Shoreline
FLORIDA SHORE & BEACH PRESERVATION ASSOCIATION
A League of Cities and Counties on Beach and Coastal Issues

news from the Florida Shore and Beach Preservation Association June 2018

An Overview of Pinellas County's Coastal Management Program *followed by* The Long Road to Stabilizing Upham Beach

By John Bishop, Ph.D. and Andy Squires, MS., CPM

"There are 35 miles of sandy beaches on 11 barrier islands in Pinellas County. The sand is what attracted many residents to move here, and it attracts visitors from throughout the world."

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Jacksonville District

Pinellas County Shore Protection Project 2018 Construction Update

FDEP Funding Requests and Planning Updates

Updates provided by Rob Buda, Division of Water Restoration and Assistance, and Guy Weeks, Division of Water Resource Management

A note from the Executive Director

June is the gateway to summer (Jean Hersey) and hurricane season! Whether or not the June rains are falling in your area this week, I hope you will find time to read *Shoreline* and maybe even to register early for the Annual Conference. This edition, like last month's, threads in articles about Pinellas County, helping to set the stage for #FSBPA2018. There's also a very interesting article by Tara Brenna (APTIM) about Hurricane Irma impacts to several Florida projects; and you'll find important updates about FDEPs funding request deadlines as well. Thank you to all contributing authors this month!
–Jackie Larson

Save your spot, register now [click here](#)!

About Shoreline

Hurricane Irma Reflections

By Tara Brenner, P.G., P.E.
APTIM

"With the first storm of the 2018 hurricane season already named on May 25, 2018, we should take the lessons learned from past storm seasons, coupled with monitoring data and post-storm assessments to continue to evolve coastal protection designs and improve storm response protocols all for the benefit of Florida's beaches."

Radar image of Hurricane Irma

Save the Date

61st Annual FSBPA Conference

September 19-21, 2018
Hyatt Regency Clearwater Beach

DEADLINES

Call for Abstracts
June 4

Award Nominations
July 31

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August 20

An Overview of Pinellas County's Coastal Management Program

By John Bishop, Ph.D. and Andy Squires, MS., CPM

Pinellas County is the local sponsor for three Federal Shore Protection Projects on the barrier islands (Figure 1) of Sand Key, Treasure Island, and Long Key. The Army Corp is also authorized to nourish, as needed, the remaining portions of these three barrier islands plus the very popular tourist destination of Clearwater Beach located just north of Sand Key. In addition to the federal projects, Pinellas County has also partnered with the Florida Department of Environmental Protection and has nourished the beach at Honeymoon Island State Park and built four low profile semi-permeable rock groins. At the north end of Long Key, the County is currently building four rock groins to stabilize Upham Beach.

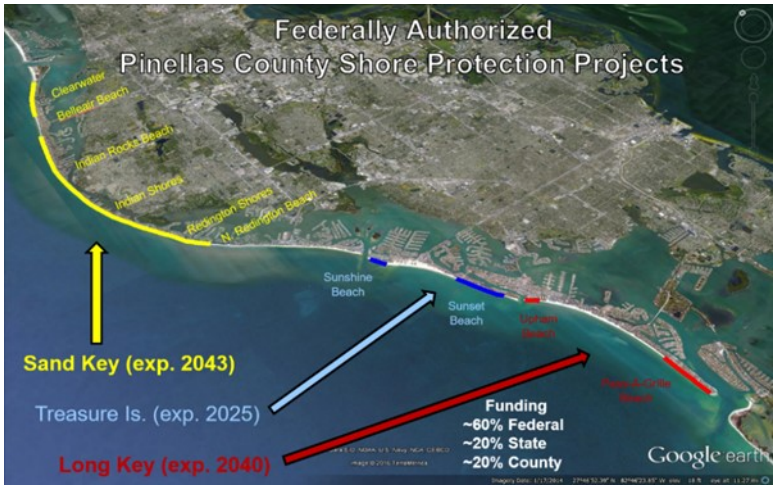

Figure 1. Pinellas County Shore Protection Projects

Figure 2. Federal Shore Protection Projects 2018, Sunshine Beach Segment

Since it began with the initial nourishment of Treasure Island in 1969, the Pinellas County Federal Shore Protection Project has placed a total of 14.1 million cubic yards of sand on the beaches. This totals 58 miles of restored coastline. That same sand volume in today's dollars ($20/ cubic yard) would cost $282 million. The money has been well spent. The County's nourishment and structural projects create a wide stable beach that protects upland infrastructure and private property, restores habitat, and draws tourists to Pinellas County. Figure 2 shows the current 2018 Federal Shore Protection project being constructed.

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An analysis of economic data from 2015 by Research Data Services, Inc. shows that direct spending by beach visitors to Pinellas County totaled $2.3 billion and had a total annual economic impact of $4.6 billion. These tourists also directly supported an estimated 47,000 jobs that paid $145 million in state and local taxes.

Pinellas County is a peninsula with nearly 588 miles of coastline. There are 35 miles of sandy beaches on 11 barrier islands. The sand is what attracted many residents to move here, and it attracts visitors from throughout the world. The beaches are vital to our way of life and the quality of life largely because of the economic support it provides.

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The Long Road to Stabilizing Upham Beach

By John Bishop, Ph.D.

Upham Beach is located at the north end of the City of St. Pete Beach at the southern end of Pinellas County on the west coast of Florida and is directly south of Blind Pass. Since 1873 Blind Pass has migrated 2 km south to its present location where it was stabilized in 1937 by installing a low groin on the southern edge of the inlet. Between 1937 and 1986 additional groins and other modifications were constructed to fully stabilize the inlet to its present condition (Coastal Planning & Engineering, Inc., 1992). In the 1950s, Blind Pass' ebb shoal collapsed essentially cutting off sand by passing to Upham Beach. Since 1980, the erosion south of Blind Pass at Upham Beach has been mitigated with seawalls and beach nourishment. The severity of the erosion is shown in Figure 1 and Figure 2. In Figure 1, the shoreline had eroded to about halfway seaward along the shore perpendicular seawall; in Figure 2, the shoreline had eroded further landward. During the 1990s and early 2000s, typical nourishments varied from 250-350 thousand cubic yards of sand placed along about 2000 feet of beach. However, the majority of placed sand commonly eroded within 2 years following nourishment.

Figure 1. Time laps photo by Nicole Elko Feb 15, 1998

Figure 2. Photo by Douglas W. Mann, P.E., D.CE. 1994

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Figure 3. Photo approximately 2006 after the geotube groin construction is finished

By spring 2018, a total of 2.2 million cubic yards of sand have been placed on Upham Beach at an approximate interval of 4 years. In today's prices ($18.50/CY) that is about $40 million dollars of sand. The need for a more long-term cost effective solution was recognized and has been implemented in stages over the recent decades.

