

MANATEE COUNTY NEARSHORE HARDBOTTOM AND ARTIFICIAL REEF RED TIDE IMPACT AND RECOVERY

Katy Brown, MS, APTIM, Boca Raton, FL

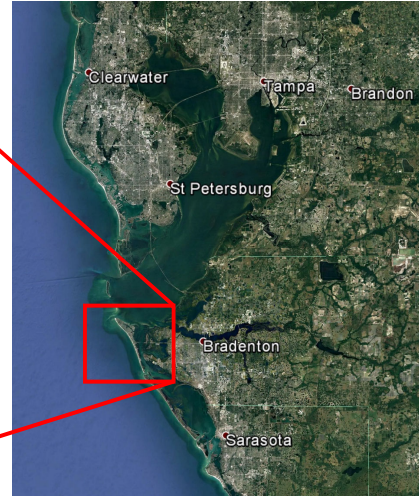
Lauren Floyd, MS, CPE, Boca Raton, FL

Charlie Hunsicker, Director, Parks & Natural Resources Dept. Manatee County

Confidential. Not to be copied, distributed, or reproduced without prior approval.
© 2018 APTIM - All rights reserved.



MANATEE COUNTY BEACH PROGRAM OVERVIEW AND PROJECT HISTORY



MANATEE COUNTY BEACH PROGRAM OVERVIEW AND PROJECT HISTORY



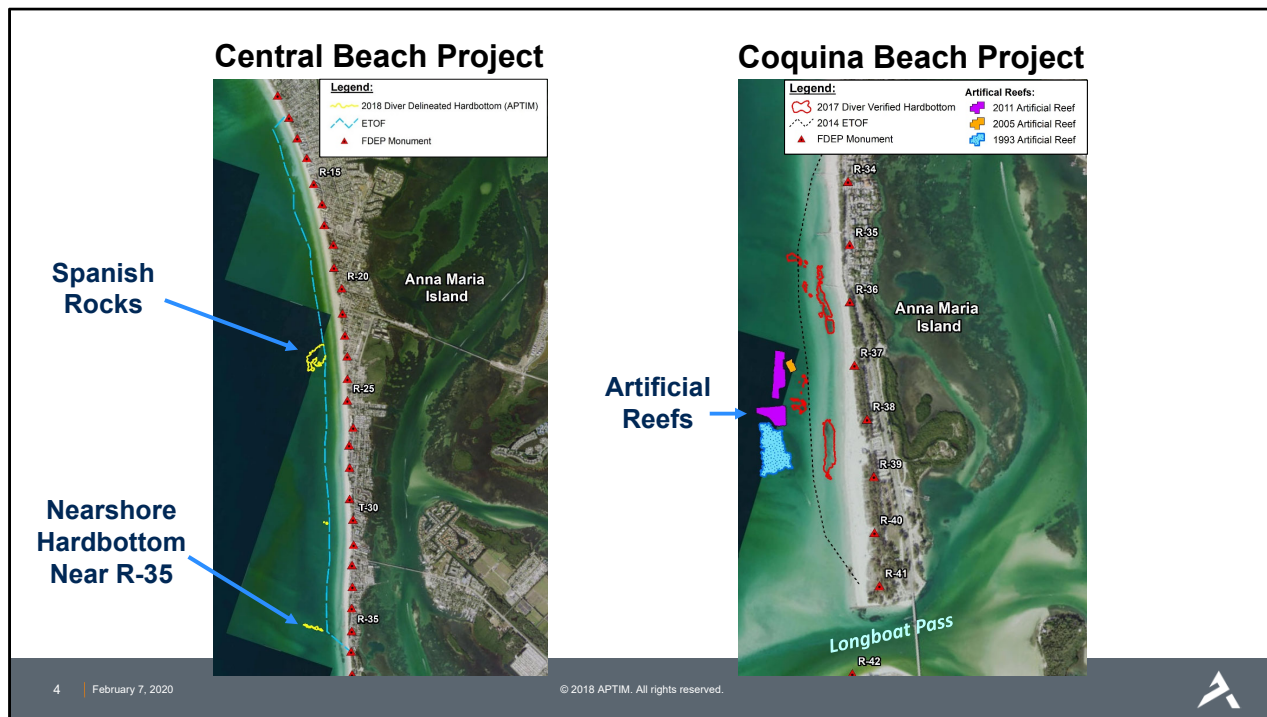
City of Anna Maria

Holmes Beach / Bradenton
Beach (Central Beach)

