

**PINELLAS COUNTY**  
**COASTAL MANAGEMENT PROGRAM**  
**SUMMARY PLANNING DOCUMENT**

*Prepared For:*

**Pinellas County**  
**Department of Environment & Infrastructure**  
**Engineering & Technical Support Division**

*Prepared By:*

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**A CB&I Company**

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## EXECUTIVE SUMMARY

This document details various aspects of the County's Coastal Management Program (CMP), including its history, program elements, funding needs for the next six years (FY 2012- 2017), and long term planning milestones through FY 2021. In addition, a discussion is included of how other coastal management programs in similar communities are run. Finally, three possible management strategies are outlined for the County with future planning recommendations. The summary planning document should be considered a living document to be updated by the County as needed to include new and changing coastal and programmatic issues.

The information in this document is organized by section as follows:

### SECTION 1: PINELLAS COUNTY COASTAL MANAGEMENT PROGRAM OPERATIONS

#### *History*

Development of the barrier islands in Pinellas County began when the causeways connecting the islands to the mainland were constructed in the early 1900s. By the 1960s, the shoreline had eroded to the seawalls along most of the developed beaches and the water quality of the back bays had suffered from dredge and fill land building practices (Pinellas County Planning Department, 2008a). The erosion and degraded water quality prompted Pinellas County to sponsor their first Federal nourishment project and designate its first aquatic preserve (Pinellas County Planning Department, 2008a; USACE, 1966). In addition, civic activism encouraged the County to purchase its first public beach park on Sand Key, which opened in 1984 (Squires, 2012).

Jim Terry, a surveyor and project manager for Public Works was the driving force in the development of the County's first Coastal Management Plan (Squires, 2011). By the mid-1980s, Pinellas County had participated in seven Federal nourishment projects. In 1985, Terry was appointed Vice Chairman of the Governor's Restore Our Coast Task Force. The task force proposed the first Comprehensive Beach Management Program for the State of Florida, which opened funding avenues and promoted increasing public access to beaches.

The CMP continues to be responsible for coordinating the Federal, state and local shoreline protection projects, monitoring the beaches, and planning for the future of Pinellas County beaches. The County's CMP won the ASBPA's 2009 Coastal Project Award. The award recognized the County's shore protection project which restored 13 miles of its 35-mile shoreline via 29 restoration and nourishment projects over 40 years. The award presentation also noted the two beach parks, one preserve, nine public access parks, numerous public access points and more than 12,000 public parking spaces for beach access (Squires, 2011).

## *Funding*

The Federal government has partially funded the construction of 25 shore protection projects including the construction of nourishments and structures within Pinellas County since 1969 and authorized even more studies of potential projects (USACE, 1984b; 1994; 2010). The Federal Shoreline Protection Project includes Sand Key, Treasure Island, Long Key and Clearwater Beach Island (ASBPA, 2009). The Federal share of the Sand Key, Treasure Island and Long Key projects has varied from 50% to 62.4% since 1969 (USACE, 2010). The terms and expirations of the projects are discussed in *Section 2, Review of Federal Authorizations*.

Maintenance dredging of Federal navigation channels is also partially funded by the Federal government and often coincides with nourishment projects. The Federal navigation channels are John's Pass, Pass-A-Grille Pass and Clearwater Pass. The Federal cost share varies with each project (from 57% to 95%) (USACE, 2010).

The Florida Department of Environmental Protection (FDEP) Beaches, Inlets and Parks Program (BIP's) (formerly the FDEP Bureau of Beaches and Coastal Systems, formerly the Department of Natural Resources, Division of Beaches and Shores) has maintained a comprehensive, long term, statewide management plan for erosion control and beach preservation since 1986 (FDEP, 2011a). The State of Florida's Beach Management Funding Assistance Program provides funding for the management of critically eroded shorelines in Florida. The state provides funding for up to 50% of the non-federal costs associated with eligible projects on publicly accessible beaches (FDEP, 2011a).

Pinellas County funds the remainder of the non-federal costs via the Tourist Development tax, Penny for Pinellas and beach parking fees (Pinellas County Government Online, 2011). One half of one percent of the Tourist Development Tax (a five percent bed tax) is allocated to beach nourishment projects (St. Petersburg/Clearwater Area Convention & Visitors Bureau, 2011). The Penny for Pinellas tax has utilized percentages of sales tax to fund beach nourishment projects since the early 1990s. Local funds are essential to maintaining the elements of the CMP and a critical part of the cooperative agreements with the state and federal government.

## *Recent Operations*

Pinellas County recently completed the construction of the Sand Key Federal Shore Protection Project in November 2012. The \$31.54 million project included the nourishment of 8.7 miles of shoreline on Sand Key (Squires, 2012).

In 2013, Pinellas County has scheduled the construction of the second phase of restoration at the Honeymoon Island State Park (Squires, 2012). The \$5.2 million project includes structures, nourishment, planting and reconstruction of the parking lot.

The beaches at the ends of Treasure Island, Sunshine Beach and Sunset Beach, are erosional hotspots (Roberts and Wang, 2012). Nourishment of Treasure Island and Upham Beach on Long Key occurred in 2010 as part of the John's Pass maintenance dredging (Pinellas County, 2010).

The next nourishment of Treasure Island and Long Key is scheduled for 2013/2014, pending funding availability (McClure, 2011). Repair of the geotextile T-groins at Upham Beach was conducted between November 2010 and July 2011 and included the removal and replacement of several geotextile tubes and scour aprons, patching and the application of a UV coating (CPE, 2011). As a result of the positive performance of the groins and part of continued hotspot management, a joint coastal permit application was submitted to reconstruct the T-groins at Upham Beach, Long Key into permanent rock structures. The permit was issued by FDEP-BIP's on October 30, 2012. Construction of the structures is anticipated to begin in 2013 or later pending funding acquisition (Squires, 2012).

### *Recent Significant Storm Events*

Tropical Storm Debby resulted in severe beach and dune erosion along sections of Sand Key, Sunshine and Sunset Beach on Treasure Island and Upham Beach and Pass-A-Grille Beach on Long Key. Shoreline retreat rates varied from 15 to 30 feet. The storm occurred during the 2012 Sand Key Nourishment on June 24-26, 2012 (Wang and Roberts, 2012).

### *Stakeholders and Partners*

The CMP cooperates and coordinates with many stakeholders affected by coastal management projects including the United States Army Corps of Engineers (USACE), FDEP-BIP's, FDEP Division of Recreation and Parks, Tampa Bay Aquatic and Buffers Preserves Program, Barrier Islands Government Council, Beach Stewardship Committees and the Pinellas County Board of County Commissioners. In addition, the CMP relies on consultants and special organizations including the University of South Florida, the Clearwater Marine Aquarium, Progress Energy and the Audubon Society for their professional services to accomplish its management goals.

## **SECTION 2: FEDERAL AUTHORIZATIONS**

Pinellas County received its first federal authorization for a beach erosion control project on Sand Key, Long Key, Treasure Island and Clearwater Beach Island in 1954 (USACE, 1966). Since that time, Pinellas County has received seven additional federal authorizations for federal nourishments on Sand Key, Treasure Island, Long Key and Clearwater Beach Island, structures adjacent to severely erosional areas and the initial dredging and maintenance of federal navigation channels at John's Pass, North Channel (Pass-A-Grille Pass), Clearwater Pass and the Gulf Intracoastal Waterway.

Following a review of the Federal authorizations, several recommendations were suggested for the CMP to maintain the Federal authorizations for the existing projects. The first recommendation was to continue pursuit of the reauthorization of funding for the Treasure Island Federal project whose authorization expires in 2019. Steps for reauthorization include the following:



- The County should continue pursuit of Federal funding for 50% of the cost of Investigations by the USACE necessary for the reauthorization of the project (\$500,000, requested for FY2012).
- The County will be responsible for the remaining portion of the cost-share for the Investigations estimated at \$500,000.
- Once the funding is available, the County should request the USACE begin Investigations for the reauthorization of funding for the Treasure Island project.
- Assuming the Investigations conclude the project is eligible for Federal funding, the County will be eligible to request Federal funding until 2069.
- If the Investigations or recommendation of the USACE do not result in the reauthorization of Federal funding for the project, the County may pursue Federal funding by requesting direct sponsorship of the project from the USACE, obtaining Federal authorization for a new project on Treasure Island, or using Congressional Adds to get Federal authorizations and appropriations.
- There have been preliminary discussions by the legislature regarding the extension of the project life of all storm damage reduction projects from 50 years to 60 years (Harms, 2012). These discussions should continue to be tracked.

The Federal authorizations could be modified in the following ways to better serve the needs of the Pinellas County CMP:

- Merge multiple project segments into one project for the entire County to avoid the independent schedule of the authorizations. The authorization would need to be included in a Water Resources Development Act bill. Merging the segments may take several years to complete.
- Develop official in-kind services agreement so the County can control some aspects of the Federal projects. This is an important item to have in place prior to any potential future changes in USACE project management, USACE project prioritization, and Congressional support.

If the Federal authorizations cannot be reauthorized or modified to address the County's needs, or if future Federal funding for the County's projects becomes difficult to obtain, the County needs to prepare to take control of the shore protection project. Management responsibilities would include maintaining a design beach, identifying sand sources, addressing remaining hotspots to reduce erosion rates, developing new funding mechanisms and administering contracts.

### SECTION 3: SUMMARY ASSESSMENT OF HISTORICAL AND EXISTING CONDITIONS FOR EACH PHYSICAL CMP ELEMENT

The historical and existing conditions of each element in the CMP are presented in Section 3. The elements include Anclote Key, Three Rooker Bar, Honeymoon Island, Caladesi Island, Clearwater Beach Island, Sand Key, Treasure Island, Long Key, Shell Key, Bunces Key, Mullet Key, Hurricane Pass, Clearwater Pass, John's Pass, Blind Pass, North Channel (Pass-A-Grille Pass), South Channel (Pass-A-Grille Pass), Bunces Pass, sediment borrow areas and artificial reefs. A brief description of each element follows:



Figure ES-1. Anclote Key

#### *Anclote Key*

Anclote Key is a wave dominated barrier island approximately 3.5 miles offshore of the Pinellas/ Pasco County line. The pristine 4-mile island is subdivided into the Anclote Key State Preserve and the Anclote National Wildlife Refuge.

As a result of the loss of seagrass beds, the spit at the north end of the island has grown by more than a half mile since the 1960s (Davis and Fitzgerald, 2004) (Figure ES-1). The southern end of the island accreted from the 1880s to the 1960s due to the landward migration and attachment of swash bars (Davis and Fitzgerald, 2004). As of June 2011, Anclote Key has been designated as non-critically eroded (FDEP, 2012a).

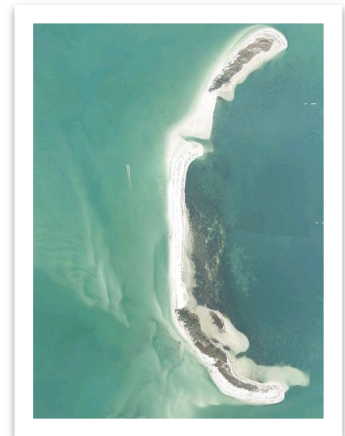


Figure ES-2  
Three Rooker Bar  
(PCPA, 2011)

#### *Three Rooker Bar*

Three Rooker Bar is part of the Anclote Key State Park (Figure ES-2). The island has formed over the past 25 years (Davis and Elko, 2003). The sand supply may have come from the release of sand that occurred after a substantial loss of seagrass beds in the area (Evans et al., 1987). The rapid establishment of upland vegetation has helped stabilize the island. Vegetation was continuous along the spine of the semi-circle island in 1995 (Google Earth, 2012). Overwash during storms caused shoreline recession in the center of the island and loss of vegetation (1998). By 2005, the island had breached near the north end. As the breach widened, the north end of the island eroded to the vegetation line. By 2010, the center of the island was submerged at low tide.

### *Honeymoon Island*

Honeymoon Island is a 3.6-mile long wave dominated barrier island bordered by Hurricane Pass to the south (Figure ES-3). Honeymoon Island was originally the north end of Hog Island, which breached during the 1921 Hurricane that formed Hurricane Pass. In 1969, developers dredged over one million cubic yards of sand and rock directly offshore of the island and placed it along the midsection of the island (Pinellas County Government Online, 2008a; FDEP, 1999; 2008). The southern half of the island severely eroded as a result (Davis and Elko, 2003).

Honeymoon Island was acquired by the state in 1974. In 2008, the County in cooperation with the FDEP's Division of Recreation and Parks completed Phase I of the restoration project which included the reconstruction of a T-head groin near the parking areas and the placement of 140,000 cubic yards of sand from the Hurricane Pass ebb shoal (FDEP, 2006).

In 2013, the County and State anticipate commencing Phase II of the restoration. The \$5.2 million project consists of the construction of three additional T-head groins with fill (at R-8, R-8.5, and R-9), vegetation removal, reconfiguration of the existing parking lot, and removal of 50 feet of an existing submerged groin (near R-8.5). Fill will be placed from R-7.5 to R-9.5, extending the berm approximately 112 feet to 184 feet at an elevation of 4.2 feet NAVD.



Figure ES-3  
Honeymoon Island  
(PCPA, 2011)

### *Caladesi Island*

Caladesi Island is an undeveloped 2.3-mile long barrier island located 1.5 miles offshore of the City of Dunedin (Figure ES-4). Prior to the Hurricane of 1921, Caladesi Island was connected to Honeymoon Island forming Hog Island. The hurricane resulted in the opening of the Hurricane Pass and the splitting of Hog Island into separate islands (Elko and Davis, 2006). Caladesi Island was acquired by the state in 1966 and designated as a state park (USACE, 1980b). In 1978, Dunedin Pass, the island's southern boundary at the time, filled in. After Dunedin Pass closed, Clearwater Island Beach was connected to Caladesi Island.

Caladesi Island has consistently been accretional. In the 1980s, the southern end of the island remained wide as swash bars, formed prior to the closure of Dunedin Pass, moved onshore (Elko, 2001). In the early 2000s, the north end of Caladesi Island rapidly accreted due to an increase in littoral drift from the south (Elko, 2001). Storm overwash is common on the island. Certain sections of the island are



Figure ES-4 Caladesi Island  
(PCPA, 2011)

protected from storm erosion by peat beds formed by mangrove detritus (Elko, 2001). Recently, the middle section of the island, in the vicinity of Dunedin Pass, has eroded, evidenced by a fairly continuous dune scarp (Wang, 2012).

