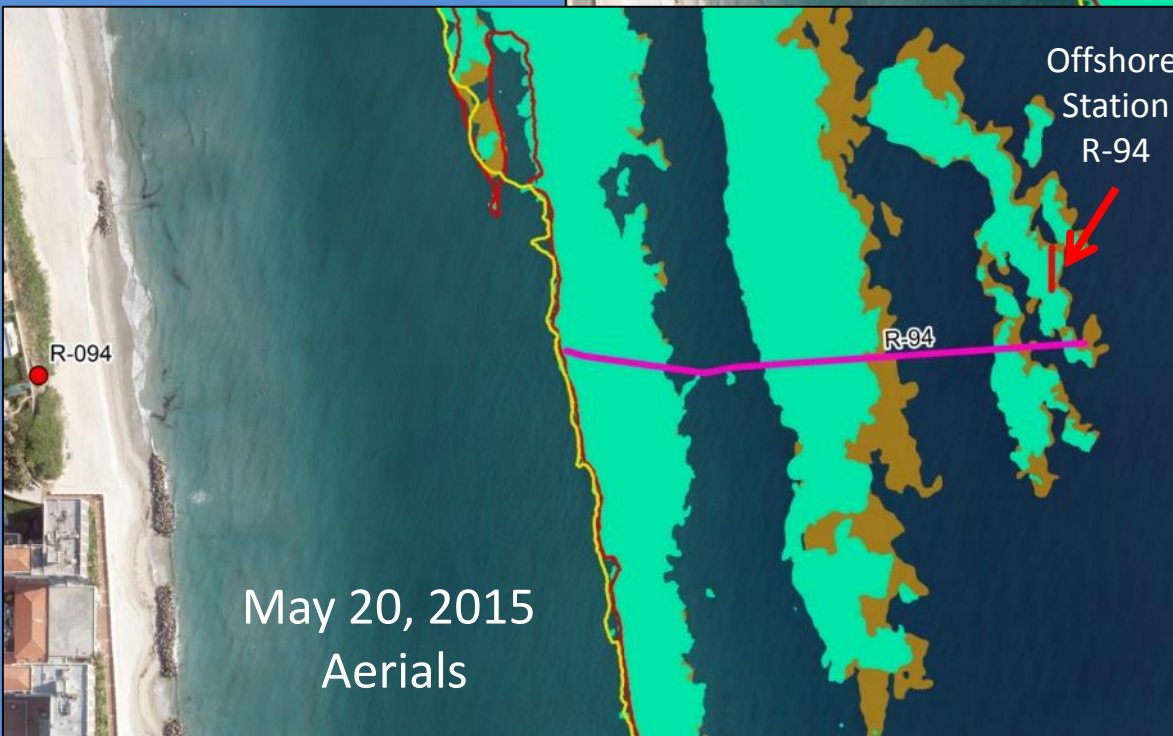
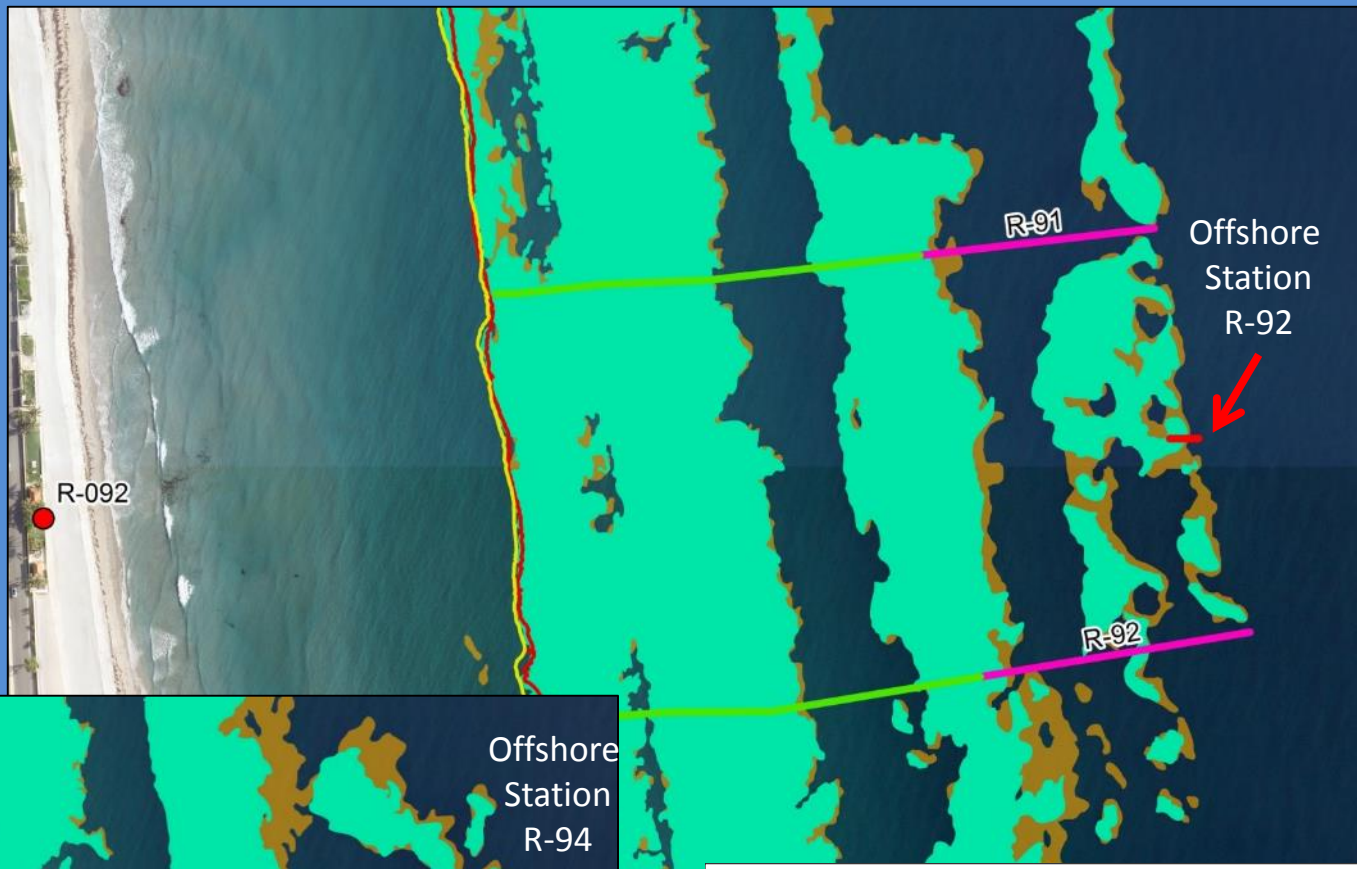


Reach 9 and 10 Transects Installed in June 2015



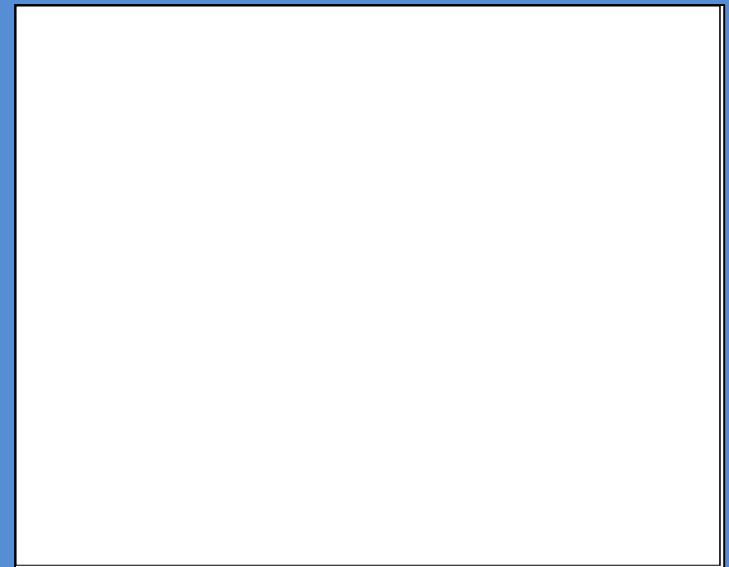
Offshore Monitoring Stations

Installed on
June 22, 2015



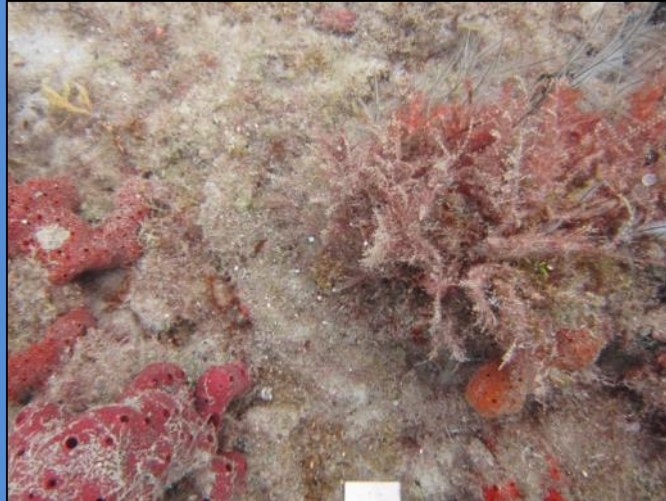
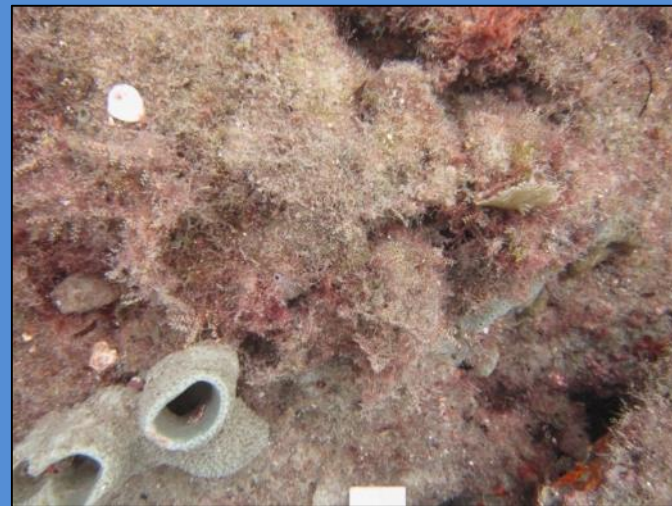


Offshore Monitoring Stations and the SECRMP Site PB 1



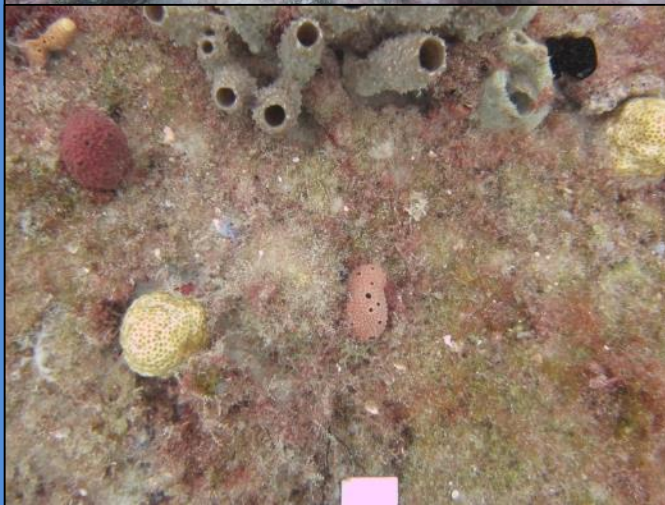
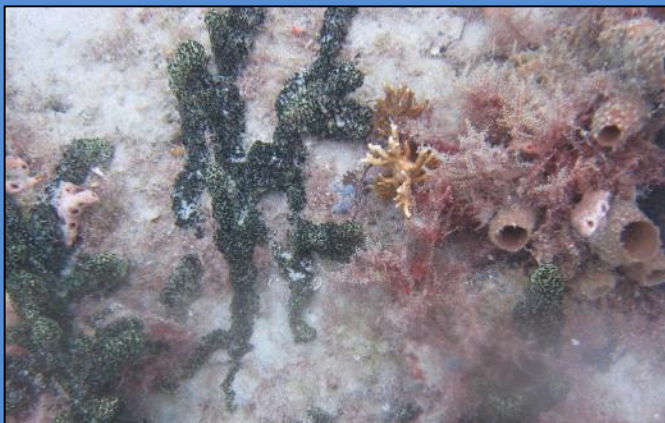
Offshore Monitoring Station R-92 Pointcount Images