Bradenton Beach
(Coquina Beach)



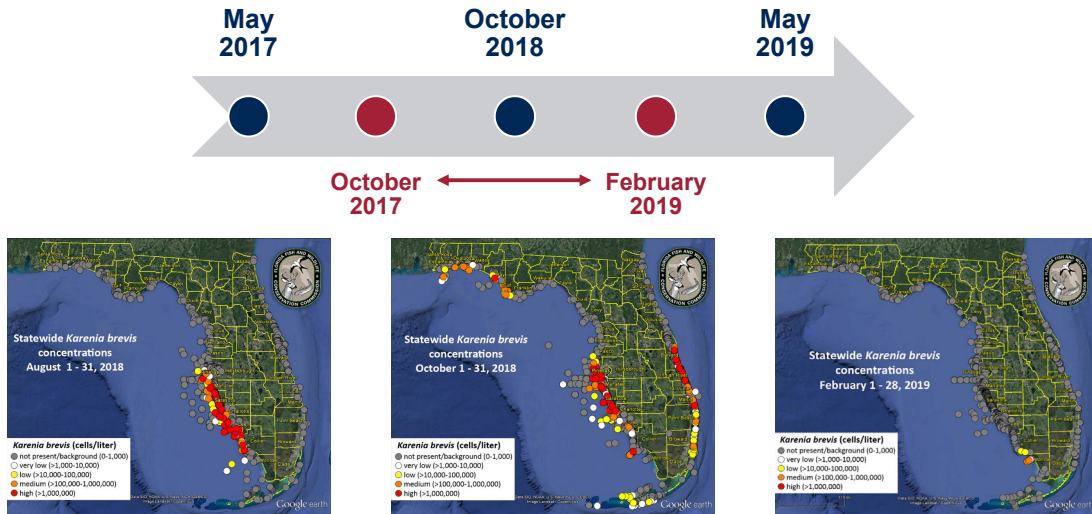
Anna Maria Island experiences historic chronic beach erosion. Today I will reference two established beach nourishment projects that are maintained on the island: the federal Central Beach Nourishment Project, which includes Holmes Beach & Bradenton Beach and the locally sponsored Coquina Beach Nourishment Project, which includes Bradenton Beach south to Longboat Pass.



On the left is a close up of the Central Beach Project Area and on the right is a close up of the Coquina Beach Project Area to the south. Both of these projects have permit required hardbottom monitoring. The map on the right shows 3 artificial reefs that were constructed as mitigation for nearshore hardbottom with the ETOF of these projects and are included in this red tide study. The 1993 artificial reef is shown in blue, the 2005 is shown in orange, and the 2011 is shown in purple. The map on the left shows 2 nearshore hardbottom areas outside of the ETOF that are included in this study.

The nearshore hardbottom within the ETOF of the Central Beach Project has been previously mitigated for by the construction of the 1993 (shown in blue) and 2005 (shown in orange) artificial reefs shown on the right. As part of the 2011 Coquina Beach Project, Manatee County constructed the 2011 artificial reef shown in purple, as mitigation for the nearshore hardbottom within the ETOF.

BIOLOGICAL MONITORING EVENTS



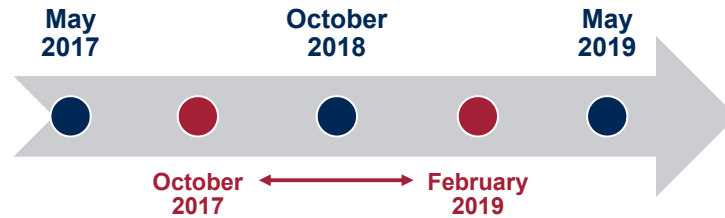
5 February 7, 2020

© 2018 APTIM. All rights reserved.



During the course of the required monitoring for these projects a severe red tide impacted southwest Florida from October 2017 to February 2019. Manatee County began to experience impacts in August 2018. Due to this, our monitoring was delayed until October 2018 when a period of strong east winds temporarily improved conditions enough for divers to safely conduct the survey.