### *Clearwater Beach Island*

Clearwater Beach Island extends 3.3 miles south-southwest of Caladesi Island to Clearwater Pass (Figure ES-5). In the 1960s, the shoreline along the island fluctuated significantly, prompting residents to construct seawalls to protect their property. In addition, the City of Clearwater constructed many groins including a terminal groin to reduce end losses to Clearwater Pass. Several of these groins were included in the first federal beach erosion control project. In 1982, the jetty at Clearwater Pass was extended and the elevation of the beach was increased via federal nourishment (USACE, 1994). Since then, Clearwater Beach Island has not required nourishment.

### *Sand Key*

Sand Key, a 14-mile long barrier island, is bordered by Clearwater Pass to the north and John's Pass to the south. Nine municipalities are located in Sand Key including Clearwater, Belleair Beach, Belleair Shore, Indian Rocks Beach, Indian Shores, Redington Shores, North Redington Beach, Redington Beach, and Madeira Beach. The County has co-sponsored four federal nourishments since the first in 1988. Sand Key has erosion control structures adjacent to the passes at the north and south and a breakwater at Redington Beach. The shoreline near Dan's Island (R-monument 60.25) at the north end of the island continues to erode rapidly. A study of management options for this hotspot is suggested in Section 4.

### *Treasure Island*

Treasure Island is a 3.3-mile barrier island, bordered by John's Pass to the north and Blind Pass to the south (Figure ES-7). By the 1960s, the island was facing serious erosion problems. In response, the City of Treasure Island constructed 56 concrete (originally timber) groins and a rubble mound jetty on the north side of Blind Pass (USACE, 1984b). These groins are no longer present or were buried by beach nourishments.



Figure ES-5 Clearwater Beach Island (PCPA, 2011)

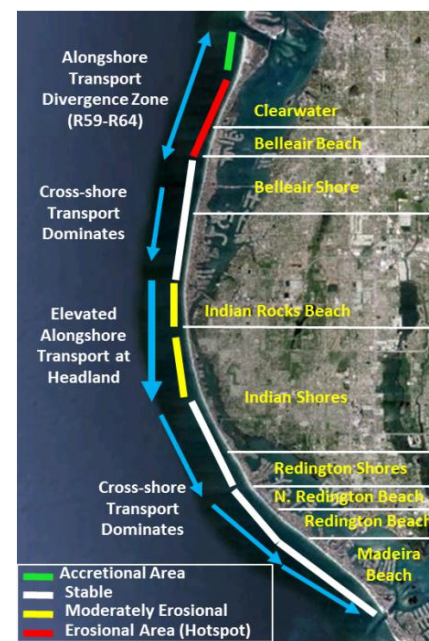


Figure ES-6 Eroding and Accreting areas on Sand Key (Roberts et al., 2012)



The first Federal nourishment project on the west coast of Florida was on Treasure Island in 1969. After the initial construction and repair following Hurricane Gladys, Treasure Island was renourished every two to three years. The material used for the nourishments was sourced from Blind Pass, John's Pass and an offshore borrow area parallel to the island at Sunset Beach. Sunshine and Sunset beaches required frequent nourishment.

Sunshine Beach, at the north end of Treasure Island, is historically erosional as a result of inlet effects. A terminal groin was constructed at John's Pass in 2000 to limit the end losses from Sunshine Beach to the inlet (Krock, 2005). Prior to its construction, the shape and beach width at Sunshine Beach fluctuated significantly.

Sunset Beach, at the south end of Treasure Island, is sediment starved due to the sediment trapping that occurs in the center of the island and wave focusing that results from an offshore borrow area parallel to the island used in the 1960s (Roberts and Wang, 2011). The center of the island accretes in response to sand bypassing John's Pass and migrating onshore. Despite nourishment in 2010, Sunset Beach continued to rapidly erode through early 2012 between FDEP monuments R-137 to R-141.5 (Caddy's on the Beach Restaurant to 77<sup>th</sup> Street).

### Long Key

Long Key is a drumstick shaped barrier island that extends 4.1 miles from Blind Pass to North Channel, Pass-A-Grille Pass (Figure ES-8). Beach management began early on Long Key with the construction of the first terminal groin adjacent to Blind Pass in 1936. The City of St. Petersburg Beach (now St. Pete Beach) armored the rapidly eroding ends of the island with seawalls and groins during the 1950s, 60s and 70s.

In 1980, the island's first Federal nourishment project was constructed on the north end. Periodic nourishment continued on a five-year interval as part of the Federal project. Data indicates the fill eroded within two to five years after construction (Elko et al.). The north end of the island (Upham Beach) was severely erosional, eroding within two years after nourishment. The central segment was accretional and the south end (Pass-A-Grille) was stable.



Figure ES-7  
Treasure Island (PCPA, 2011)



Figure ES-8 Long Key

In response to the erosion at Upham Beach on the north end of the island, five geotextile T-head groins were constructed in 2005-2006 (Figure ES-9). The successful performance of the temporary groins prompted the CMP to begin planning and permitting to reconstruct the T-groins out of rock and make them permanent structures.

### *Shell Key*

The Shell Key Preserve includes a barrier island, a series of mangrove islands, seagrass beds and sand flats (Figure ES-10). The barrier island was formed by the amalgamation of sand bars in the 1950s (ASBPA, 2009). In 1998, the channel flowing through the center of the island closed (Google Earth, 2012c). Over the next ten years, the island stabilized and the line of vegetation became continuous (CPE, 2010).

Pinellas County has leased the preserve from the state since 2000 (Lease No. 4228), with the exception of a few privately owned parcels. The Pinellas County Board of County Commissioners manages the preserve through the County Department of Parks and Conservation Resources (formerly managed through the Department of Environmental Management, Environmental Lands Division).

### *Bunces Key*

Bunces Key was formed from sediments from the ephemeral south channel of the Pass-A-Grille Pass and the Bunces Pass ebb shoal (Wilhoit, 2004). From the 1960s on, the north end of the island lengthened, closing the south channel of Pass-A-Grille Pass and connecting to Shell Key (Wilhoit, 2004). At present, Bunces Key is connected to Shell Key.

### *Mullet Key*

Mullet Key is a V-shaped island at the south end of Pinellas County (Figure ES-11). The north end of the Key contains the historically-significant and recreationally-popular Fort DeSoto Park.

The federal Mullet Key Beach Erosion Control Study was authorized in 1963. Federal nourishment projects using the offshore borrow area were constructed in 1973 and 1977 (USACE, 1980; Pinellas County,

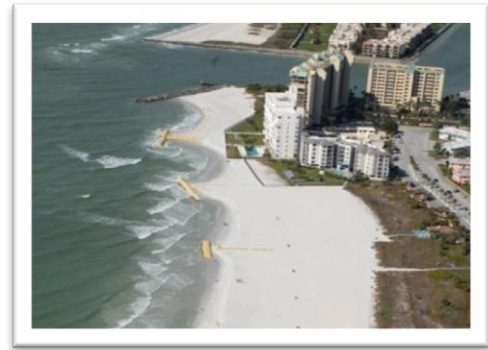


Figure ES-9  
Upham Beach Structures



Figure ES-10  
Shell Key



Figure ES-11 Mullet Key  
(PCPA, 2011)

2011). The 1973 project included the construction of a 1,150-foot long revetment at the south bend of the island. The project was deauthorized in 1990 as a result of a lack of funding obligations (USACE, 2010; USACE, 2009; FDEP, 2008). In response to erosion on the island, Pinellas County partnered with the USACE on a beneficial use of dredged material project at Fort De Soto Park in 2006.

### *Inlets*

Pinellas County has seven inlets. Three of the inlets have federally maintained navigation channels, Clearwater Pass, John's Pass and North Channel (Pass-A-Grille Pass). Five of the inlets and their ebb shoals have been used as borrow areas for nourishments including Hurricane Pass, Clearwater Pass, John's Pass, Blind Pass and North Channel (Pass-A-Grille Pass) (Taylor, 2001; FDEP, 2008; Elko, 2006a). In the past, changes in the tidal prism due to development of the bay area caused destabilization of several of the inlets, resulting in the construction of structures and armoring on the barrier islands adjacent to the inlets. John's Pass and Blind Pass have state approved inlet management plans. Overall, the inlets are managed on an as-needed basis.

### *Sediment Borrow Areas*

Sand resources along the west coast of Florida typically fall within three (3) broad categories: (1) ebb-tidal shoals, (2) shoreface sands and (3) sand ridges (Finkl et al., 2007). For decades, ebb-tidal shoal deposits have been used for beach nourishment projects in Pinellas County. Egmont Channel Shoal is an ebb-tidal shoal located approximately 3.5 miles west of Mullet Key. Egmont Channel Shoal has been used as a sand source numerous times in the past for projects including Indian Rocks Beach Nourishment (1990), Indian Shores Beach Nourishment (1992), Treasure Island Beach Renourishment (1996), Long Key Beach Renourishment (1996) and Sand Key Renourishment (1998 and 2006). The Egmont Channel Shoal Borrow Area has also been previously authorized as the borrow area for Clearwater Beach Island and Mullet Key. John's Pass, Blind Pass, Pass-A-Grille north, and Pass-A-Grille south ebb-tidal shoals have all been investigated by the USACE and used in the past multiple times.

In 1994, the U.S. Army Corps of Engineers (USACE) conducted a sand resource survey offshore of Sand Key to identify sand resources to be used as borrow areas for future nourishment projects (Dial Cordy and Associates, 2002). Over the course of the survey, they identified nine (9) study areas containing potentially beach compatible material. Further analysis of these areas led to the development of twenty (20) potential borrow areas. These borrow areas were developed by the USACE in 2004.

In 2007, Pinellas County requested that Coastal Planning & Engineering, Inc. (CPE) re-evaluate the USACE data for dredgeability and beach compatibility (Forrest et al., 2007). Based on CPE's re-evaluation of the USACE data, the three (3) most promising sources of beach compatible material were Study Areas C, D and H. Upon further analysis, three (3) borrow areas, containing an estimated 72,000 cy of potentially beach compatible material were developed within Study Area D. Three (3) borrow areas containing an estimated 817,300 cy of potentially beach compatible material were developed within Study Area H.

In 2008 and 2009, the County authorized CPE to conduct additional offshore sand search reconnaissance- and design-level investigations (Forrest et al., 2009). These investigations resulted in the identification of three potential sand source areas, labeled J, K, and L. A single borrow area containing 305,300 cy of potentially beach compatible material was developed within Study Area J. A single borrow area containing 1,480,600 cy of potentially beach compatible material was developed within Study Area L. Area L was used as the sand source for the 2012 Sand Key nourishment project.

#### **SECTION 4: NEEDS ANALYSIS AND SCHEDULE OF FUTURE ACTIVITIES**

We have identified needs to be included in the comprehensive management plan based on the analysis of the conditions of the CMP elements. A schedule of future activities has been suggested to address erosional hotspots and ensure continuity and consistency in program management.

##### ***Program Management***

- Identify potential opportunities to align project schedules and save on mobilization costs. The County needs to continue aligning schedules for the dredging of Blind Pass and the nourishment of Long Key.
- Continue to link projects, i.e. Treasure Island and Long Key for construction. Regional monitoring of the combined projects should also be continued.
- Study the value of including or excluding Bellair Beach with the nourishment of Sand Key. The study's findings can then be used to establish and adopt a policy for the case when a non-public section of beach is adjacent to public beaches with plans to be nourished. The best source of funding must also be determined.
- Be prepared to assess the damage, estimate losses and request emergency funding from state and federal agencies. In order for any non-Federal beaches to qualify for FEMA funding, records from monitoring and a beach design template must be kept on file.
- Develop emergency response plans for state parks and other non-federal beaches.

##### ***Honeymoon Island***

- Offshore sand sources for Honeymoon Island nourishments need to be identified.
- An island-wide monitoring program should be initiated.

##### ***Sand Key***

- A sand source needs to be identified for the next Sand Key project, tentatively scheduled in the 2017 to 2019 time frame.



- An analysis of the coastal processes near the hotspot at the north end of Sand Key (Dan's Island) is necessary to identify management options to slow the erosion rate in the area. The analysis may be part of the development of an inlet management plan for Clearwater Pass.
- The necessity and feasibility of removing the Redington Beach breakwater needs to be evaluated.
- The City of Madeira Beach and the County must continue to monitor the Madeira Beach groin system. The groins may require maintenance, safety inspections and performance evaluations.
- The County may need to consider proposing to extend the fill template at their cost as a betterment to the federal project.
- As part of the coastal processes analysis of John's Pass (see Inlet Management section), the performance of the terminal groin at the south end of Sand Key should be evaluated.
- The performance of the nourishment projects at the Headland (R-82 to R-89) should be analyzed to address erosional issues.
- The County should evaluate the benefits of extending pipeline corridors farther offshore of Sand Key into deeper water. This would increase the efficiency of current construction methodologies while adding the potential for additional construction method options in the future, resulting in increased bidding competition from contractors. Investigation and permitting longer pipeline corridors will require sidescan sonar surveys with potential diver verification of hardbottom resources.

#### *Treasure Island*

- A feasibility study including morphology modeling of management options to address the hotspots should be conducted.

#### *Long Key*

- The County needs to continue pursuit of the joint coastal permit to nourish Pass-A-Grille Beach. Additionally, monitoring and design records need to be kept on file for use in requesting emergency funding as needed.

#### *Shell Key*

- The Shell Key Management Plan was released in 2007. The plan may need to be updated as environmental conditions or the intended use of the island changes.
- Funding resources for Shell Key need to be reviewed.

### *Mullet Key*

- The County should continue to take advantage of dredge spoils from Tampa Bay ship channel to nourish Mullet Key and plan projects accordingly.

### *Inlet Management*

- An updated coastal processes analysis of the inlet dynamics at John's Pass needs to be conducted to evaluate the performance of the inlet stabilization structures and their need for modification, the wave focusing on the north end of Treasure Island and the shoaling inside the pass. The study will require wave and morphology modeling. Results from the study can be used to update the inlet management plan (IMP).
- IMPs for Clearwater Pass and Pass-A-Grille Pass need to be developed. Additionally, the management strategies in the Blind Pass and John's Pass IMPs should be updated to reflect current operations and needs. IMPs are a critical component in improving eligibility for state funding. IMPs can be adopted by the FDEP-BIP's and incorporated into the Statewide Strategic Beach Management Plan (SBMP), thus making some management activities eligible for state funding.
- Inlet management plans should consider the impacts of changing the inlet and ebb shoal configurations on the locations of sediment transport divergence and ebb shoal attachment points on the adjacent beaches.
- Hurricane Pass has been a passively managed long term sand source for nourishment projects on Honeymoon Island. The County should consider the maintenance needs of the channel through Hurricane Pass, identify trigger points for maintenance dredging and develop a plan for future dredging.
- Nourishment projects should be planned concurrently with inlet maintenance dredging projects to ensure any beach compatible dredge spoils are placed on the adjacent beaches.
- Several of the undeveloped barrier islands have naturally opening and closing passes or breaches. The County should have a response plan for the potential occurrence of a breach.