7/16/2015 Baseline
Monitoring Survey

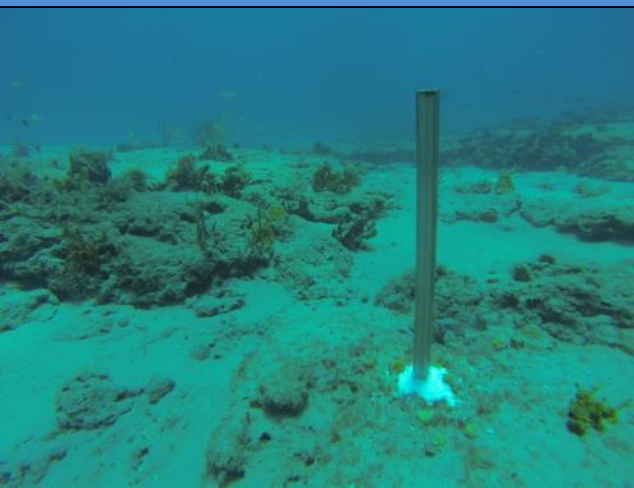
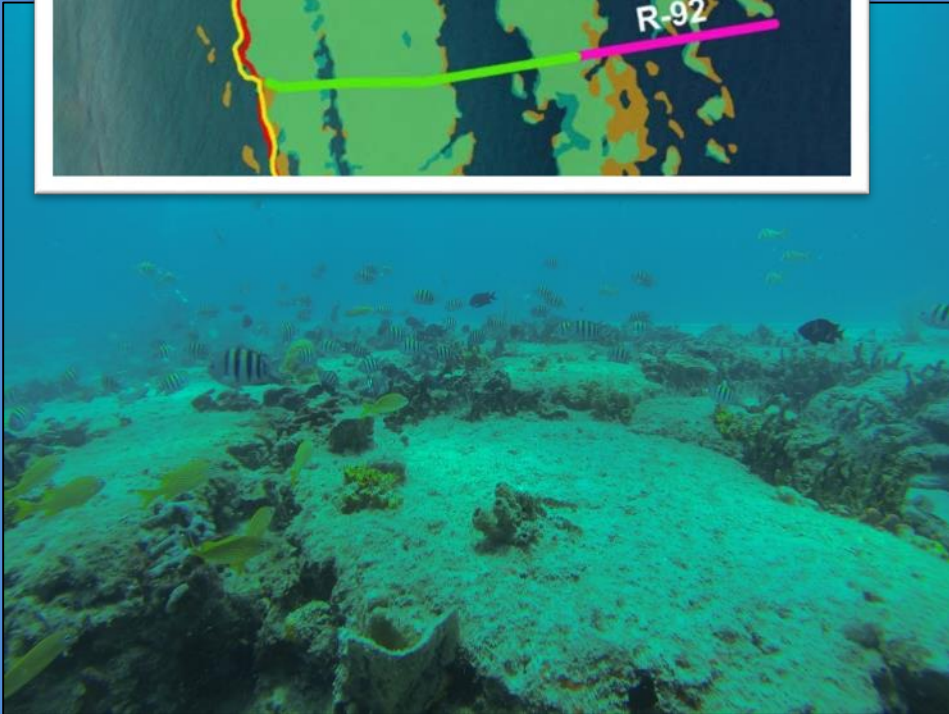
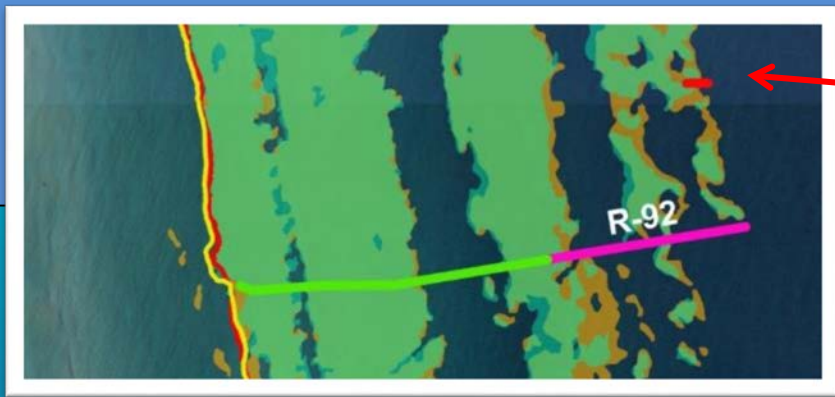


Offshore Monitoring Station R-94 Pointcount Images

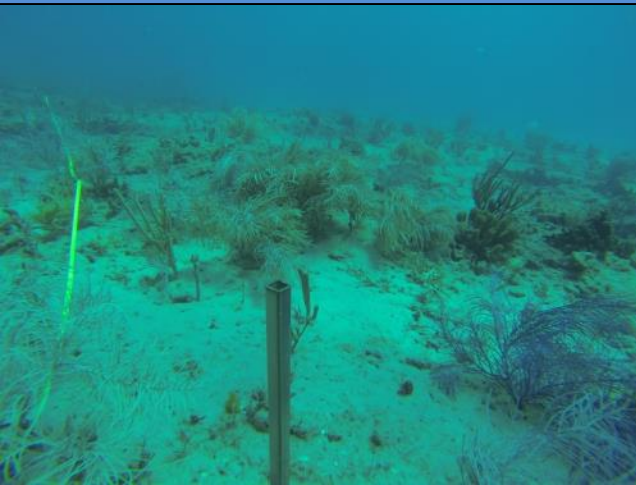
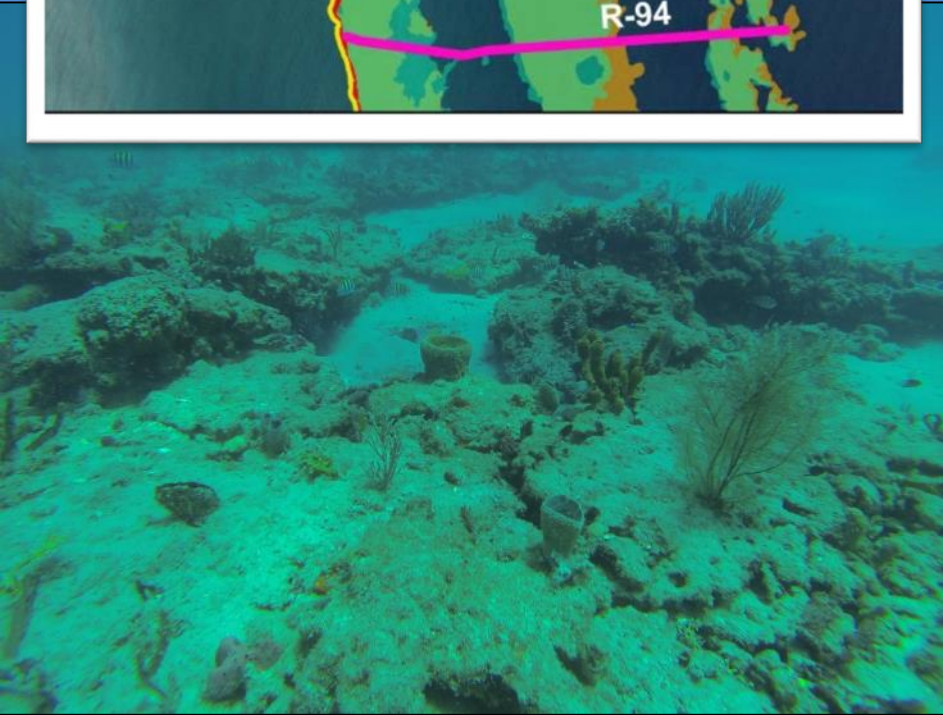
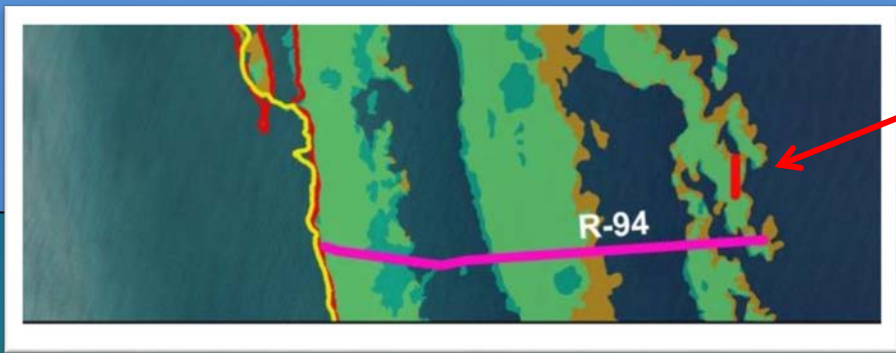
7/16/2015 Baseline
Monitoring Survey



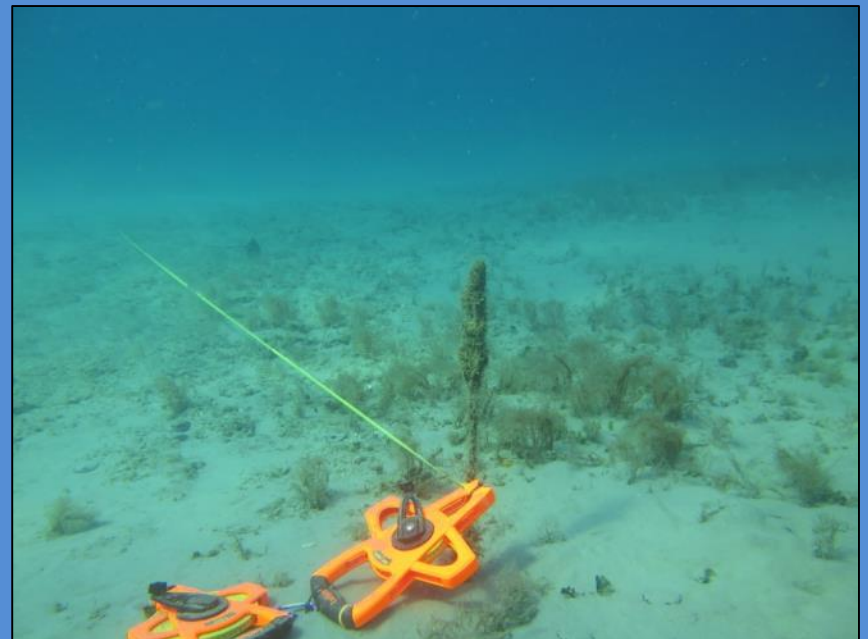
Images from Offshore Station R-92



Offshore Station R-94

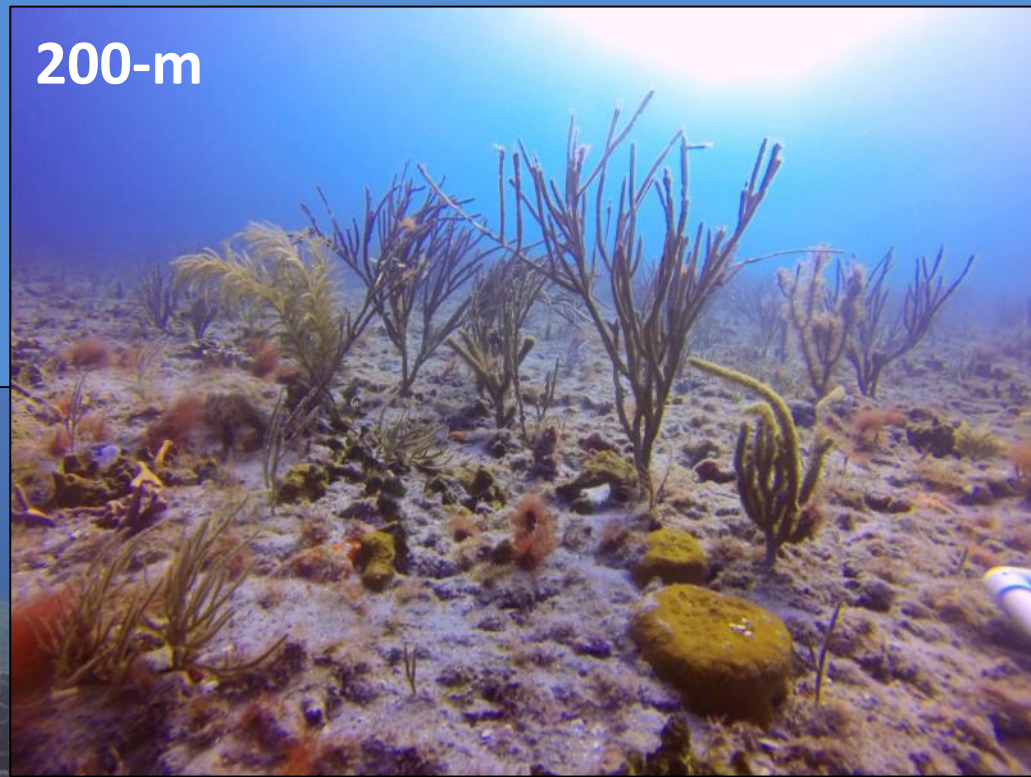


R-90 BMA Extension (200-m to 281.5-m)