Stabilizing Upham Beach with groins was proposed in the Blind Pass Inlet Management Study (CPE, 1992) as a way to mitigate the excessive erosion that this beach endures. This option was popular with local residents and an application for a permit to install structures was submitted to Florida Department of Environmental Protection (FDEP) that same year. In 1997, Jim Terry (Pinellas County's Coastal Manager) expected groin installations within 12 months; ultimately, it took much longer. The first two attempts to permit a structural solution failed because FDEP was concerned about potential adverse downdrift impacts. In the end, it was the temporary solution of installing geotextile tube groins to "field test" the effects of structural stabilization on the neighboring beach that was approved (Elko, 2008). The final permit application submitted in 1999 was approved February 28, 2003. The Final Order for the FDEP Joint Coastal Permit was issued to install five temporary geotextile tube groins and place 330,000 cubic yards of sand. Two years later, the project began and was completed in 2006 (Figure 3).

The initial success of finally installing the groins was short lived, between 2008 and 2014, the project was vandalized on multiple occasions and several of the tubes were cut opened deflating the impacted tubes. Damages by vandalism and expected wear and tear required repair or removal of some geotextile tubes on four separate occasions in 2008, 2012, 2013, and 2014. Figure 4 shows the state of the groins after five and a half damaged tubes were removed in 2016. The need to replace the temporary geotextile tubes with a more permanent solution was evident.

Figure 4. May 06, 2016 Post Geotextile tube removal.

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The University of South Florida (Wang and Roberts, 2009) reported that the downdrift beach had no observable negative impact from the installation of the geotextile tube groins. USF also reported that the downdrift beaches were slightly accretional due to the nourishment sand eroding from Upham Beach.

Figure 5. Progress photo August 18, 2017

In 2010, Coastal Planning & Engineering, Inc. (CPE) modeled four alternative rock groin designs with input from stakeholder meetings and lessons learned from the effects from the geotextile tube orientation. The design that was ultimately chosen included four rock structures in a slightly different configuration than the temporary geotextile tubes (Figure 6).

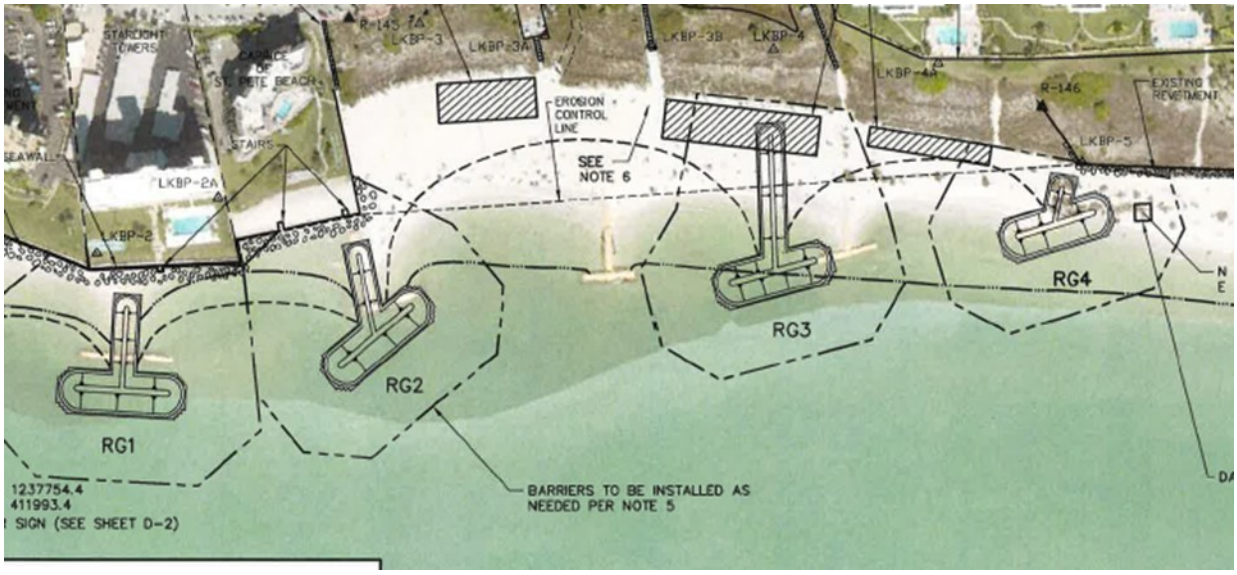

Figure 6. Rock groin configuration

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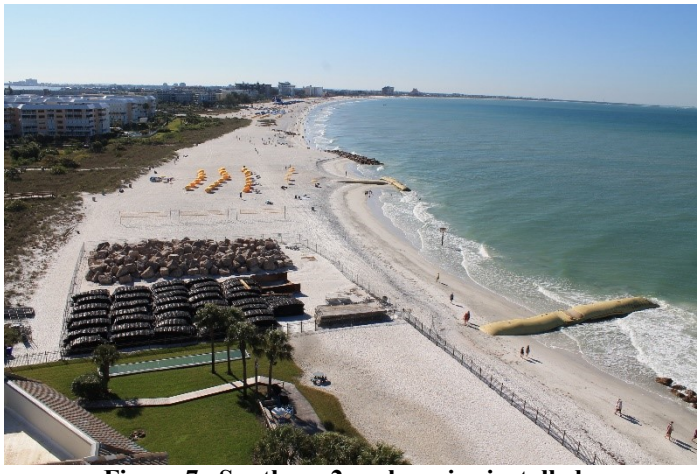

Figure 7. Southern 2 rock groins installed

In September 2011, the County applied for a permit from FDEP to remove the five geotextile groins and install four permanent rock groins. On December 13, 2016, after two bid attempts, the contract to build the groins was awarded to Weeks Marine Inc. with Luhr Bros., Inc. subcontracted to supply the rock and complete the site work. They began excavating for the first groin on August 17, 2017 and were forced to demobilize from September 5th to 18th due to Hurricane Irma. The contractor constructed two of the four rock groins before demobilizing again due to the onset of winter conditions that prevented rock from being barged from Missouri down the Mississippi River. The photo in Figure 7 taken April 5, 2018 shows two installed rock groins with the fenced work area in the foreground where materials for the groins are stored. The contractor remobilized to the site and resumed work on May 18, 2018. The two remaining rock groins are currently scheduled to be finished by early July 2018.

The success of this project is important to the County because it will provide lasting protection to Upham Beach Park. The temporary geotextile groins have reduced the volume of sand placed on Upham beach per nourishment event from a range of 250-350 thousand cubic yards to approximately 160 thousand cubic yards, saving the Army Corp, State and County millions of dollars. It's expected that the reconfiguration of the rock groins being installed will lengthen the nourishment interval by 1 to 2 years creating further savings. This project is a good example of how structures can create a more cost-effective nourishment project.