### *Sediment Management*

- Pinellas County needs to maintain a regional sand inventory including comprehensive mapping of offshore sediment resources in both state and federal waters. A better understanding of available resources will facilitate design and decision making.
- Further investigation is needed to determine if dredged material from the Tampa Harbor or other Federal navigation maintenance projects could be placed in the nearshore zone adjacent to the Egmont Key gulf shoreline.

- A regional sediment management strategy that uses beach quality sand from upland dredged material management areas and the maintenance dredging of the navigation projects, where possible, should continue to be incorporated into the maintenance of the beach restoration projects.
- An investigation is needed to determine the potential applications and resources available for the use of upland beach compatible sand hauled by truck for small nourishments. A potential application for these sands is to nourish estuary (bayside) beaches.

### *Construction*

- The County should evaluate alternative nourishment construction methods to potentially lower costs and add flexibility to the construction schedule. Contractors with small hopper dredges may be able to dredge large shallow areas or small hills at a reduced cost and during times when other dredges are not available.

### *Environmental Resource Planning*

- Mapping of the nearshore hardbottom in the vicinity of North Madeira Beach needs to be updated to assist in design and permitting of future shore protection projects.
- Projects located within and near the aquatic preserve boundaries require additional protection, including more stringent water quality standards than in non-aquatic preserve waters, during permitting and construction to ensure preservation of the existing conditions.
- The Shell Key Management Plan recommends collaborating with the Environmental Land Division (now the responsibility of Pinellas County Parks and Conservation Resources) to reduce propeller scarring and nutrient loads and to promote healthy seagrass beds around Shell Key (PCDEM, 2007).
- The County should continue to encourage dune restoration of stable beaches by local municipalities and individual owners in order to increase storm protection and improve habitat.

## **SECTION 5: DESCRIPTION OF OTHER COASTAL COMMUNITIES MANAGEMENT PLANS**

### *Manatee County*

Coastal management responsibilities in Manatee County are part of the Marine Resources program under direction of the Department of Natural Resources. The Marine Resources program is responsible for beach nourishment projects on Anna Maria Island's nine miles of sandy beaches, artificial reefs and waterways, Aids to Navigation and abandoned vessel removal. The County's responsibility extends the length of Anna Maria Island from R-1 to R-41

approximately 37,300 feet. There are four public beaches along Anna Maria Island; Anna Maria Bayfront Park, Manatee County Public Beach in Holmes Beach, Bradenton Beach/Cortez Beach, and Coquina Beach. The existing coastal management strategy consists of shore protection in the form of beach nourishment and implementation of well-designed coastal structures with ongoing monitoring programs.

In Manatee County, the engineering, design, permitting, and coordination of beach nourishment projects, and development of artificial reefs is contracted to outside consultants (CPE) with oversight by the Natural Resources Department Director. Three in-house employees work on coastal management.

Federal, state and local sources provide the primary funding for the coastal projects. The local sponsor, Manatee County, provides support through the use of funds dedicated to beach nourishment provided by a one cent sales tax administered by the Tourist Development Council (TDC). Additionally, the County has adopted a Capital Improvement Program, which appropriates the funding necessary to cost share the Anna Maria Island Beach Renourishment Program with the State. The Cities of Anna Maria Island (Anna Maria, Holmes Beach and Bradenton Beach) have also adopted an annual operating budget to fund the Cities' on-going maintenance of the beach and park systems (outside of nourishment costs).

Manatee County assumed control of the Federal project under the provisions of the 1992 Water Resources Development Act (WRDA) which provided for local government project control and Federal cost-sharing on a reimbursable basis. As the non-Federal sponsor, Manatee County proceeded under the authority of Section 206 of the Water Resources Development Act of 1992, Public Law 102-580, with the first periodic beach nourishment project. Section 206 allows a local sponsor, Manatee County in this case, to engineer and construct the beach nourishment project and then receive reimbursement for the Federal share of the project costs. In 2002, USACE reviewed the County's engineering products, issued a permit for the upcoming nourishment project and participated in project cost-sharing.

Coastal protection within Manatee County is a large and complex program with many features and multiple funding sources. Manatee County relies heavily on their consultant to manage their coastal program. Manatee County has seen the benefits of creating well maintained beaches with scheduled nourishment. The Manatee County Natural Resources Department is of the opinion that the present shoreline management strategy is functioning well and they intend to maintain a similar program management strategy into the future.

### *Bay County*

The Bay County Tourist Development Council (TDC), a semi-independent County department, maintains the recreational beaches of Panama City to support the local economy and provide storm protection. The beach management program is managed by one consultant, hired by the TDC who was formally an employee of the County. The TDC and County staff provide in house support to the consultant. The consultant and staff manage the beach nourishment projects, perform monitoring and beach cleaning programs, and provide design and permitting-related

services. In addition, the consultant is responsible for coordinating with stakeholders on behalf of the County.

The Bay County coastline extends 17.5 miles along the Gulf of Mexico. The County includes two state parks, five inlets, a federally authorized shore protection project, and a Federal navigation project. The Panama City Beaches Federal Shore Protection Project was initially federally authorized under the Water Resources Development Act of 1986. The Bay County TDC, on behalf of the County, assumed control of the Federal project under Section 206 of the Water Resources Development Act of 1992, Public Law 102-580. The Panama City Beaches Federal Shore Protection Project has been constructed twice (1999 and 2005) with three hurricane repairs (1995, 1999 and 2011). The strategy of the beach management program is to maintain active permits and have sufficient sand sources available to restore the beach at regular intervals and in response to emergencies.

Project funding is obtained from the USACE, FEMA, the FDEP-BIP's and the Bay County TDC. In addition to the Panama City Beaches Shore Protection Project, the USACE funds the Federal navigation project in St. Andrews Inlet, including maintenance of the jetties. FEMA has funded emergency restoration projects. The local source of funding for beach nourishment projects is a 5% bed tax collected from a special taxing district within the county. Of the 5% tax, 3% is used for the promotion of Panama City Beaches, beach cleaning, maintenance and improvements. Funds from the tourist development tax have been enough to fund nourishment projects and generate reserves.

Bay County would prefer to continue to receive funding from the USACE and the state. However, the TDC has built up reserves to be able to fund projects on its own, at a lower level of service. In an effort to prepare for future projects, the TDC submitted a ten-year multi-use joint coastal permit application in 2011.

### *Collier County*

The Coastal Zone Management (CZM) Department, a department under the Public Services Division, manages the coastal programs for Collier County. With a staff of six employees, the Department's Staff Director administers contracts, conducts construction and maintenance inspections, and performs environmental monitoring. The staff also manages contracts with consultants hired for engineering, permitting, monitoring and construction services. The majority of the staff's time is spent on coastal management related issues.

The Coastal Zone Management Department implements the County's objectives after coordination with several stakeholders. The Board of County Commissioners (BCC), a panel of five elected officials, is responsible for the legislation necessary for the CZM to provide services to Collier County. The BCC is advised by the Coastal Advisory Committee, a nine member appointed committee. The Committee advises the Commission on project priorities and funding availability. In addition, the CZM coordinates with the municipalities of the City of Naples and Marco Island.

The Coastal Zone Management Department is responsible for preserving and protecting Collier County's coastal ecosystem while providing access and complementary facilities. The elements of the program include artificial reef management, beach maintenance, park facilities, channel marker maintenance, derelict vessel removal, estuary management and inlet management. The CZM maintains four of the six inlets within Collier County. The USACE maintains one of the other two inlets. Collier County does not yet have a Federal shore protection project but has been pursuing one over the past several years.

Beach nourishment programs in Collier County are funded in part by tourist development taxes. The County levies a four percent (4%) tourist development tax on all rental income rented for less than 6 months (Ordinance 2005-43). Approximately two thirds of two percent (2%) is allocated to fund beach improvement, nourishment, restoration and inlet management. One third of two percent (2%) is allocated for beach park facilities. The remaining tax is allocated to tourism promotion and museums. Additionally, Collier County collects funds from parking permits, meter collections and parking tickets. The remaining funds required are sourced from property tax revenue or contributions by local municipalities. Collier County property tax revenue provides \$500,000 per year for the county's beach fund, part of a \$1 million annual contribution for parks and recreation services. Private beaches are funded by local municipalities.

The Coastal Zone Management Department will continue to optimize inlet maintenance, sand bypassing and beach maintenance. Securing funding for future projects will continue to be a major issue for the County and they are taking various cost saving steps i.e. pursuing Federal funding and altering beach designs.

## **SECTION 6: MANAGEMENT OPTIONS FOR PINELLAS COUNTY**

Three management options for Pinellas County were developed after reviewing the strategies employed by the communities described in Section 5.

- ***Option 1, Coordination & Cooperation***, is similar to Pinellas County's existing coastal management program. The approach entails relying on external agencies and consultants to perform most technical services required to run the coastal management program with the exception of coordinating with stakeholders, administering and managing non-federal design and construction projects, and facilitating the local sponsorship necessary for state and federal projects. The advantage of the Coordination and Cooperation option is the limited work and funding required by the County. Disadvantages of this approach include its lack of control over the design and schedule of federal projects. The process of authorization and appropriation of funds can take multiple years and result in construction schedule delays.
- ***Option 2, Autonomous Management***, relies on in house expertise for program management and coordinates with stakeholders to construct projects with federal and state reimbursements. The CMP administers contracts, coordinates with regulatory agencies to obtain permits and funding, conducts construction and maintenance

inspections, and performs environmental monitoring. The CMP may or may not contract with consultants for engineering and additional construction services. The County may setup an advisory panel to direct the project priorities and manage funding resources. The advantage of the autonomous approach is the control over schedule. The disadvantage is the need to compete for federal reimbursement. Federal reimbursement is limited on reimbursable projects to \$50 million annually (nationwide) with no project receiving more than \$10 million in any given year. Reimbursement may occur over several appropriations (a portion of the requested funds are received with each appropriation).

- ***Option 3, Consultant Management***, is similar to Bay County's existing coastal management program. The approach entails relying on consultants to perform all services required to run the coastal management program including coordinating with stakeholders and facilitating the local sponsorship necessary for state and federal projects. The hired consultants report directly to the BCC or a CMP advisory board. The advantage of hiring consultants to manage the program is the relief of the County's workload, the access to coastal experts and the continuity provided by allowing one expert source to coordinate projects and tasks. The disadvantage may be the consultant's fees and the dependence of the CMP on the consultant.

## **SECTION 7: FINAL RECOMMENDATIONS**

CPE recommends that Pinellas County pursue a hybrid management strategy that incorporates coordination and cooperation with Federal and State agencies and the flexibility to transition to a more financially self-reliant program aided by consultants and in-house staff. This recommendation is based on the existing conditions at this time, including:

- The unpredictability of federal appropriations,
- The unknown outcome of reauthorizations for expired projects,
- The need for the flexibility to align construction schedules, conducting maintenance dredging and nourishment projects simultaneously, when possible,
- The opportunity to control project schedule under Section 206 of the Water Resources Development Act of 1992.

The County needs to explore ways to be prepared to take over management and maintenance of any federal projects when federal funds are not available. Steps towards developing a new strategy include the following:

- The County should pursue obtaining approval and authority to construct federal projects without federal funding. Negotiating an in kind services agreement to begin planning and construction with County funds may be the first step.



- The County needs to develop a management mechanism to regularly maintain navigation channels that lack national priority and federal funding.
- The County should maintain their relationship with the USACE and pursue their federal authorized beach projects since having federally authorized projects increases the likelihood of obtaining state funding.

The CMP should continue to manage the coast as a countywide program. The CMP should prioritize reducing sand needs over time and increasing the nourishment interval of each element. The County should rely on their consultants to assist them in hotspot management. The success of the structures at Upham Beach is an example of using advanced engineering and hotspot management to achieve these goals. The County should also prioritize emergency response planning by maintaining design and monitoring records to maintain eligibility for emergency funding. By addressing hot spots, maintaining funding eligibility, and planning for times when federal and state funds are not available, the CMP will evolve into a manageable and sustainable program.



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## **SECTION 1: PINELLAS COUNTY COASTAL MANAGEMENT PROGRAM OPERATIONS**

### **History of the CMP**

Development of the barrier islands in Pinellas County began when the causeways connecting the islands to the main land were constructed in the early 1900s (Pinellas County Planning Department, 2008a). Resorts at Pass-A-Grille and St. Petersburg Beach (now St. Pete Beach) were among the first developments on the islands. In the 1930s, Pinellas County supported development by supplying water to the beaches and constructing several additional causeways (Pinellas County Planning Department, 2008a). The causeways significantly influenced the tidal prisms of adjacent inlets and altered erosion and accretion patterns along the beaches (CPE, 1992; ASBPA, 2009; Davis and Elko, 2006). From the period of initial development until the 1970s, response to shoreline erosion was managed by developers, private property owners and local municipalities. Small nourishment projects, groins and seawalls were constructed to slow erosion and protect property (USACE, 1980).

By the 1960s, the shoreline had eroded to the seawalls along most of the developed beaches and the water quality of the back bays had suffered from dredge and fill land building practices. In response to civic activism, coastal and environmental management became a priority for the County in 1969 (Pinellas County Planning Department, 2008a). Pinellas County became the local sponsor for the County's first Federal shoreline protection project. The project called for nourishment of all of the developed beaches on Treasure Island, Sand Key, Clearwater Beach and Long Key (USACE, 1984b).

In a separate effort, the County began their first environmental resource management program which included the prohibition of dredging in Boca Ciega Bay, the designation of the Boca Ciega Bay Aquatic Preserve, and the acquisition and protection of environmentally sensitive lands. To manage the acquisition of the public lands, the County's Department of Environmental Management (DEM) was created in 1974. The first beach park was the collaboration of the City of Clearwater and the DEM to purchase 66 acres on the north end of Sand Key in 1974. A citizen group, Save Sand Key, Inc., advocated the \$6.3 million purchase after the US Steel Corporation began developing high rise condominiums on Sand Key (Pinellas County Planning Department, 2008a). Over time, the DEM, in collaboration with the Coastal Management Program (CMP), citizen advocacy groups and the Pinellas County Parks Department, created nine county beach access parks and the Shell Key Preserve (ASBPA, 2009).