BIOLOGICAL MONITORING EVENTS



- **Nearshore Hardbottom**
 - October 2018 – Central Beach Baseline Characterization (Mid-Red Tide)
 - May 2019 – Central Beach Pre-Con Event (Post-Red Tide)
- **Artificial Reefs:**
 - May 2017 – Coquina Beach 3-Year Post-Con (Pre-Red Tide)
 - May 2019 – Post-Red Tide Subset of Transects

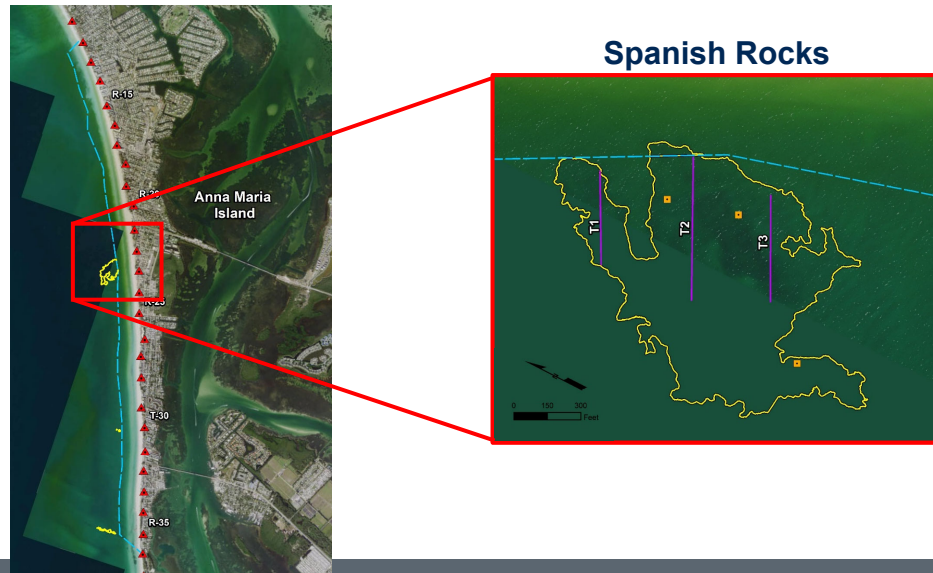


After conducting the 2018 monitoring event, it was clear that the red tide had a severe impact on the hardbottom. Manatee County determined it would be worth putting additional effort into annual monitoring events to specifically document red tide impacts and recovery. So to summarize the sequence of monitoring events. Nearshore hardbottom monitoring included the 2018 characterization followed by the May 2019 pre-construction event for the Central Beach Project. Artificial Reef monitoring included the May 2017 3-Year post-con event for the Coquina Beach Project and in May 2019 a subset of these established transects were revisited for this red tide study.

While the survey methods differed since transects weren't installed until the pre-con event for the nearshore hardbottom, observations, photos, and videos were collected to document mid-red tide conditions.

The following data will be presented in two sections: nearshore hardbottom and artificial reefs.

NEARSHORE HARDBOTTOM



7 February 7, 2020

© 2018 APTIM. All rights reserved.



As mentioned earlier, there are 2 sections of nearshore hardbottom offshore of the Central Beach project that we included in this study. The first area is called Spanish Rocks, locally known as a recreational dive site. In 2018 we conducted a recon level survey based on Manatee County's decision to monitor this area. And in 2019 we conducted the Pre-Con monitoring event and established permanent transects shown on the right.

NEARSHORE HARDBOTTOM



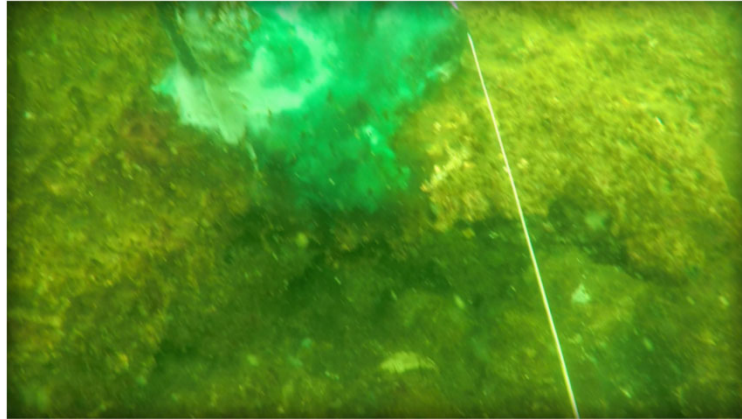
8 February 7, 2020

© 2018 APTIM. All rights reserved.