Thank you to Andy Squires, Pinellas County; Tom Pierro and Michelle Pfeiffer, APTIM; and Nicole Elko, Elko Coastal Consulting, Inc. for reviewing and editing this article.

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Hurricane Irma Reflections

By Tara Brenner, P.G., P.E.
APTIM

With the start of the 2018 hurricane season upon us, it's a good time to consider the lessons learned from the active 2017 season and plan for continued coastal management improvements. This article will build upon 'Hurricane Irma Observations' from the November 2017 issue of Shoreline and give additional details related to Hurricane Irma impacts in a few contrasting project areas. As Tom Pierro and Lindino Benedet discussed in that summary, storm surge models, though improving, are limited by the reliability of the atmospheric inputs into the models. Although model reliability improves as the storm approaches, coastal managers often must make important decisions regarding storm protection long before the models are showing certainty. For this reason, it is important for those charged with coastal management to reflect on past storms as a frame of reference from which to use best judgement for management decisions during the critical times before and after future storms.

Damaged gas station in Collier County post-Hurricane Irma, September 2018

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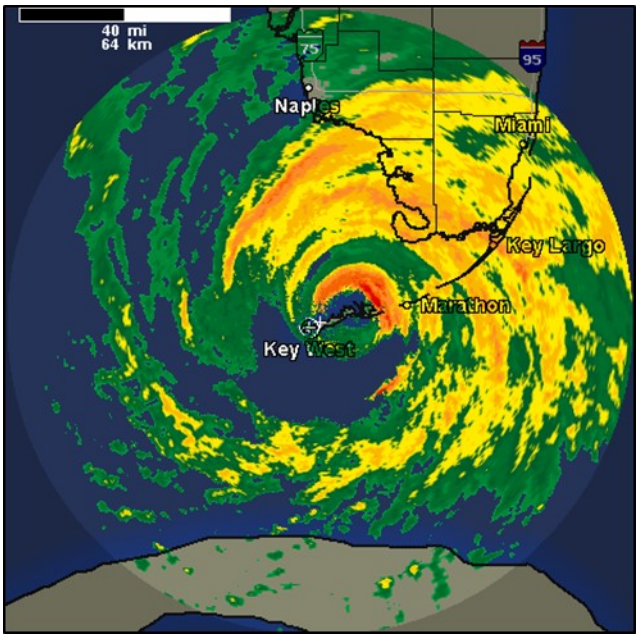
There tends to be a repeated pattern in the phases of human storm response. Initially, there's interest as the forecast starts to show a likelihood for a tropical depression. For example, we may tune into the news channels more frequently than we would on a typical day. As more information pours in, news reports about the potential storm event can lead to confusion, because the information can be conflicting and create an uncertainty about what information source to trust. Depending on the delivery of the information, some will prepare while others will wait it out. Eventually, as the storm becomes imminent, some level of panic will become unavoidable. As the storm approaches, calls for evacuation are made on both an individual basis and by declaration. As time passes, evacuations occur, and wherever you've ended up, it is time to hunker down, and wait out the storm. While this is often referred to as the "hurricane party", it's the start of the most critical phase of the storm. Once the storm passes, there's an emergence to see what the immediate storm damages are. There's likely to be no power, no air conditioning, flooding, and often limited communication. Soon after, coordinated efforts for assessment begin, which are often focused in coastal areas. Based on the assessments, priorities are set for clean-up efforts to restore normalcy to an area. Once an area is cleaned up, it is time to make plans for recovery, to repair damages, and consider improvements to prevent future damages. Coastal professionals, we will not change the public's natural response to storms, but we can work as an industry to improve the flow of information, collect appropriate data, and coordinate for efficiency during the post-storm phases.

Hurricane Irma

After a few days as a tropical storm, Hurricane Irma developed and became a Category 1 hurricane in the Central Atlantic region, west of Cape Verde Islands, on August 31, 2017. Over the following week, Hurricane Irma moved west and gradually strengthened, reaching St. John's, Barbuda, Anguilla, British Virgin Islands and San Juan on September 6, 2017 as a catastrophic Category 5 hurricane. On September 8, the Category 5 Hurricane Irma moved over Turks and Caicos Islands, reaching Cuba on the following day. The interaction of the hurricane with land in Cuba resulted in a slight reduction of its strength from a Category 5 to a Category 4 hurricane.



Radar image of Hurricane Irma taken at the time of land-fall in the Florida Keys, 9:10 am EDT September 10, 2017 (source: https://www.wunderground.com)