In the mid-1980s, Jim Terry, a surveyor and project manager for Public Works was the driving force in the development of the County's CMP (Squires, 2011). By 1984, Pinellas County had participated in seven Federal nourishment projects. In 1985, Terry was appointed Vice Chairman of the Governor's Restore Our Coast Task Force. By 1986, the task force proposed the first Comprehensive Beach Management Program for the State of Florida. To implement the program, beach management districts with similar geomorphic characteristics were proposed,

one of which was District Two: Pinellas County. Each district was to have an administrator appointed by the local board and a small staff. The districts were tasked with providing the local share of funds for erosion control projects, obtaining public access to beaches and providing parking at beach access points. Each district had the authorization to levy ad valorem taxes to fund the required local contribution (25% of beach project cost). Florida's Comprehensive Beach Management Program was adopted by the state legislature in 1986 (FDNR, 1986). Jim Terry became Pinellas County's first coastal manager, within the Public Works Department (Squires, 2011).

In 2003, Nicole Elko, Ph.D. took over the role of coastal manager. In 2004, the CMP was reassigned from Public Works to the DEM. The CMP began a two-year transition period with Dr. Elko departing the County in 2009, a reorganization of County government that led to the dissolution of DEM in October 2010, a continuation of the CMP briefly within the Public Works Department in 2010, and the merger of Public Works into a large newly formed 840-employee Department of Environment & Infrastructure (DEI) in October 2011. During this transition period, the management of the CMP was handed over to Andy Squires, the former Assistant Director of DEM (Squires, 2011).

The CMP continues to be responsible for coordinating the Federal, state and local shoreline protection projects, monitoring the beaches, and planning for the future of Pinellas County beaches. The County's CMP won the ASBPA's 2009 Coastal Project Award. The award recognized the County's shore protection project which restored 13 miles of its 35-mile shoreline via 29 restoration and nourishment projects over 40 years. The award presentation also noted the two beach parks, one preserve, nine public access parks, numerous public access points and more than 12,000 public parking spaces for beach access (Squires, 2011).

### **Description of Internal Organizational Operation**

DEI has a staff of approximately 840 employees and consists of the following divisions: Administration & Business Support, Engineering & Technical Support, Finance, Solid Waste, Transportation & Stormwater, and Water & Sewer. Coastal Management resides within the Division of Engineering & Technical Support (Squires, 2011).

The sole staff member of the CMP is the former Assistant Director of Environmental Management. Since 2009, the former Assistant Director has served as the Coastal Manager, responsible for coordinating shoreline protection projects, requesting funding, reviewing engineering reports and design, and participating in field observations. The CMP also depends on support and assistance from contracted consultants, section engineers in its division and other divisions within DEI. The CMP is considering adding an additional staff member in 2013. The CMP is a central clearinghouse for all beach related questions, information requests and public outreach (Squires, 2011).

## Funding Avenues

### Federal Funding

The Federal government has partially funded the construction of 25 shore protection projects including the construction of nourishments and structures within Pinellas County since 1969 and authorized even more studies of potential projects (USACE, 1984b; 1994; 2010). The Federal Shoreline Protection Project includes Sand Key, Treasure Island, Long Key and Clearwater Beach Island (ASBPA, 2009). The Federal government will fund up to 65% of the project cost (USACE, 1989). Project costs include pre-construction and construction costs associated with engineering, design and construction. Annual monitoring is not covered by the federal cost share. The Federal share of the Sand Key, Treasure Island and Long Key projects has varied from 50% to 62.4% since 1969 (USACE, 2010). The terms and expirations of the projects are discussed in *Section 2, Review of Federal Authorizations*.

Maintenance dredging of Federal navigation channels is also partially funded by the Federal government and often coincides with nourishment projects. The Federal navigation channels are John's Pass, Pass-A-Grille Pass and Clearwater Pass. Anclote River and the Intracoastal Waterway are also federally authorized waterways in Pinellas County. The Federal cost share varies with each project (from 57% to 95%) (USACE, 2010).

### Federal Authorization and Appropriations

Prior to requesting Federal funding, Congress must first authorize the study and evaluation of the potential Federal shoreline protection project. If Federal participation is warranted, Congress can then authorize the construction of the project and appropriate funds (USACE, 1989). The construction of projects can only be authorized during the years Congress enacts a Water Resource Development Act (WRDA). As a result, the process of authorization and appropriation of funds can take multiple years and result in construction schedule delays.

The US Senate Environment and Public Works Committee (EPW) may consider a new WRDA bill soon. This bill may contain policy revisions to allow the Corps to assess Federal interest in continuing participation in expiring Federal shore protection projects. The WRDA policy change is critical for a new study to be initiated. In 2011, the American Shore & Beach Preservation Association initiated an effort, with Marlowe & Co. under contract, to help present and then move a new WRDA bill with the required policy change through the committee (Squires, 2011). This policy change could potentially affect the continuation of Federal support for Treasure Island (project funding authorization expires in 2019) and the time required for future evaluation studies, reviews, and approvals.

### Federal Funding Eligibility

Policy dictates the primary purpose of a beach nourishment project recommended by the USACE must be hurricane and storm damage reduction (not recreation). In addition, the project area must be publicly owned and publicly accessible. The Federal cost share percentage may be less than

65% if any part of the project is not publicly owned or accessible. Private property is not eligible for Federal funding (USACE, 1989). Undeveloped barrier island segments are not eligible for Federal funding either, pursuant to the Coastal Barrier Resource Act, Public Law 97-348 (96 Stat. 1653; 16 U.S.C. 3501).

### *Constraints of a Federally Funded Project*

The existing Federal shore protection projects are administered by the Jacksonville District of the U.S. Army Corps of Engineers (USACE). The USACE is responsible for evaluating design alternatives and providing a recommendation to Congress. The USACE may consider requests by the local sponsor during the alternative evaluation; however, their recommended alternative will depend on a cost-benefit analysis. The local sponsor's influence over a Federal project design may or may not be limited as a result.

### *Continuing Authorities Program*

The Continuing Authorities Program (CAP), pursuant to Section 206 of the Water Resources Development Act of 1996, allows the USACE to participate in projects without specific congressional authorization for each project. Under this authority, the studies and initial reports are conducted by the local sponsor and their consultants without waiting for Federal appropriations. The local sponsor is responsible for initial study and design costs; however, these costs may be eligible for Federal cost sharing and reimbursement later. Reimbursements are dependent on the successful negotiation and execution of a Federal Cost Sharing Agreement (FCSA) and a Project Cooperation Agreement (PCA) and the availability of congressional appropriations to fund the reimbursements. Pinellas County has not participated in the CAP.

Manatee and Bay Counties have completed projects under the authority of the Continuing Authorities Program (*further discussion in Section 5*). In Pinellas County, the Jacksonville District USACE began an erosion control project in Whitcomb and Kreamer Bayous in Tarpon Springs under the authority of CAP in 2011.

### *Federal Emergency Funding*

The USACE has authority to repair federally authorized shore protection projects under the Flood Control and Coastal Emergency Act (PL84-99). An eligible shore protection project can be restored to its pre-disaster condition at no cost to the Federal sponsor and at 20% cost to the non-Federal sponsor. Funding is provided by Congress through the annual Energy and Water Development Appropriation Act. Pinellas County has received Federal emergency funding for Sand Key project (1990 and 1997) and the Treasure Island/ Long Key project (2006) (ASBPA, 2009).

### *FEMA Funding for Permanent Work*

Federal funding is available to replace sand on non-federally sponsored storm damaged public engineered and maintained beaches under certain conditions, as part of Federal Emergency

Management Agency (FEMA) Program, under authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121-5206, as amended, Sections 403 and 406, and 44 CFR 206.225 and 206.226. A beach may be eligible if improved property is vulnerable to the damage caused by a five-year storm. The amount of sand eligible for replacement is limited to the amount of sand lost as a result of a storm event. The local sponsor is responsible for obtaining all permits (FEMA, 2009).

### *FEMA Funding for Emergency Work*

Funding from FEMA for emergency work is available for the construction of temporary sand berms. The work must eliminate or lessen the immediate threats to the public or to improved property in expectation of an event that could occur within five years. A five-year event is expected to cause on average six cubic yards per linear foot of shoreline erosion. As a result, FEMA will fund the construction of berms with six cubic yards per linear foot of sand above the five-year stillwater elevation and any necessary base below the berm (FEMA, 2009).

### *State Funding*

The Florida Department of Environmental Protection (FDEP) Beaches, Inlets and Parks Program (BIP's) (formerly the FDEP Bureau of Beaches and Coastal Systems, formerly the Department of Natural Resources, Division of Beaches and Shores) has maintained a comprehensive, long term, statewide management plan for erosion control and beach preservation since 1986, pursuant to Sections 161.101 and 161.161, Florida Statutes (FDEP, 2011a). The State of Florida's Beach Management Funding Assistance Program provides funding for the management of critically eroded shorelines in Florida (pursuant to Chapter 62B-36, F.A.C.). In order for a project to receive state funding it must provide for adequate public access, protect natural resources and provide for the protection of endangered and threatened species (Chapter 161, F.S.).

### *State Funding Eligibility*

The following public shorelines are eligible for up to 50% reimbursement of non-federal costs by FDEP-BIP's (Chapter 161, F.S.):

- (a) The shoreline of a primary public beach access site plus the shoreline one half mile in each shore parallel direction from the beach access site. A primary public beach access site is a site with at least 100 public parking spaces and public restrooms (62B-36.002 F.A.C.).
- (b) The beachfront footage of a public lodging establishments times the percentage of units available to the public (rounded to the nearest 10%).
- (c) The shoreline of a secondary public beach access site plus the shoreline up to one quarter mile in each shore parallel direction from the access at a rate of 52.8 linear feet per parking space, if the parking space is within one quarter mile of the access site and there are signs and clear designation the parking is for the general public. A secondary public beach access is a site with parking and amenities that does not qualify as a primary public beach access (62B-36.002 F.A.C.).

- (d) The shorelines above cannot overlap for more credit.
- (e) The percentage of shoreline eligible for cost sharing is determined by dividing the sum of the eligible shoreline lengths by the total project length.

Note: As of 2013, eligibility requirements were being updated and rewritten by the FDEP.

### *State Funding Requests*

Annually, eligible local governments are requested to submit to the FDEP an updated Annual Funding Request and Local Long Range Budget Plan for projects expected to be initiated or continued in the current fiscal year (Note: the FDEP notifies the local government entities of the 60-day submittal period). The projects are reviewed and ranked for funding in the next fiscal year. The order of priority of the projects is based on the severity of erosion and threat, benefits, project history and Federal sponsorship (Chapter 62B-36, F.A.C.).

### *Funding Amounts*

The Florida Legislature may authorize appropriations up to 75% of the costs associated with restoring and nourishing critically eroded beaches (Chapter 161, F.S.) or up to 100% of costs if the project is on state lands. However, it is the intent of the Legislature to cost-share the costs with the local sponsor equally. Thus, federally authorized and federally financed projects are eligible for cost sharing of up to 50% of the non-Federal share of the cost. Costs eligible for state cost sharing include feasibility study and design costs, construction costs, environmental and performance monitoring costs required by permit, and approved costs associated with private contractual services necessary to conduct the project.

### *Funding Conditions*

The conditions for receiving state funding are outlined in Chapter 161, F.S. Several conditions are listed below:

- The project engineer must be selected on the basis of competitive negotiation as provided in Chapter 287, F.S.
- The local sponsor must assume full responsibility for all project costs in excess of the state cost limitation.
- If the local government desires to initiate and pay the costs associated with a project prior to the state initiating construction, the state will reimburse the costs according to Section 161.161, F.S. if the project was approved by the FDEP-BIP's before construction, if funds are available and if it furthers the provisions of Section 161.161, F.S.
- The state's cost share cannot exceed 75% (except for projects on state lands) even if projects are combined to reduce the local cost-share.



- The non-Federal portion of a federally authorized project is not eligible for state cost sharing unless an immediate threat to upland properties and financial loss is demonstrated (Chapter 62B-36.003(8)).

### *Funding Source*

Documentary stamp tax collections contribute to the General Revenue Fund which provides funding for the state's beach program. The Florida Department of Revenue distributes a maximum of \$30 million of the taxes collected (or the 2.12% of the remainder after the required payment towards the Preservation 2000 bonds, the Florida Forever bonds and the Save Our Everglades Trust Fund) each fiscal year to the Ecosystem Management and Restoration Trust Fund for the preservation and repair of beaches (Section 201.15 Florida Statutes). In recent years, documentary stamp tax receipts have declined from \$4 billion at the peak in Fiscal Year 2005-2006 to \$1.16 billion in 2010-2011 (EDR, 2011). As a result, funds available for the beach program are significantly less than \$30 million. In Fiscal Year 2010-2011, only \$5 million was contributed to the Ecosystem Management & Restoration Trust Fund (EDR, 2011). To obtain additional funding necessary for the state's priority projects, no longer available from the Ecosystem Management and Restoration Trust Fund, appropriations from the General Revenue Fund by the state legislature are requested for individual projects on an annual basis. The dependence on the legislative process for funding introduces a level of uncertainty to the project schedules. The level of state funding and its distribution is listed in Table 1-1 (Florida Senate, 2009; 2010; 2011).

As an alternative to requesting appropriations from the legislature for individual projects, funding may be obtained from the "Aid to Local Governments" line item in the General Appropriations Bill. The Honeymoon Island State Park Restoration was funded in this way. The lack of funding available from documentary stamp tax collections prompted the FDEP-BIP's to encourage Pinellas County to sponsor the project and be eligible for funds through "Aid to Local Governments." As previously stated, the State has the authority to fund up to 100% of a project on state owned lands. An agreement was reached between Pinellas County and FDEP-BIP's to cost share the project 75% (State funds) to 25% (County funds) for design and monitoring with the state covering 100% of construction. As a result of obtaining funding in this way, Pinellas County must front the full cost of the project and receive reimbursement upon completion.