The second area is near R monument 35 and consists of patchy, low relief hardbottom. Based on the County's decision to mitigate for this hardbottom a baseline survey using temporary transects was done to determine the mitigation required based on UMAM

NEARSHORE HARDBOTTOM MID-RED TIDE (OCTOBER 2018)



Video

Silence (no fish)

Soft bodies organisms (sponges, tunicates, octocorals) in severe stress or absent; sponge layers would slough off if you gently touched them

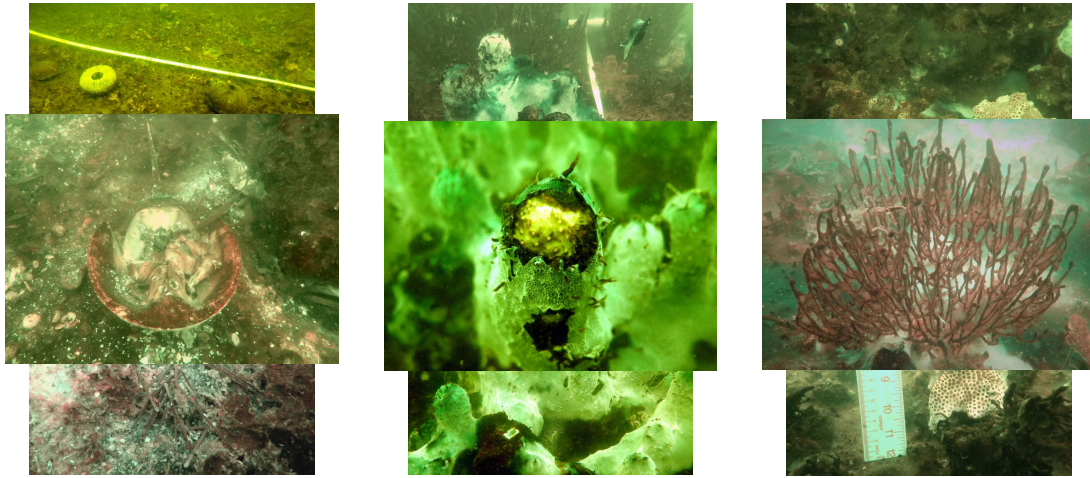
Cyanobacteria blanketing hardbottom

Unknown blue-green/white film on benthos (particular the clionaid sponge *Cliona celata*) - & substrate

Blackness underneath film would suspend in water column

Low visibility, lots of particulates in water column

NEARSHORE HARDBOTTOM MID-RED TIDE (OCTOBER 2018)



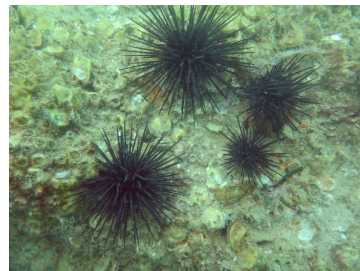
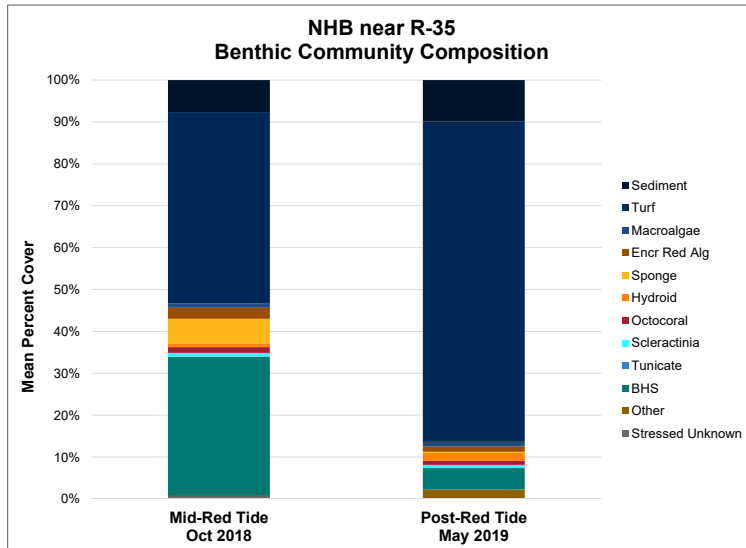
10 February 7, 2020

© 2018 APTIM. All rights reserved.



Here are some more images from the mid red-tide event. Motile invertebrates were severely impacted, there were numerous empty urchin tests, piles of urchin spines, and dead crabs scattered along the nearshore hardbottom. Again here is the clionaid sponge *Cliona celata* we saw in the video completely covered in the unidentified blue-green/white film and in a state of decay. Stony corals showed signs of stress but did not seem as severely impacted as other functional groups. Octocorals, on the other hand were completely smothered in cyanobacteria.