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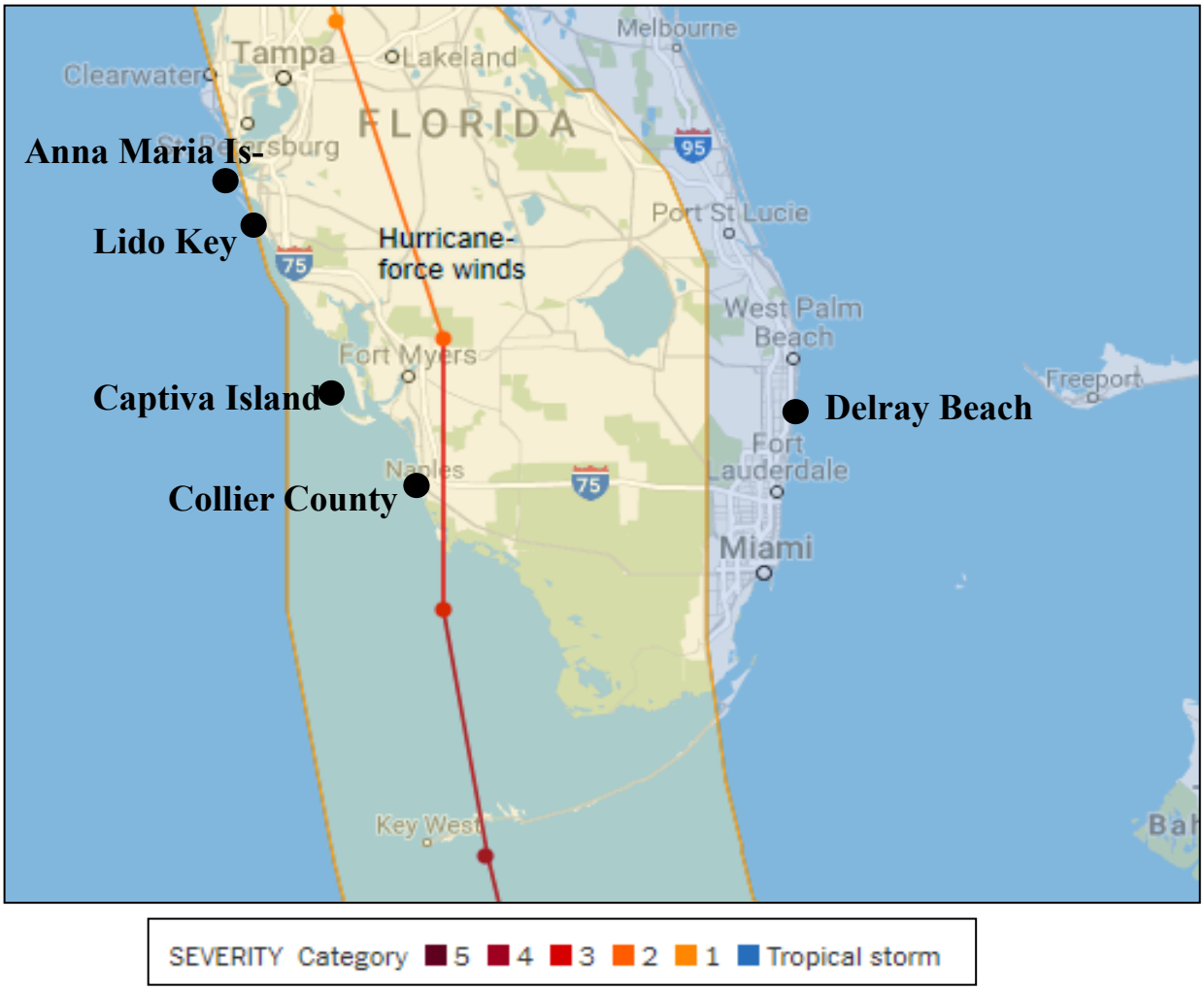
Following a sharp turn to the north on the early hours of September 10, 2017, Irma started its move towards the Florida Keys and Florida Peninsula as a Category 4 hurricane. The eye of the hurricane passed over the western Florida Keys on September 10 around 8 a.m. and reached Marco Island, Collier County, FL, by 3 p.m. as a Category 3 hurricane. By 8 p.m., the center of the hurricane was past Collier County and located east of Fort Myers, as a Category 2 hurricane. Within the following day, Irma continued to move north towards Gainesville, reducing its severity to tropical storm and reaching Columbus, GA, late at night. Overall, the state of Florida was impacted by tropical storm force and greater winds for three full days.

Due largely to Irma's path and intensity, storm effects occurred from coast to coast throughout the state. In the following paragraphs, observations are presented from selected projects to compare and contrast impacts that occurred during Irma. All of the following projects have active coastal management programs and engineered beaches. Established communication between project partners led to quick assessments, efficient clean-up efforts and laid a foundation for recovery planning.



Project locations and Hurricane Irma storm track
(Source: National Weather Service; www.nytimes.com)

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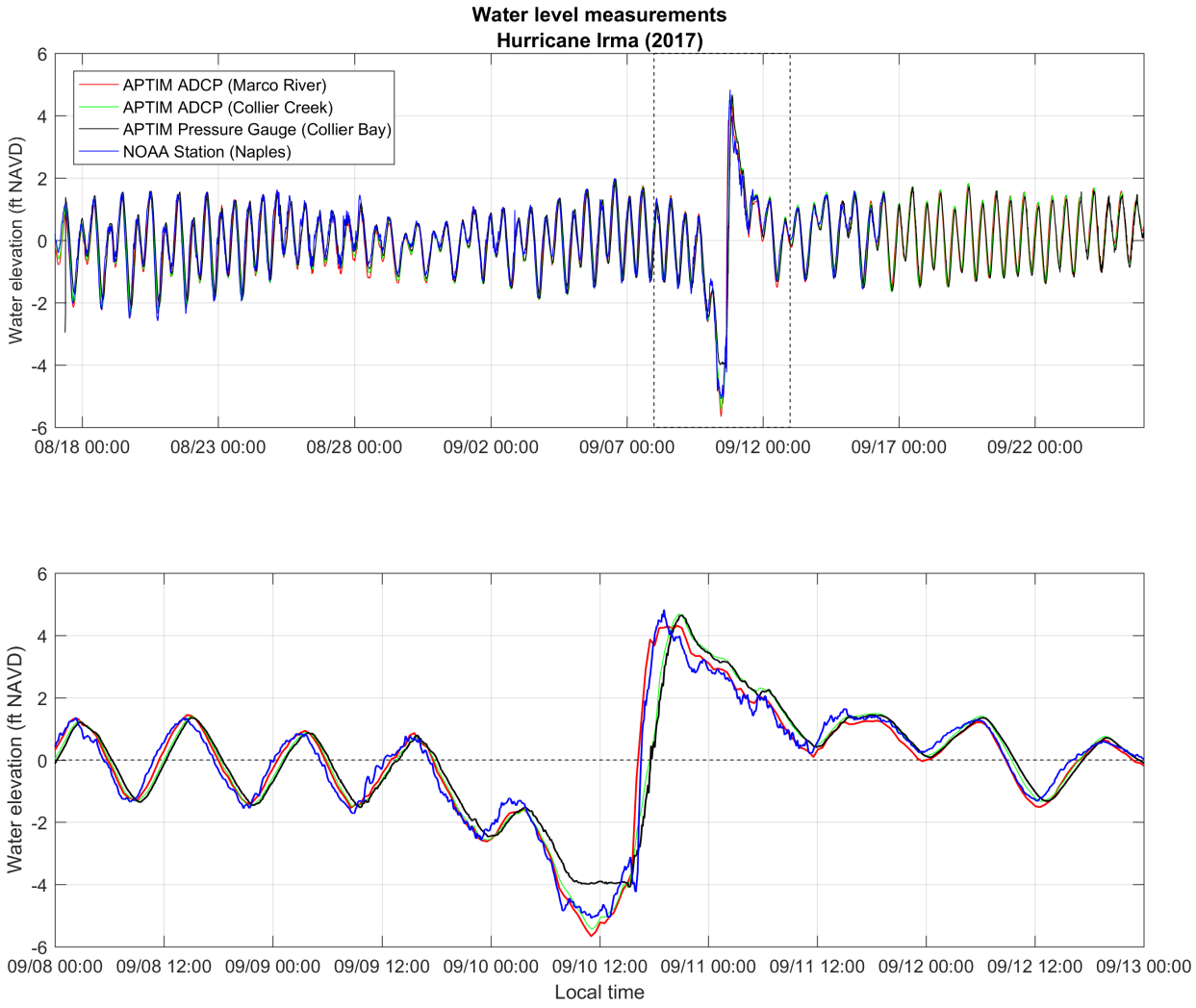
Collier County

Collier County is located on the southwest coast of Florida and was where Hurricane Irma made landfall on mainland Florida. Irma traveled through coastal Collier County on an alongshore track. The day prior to making landfall, winds were blowing from the NE quadrant (offshore), pushing the water away from the coast and causing water levels to drop in the coastal and inland waterbodies. As the eye moved northward, the severe hurricane force winds sharply shifted direction from offshore to onshore, pushing water back towards the coastline and bays. The large volume exchanges in a short period of time resulted in extremely high currents in the connections between the coastal and inland water bodies (i.e. inlets and channels).