Table 1-1. State Funding Distribution from 2009 through 2011

Year	Total Funds to State Beach Program	Portion from Trust Funds <sup>(1)</sup>	Portion from General Revenue Fund	Fund Distribution
2009	\$25,824,738	\$20,021,678	\$5,803,060	<ul style="list-style-type: none"> <li>▪ Priority projects ready to proceed that maximize Federal funds leveraged</li> <li>▪ Top 3 inlet management projects</li> <li>▪ Post construction monitoring</li> <li>▪ Alternate projects from 2007 and 2008</li> </ul>
2010	\$20,836,398	\$9,995,051	\$10,841,347	<ul style="list-style-type: none"> <li>▪ 7 priority projects that maximized Federal funds leveraged</li> <li>▪ Projects the state committed partial funding to in Fiscal Year 2009-2010</li> </ul>
2011	\$13,050,532	\$5,045,216	\$8,005,316	<ul style="list-style-type: none"> <li>▪ Top 12 individual projects on the priority list</li> <li>▪ Top 3 inlet management projects (10%)</li> <li>▪ Post construction monitoring (10%)</li> </ul>

## **Local Funding**

### ***Penny for Pinellas***

Pinellas County has utilized percentages of sales tax to fund beach nourishment projects since the early 1990s. Voters first passed the Penny for Pinellas referendum, a 1% increase in sales tax, to fund the Capital Improvement Program (CIP) and avoid increases in property taxes. The Penny for Pinellas levy began in 1990; it lasted for ten years and has been extended twice since then. The existing Penny for Pinellas program expires January 31, 2020 (Pinellas County Government Online, 2011).

Funds are earmarked for road improvements, flood control, parks, acquisition of endangered lands and public safety. The Penny generated \$826 million from 1990 to 2000 and \$1.26 billion from 2000 to 2010. During the 2000 to 2010 period, the funds were split between the County and the twenty four municipalities (distribution was formula based). Approximately 3.9% of the funds were designated to coastal management; however, fund transfers into the CIP from the Tourist Development tax cover the costs of capital coastal management projects as noted below. The projected funding estimate for the 2010 to 2020 period is \$1.4 billion; the project list is modified when the funding is not available (Pinellas County Government Online, 2011).

### ***Tourist Development Tax***

A 5% sales tax is collected on accommodations rented for less than six months pursuant to Florida Statute 125.0104. The Pinellas Board of County Commissioners established the requirements and conditions of the tax in 1990 under Ordinance 90-50, Sections 118-31 through 118-70. One half of one percent of the tax is allocated to beach nourishment projects. The remaining portion of the tax is spent on marketing and operations (60%), debt service for sports facilities (23%), tax collection (2%), and held in reserves (6%) (St. Petersburg/Clearwater Area Convention & Visitors Bureau, 2011).

Tourist Development Tax dollars are transferred into the County's CIP fund annually. Beach projects that qualify as CIP projects are thus paid for by Tourist Development Taxes collected.

### ***Parking and Park Use Fees***

Beach parking fees are an additional source of local funding approved by the Pinellas County Commission. At Fred Howard Park and Fort De Soto Park, a \$5 parking fee was implemented January 3, 2012. The County will also sell annual park passes for \$75 dollars (Pinellas County Government Online, 2011b). The entrance fee at Honeymoon Island State Park is \$4 to \$8 dollars.

Note: Sand Key has had parking fees for decades. The City of Clearwater administered fee collection until October 2011. The County took over fee collection administration in October 2011 and changed the parking fee from \$1.25 per hour to \$1.50 per hour with a daily maximum of \$5.

### *Municipal Contributions*

Since the implementation of the Federal shore protection program, the municipalities within Pinellas County have not been directly contributing to the cost of the beach nourishment projects. The City of Madeira Beach, the City of Clearwater, the City of Treasure Island and the City of St. Pete Beach have sponsored local nourishment and dredging projects in the past (USACE, 1984). Recently, the City of Treasure Island sponsored the design and permitting of a sand sharing contingency plan for Treasure Island (discussed in Section 3).

### *Ad Valorem Taxes*

Ad valorem taxes are not used to fund the CMP (Pinellas County Tax Collector, 2011).

### **Recent Operations**

#### **Honeymoon Island**

The initial phase of the Honeymoon Island Restoration project was constructed in 2008 (FDEP Permit No. 0249602-001-JC). Phase I included the construction of a T-head groin and the placement of 140,000 cubic yards of sand dredged from the Hurricane Pass ebb shoal. The County is the local sponsor for the project (Humiston & Moore, 2011a).

The second phase of the restoration of Honeymoon Island includes the construction of three additional T-head groins (at R-8, R-8.5, and R-9) with fill from the Hurricane Pass ebb shoal, vegetation removal, reconfiguration of the existing parking lot and removal of 50 feet of an existing submerged groin (near R-8.5). Fill will be placed from R-7.5 to R-9.5, extending the berm approximately 112 feet to 184 feet at an elevation of 4.2 feet NAVD (Humiston and Moore, 2011b). The borrow area for the fill is the Hurricane Pass ebb shoal. Construction of the estimated \$5.63 million project is set to begin in 2013, if the permit is approved.

#### **Sand Key**

The construction of the Sand Key Federal Shore Protection began in April 2012 with the first sand placement in mid-May 2012. A 10-year Joint Coastal Permit to nourish the beach with approximately 1.25 million cubic yards of sand (8.7 miles) was issued in July 2011. The Norfolk Dredging Company was contracted to construct the \$31.54 million project. The project was completed by November 2012.

#### **Treasure Island/Long Key**

The beaches at the ends of Treasure Island, Sunshine Beach and Sunset Beach, are erosional hotspots (Roberts and Wang, 2012). Nourishment of Treasure Island occurred in 2010 as part of the John's Pass maintenance dredging (FDEP Permit No. 0270453-001-JC, expiration date of March 29, 2020). The 2010 project also included the nourishment of Upham Beach on neighboring Long Key. The next nourishment of Treasure Island is scheduled for 2013/2014,

pending permit and funding acquisitions (Squires, 2012). If the project is delayed, a new joint coastal permit will be required. The existing permit was issued March 29, 2010 and expires May 17, 2014 (FDEP Permit No. 0221569-008-JM).

Repair of the geotextile T-groins at Upham Beach commenced in November 2010 and was substantially complete in July 2011. The plans and specifications were developed by CPE and the work was conducted by Waterfront Property Services, LLC. The repair consisted of the removal and replacement of destroyed geotextile tubes (T-groins #1 and #2 and part of #3) and scour aprons, patching holes and tears in existing tubes (T-groins #4 and #5) and applying a UV protective polyurea coating to the new tubes and as needed on the existing tubes (CPE, 2011). The authorization of the maintenance phase of the geotextile T-head groins at Upham Beach expires on February 28, 2013 (FDEP Permit No. 0198739-001-JC).

As a result of the positive performance of the groins, a joint coastal permit application was submitted to reconstruct the T-groins out of rock and make them permanent structures (FDEP Permit No. 0308348-001-JC). As part of the permitting process, numerical modeling was conducted to refine the design of the permanent structures. The permit was issued on October 30, 2012. Construction of the structures is anticipated to begin in 2013 pending funding acquisition (Squires, 2012).

### **Hurricane Pass**

Hurricane Pass is a non-Federal channel that was last dredged in 2000 (12,500 cubic yards) (FDEP, 2008). The County 2012-2017 CIP budget has assigned \$1 million for maintenance dredging, if needed. The Hurricane Pass ebb shoal is scheduled to be dredged as the sand source for the Phase II Honeymoon Island Restoration in 2013. Discussion of the project history of Hurricane Pass is presented in Section 3.

### **South Channel, Pass-A-Grille Pass (Shell Key Pass)**

In March 2011, the County commissioned CPE to observe the coastal processes occurring in the vicinity of South Channel, Pass-A-Grille Pass (also referred to as Shell Key Pass). Local interests have reported infilling of the pass and have obtained a permit for maintenance dredging. CPE recommended surveys of the channel and shorelines, a review of historic aerial photography, monitoring of water quality, and predictive modeling to improve the understanding of processes in the area.

## Recent Significant Storm Events

Tropical Storm Debby resulted in energetic wave conditions and elevated water levels of 2 to 3 feet along Pinellas County shorelines. The shoreline was impacted primarily on June 24-26, 2012. The 2012 Sand Key nourishment was under construction. The nourishment from R-57 to R-61 on Sand Key was partially complete. Beach and dune erosion occurred along most of Sand Key (Figures 1-1a through c), Sunshine and Sunset Beach on Treasure Island (Figures 1-2a and b), Upham Beach on Long Key (Figure 1-3a) the southern section of Pass-A-Grille Beach (Figure 1-3b). Shoreline retreat ranged from 15 to 30 feet on average (Wang and Roberts, 2012).

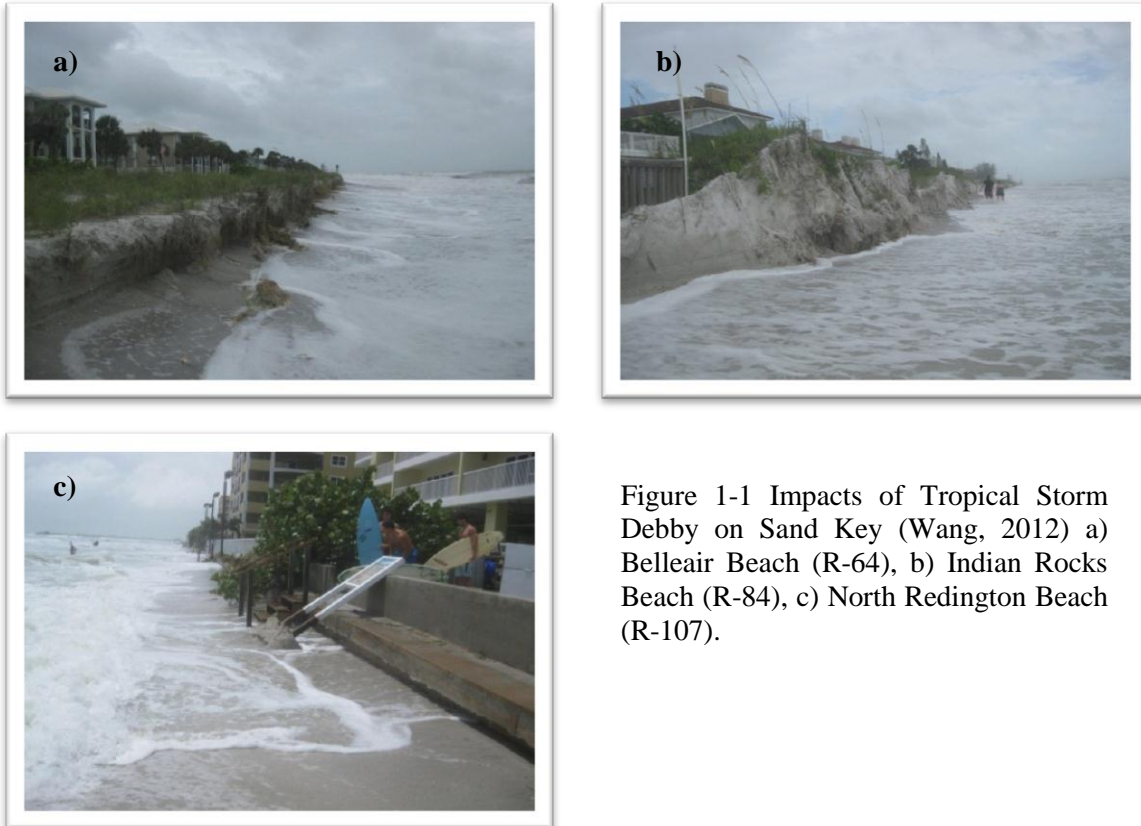


Figure 1-1 Impacts of Tropical Storm Debby on Sand Key (Wang, 2012) a) Belleair Beach (R-64), b) Indian Rocks Beach (R-84), c) North Redington Beach (R-107).



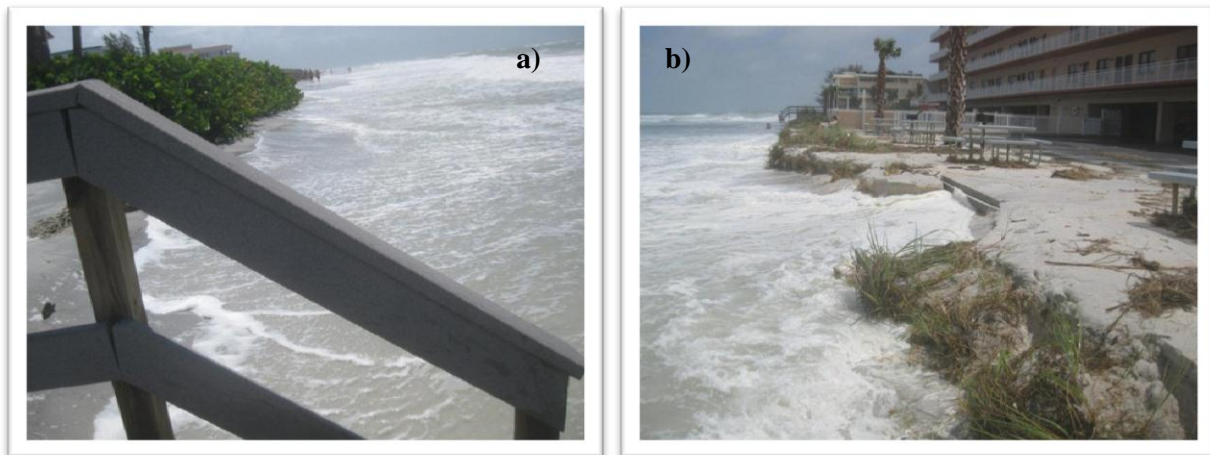


Figure 1-2 Impacts of Tropical Storm Debby on Treasure Island (Wang 2012) a) Sunshine Beach (R-127) b) Sunset Beach (R-139).