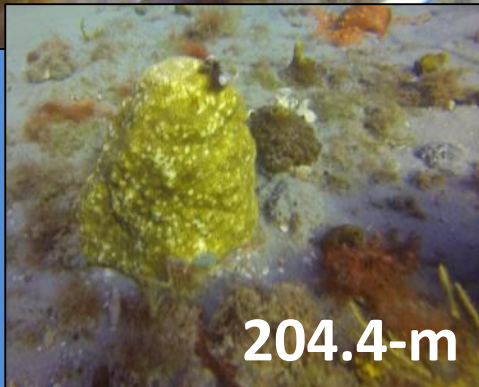
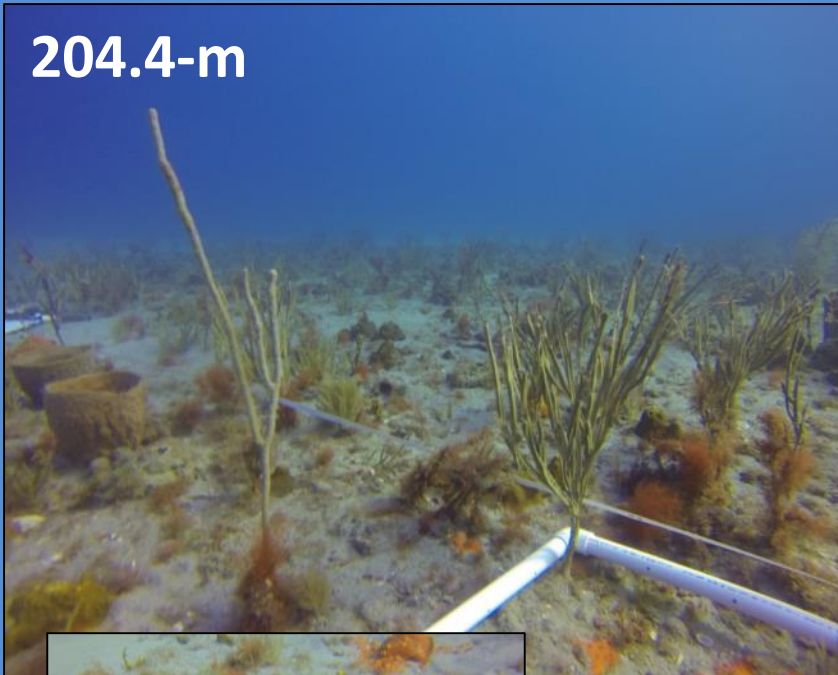


Midtown R-91 BMA Extension

200-m



204.4-m



208.8-m





Comparison of Pre-Construction Hardbottom Edge Mapping Surveys October 2011, November 2013 and July 2014



October 25, 2011 Hardbottom Edge Relief

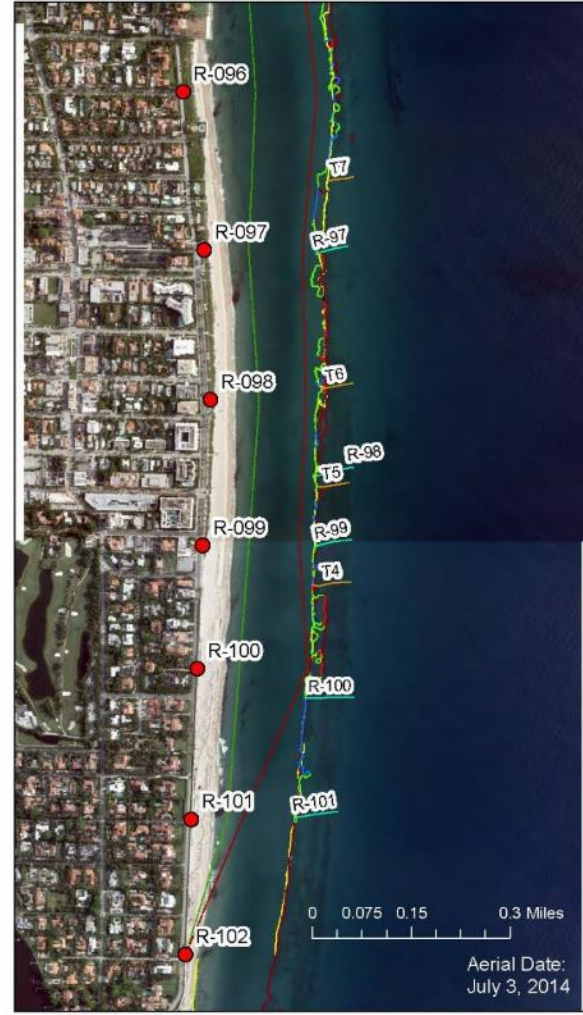
- No Relief Data
- High Relief
- Intermediate Relief
- Low Relief

- DNR Monuments
- Mid-Town 2014 ETOF
- Mid-Town 2014 CTOF
- 2014 Mid-Town Regulatory Transects
- 2014 Mid-Town Sediment Transects
- 2014 BMA Transects and Extensions
- November 19, 2013 Hardbottom Edge
- July 22, 2014 Hardbottom Edge

Aerial Date:
July 3, 2014



Comparison of Pre-Construction Hardbottom Edge Mapping Surveys October 2011, November 2013 and July 2014



October 25, 2011 Hardbottom Edge Relief

- No Relief Data
- High Relief
- Intermediate Relief
- Low Relief

- DNR Monuments
- Mid-Town 2014 ETOF
- Mid-Town 2014 CTOF
- 2014 Mid-Town Regulatory Transects
- 2014 Mid-Town Sediment Transects
- November 19, 2013 Hardbottom Edge
- July 22, 2014 Hardbottom Edge

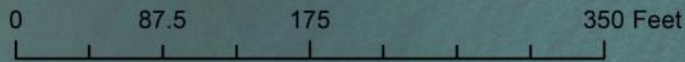
Aerial Date:
July 3, 2014

July/August 2014 Hardbottom Edge Relief Categories

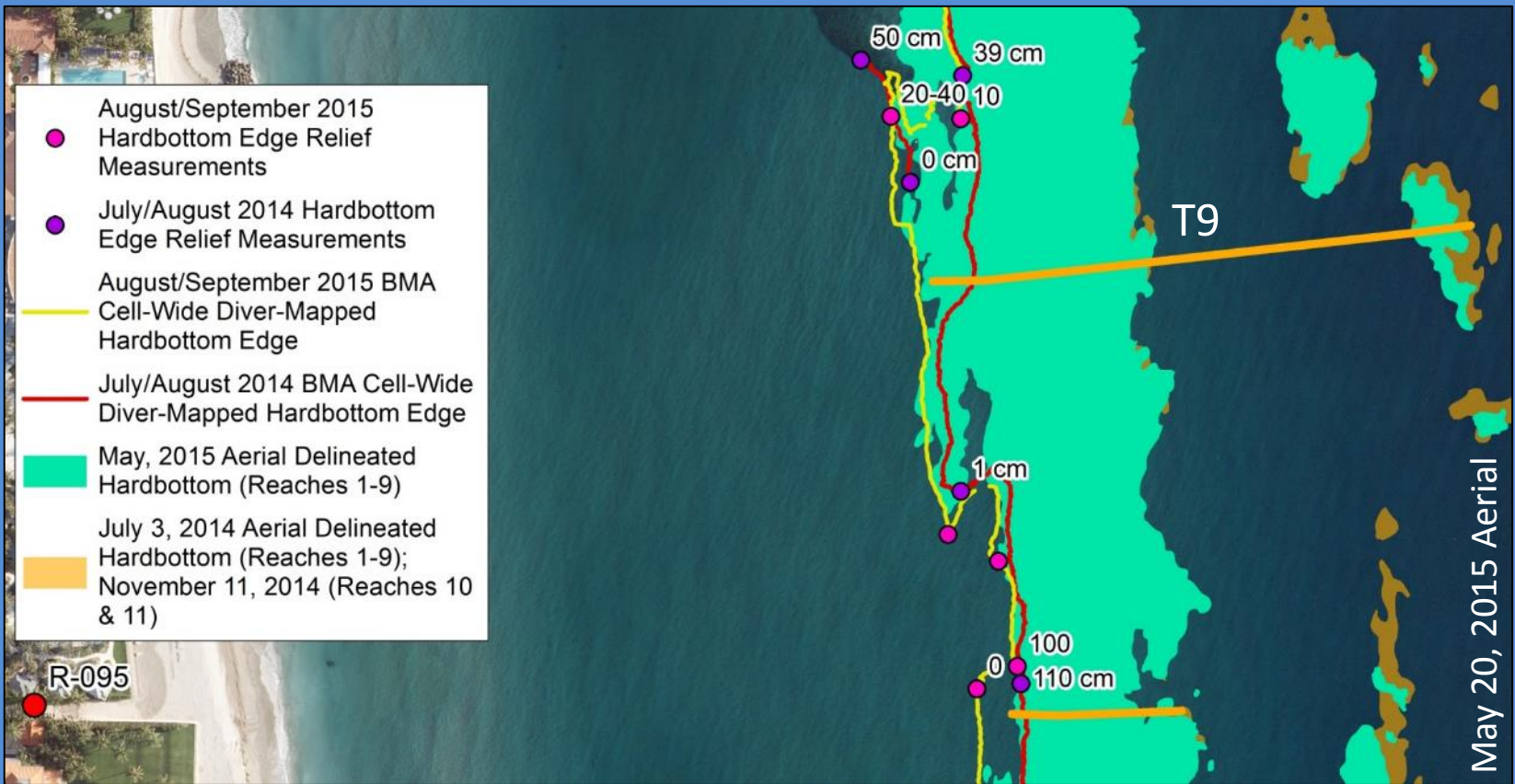
- High Relief
- Medium Relief
- Low Relief
- No Relief Data
- July/August 2014 Hardbottom Edge Relief Measurements
- Midtown Regulatory Sediment Transects
- July 3, 2014 Aerial Delineated Hardbottom (Reaches 1-9); November 11, 2014 (Reaches 10 & 11)

Short-term variability in exposure of low relief edge prior to the 2015 Mid-Town Nourishment Project