Water levels in Collier County (APTIM)

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The post-storm assessment site visit was conducted on September 14th, four days after the passage of Hurricane Irma in Collier County. With a Category 3 hurricane making landfall on Marco Island, significant losses were expected. During the site visit, the beach was observed to be scoured and low with a recessed and narrow beach width, and widespread overwash evident in the dunes. Once the post-storm (full profile) surveys were available for analysis, it was determined that much of the apparent sand losses observed from the dry beach, had been deposited in the bar system landward of the depth of closure, or had been moved by alongshore currents outside the project area. The track of the hurricane created moderate wave heights in Collier County (just under 5 feet at APTIM's Marco River gauge) and a tidal rise of over 8 feet within 3 hours based on two local tidal gauges (NOAA at Naples Pier and APTIM at Marco River). These conditions caused overwash and significant berm and dune erosion, but the lack of prolonged wave action led to relatively weak cross-shore and offshore forces. The resulting deposition of eroded material within the submerged portion of the active profile was not observed by visual observations during the initial post-storm assessment but was identified in the later beach profile surveys.

Post-storm assessments of Collier County's beaches

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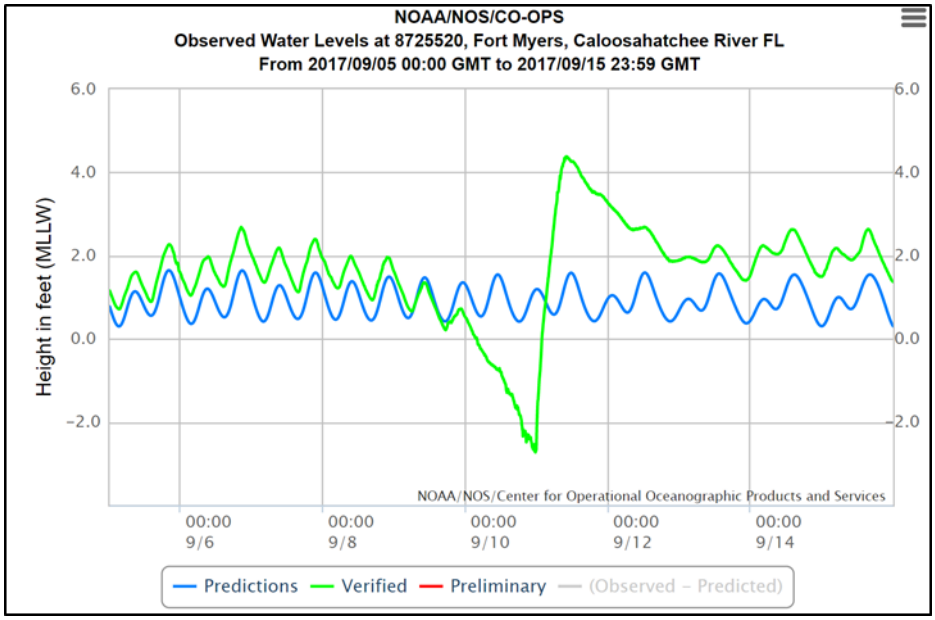
Captiva Island

Captiva Island is a barrier island approximately five miles long located in Lee County in southwest Florida. Hurricane Irma made landfall approximately 80 miles south of Captiva Island. The storm surge, waves and winds created by the storm impacted the island, resulting in loss of sand from the Captiva Island project area. Similar to water levels observed throughout southwest Florida, Captiva Island experienced a draw down during the day before the storm and a rapid increase in water level of about 7 feet as the storm passed.



Water levels at Fort Myers, FL between September 5 – September 15, 2017

(http://tidesandcurrents.noaa.gov, November 2017)

Visual observations and surveys showed that the storm caused shoreline retreat, deflation and sand loss on Captiva Island. Like Collier County, the initial estimates were based on visual observations, which suggested a significant impact to the beaches. Once the full profile survey data was analyzed, the measured changes were calculated to be approximately 34,000 cy and profile evaluation revealed that much of the material that eroded from the upper beach was retained in the nearshore trough and bar.

Lido Key

The Lido Key Beach Nourishment Project area is on Lido Key, an island located within the City of Sarasota on the west coast of Florida. Lido Key is located between New Pass and Big Sarasota Pass, and is 2.57 miles long. Lido Key is a man-made island, initially constructed in the 1920's by filling in the area between a set of small islands. Hurricane Irma made landfall approximately 110 miles south of Lido Key.

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Similar to water levels observed in the other west coast projects, Lido Key experienced a draw down during the day before the storm and a rapid increase in water level of about 5 feet as the storm passed (water levels at Port Manatee, FL, http://tidesandcurrents.noaa.gov, NOAA, 2017). As a result of the storm, Lido Key sustained impacts to the beach and dunes resulting in a measured volumetric loss of approximately 37,000 cy. Infilling of the nearshore trough occurred in some areas, and in others, the nearshore bar was lowered and shifted further offshore. The beach was in a relatively low and narrow state prior to the storm, which may have contributed to the conditions that allowed water levels and wave impacts to reach the dunes.

Dune damages observed post-storm

Manatee County

Manatee County is located on the west coast of Florida, south of Tampa Bay and has a 7 mile barrier island named Anna Maria Island. Hurricane Irma made landfall approximately 125 miles south of Anna Maria Island. Similar to water levels observed in other west coast projects, Mantee County experienced a draw down during the day before the storm and a rapid increase in water level of about 5 feet as the storm passed.

Storm damages were assessed in two project areas on Anna Maria Island, the Central Beach and Coquina Beach. The Central Beach project area occupies approximately 4.6 miles of the Anna Maria Island shoreline in the central region of the island, and Coquina Beach project area is located along the southern 1.5 miles of the island. The estimated storm losses to the Central Beach project were approximately 38,000 cy with less obvious changes to the dry beach and nearshore area than experienced in other locations. The nearshore bar was lowered and shifted further seaward as a result of the storm, yet remained within the active profile.