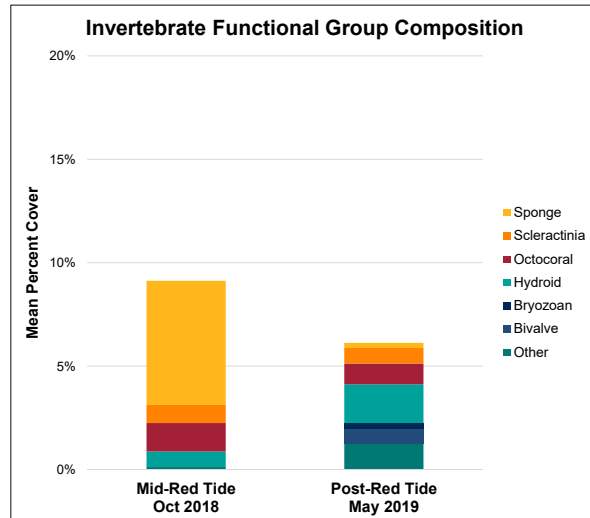
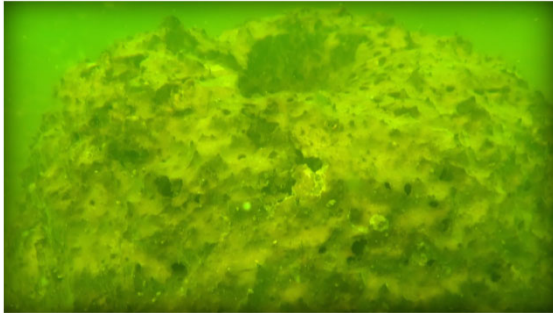
NEARSHORE HARDBOTTOM – R-35



Here we compare the mid-red tide data to the post-red tide data for the nearshore hardbottom near R-35. The chart shows the percent cover of functional groups surveyed using quadrats. During the red tide survey the dominant functional groups included turf algae and bare hard substrate, accounting for nearly 80% of the benthic composition. All of the sponges and octocorals observed during this event were severely stressed (*i.e.*, overgrown with cyanobacteria/dying) and no tunicates were observed. In general, the soft bodied organisms were in states of severe decay during the mid-red tide monitoring event. During the post-red tide survey conducted seven months later, the bare hard substrate cover decreased by approximately 30% as the turf algae cover increased by nearly the same amount.

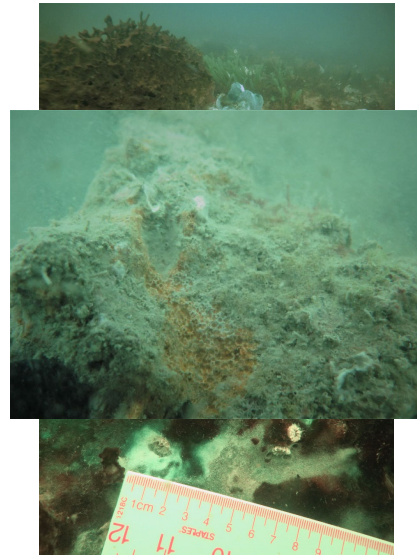
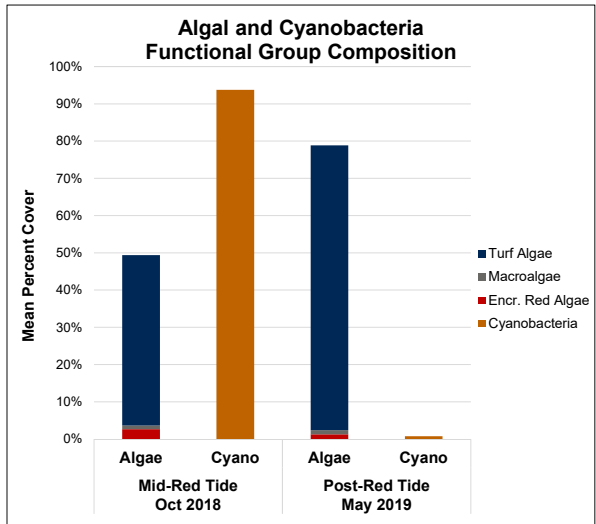
Turf algae dominating during both surveys and the bare hard substrate (limestone, dead bivalves) decreased between surveys.