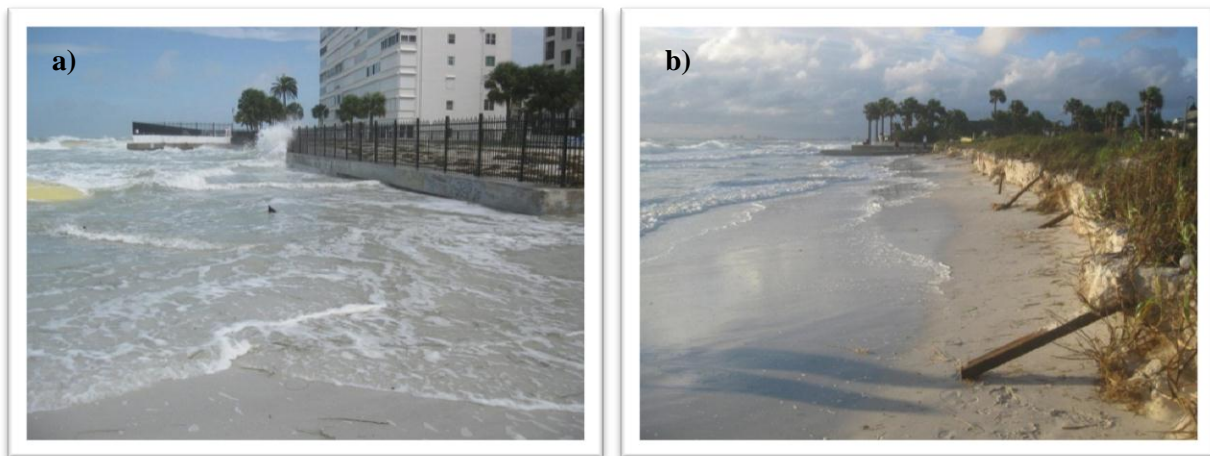


Figure 1-3 Impacts of Tropical Storm Debby on Long Key (Wang 2012) a) Upham Beach (LK-3) b) Pass-A-Grille Beach (R-164).

## Stakeholders and Partners

### *United States Army Corps of Engineers*

The U.S. Army Corps of Engineers (USACE, Corps, COE) is the Federal sponsor for the Federal Shore Protection and Federal Navigation projects in Pinellas County. These projects have included the nourishment and construction of erosion control structures on Sand Key, Treasure Island and Long Key, in addition to the maintenance dredging of the Federal navigation channels in John's Pass, North Channel (Pass-A-Grille Pass) and Clearwater Pass. The USACE is also responsible for reviewing joint coastal permit applications for compliance with federal regulations.

### *Florida Department of Environmental Protection, Beaches, Inlets and Parks Program*

The Florida Department of Environmental Protection (FDEP), Beaches, Inlets, and Parks Program (BIP's) oversees three state programs under the authority of the Florida Beach and Shore Preservation Act (Chapter 161, F.S.) including two of the state's permitting programs. Additionally, FDEP-BIP's funds eligible projects through the Beach Erosion Control Program or Beach Management Funding Assistance Program.

In areas where a Coastal Construction Control Line exists, the CCCL program enforces special siting and design criteria for upland property to prevent the destabilization or destruction of the beach and dune system. The Coastal Construction Control Line demarks the area of beach and dune system subject to severe fluctuation from a 100-year storm, seaward of which the BIP's has regulatory authority. Chapter 62B-33, F.A.C. provides the requirements for a CCCL permit (FDEP, 2011c).

The Joint Coastal Permit program implements the concurrent processing of applications for coastal construction, environmental resource permits (navigational dredging of inlets and deepwater ports), wetland resource permits (dredge and fill) and sovereign submerged lands authorizations and coordinates interagency review (Section 161.055 F.S., Chapter 253, F.S., Chapter 373, F.S.). The reviewing agencies include the Florida Fish and Wildlife Conservation Commission (FWC), the Florida Division of Historical Resources (DSHR) in the Department of State, other state agencies as incorporated in the Florida Coastal Zone Management Program and the USACE (FDEP, 2011c). A JCP is required for any activity that is seaward of the mean high water line, on the natural sandy beach, on sovereign submerged lands, or affects the distribution of sand along the beach.

FDEP-BIP's typically reviews permit applications to assess the following:

- compatibility of the proposed fill and the native material,
- the potential impacts to benthic and upland habitats and the dune system,
- turbidity levels at the borrow and placement site,
- the potential impact of construction on nesting and hatching marine turtles, manatees, Gulf sturgeon and nesting and migrating shorebirds
- the potential water quality impacts if projects are within or near Aquatic Preserves or Outstanding Florida Waters.

Permit conditions may include restrictions on construction schedule and methods, physical and environmental monitoring and mitigation requirements to offset any anticipated environmental impacts. Failure to obtain permits before performing work or failure to abide by permit conditions is a violation of state and federal law and may result in fines and requirements to restore the area. Violations are reported by various agencies actively monitoring environmental resources and projects.

In 1986, the Florida Legislature adopted the policy of protecting and restoring beaches through a comprehensive management planning program, the Beach Erosion Control Program (BECF).



The Statewide Strategic Beach Management Plan (SBMP) (originated in 2000, updated in 2008), developed by the FDEP-BIP's, contains a multiyear repair and maintenance strategy to implement the state's strategies of comprehensive long term erosion control, beach preservation, restoration and nourishment, storm and hurricane protection and inlet management. The activities listed in the plan are referenced from inlet management plans adopted by the FDEP-BIP's, local government feasibility studies, federal and state studies and reports and studies of federal shore protection projects. All projects are required to obtain the appropriate federal and state permits and authorizations, must comply with local comprehensive plans and ordinances, must comply with state water quality standards and must protect threatened and endangered species as required by the Biological Opinions issued by the National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS).

Segments of shoreline listed as critically eroded in the annually updated *Critically Eroded Beaches in Florida* report and activities listed in the SBMP are eligible for state funding (Pinellas County sections shown in Figure 1-4) (FDEP, 2012a). The project costs for activities referenced in the plan including feasibility and design studies, construction of structures and nourishments and post- construction monitoring are eligible for state funding in an amount up to 75% (refer to State Funding, Section 1). FDEP-BIP's is authorized to pay up to 100% of the costs associated with constructing and maintaining beach erosion control projects on state lands (161.091(10), F.S).

The 10-year funding needs for SBMP activities are summarized in the current Long Range Budget Plan (LRBP), developed annually based on local government requests and information from the USACE District Offices. The SBMP and the LRBP are grouped by region. Project managers within the BECP are assigned to manage projects within each region. The LRBP and project manager for Pinellas County can be found on the FDEP-BIP's website (<http://www.dep.state.fl.us/beaches/programs/becp/managers.htm>).

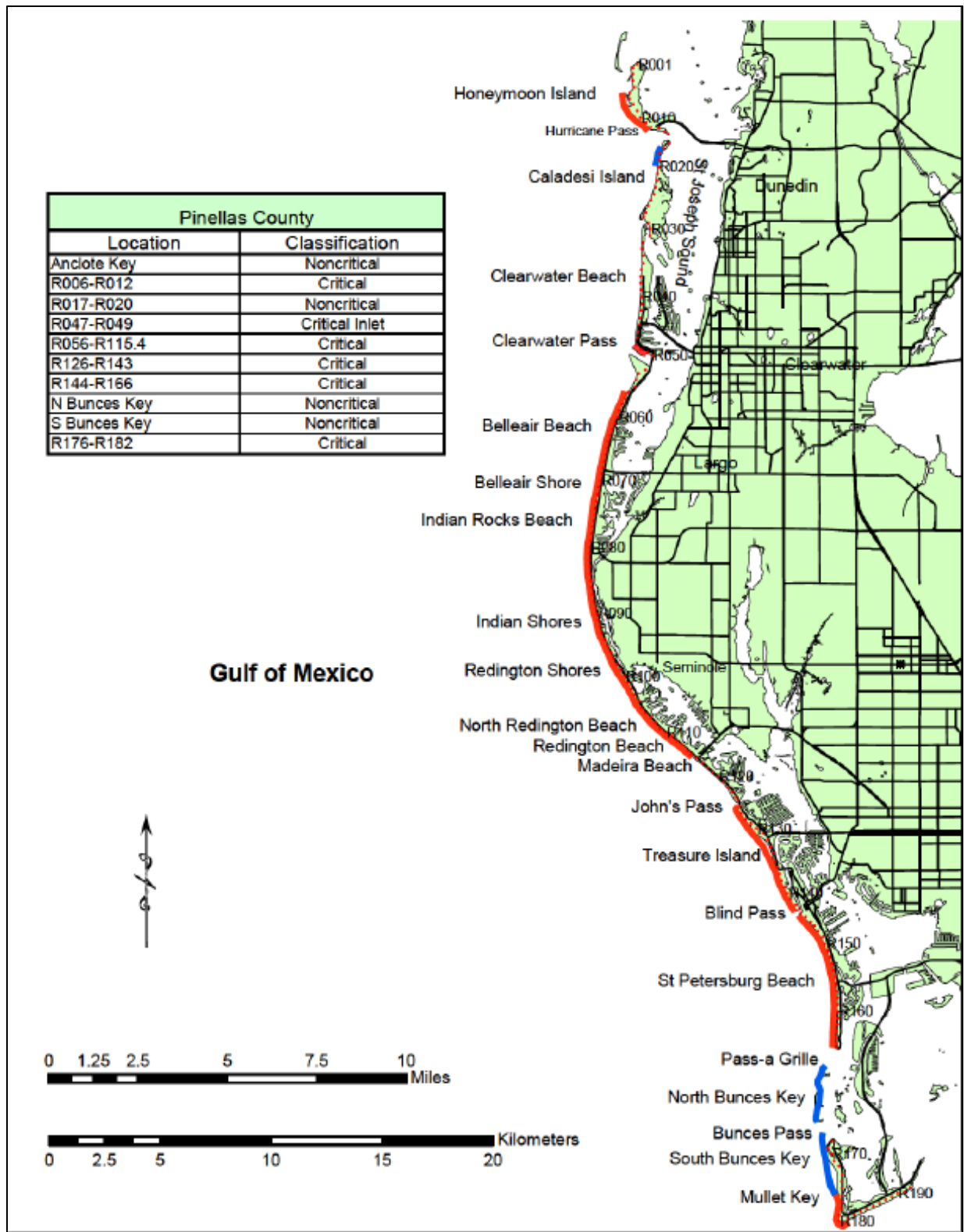


Figure 1-4. Critically Eroded Beaches in Pinellas County. Critically eroded shoreline shown in red, noncritical shoreline shown in blue. (FDEP, 2012a)

### *FDEP Division of Recreation and Parks*

The Florida Department of Environmental Protection Division of Recreation and Parks has sponsored the restoration of Honeymoon Island. They also own and operate Caladesi Island and Anclote Key State Parks within the County. As state-owned lands, these parks qualify for up to 100% state reimbursement of shore protection projects. At this time only Honeymoon Island receives funds for shore protection projects, Caladesi Island and Anclote Key currently exist as natural, un-engineered coastal systems.

### *Tampa Bay Aquatic and Buffers Preserves Program*

The Tampa Bay Aquatic and Buffer Preserves Program (TBABP) is under the direction of the Office of Coastal and Aquatic Managed Areas (CAMA), which is under the administration of the Florida Department of Environmental Protection's Deputy Secretary for Land and Recreation Use. CAMA manages state-owned coastal and submerged lands to ensure their protection. The TBABP manages two preserves for the State of Florida within Pinellas County, the Pinellas County Preserve and the Boca Ciega Preserve (Figure 1-5 and Figure 1-6), under the authority of F.S. 258 and 253 and F.A.C. 18-20 and 18-21. The aquatic and buffer preserves within Pinellas County include 336,265 acres of sovereign submerged lands, 182 natural and dredge spoil islands and the adjacent shoreline habitat. The TBABP also manages the Cockroach Bay Aquatic Preserve, the Terra Ceia Aquatic Preserve and their adjacent buffer preserves, all of which are outside of Pinellas County (FDEP, 2002).

The uncertainty of ownership of the islands within the aquatic preserve has continued to be an issue. The state owned spoil islands, of which there are 33, are legally considered submerged lands despite being uplands since their source of material was the bay bottom. The state also owns 45 natural or mangrove islands within the preserve. Other government entities own 20 of the remaining islands in the preserve, another 34 are in private ownership, and five islands have dual ownership. Of the total 182 islands, 45 islands lack ownership information (FDEP, 2002).

In 2002, the TBABP developed the Pinellas County Island Management Plan to address the need to assign appropriate management strategies to each island based on their location, biology and use in order to preserve, maintain and restore the natural ecosystems. The development of the plan required an extensive data collection effort including topographic, vegetation and biological surveys. The island management categories included (1) conservation, (2) education, (3) recreation and (4) combination (FDEP, 2002).

Any person requesting use of state-owned land must have approval from the Board of Trustees of the Internal Improvement Trust Fund (the Governor and the Cabinet) (Section 253.77, F.S.). Management authority of the aquatic preserves has been delegated to the FDEP-BIP's, CAMA. FDEP-BIP's staff can comment on potential environmental impacts of projects within preserves through the permitting process (Chapter 403, F.S. and Chapters 17-3, 17-4 and 17-12, F.A.C.). Additionally, all aquatic preserve waters are classified as Outstanding Florida Waters which "enhances the protective provisions of Chapter 258, F.S." (FDEP, 2002).



Prior to July 1, 2011, FDEP-BIP's provided support management services including coastal education and resource monitoring to Pinellas County. These services were discontinued as part of the state's 15% reduction mandate required by the 2011 legislative session. The support services may be reinitiated if funding is available. In 2012, the local office of the Tampa Bay Aquatic Preserves was re-opened. Permit review by the FDEP-BIP's regulatory staff continues.