R-098

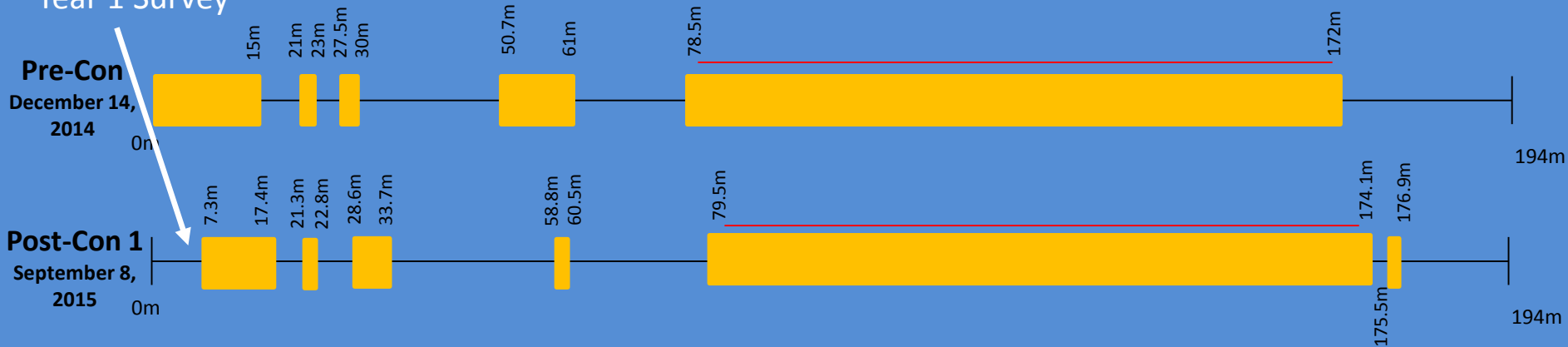


July 3, 2014 Aerial



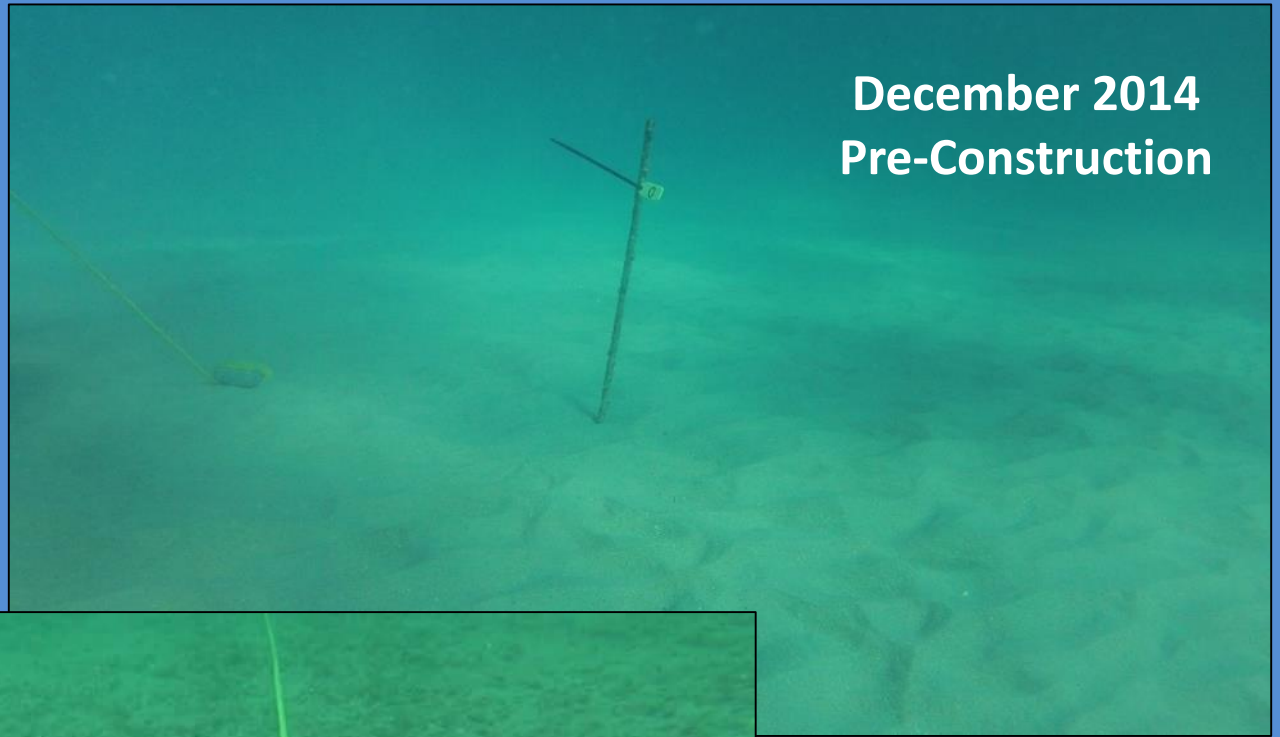
New landward exposure in 2015
Year 1 Survey

Transect T9 Line-Intercept

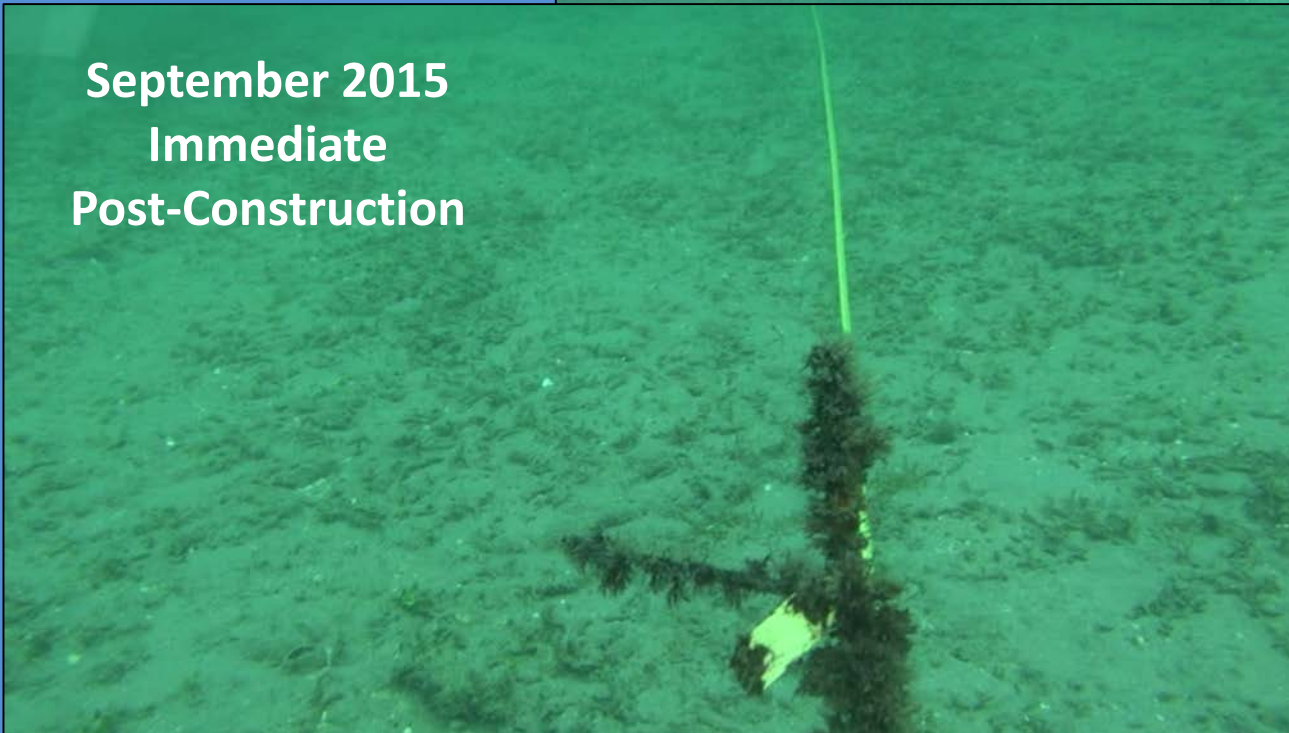


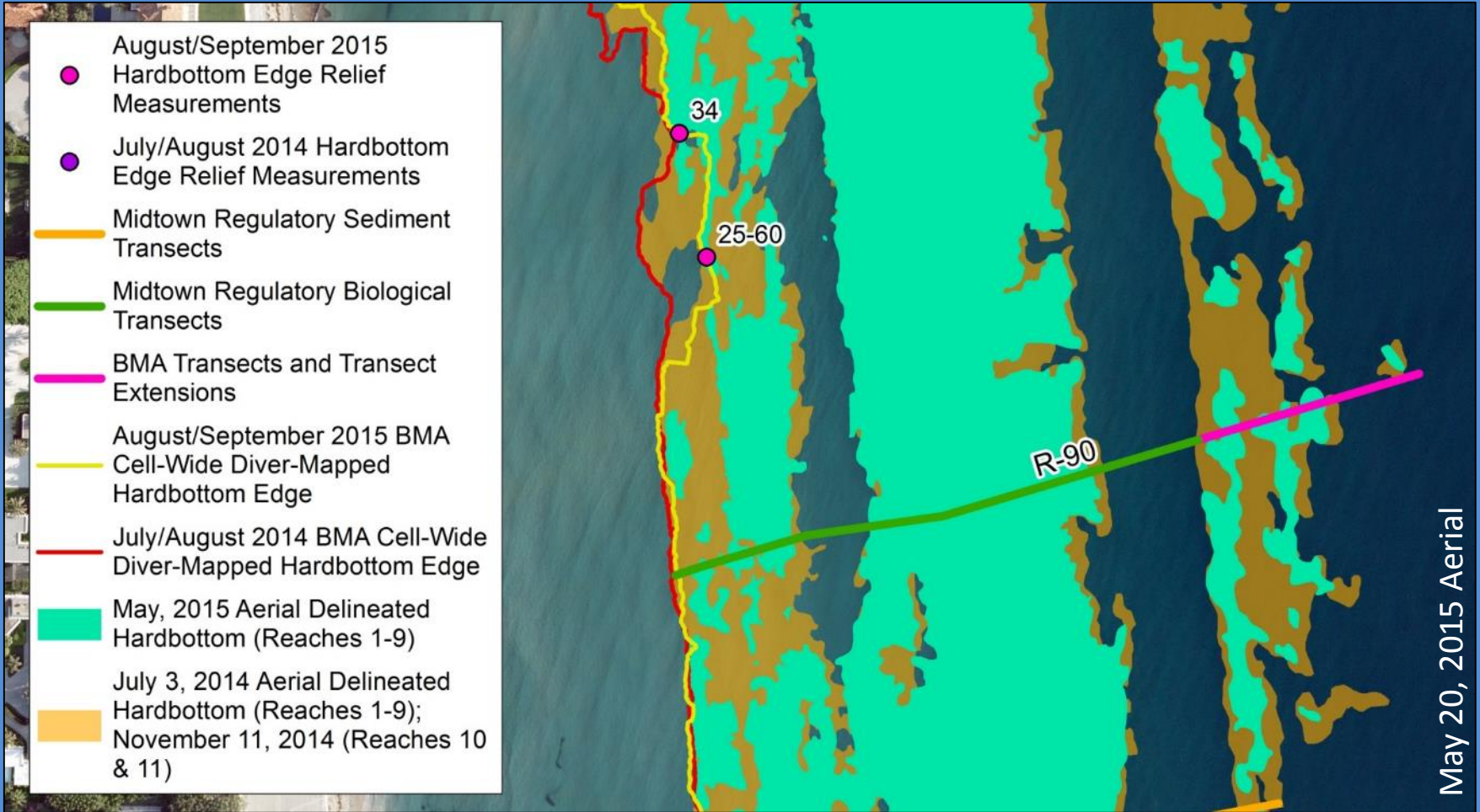
**Midtown
Sediment
Transect T9
0-m Pin**

**December 2014
Pre-Construction**



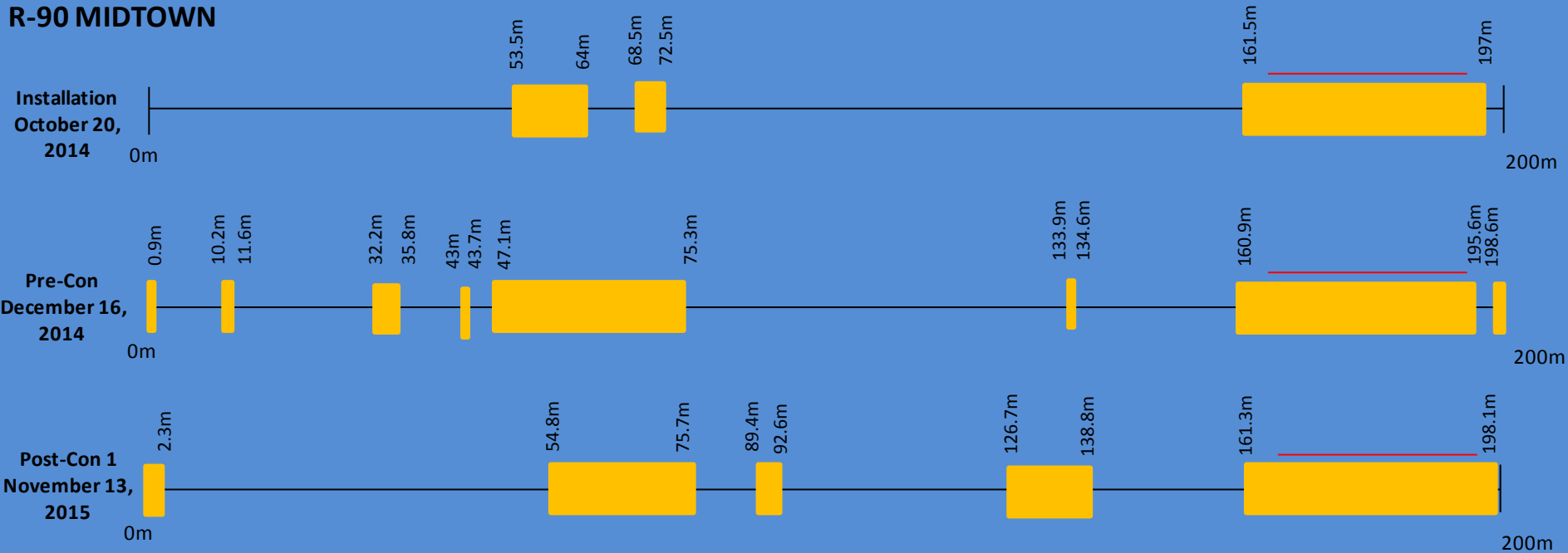
**September 2015
Immediate
Post-Construction**