NEARSHORE HARDBOTTOM – R-35



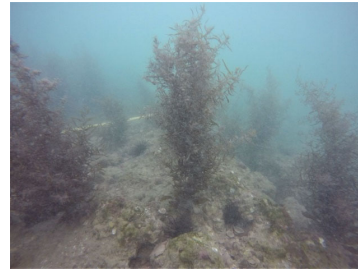
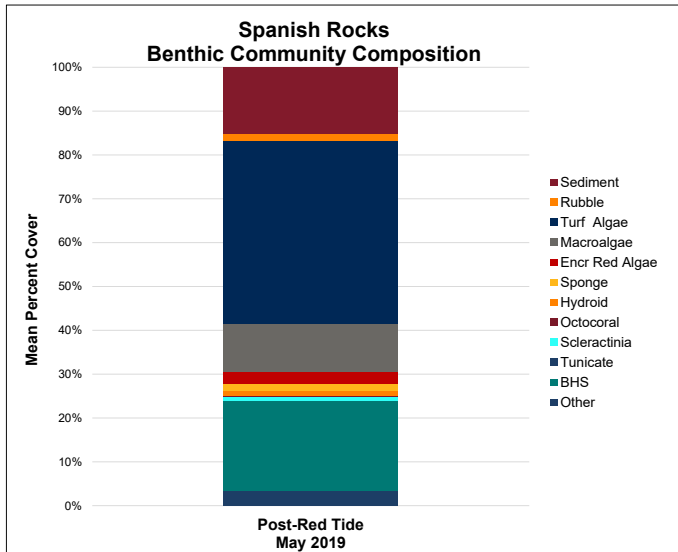
The video here shows a black ball sponge (*Ircinia strobilina*) covered in cyano and in a state of decay. These observations translated to a decrease in sponge cover shown in the graph on the right. Increases in barnacle and bivalve cover were also recorded. The percent cover for stony coral and octocorals did not change to much but the level of stress decreased for both.

NEARSHORE HARDBOTTOM – R-35



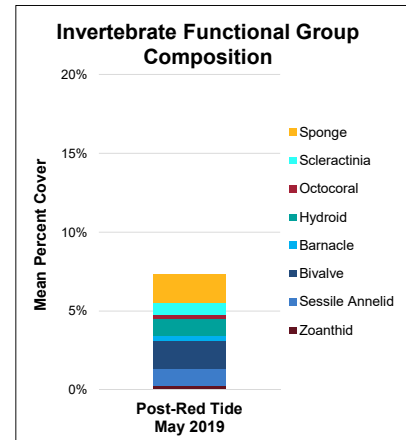
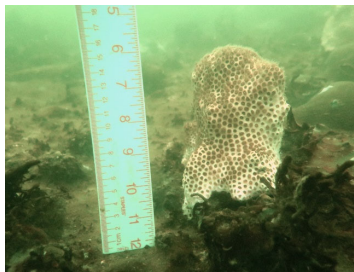
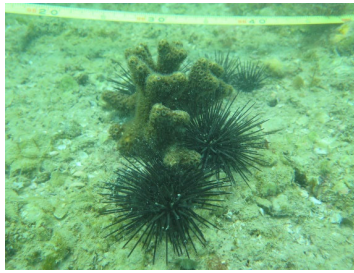
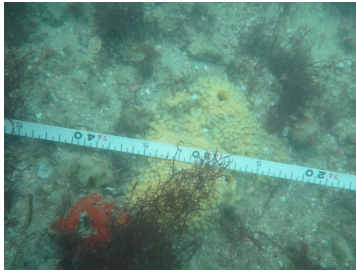
This graph shows the huge decrease in cyano cover between monitoring events. It dropped from over 90%, as you can see in the photos, to less than 1%.

NEARSHORE HARDBOTTOM – SPANISH ROCKS



Moving to the Spanish Rocks area. We only collected quadrat data during the May 2019 pre-con monitoring event and have general observations, photos, and video for comparison to the mid-red tide. Turf algae and bare hard substrate, primarily dead bivalves shown on the right, were the dominant functional groups. We also observed fields of sargassum, shown in the photo, with some individuals reaching 60 cm in height. Cyano that blanketed the hardbottom in October 2018, decreased to less than 1% cover on the hardbottom.

NEARSHORE HARDBOTTOM – SPANISH ROCKS

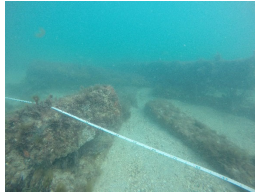


This chart shows the invertebrate functional groups. The sponge and octocoral cover were really low, at less than 2%. Stony corals did not show signs of stress. Bivalves, sessile annelids, and hydroids made up the benthic invertebrate composition. High numbers of rock boring urchins (*Echinometra lucunter*) were observed throughout the nearshore hardbottom.