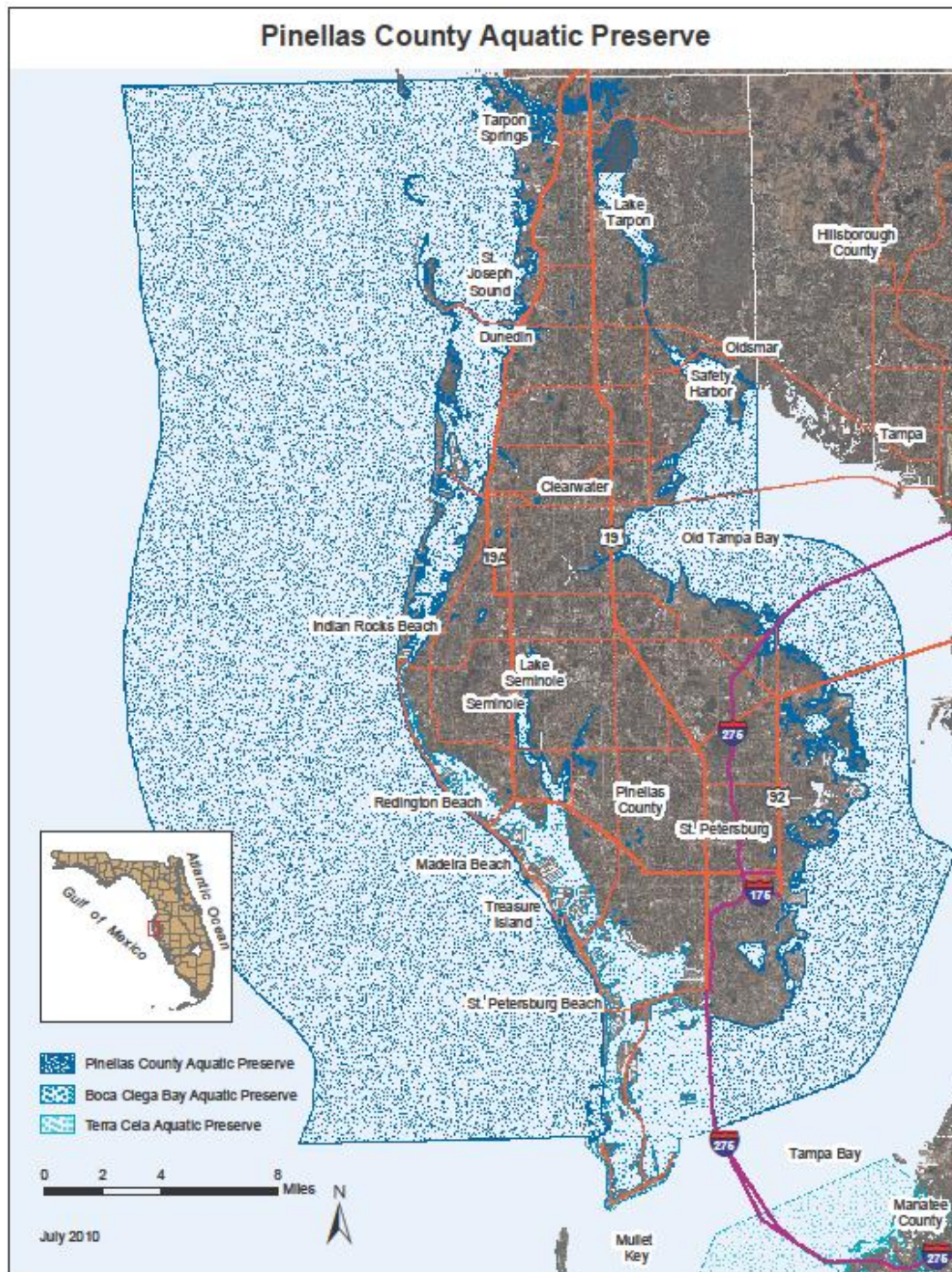


Figure 1-5. Pinellas County Aquatic Preserve (FDEP, 2010)





Figure 1-6. Boca Ciega Bay Aquatic Preserve (FDEP, 2010)

### *Barrier Islands Government Council*

The Barrier Islands Governmental Council, BIG-C, is a governmental council that exists to communicate the interests of the 11 Pinellas County Gulf-coast municipalities to the County, State and Federal government. The municipalities represented include Clearwater, Belleair Beach, Belleair Shore, Indian Rocks Beach, Indian Shores, Redington Shores, North Redington Beach, Redington Beach, Madeira Beach, Treasure Island, and St. Pete Beach. The Pinellas County CMP provides project status updates to the council and funds dune walkover and vegetation projects.

Resolutions passed by the council related to beach management between 2003 and 2009 include:

- Resolution No. 2009-01: The council unanimously opposes offshore drilling in state controlled waters off the coastline of Florida.
- Resolution No. 2007-01: The council supports the Board of County Commissioners in extending the Penny for Pinellas program from 2010 to 2020.
- Resolution No. 2003-01: The council opposes amendments to existing state law that allocates \$30 million annually in documentary stamp tax revenues to the Ecosystem Management and Restoration Trust Fund for beach construction and repair.

### *University of South Florida*

The University of South Florida (USF) Department of Geology has agreements with the County to conduct physical monitoring of Pinellas County beaches. Funding for the work is sourced from the Tourist Development Tax through the County's Capital Improvement Program. The individual agreements include:

- Surveys of 116 beach profiles along Sand Key, every two months from January 2011 through December 31, 2012. The contract amount is not to exceed \$141,064.00.
- Mapping of the high tide line, berm crest, vegetation line, and the seaward edge of the dune along Honeymoon Island, Caladesi Island, Clearwater Beach Island, Sand Key, Treasure Island and Long Key after storm events. The contract amount is not to exceed \$46,000.00 and expires December 30, 2013.
- Surveys of 27 beach profiles within the Upham Beach T-groin project area monthly for a two-year period ending in March 2013. The contract amount is not to exceed \$49,592.00. The survey analysis will report on the performance of the two repaired northernmost T-groins.

### *Clearwater Marine Aquarium*

The Clearwater Marine Aquarium (CMA), under contract with the County, conducts daily sea turtle surveys along much of the Pinellas County coastline during the months of April through October. The survey is conducted along the barrier islands of St. Pete Beach (Upham and Pass-A-Grille beaches only), Treasure Island, Sand Key, and Clearwater Beach for a total of 29.5 miles of nesting beach front. In addition to data collection, the contract also includes nest

marking, nest relocation and data reporting to the FWC. The CMA must send a monthly summary report to the County on the 10<sup>th</sup> of each month and an annual report on December 1<sup>st</sup>. The estimated cost for monitoring over three years (2010-2012) is \$390,000 (Pinellas County Environmental Management, 2009).

CMA will survey the St. Pete Beach shoreline between Upham and Pass-A-Grille beaches when required by an active state permit for beach nourishment or when not monitored by a private volunteer under a Florida Wildlife Conservation Commission sea turtle permit (Elko, 2007). Individuals with sea turtle permits are permitted to conduct nesting surveys, relocate nests, screen nests and conduct stranding/salvage activities for a specific area in adherence with FDEP-BIP's and USFWS guidelines. Four of the five marine turtle permits in Pinellas County are held by representatives of the CMA. Bruno Faulkenstein, a local sea turtle advocate, also holds a marine turtle permit.

In addition, the CMA is under contract to provide two lighting surveys to the County per year (in May and late June). The survey must include a list of properties not in compliance with municipal lighting ordinances. The CMA staff has also worked with local municipalities, including the City of St. Pete to draft turtle lighting ordinances (Elko, 2007).

### *Beach Stewardship Committees*

The Beach Stewardship Committees, one for Treasure Island and one for St. Pete Beach, hold quarterly meetings for interested citizens to discuss beach related issues. Meeting topics have included the Upham Beach project, the Treasure Island Sand Sharing program, and coastal processes impacting beach erosion.

### *Board of County Commissioners*

The Board of County Commissioners has the authority, under the state constitution, to adopt local ordinances, approve the County budget, set millage rates, and establish the requirements for the certain departments.

The Pinellas County Water and Navigation Control Authority was created by Special Act of the Legislature (Chapter 31182, Laws of Florida, 1955) in response to rampant dredge and fill activities in Pinellas County waterways, particularly in Boca Ciega Bay. The Board of County Commissioners (BCC) historically made up the members of the Authority. In 2006, the Special Act was abolished as part of the Pinellas County Charter review process and the functions of the Authority were wrapped into the County Charter. The BCC's responsibilities and powers remained the same; however, they now act as the BCC rather than the Pinellas County Water and Navigation Control Authority. Under the Water and Navigation code, the BCC has jurisdiction over all saltwater bodies in the County (including within municipalities) and a few freshwater lakes (lakes Seminole, Tarpon, Chatauqua, Salt, Leisure, Walsingham, and Taylor). Projects requiring Water and Navigation permits include: single family docks, multi-use private docks, commercial docks, boat lifts and tie poles, dredging, filling (wetland encroachments), and shoreline stabilization. Projects are reviewed for environmental impacts, navigational impacts,



construction requirements, as well as consistency with the Pinellas County Water and Navigation Code (Squires, 2011).

### *Progress Energy*

Pinellas County works with Progress Energy and the local municipalities to reduce lights that are visible from the beach prior to turtle nesting season.

### *Audubon Society*

Audubon volunteers monitor shorebirds and shorebird nesting. Additionally, they act as bird stewards, protecting nests and educating the public. Both the St. Petersburg Audubon Society and the Tampa Audubon Society are part of the Suncoast Shorebird Partnership (SSP) which coordinates data collection and shore protection with other groups and agencies (SSP, 2012). Shorebird data collected is submitted to the FWC shorebird database. None of the above organizations are under contract with the County.

### *Suncoast Seabird Sanctuary, Inc.*

The Suncoast Seabird Sanctuary, Inc. is a wild bird rehabilitation center and sanctuary located in Indian Shores. The Sanctuary treats an average of 8,000 birds annually and host 600 wild birds on the premises (SSSI, 2012).

## SECTION 2: FEDERAL AUTHORIZATIONS

### Pinellas County Beach Erosion Control Project

The USACE coordinated with the BCC under the provisions of the 1930 River and Harbor Act to conduct the first beach erosion control study for Pinellas County (including the shoreline from Dunedin Pass to North Channel, Pass-A-Grille Pass) (Figure 2-1). The study was completed in 1953 (USACE, 1953). The first Federal project authorized for construction was in 1954 which required the local interests to complete one island segment (or the whole project) within 10 years of authorization (USACE, 1966). The design included the placement of 1,319,000 cubic yards of fill to build a 60-foot wide berm on Sand Key, Long Key and Treasure Island and the construction of groins at the end of Clearwater Beach Island. All of the first costs for Sand Key and one-third of the costs for the other public beaches were eligible for funding. Due to lack of progress, the project was declared inactive in 1961 and expired in 1964 (USACE, 1994).

The first Federal beach erosion control project that was actually constructed was authorized in 1966, under the Rivers and Harbors Act of 1966, Public Law 89-789 (Table 2-1). The Pinellas County Shore Protection Project included the construction of a 40-foot wide, 6-foot high berm (from mean low water) on Sand Key (9.3 miles, first constructed in 1988, emergency fill placed in 1969), Treasure Island (1.7 miles, first constructed in 1969), Long Key (1.1 miles, first constructed in 1980), and Clearwater Beach Island (1 mile, first constructed in 1982) (USACE, 1980) (Table 2-2, Figure 2-2). Honeymoon Island, Caladesi Island and Mullet Key were excluded from the project. A Mullet Key erosion control project was federally authorized separately in 1966 (*see following section*). The Pinellas County Federal project had a cost-benefit ratio of 1.6 over the entire area. The Federal share of the first project cost (\$299,000) was only 5.9% for Clearwater Beach Island, 1.9% for Sand Key, 5.7% for Treasure Island, and 50% for Long Key (USACE, 1980).

Federal participation was recommended for the project presented in House Document 519/89/2 in 1966; however, several addendums modified the project over time. General and Detail Design Memoranda were released for the Treasure Island Beach Restoration in 1968, 1969 (authorized design), and 1975 (Addendum I, third nourishment). In 1978, a General and Detail Design Memorandum Addendum pertaining to Long Key was released which included a 25-foot berm at elevation +6 feet (from mean low water), a modification from the original design (constructed in 1980) (USACE, 1984b).

In 1980, a letter report from the USACE was released recommending the extension of Federal participation in the continued nourishment of Treasure Island through project year 15. General and Detail Design Memorandum Addendum III was released in 1982 to include the design of southern Treasure Island and the rehabilitation of the Pass-A-Grille groin on Long Key in the project (USACE, 1980).

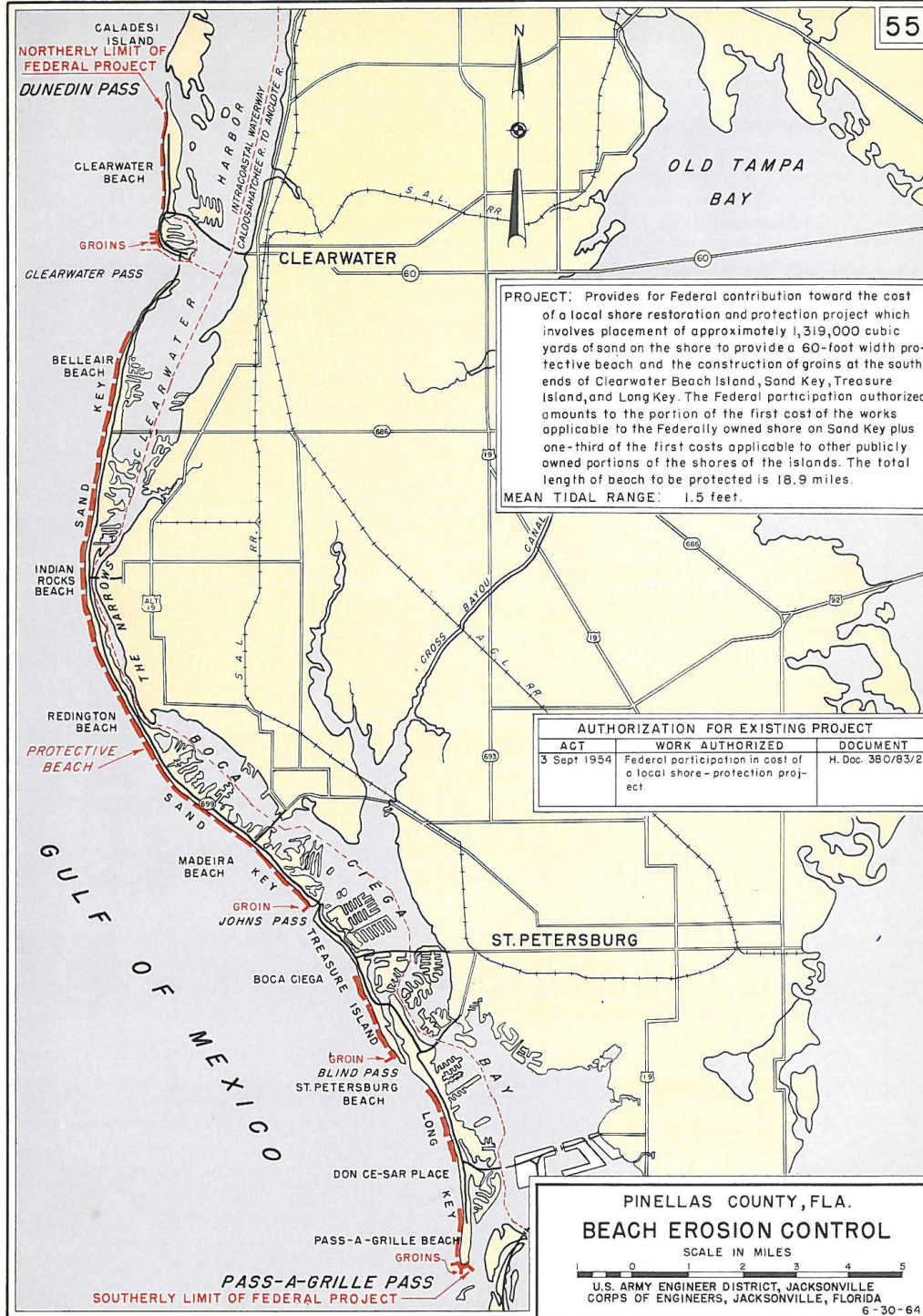


Figure 2-1. 1954 Authorized Federal Project (USACE, 1966)



The project was re-evaluated in 1984 and modified to be in compliance with the March 4, 1976 resolutions adopted by the Committee on Public Works of the United States Senate and the September 23, 1976 resolutions adopted by the Committee on Public Works and Transportation of the House of Representatives (Dial Cordy and Associates Inc., 2002). The Water Resources Development Act of 1986 reauthorized the construction of the Pinellas County beach erosion control project as presented in the Board of Engineers for Rivers and Harbors report (April 23, 1985) with a first Federal cost share of \$32,700,000. The authorization for the Treasure Island segment of the project (which had expired) was extended to include periodic nourishment for 50 years of project life (from date of initial construction in 1969). In April 1994, a Limited Reevaluation Report to the Beach Erosion Control Project Review Study was drafted to summarize the results of the Federal project. The cost benefit ratios presented in the Limited Reevaluation Report were 1.2, 9.8, 7.6 and 1.8 for Clearwater Beach Island, Sand Key, Treasure Island and Long Key, respectively. Benefits were based on annual recreation, downdrift effects, and storm damage prevention (USACE, 1994). Following the study, a design memorandum and environmental assessment was issued in November 1996, revised March 1997 (Dial Cordy and Associates Inc., 2002).