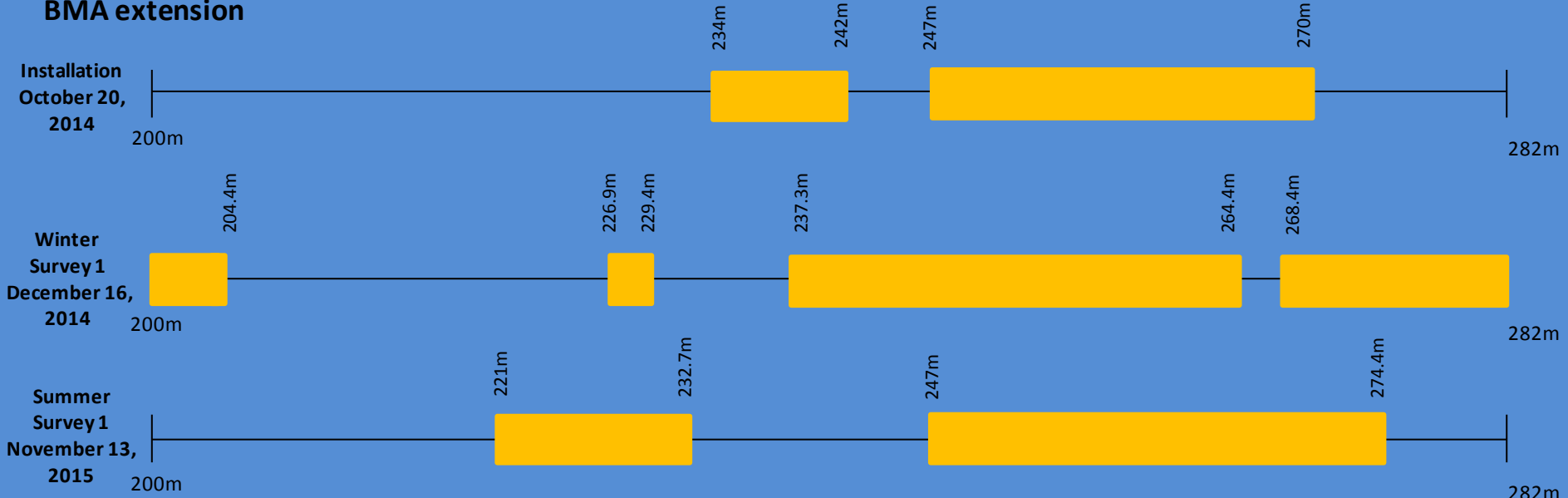


Transect R-90 Line-Intercept

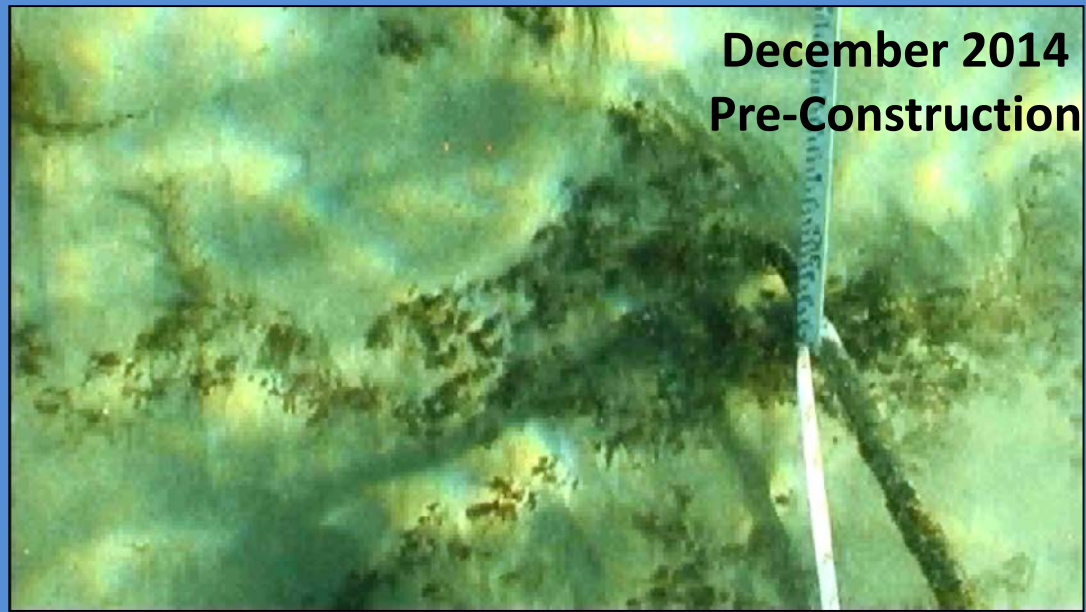
R-90 MIDTOWN



R-90 BMA extension



**Midtown
Benthic
Transect R-90
10-m Pin**

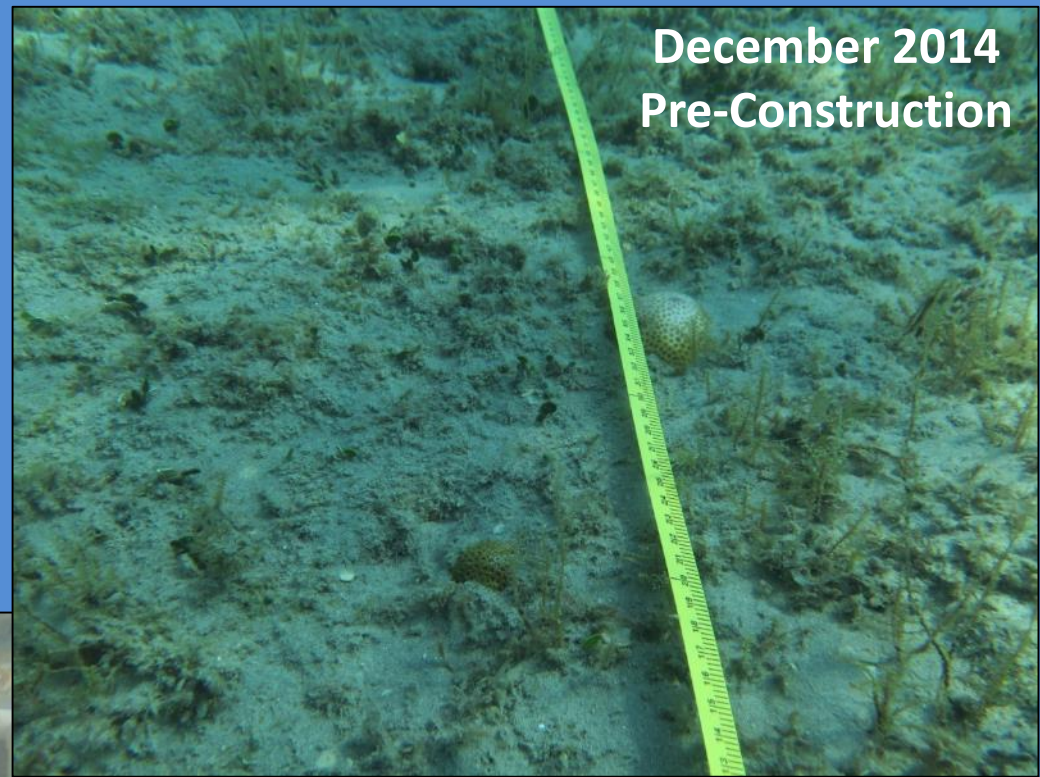


**December 2014
Pre-Construction**

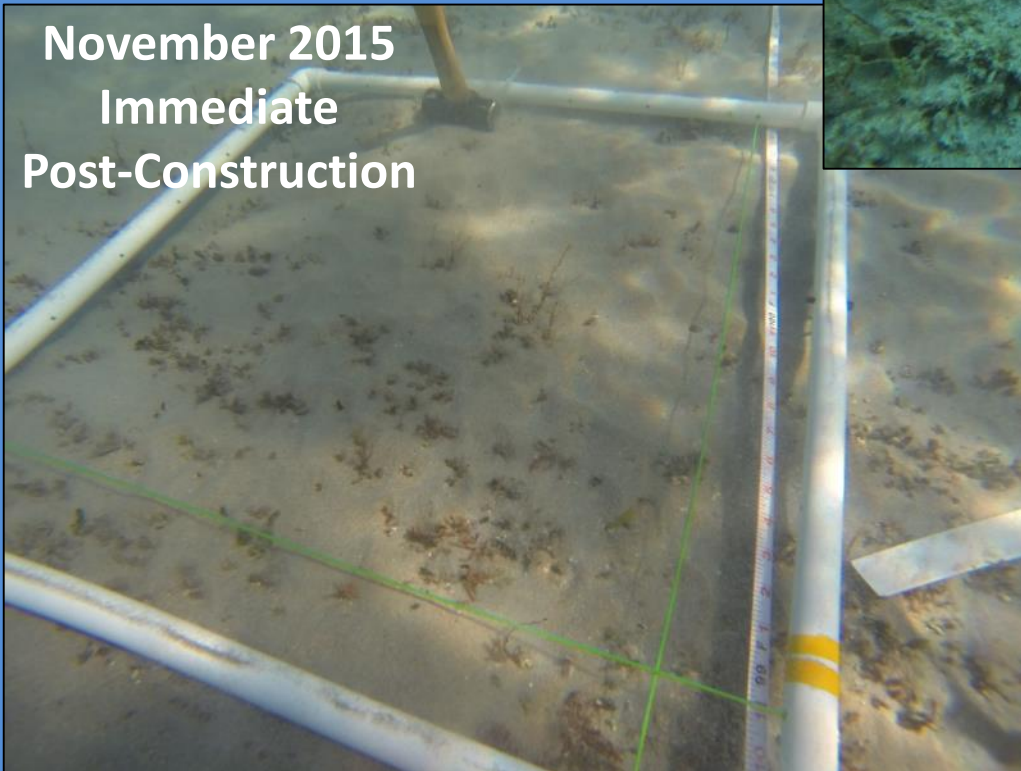
**November 2015
Immediate
Post-Construction**