ARTIFICIAL REEFS

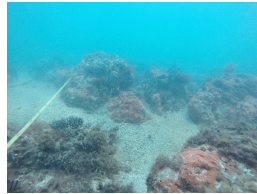
> 1993 AR

- Clean concrete
- 6.6 ac



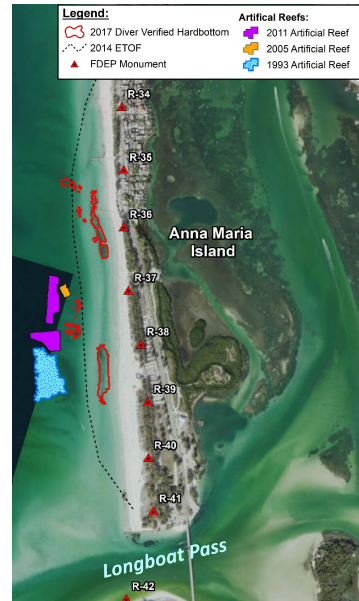
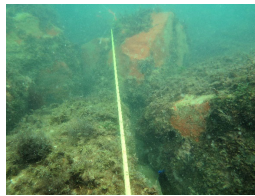
> 2005

- Limestone boulders
- 0.5 ac



> 2011

- Limestone boulders
- 5.4 ac

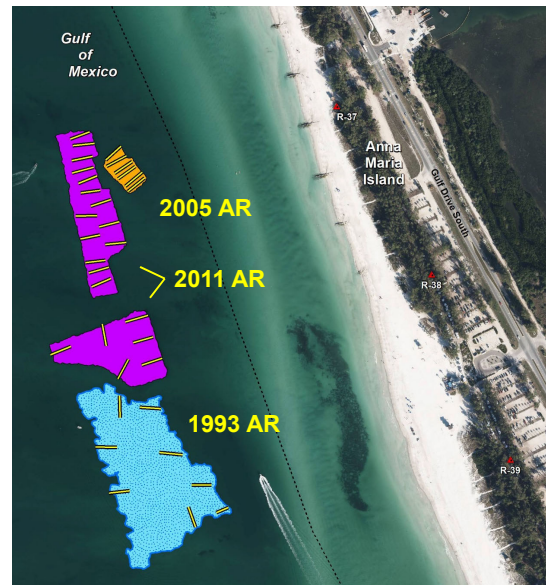


Artificial Reefs offshore of Coquina Beach shown on the map. Representative photos show the typical layout of each reef.

ARTIFICIAL REEFS

Biological Monitoring Events

- May 2017

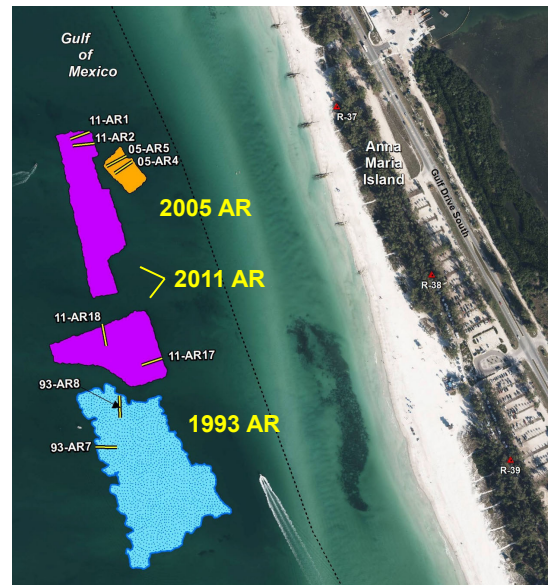


In 2017 these reefs were monitored as part of 3-Yr post-con for the Coquina Beach Project. Permanent monitoring transects were established along each of these reefs.