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The Coquina Beach project area, located south of the Central Beach project, and adjacent to Longboat Pass, was inundated with high water levels as evidenced by distribution of wrack on the upper berm. The project area lost approximately 47,000 cy due to the storm. Generally, losses occurred on the seaward portion of the beach, while the dunes only sustained isolated impacts.

Post-storm assessment of Coquina Beach

Delray Beach

In contrast to the other project examples, The City of Delray Beach is located on the southeast coast of Florida, within Palm Beach County. During the days leading up to the storm, models were predicting the direct hit would occur in Delray Beach. As a Delray resident with our roof under construction as the storm advanced, my family and I found solace in the comfort of our friend's home in Georgia. Thanks to the newscasters reporting from Delray's beaches we were able to keep an eye on the storm conditions from TV.

September 8 Newscasters reporting from Delray Beach

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In reality, the storm made a turn to the north later than predicted, and Delray was spared from the direct hit as Irma traveled into the Gulf of Mexico. Despite making landfall on the west coast, storm surge and increased wind and wave activity had significant impacts along the east coast of Florida. Measured wave data immediately offshore of the Delray Beach project area was not available, but based on NOAA Global WAVEWATCH hindcast data obtained approximately 5.5 miles offshore, the significant wave heights were estimated between 28 and 30 feet during the peak of the storm.

Immediately post-storm, visual observations were made and coordination with project sponsors began. A joint beach assessment was conducted by the City of Delray Beach, Palm Beach County, FDEP, USACE and APTIM on September 16th. Post-storm, the beach was in a deflated condition and had lost substantial beach width based on pre-storm and post-storm observations. The high water mark indicated that the beach was overtopped, but was high and wide enough to prevent loss of dunes or damage to upland development.

Post-storm assessment of Delray Beach

The measured post-storm profiles at Delray Beach showed significant impact to the offshore bar, and movement of sand past the project's annual depth of closure. Following Irma, Hurricanes Maria and Jose passed near Florida and caused increased wind and wave activity in addition to storm surge. It may be that the large waves of Irma reconfigured the bathymetry in a way that left Delray Beach vulnerable to the subsequent weeks of elevated wave activity, which continued to erode the profile. Between monitoring surveys collected in 2016 and 2017, Delray Beach lost approximately four times more than the typical annual erosion due to the active storm season.

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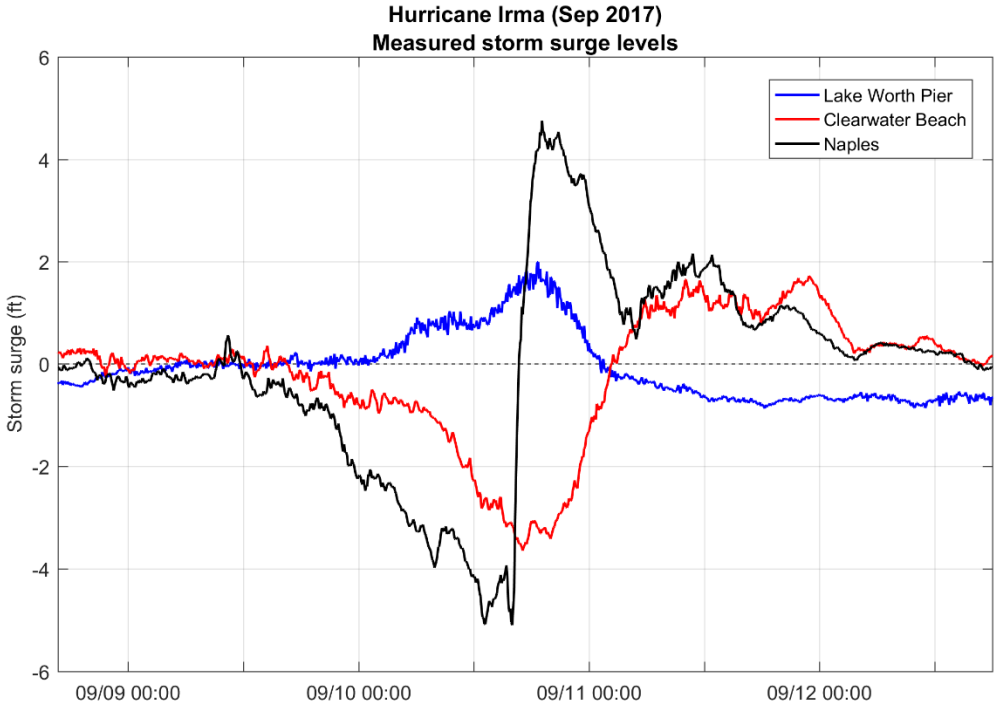
Collective Reflections

- In all cases, quick field response of state and federal agencies was appreciated. Agency representatives were mobilized and meeting with local project sponsors within days of the storm passing. In Collier's case, the post-storm assessment occurred even before power and gas stations were operational.
- Within all of these examples, an active beach management program is in place. Lido Key had a narrow beach at the time of impact, which may have allowed more dune impacts than would otherwise be expected. Whereas Delray Beach was mid-renourishment cycle and withstood more extensive erosion.
- In a broad sense across southwest Florida, storm surge level and wave height were those of a fairly low return interval storm (common), while other parameters such as currents and tidal fluctuations were a much higher return interval storm (rare).
- Overall, measured observations varied from initial storm impact assessments. Now that more data is available post-storm, it appears that damages were highly dependent upon storm track, approach angle and duration. Collier experienced intense conditions, but for a short duration and an alongshore angle of approach such that wave forces were short-lived. In contrast, while the storm never made landfall in Delray Beach, the project area endured elevated winds and waves for a long duration resulting in large erosional losses to the entire active profile.