**Midtown Benthic
Transect R-90
25.8-m**

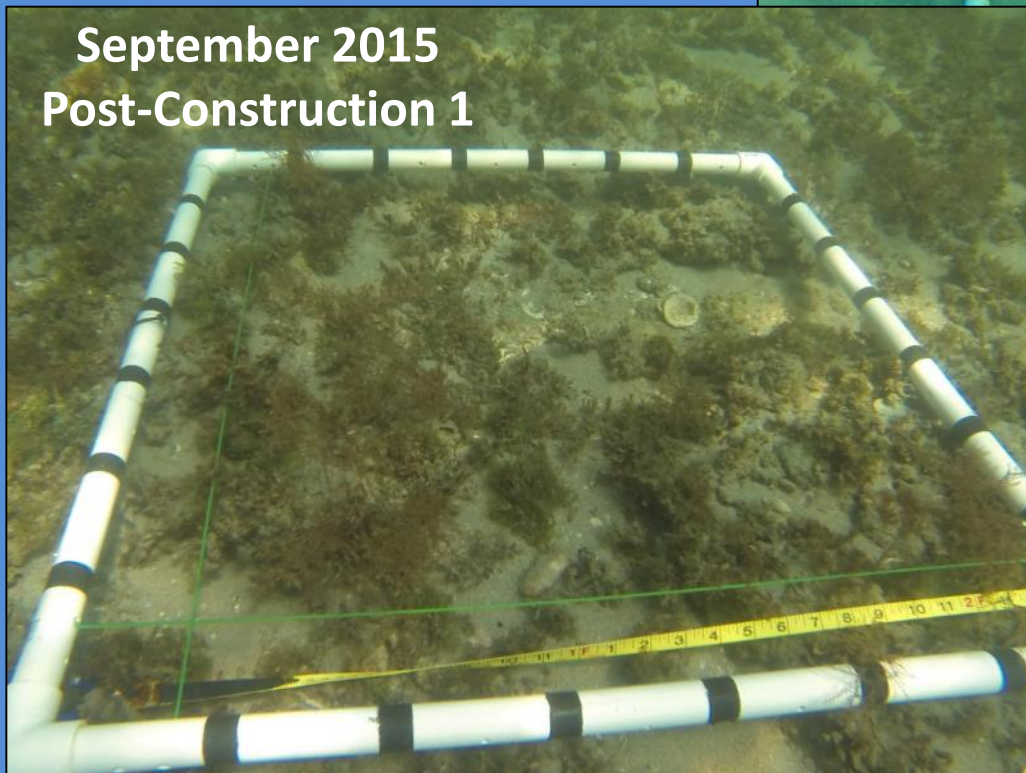
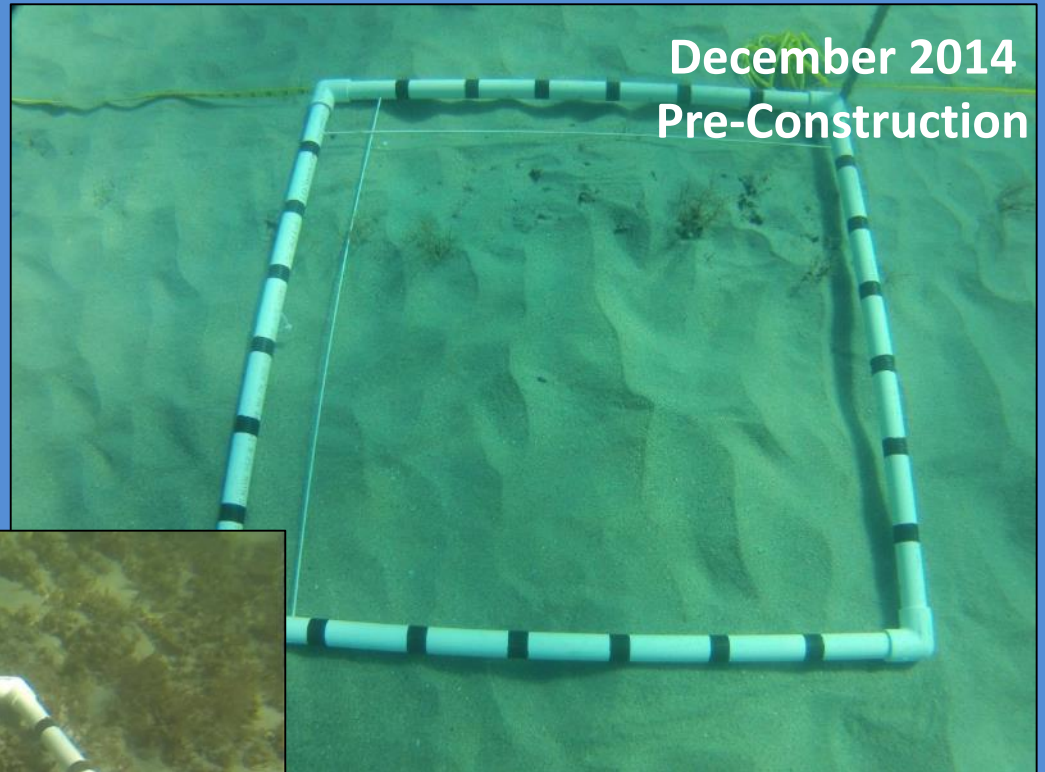