ARTIFICIAL REEFS

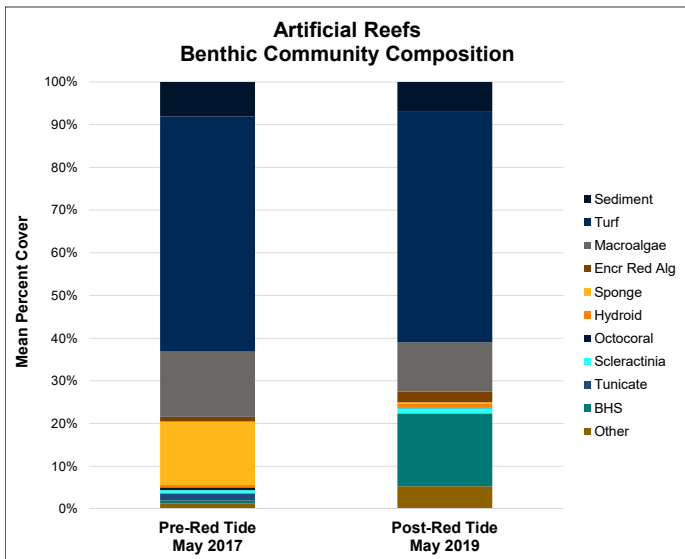
Biological Monitoring Events

- May 2017
- May 2019



In May 2019, we visited a subset of these transects, shown on the map, to collect post-red tide data.

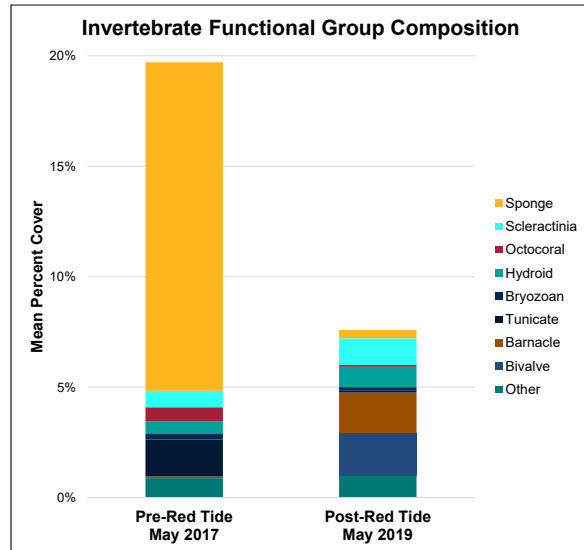
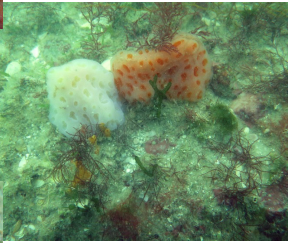
ARTIFICIAL REEFS



The artificial reef data shows similar increases in bare hard substrate, sessile invertebrates, and decreases in sponge and tunicate cover. Large numbers of rock boring urchins were also observed on all 3 artificial reefs.



ARTIFICIAL REEFS



This chart details the 15% drop in sponge cover, of which 11% consisted of clionaid sponges (*Cliona celata* and *Pione lampa*). Tunicate cover decreased to nearly 0% while barnacle and bivalve cover increased.

SUMMARY

- › Decreased cyanobacteria and blue-green/white cover
- › More available substrate
 - Decreased sponge cover
 - Decreased tunicate cover
 - Increased barnacle and bivalve (alive and dead) cover
- › Lower percent of stressed stony corals and octocorals
- › Increase in urchins and other motile invertebrates
- › Fish started to come back
- › Reef noise returning

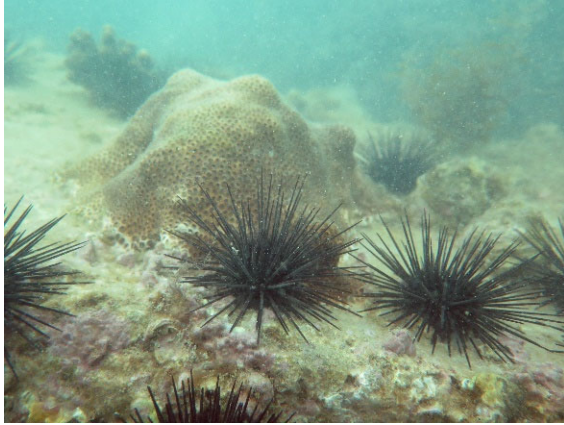


FUTURE MONITORING

- › Central and Coquina Beach Projects - construction Spring 2020
- › Immediate Post-Con Monitoring Event – Summer 2020



Ongoing annual monitoring associated with the County's beach nourishment program will provide continued opportunity to document the recovery of these habitats, which lead to a better understanding of the response and resiliency of hardbottom communities to red tide events.



Katy Brown
Kathryn.Brown@aptim.com
561-361-3181

Lauren Floyd
LFloyd@coastalprotectioneng.com
954-551-2594

Charlie Hunsicker
Charlie.Hunsicker@mymanatee.org
941-737-4765





Expect the Extraordinary.