Measured storm surge levels

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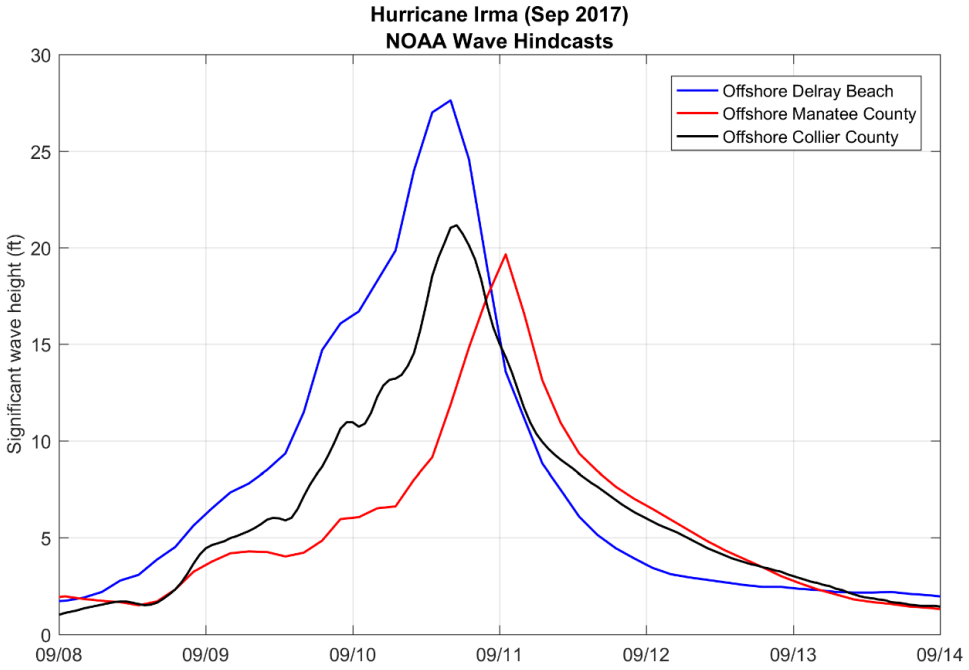

Significant wave heights

With the first storm of the 2018 hurricane season already named on May 25, 2018, we should take the lessons learned from past storm seasons, coupled with monitoring data and post-storm assessments to continue to evolve coastal protection designs and improve storm response protocols all for the benefit of Florida's beaches. By working together to maintain our beaches in a healthy state and coordinating closely before and after significant storm events, we can improve the resiliency of Florida's coastal communities for residents and visitors alike.

I would like to thank APTIM's clients in Collier County, Captiva Island, Lido Key, Manatee County and Delray Beach for allowing us to partner with them in maintaining their beaches, and to acknowledge my coworkers Tom Pierro, P.E., D.CE. and Michelle Pfeiffer, P.E. for their contributions to this article.

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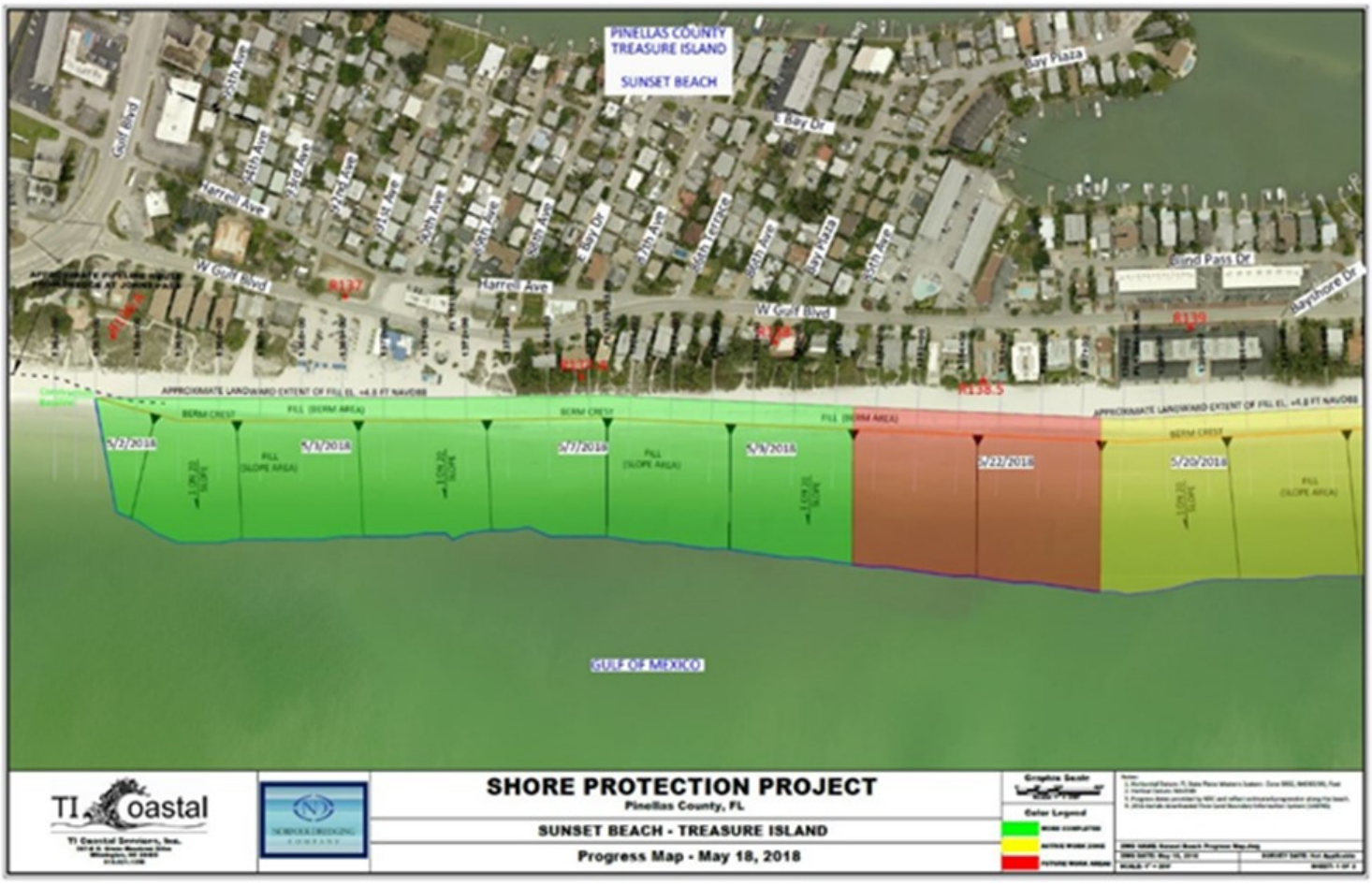
USACE Jacksonville District
Pinellas County Shore Protection Project 2018 Construction Update

US Army Corps of Engineers®

By Gabriel Todaro
Intern, EN-WC
USACE Jacksonville District

The Pinellas County Shore Protection Project consists of 21.8 miles of shoreline along the west coast of Florida. There are three authorized segments (Sand Key, Treasure Island, and Long Key) that are maintained by the federal government in a cost share agreement with Pinellas County. Sand Key is the northern most segment of the project and consists of 14.2 miles of beach. Treasure Island is the oldest segment of the Pinellas County Shore Protection Project and has been renourished a total of 11 times since its authorization in 1966. Treasure Island is 3.5 miles long and is the shortest segment. Long Key is the southernmost segment and consists of 4.1 miles of shoreline.