**November 2015
Immediate
Post-Construction**



Midtown Benthic Transect R-97

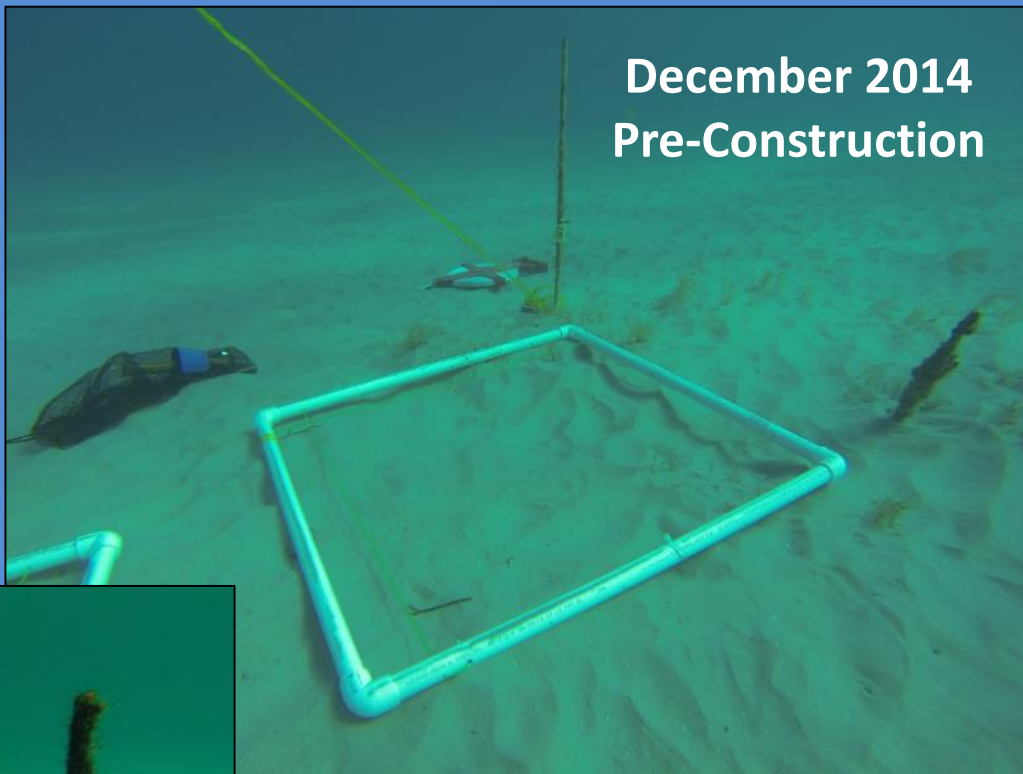
0-m Pin



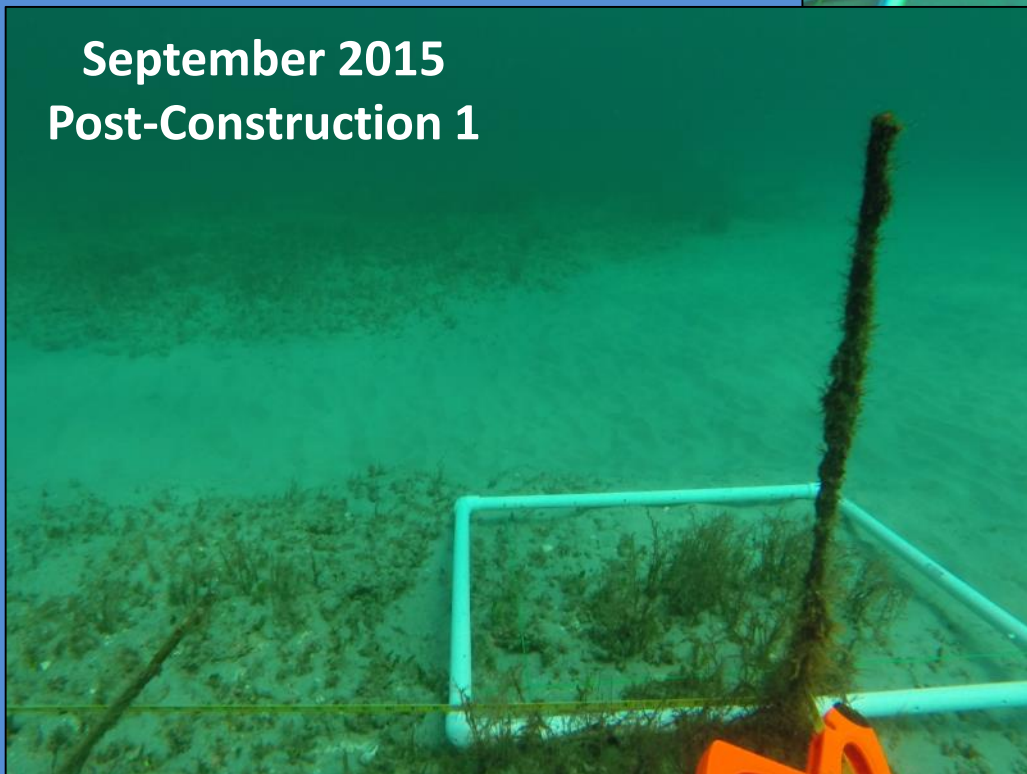
Midtown R-98

94-m Pin

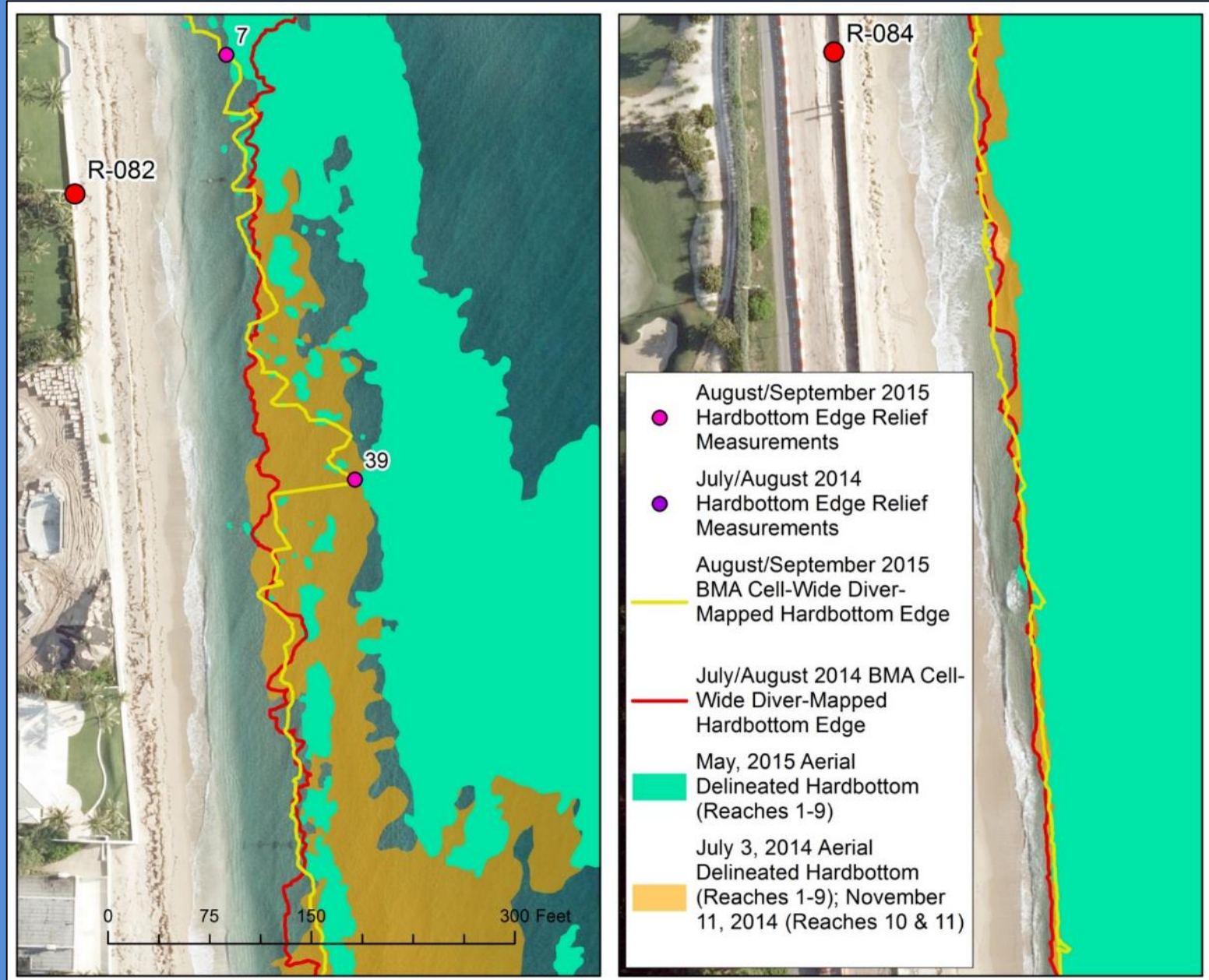
December 2014
Pre-Construction



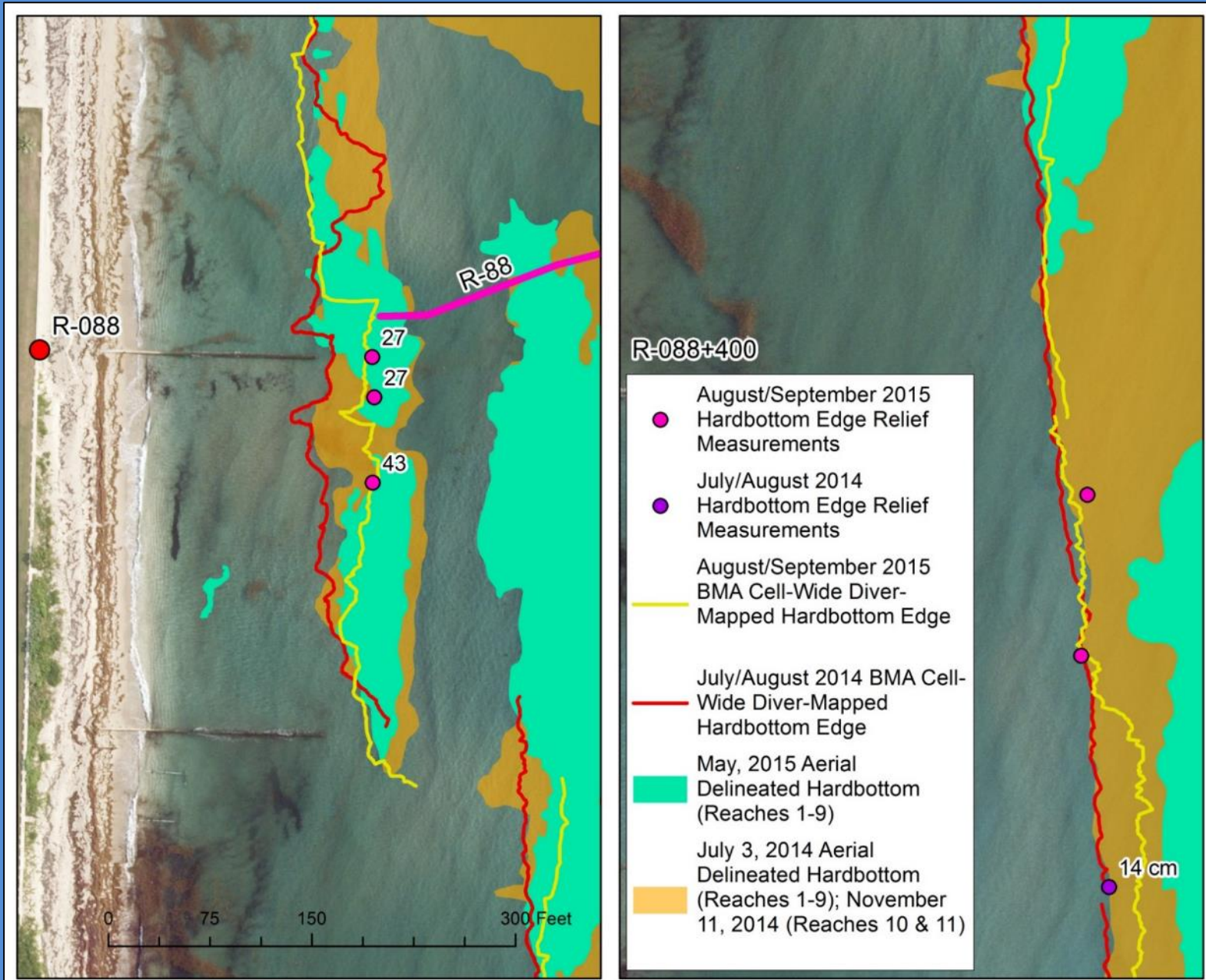
September 2015
Post-Construction 1



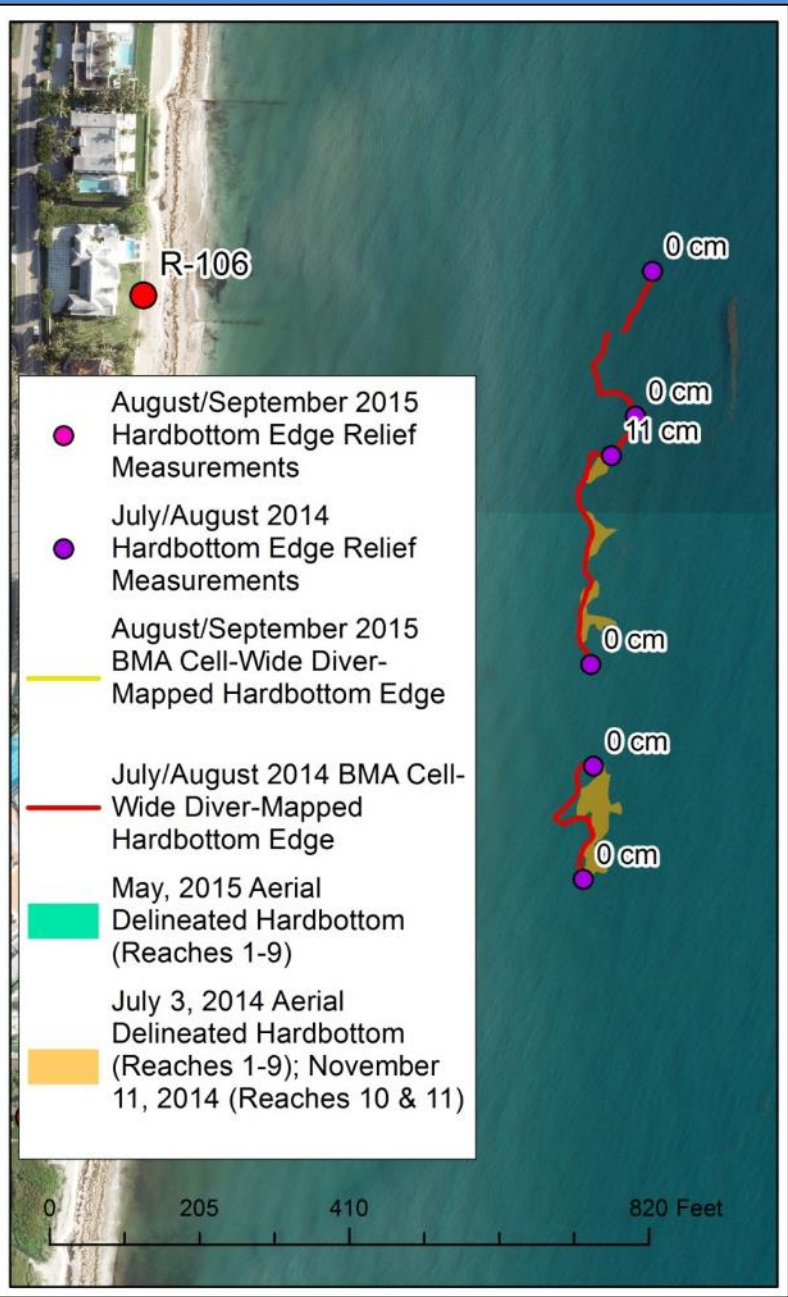
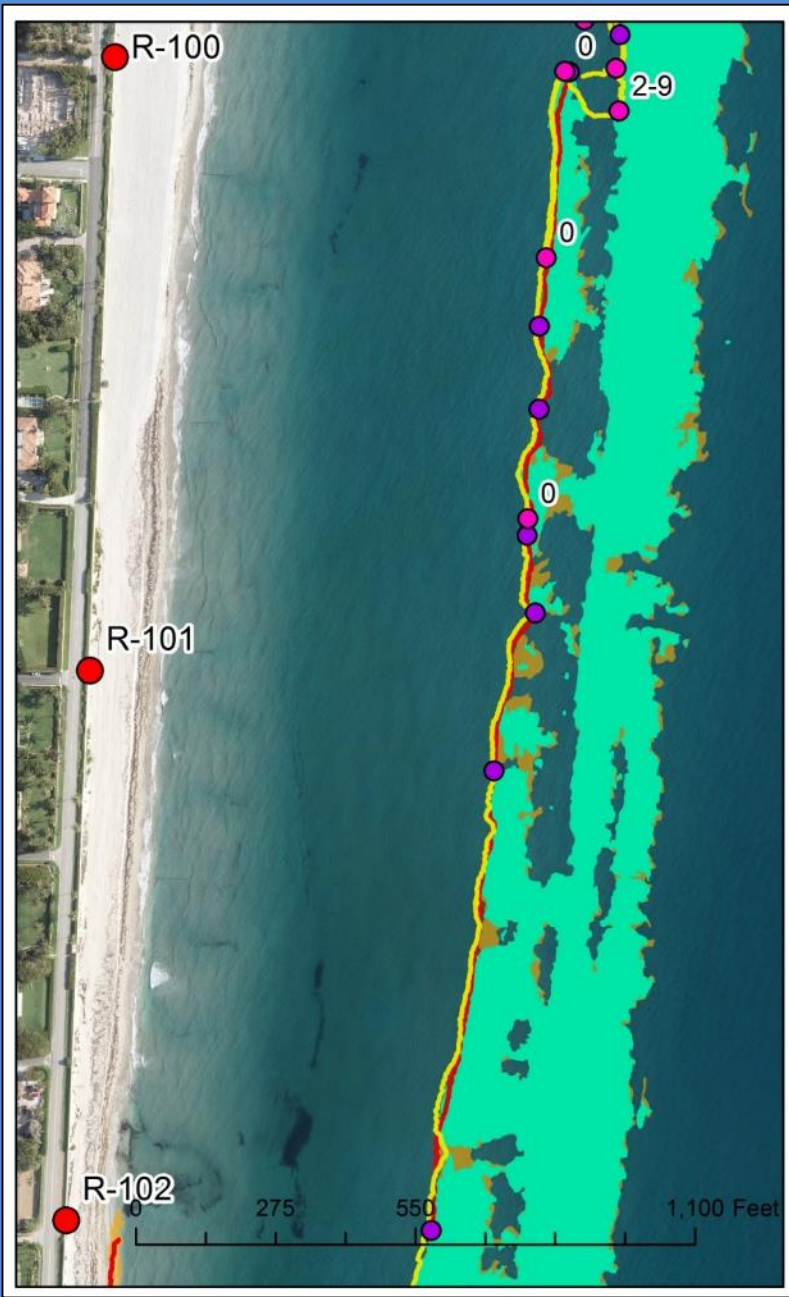
Variability in nearshore exposure in Reach 2- 2014 vs. 2015



Variability in nearshore exposure in Reach 3 north of Mid-Town Project

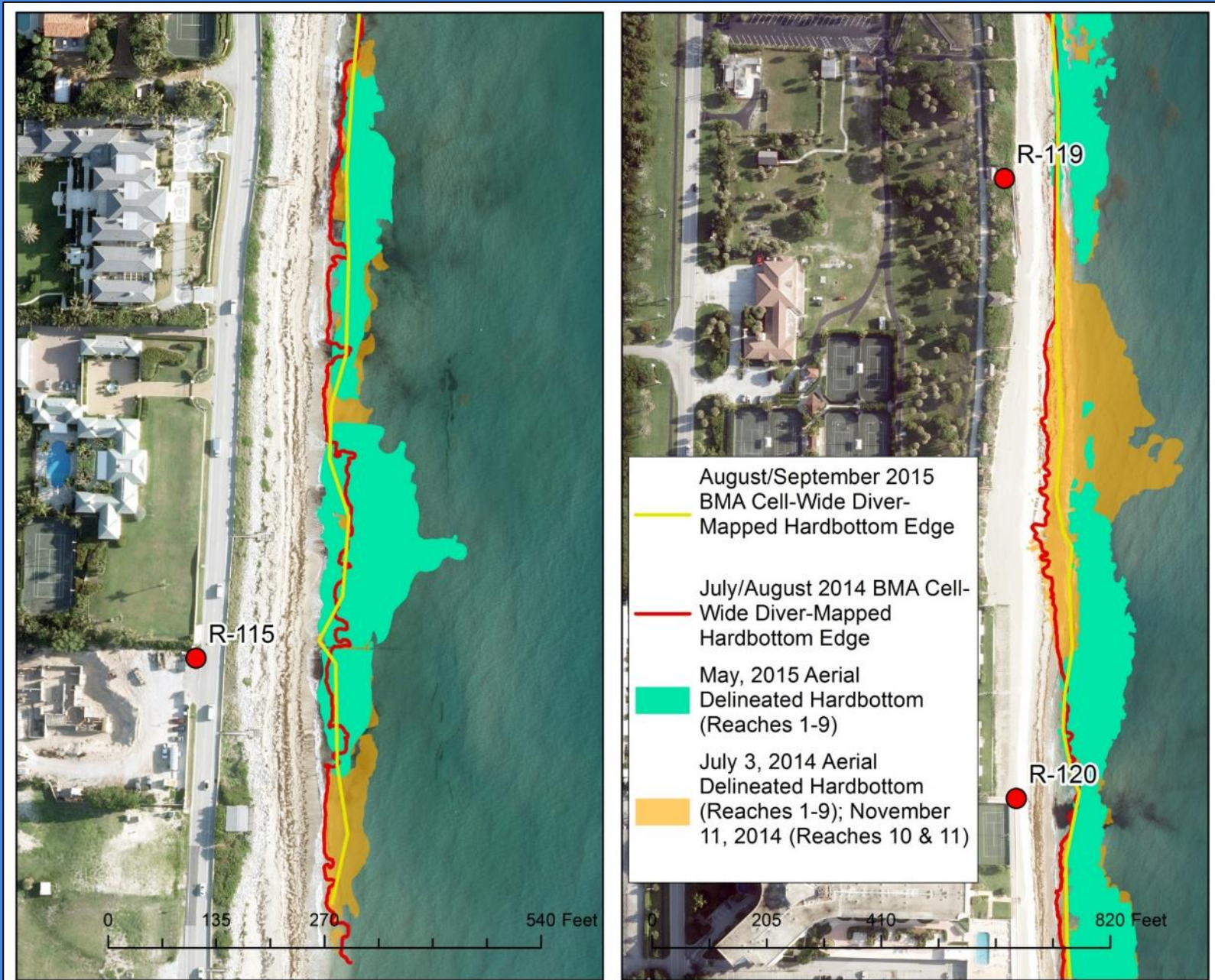


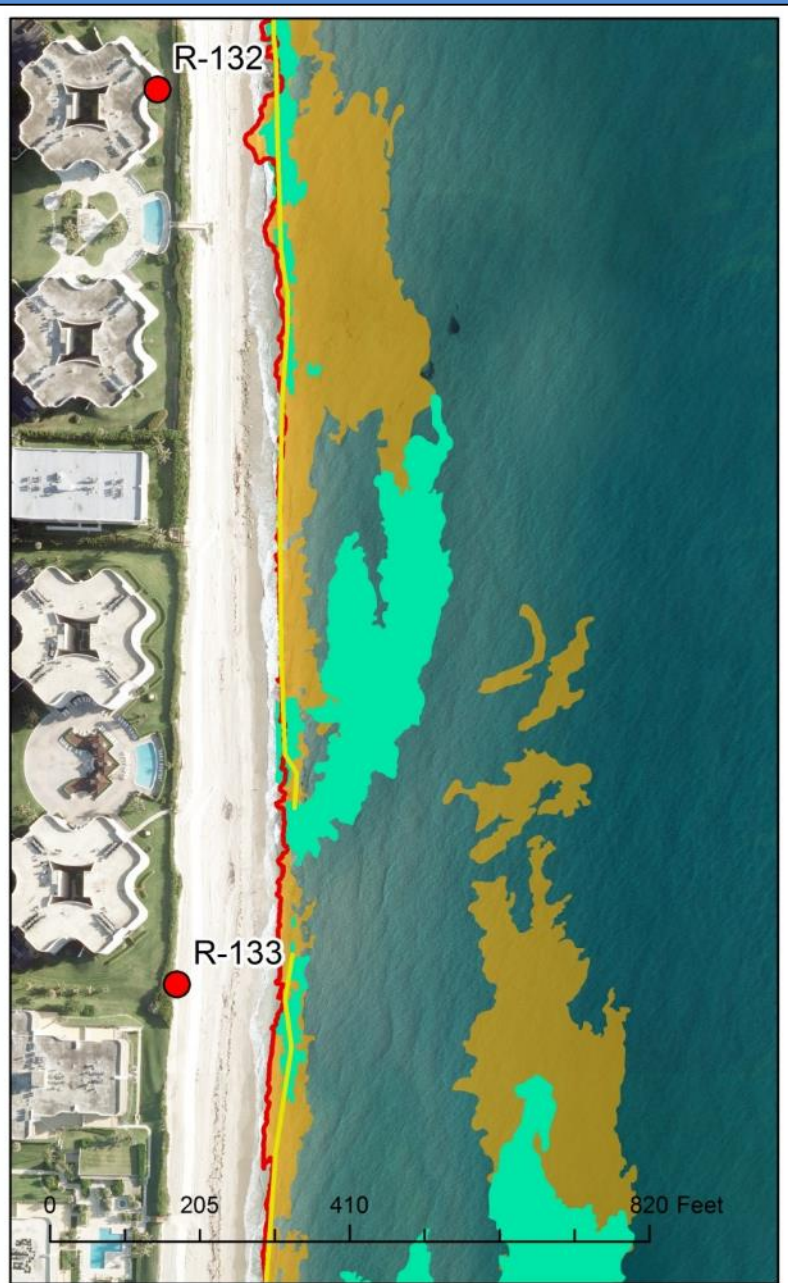
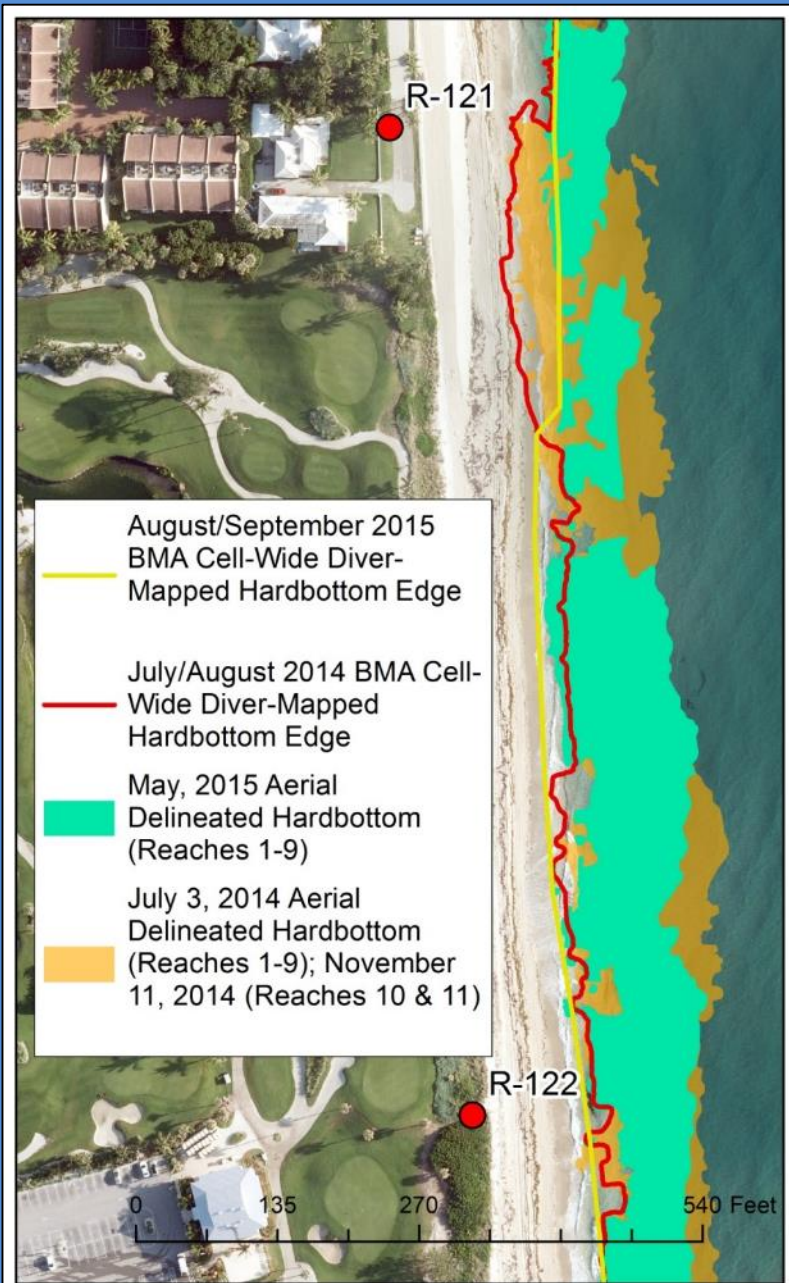
May 20, 2015 Aerial



May 20, 2015 Aerial

Variability in nearshore exposure in Reach 7



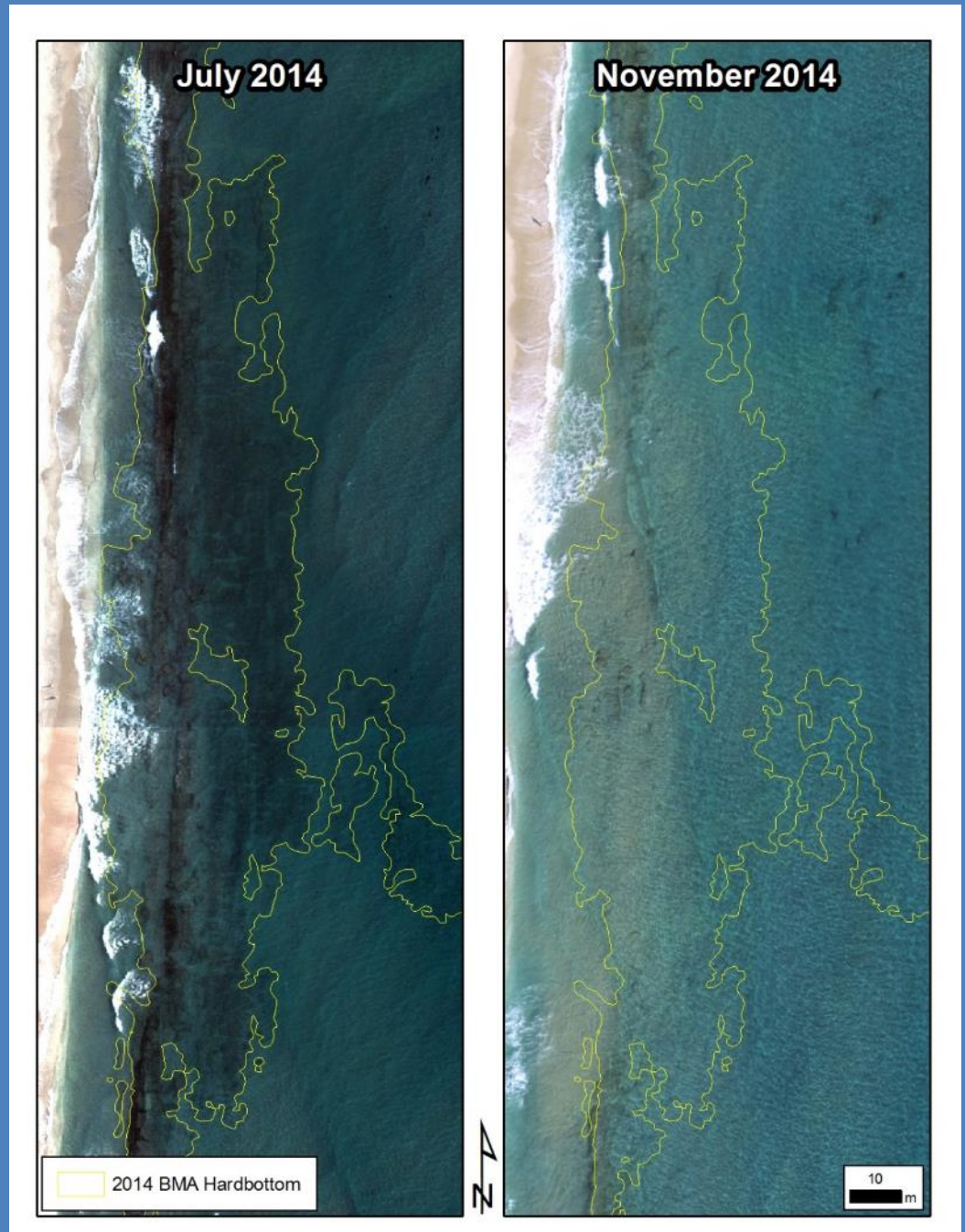


May 20, 2015 Aerial

Nearshore hardbottom east of R-136 was exposed in July 2014 and completely buried in November 2014

This variability in hardbottom exposure highlights the importance of more frequent aerial surveys and mapping and in situ diver edge mapping.

Cell-wide sediment dynamics and changes in benthic habitat functions are assessed using permanent cross-shore transects.



Summary of BMA Cell-Wide Monitoring Plan Goals

Evaluate variability of sand cover over ephemeral and persistent hardbottom and resulting habitat functional shifts within the coastal cell.

Develop more appropriate hardbottom classification using adaptive management according to the BMA.

- Benthic habitat data analyses show that benthic community changes at 3 m water depth.
- Gorgonian abundance is higher at sites deeper than 3 m, especially abundance of larger colonies.
- Abundance of small stony corals, *Siderastrea spp.* is much higher on sites shallow than 3 m.
- New hardbottom classification based on frequency of exposure (greater than 60%) on hardbottom shallower and deeper than 3 m. This would change the designation to four classes: Shallow High Exposure, Shallow Low Exposure, Deep High Exposure, and Deep Low Exposure.