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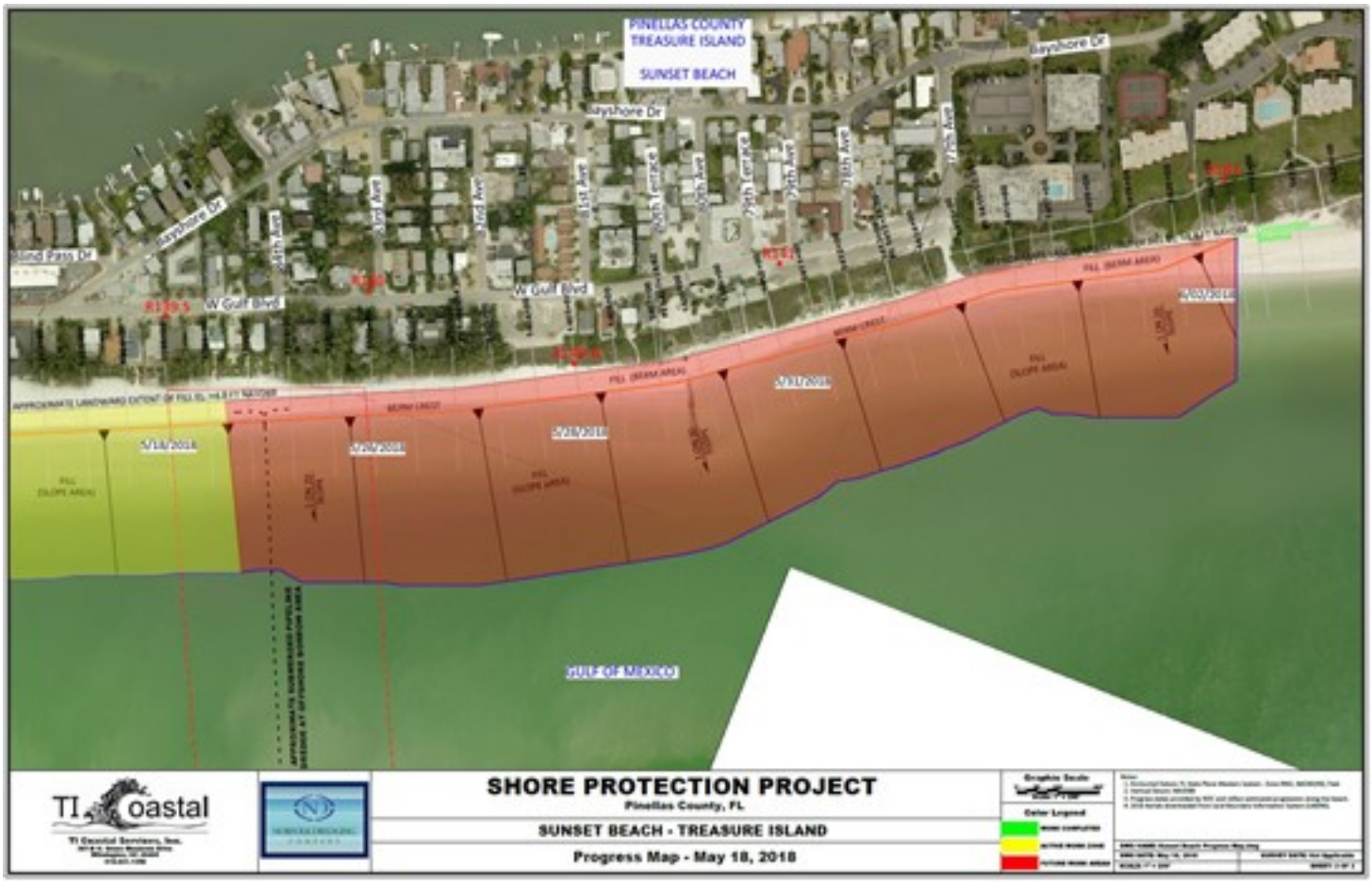
The contract for the 2018 Pinellas County Beach Renourishment was awarded on 27 September 2017 to Norfolk Dredging Company for $36,569,582.00. Norfolk will renourish critically eroded shoreline in Pinellas County using dredge material from Egmont Shoals and Johns Pass.

The work was divided into a base and four options and the award included Options A and B. Norfolk is expected to place a total of approximately 1,000,000 cubic yards of beach-quality material on Sand Key and approximately 63,000 cubic yards of material on Treasure Island at Sunshine Beach.

Construction of 2018 Renourishment commenced in April 2018 and is expected to continue until October 2018. The latest released progress map (Figure 1 below) shows the extent of the work completed on Treasure Island on 18 May. Construction on Treasure Island is expected to be completed in early June. Afterwards, the contractor will shift their focus to Sand Key for the remainder of the project.



Up to date information on the construction activities for the 2018 Pinellas County Beach Renourishment can be found on the U.S. Army Corps of Engineers website at:

http://www.saj.usace.army.mil/Missions/Civil-Works/Shore-Protection/Pinellas-County/

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FDEP Funding Requests and Planning Updates

Updates provided by Rob Buda, Division of Water Restoration and Assistance, and Guy Weeks, Division of Water Resource Management

Expected the first week of June…

The Florida Department of Environmental Protection Beach Management Funding Assistance Program is preparing to announce call for submittals for the **FY 2019-2020 Local Government Funding Request**. The Florida Legislature appropriated $50 million for beach and inlet management projects during the FY 2018-2019 Session. Look for the announcement to be sent to local sponsors and stakeholders during the first week of June.

Available through October 1st…

FDEP's Beach Management Funding Assistance Program will be accepting funding requests for beach and dune repair projects in response to the damages caused by Hurricane Irma. A supplemental appropriation of $11,198,282 was appropriated by the Florida Legislature to assist with the expense of replacing sand losses. The legislation states that funds shall be used as necessary state match to federal funds, or otherwise provide for up to 50 percent of the beach and dune restoration costs where federal assistance is not provided. Counties impacted by Hurricane Irma that are interested in receiving this funding must submit a formal request with a detailed scope of work to Beaches_Funding@dep.state.fl.us by October 1, 2018.

Recently released…

Updates to the Strategic Beach Management Plan, the Department's plan for addressing critical erosion along Florida's beaches, were released on May 15th. For more information, visit the Department's Strategic Planning and Coordination page at https://floridadep.gov/water/beaches-inlets-ports/content/strategic-planning-and-coordination.

Save the Link…

With the 1st named storm of the 2018 Hurricane season making landfall this week, we are reminded about the importance of preparation. Be sure to bookmark FDEP's Hurricane information page at https://floridadep.gov/hurricane for links to Emergency Orders, related sites, and other pertinent information.

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Shoreline

A monthly electronic publication of the Florida Shore & Beach Preservation Association.

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CALENDAR OF EVENTS

FSBPA Conferences

September 19-21, 2018
61st Annual Conference
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