A Project Cooperation Agreement was executed in April 1995 for an extension of the construction of the Pinellas County Shore Protection Project (authorized under Water Resources Development Act, Section 501 (b), Public Law 99-662). The design of the project is consistent with the original (approved by USACE on November 4, 1994). The extension authorizes periodic nourishment of Sand Key (14.2 miles) until December 2043, Treasure Island (3.5 miles) until December 2019, and Long Key (4.1 miles) until December 2030 (Figure 2-2).

The total projected cost in the agreement was \$143,362,000. The overall project Federal and non-Federal shares were 59.3% and 40.7%, respectively. The cost share breakdown of the Sand Key nourishment was 62.8% Federal and 37.2% Non-Federal (USACE, 1997). The cost share breakdown of the Treasure Island nourishment was 58% Federal and 42% Non-Federal (USACE, 2000). The cost share breakdown of the Long Key nourishment was 60.8% Federal and 39.3% Non-Federal (USACE, 1994).

The Federal cost sharing applies to costs associated with planning and engineering costs after October 1, 1985, engineering and design (advanced, preconstruction and construction), hazardous substance investigations, historic preservation activities, construction, alteration of railroad bridges, supervision and administration costs, project coordination team, contract dispute settlements, value of lands, easements, rights of way and suitable borrow and dredged or excavated material disposal areas. Costs for repairs or replacement are not included in the agreement. The local sponsor is responsible for maintaining public ownership and access of beaches. Bidding of a project will not begin until the local sponsor has provided its share of the cost. If additional funds are required from the local sponsor, the local sponsor has 60 days to provide the funds after notice is given (Project Cooperation Agreement, 1995).



## Mullet Key

Prior to federal authorization of the Mullet Key project, the Pinellas County Park Department dredged 516,769 cubic yards of material from Mullet Key Bayou (USACE, 1971). The County placed 138,000 cubic yards of the material along the gulfside recreational beach area between June and November 1964 (northern 1,400 feet of the key was not nourished) (USACE, 1967; 1971). The initial placement raised the berm from an elevation of 2-4 feet to 5-6 feet. The remaining fill was used to fill low lying areas around Fort De Soto and the Bayway (USACE, 1967). Between November 1963 and August 1964, the County constructed the southern L-groin (420 feet long) and the southwest revetment (1,150 feet long) at a cost of \$275,565 (USACE, 1967; 1971).

In 1966, the Mullet Key Beach Erosion Control Project was federally authorized (USACE, 1980). The project consisted of the construction of 6,750 feet of beach, 60 feet wide (already partially constructed by the County, another 145,000 cubic yards was recommended by 1966 study, total of 213,000 cubic yards was authorized in 1966), an anchor groin at the south end (already constructed by County), a revetment along southwest edge (already constructed by County), a deferred groin at the north end if needed and justified (never constructed), periodic nourishment for 10 years and reimbursement for parts of the project completed after the study was initiated but prior to authorization (USACE, 1967; 1971; 1980).

The 1971 federal study concluded the beach restoration was only partially complete and an additional 325,000 cubic yards would be needed to fill the project area (USACE, 1971). As a result of severe erosion along the central part of the key and accretion at the north and south ends, the initial federal fill area only extended approximately 6,000 feet in the center of the key (USACE, 1971). The initial federal fill placement occurred in 1973 (Figure 2-3) (USACE, 1980).

In May 1977, approximately 750,000 cubic yards was placed along the gulf shore of Mullet Key (Figure 2-3) (USACE, 1980). The material was sourced from the Tampa Bay Harbor dredging project. In June 1977, approximately the south shore was nourished with 350,000 cubic yards of material from the same dredging project. The south shore project was not part of the federal project (USACE, 1980).

The Mullet Key Federal shore protection project was reportedly deauthorized in 1990 as a result of a lack of funding obligations (USACE, 2010; USACE, 2009; FDEP, 2008). In response to erosion on the island, Pinellas County partnered with the USACE on a beneficial use of dredged material project at Fort De Soto Park in 2006. Dredge spoils from Tampa Bay were placed on Fort De Soto Park and Egmont Key. Between 100,000 and 350,000 cubic yards were placed by Bean Stuyvesent and Wilkinson & Jenkins (exact volumes listed in references were conflicting) (Squires, 2011; Pinellas County, 2010; FDEP, 2008).

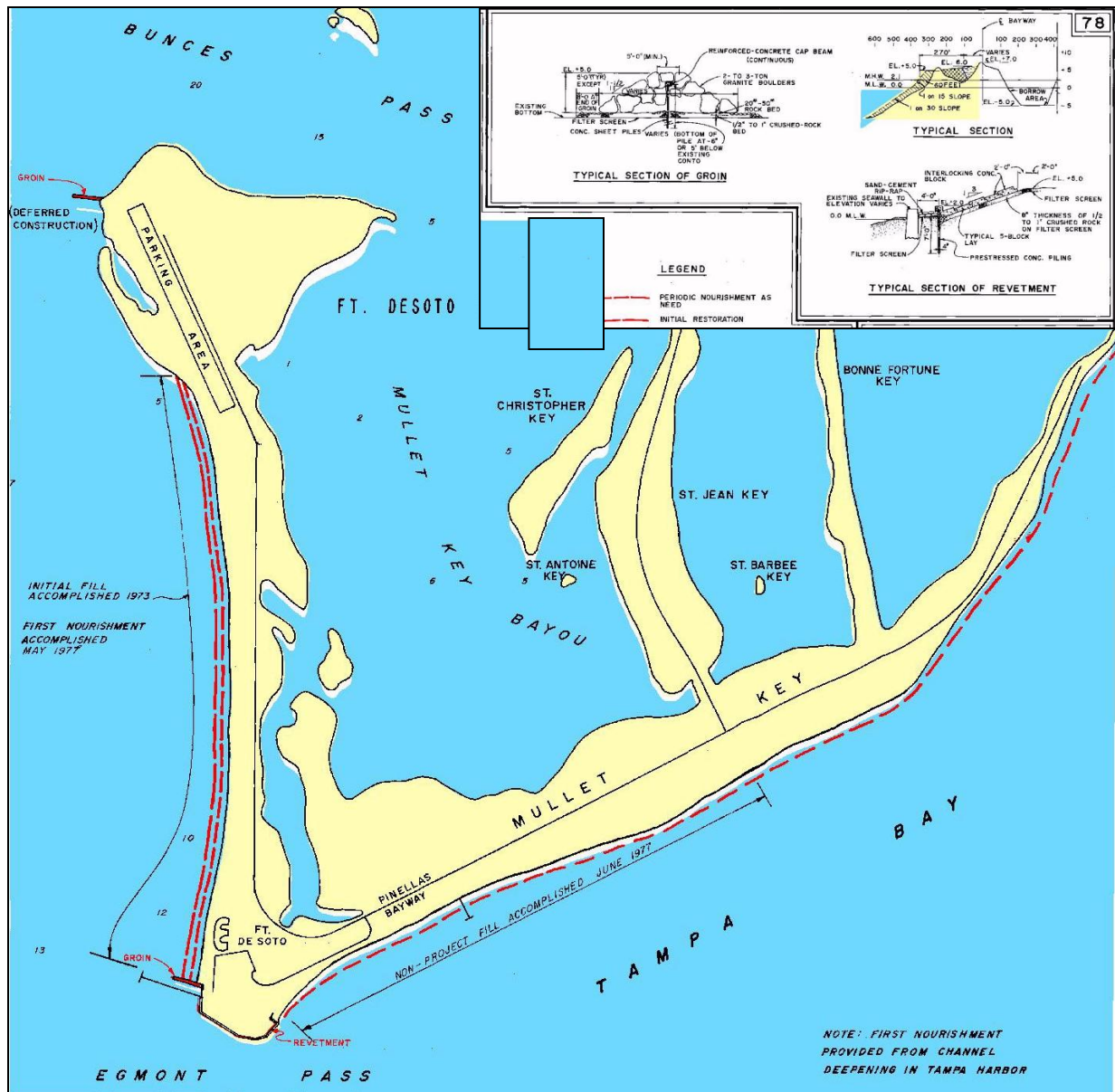




Table 2-1. Federal Shore Protection & Navigation Project Authorizations, Pinellas County, Florida

Federal Project	Location	Legislation			Initial Constr. Completed	Expiration
Pinellas County, Florida, Shore Protection -1954	Clearwater Beach to Pass-A-Grille	Rivers and Harbors Act of 1954, Public Law, 83-780		September 3, 1954	Not constructed	Expired 1964
Pinellas County, Florida, Shore Protection -1966	Clearwater Beach to Pass-A-Grille	Rivers and Harbors Act of 1966, Section 101, Public Law 89-789 Water Resources Development Act of 1976, Section 156, Public Law 94-587* (* This changed the project life from 10 to 15 years, CESAJ, 1984a)	H. Doc. 519/89/2	November 7, 1966 October 22, 1976	July 1969 (Sand Key)	1985
Pinellas County, Florida, Shore Protection -1986	Clearwater Beach to Pass-A-Grille	Water Resources Development Act of 1986, Section 501(b), Public Law 99-662	H. Doc. 519/89/2	November 17, 1986	December 1992  July 1969  April 1980 1982	Sand Key 12/31/2043 Treasure Is. 12/31/2019 Long Key 12/31/2030
Mullet Key, Florida Beach Erosion Control	Mullet Key (Fort DeSoto)	Rivers and Harbors Act of 1965, Public Law 89-298	H. Doc. 516/89/2	November 7, 1966	March 1973	January 1, 1990
John's Pass	John's Pass	Rivers and Harbors Act of 1960, Public Law, 86-845 River and Harbors Act 1966, Public Law 89-789	-N/A-	July 14, 1960 November 7, 1966	May 1968	-N/A-
Pass-A-Grille Pass	Pass-A-Grille Pass	Rivers and Harbors Act of 1960, Public Law, 86-845	-N/A-	July 14, 1960	1966	-N/A-
Clearwater Pass	Clearwater Pass	Rivers and Harbors Act of 1960, Public Law, 86-845	H. Doc. 293/86/2	July 14, 1960	1961	-N/A-
Intracoastal Waterway Caloosahatchee River to Anclote River	Intracoastal Waterway Lee to Pinellas County, FL	Rivers and Harbors Act of 1945, Public Law, 79-14 Rivers and Harbors Act of 1948, Public Law, 80-858 Rivers and Harbors Act of 1950, Public Law, 81-516 Rivers and Harbors Act of 1954, Public Law, 83-780	H. Doc. 371/76/1 -N/A- -N/A- -N/A- H. Doc. 109/85/1 -N/A- -N/A-	March 2, 1945 June 30, 1948 May 17, 1950 September 3, 1954 May 10-16, 1957 March 1, 1962 March 1, 1963	1962-1963	-N/A-

(Pinellas County, 2010; USACE, 1984a; 1995; 2010)

Table 2-2. Elements of Federal Shore Protection & Navigation Project Authorizations, Pinellas County, Florida

Federal Project	Originally Authorized Design Elements			Modifications Constructed	Federal Cost Share
Pinellas County, Florida, Shore Protection -1954		60-foot berm width	Groins at Clearwater Beach Island		100% Sand Key 33% all other public beach
Pinellas County, Florida, Shore Protection -1966	Sand Key: 9.3 miles Treasure Island: 1.7 miles Long Key: 1.1 miles Clearwater Beach Island: 1 mile	40-foot berm width, 6-foot berm height	600-foot revetment on Long Key	TI project extended 2,000 feet north, 1971 Two groins adjacent to Blind Pass, 1968-1971 North Groin at Blind Pass extended, 1983 Rehabilitation of Pass-A-Grille Groin, 1984	First Project Costs: Sand Key: 1.9% Treasure Island: 5.7% Long Key: 50% Clearwater Beach Island: 5.9%
Pinellas County, Florida, Shore Protection -1986	Sand Key: 14.2 miles Treasure Island: 3.5 miles Long Key: 4.1 miles  Clearwater Beach Island: 1 mile	40-foot berm width, 6-foot berm height		South Groin at Blind Pass extended, 1986 Redington Shores Breakwater, 1986 Rehabilitation of North Groin at John's Pass, 1987  Extension of Sand Key project, 1988, 1991, 1992	Sand Key: 62.8% Treasure Island: 58% Long Key: 60.8%
Mullet Key, Florida Beach Erosion Control	6,750 feet shoreline	60-foot berm width	Anchor groin at south end (420 feet) Groin at north end Revetment along southwest end (1,150 feet)		70% of first cost
John's Pass	2.2 mile channel	10 feet x 150 feet across bar 8 feet x 100 feet in pass 6 feet x 100 feet in IWW	700-foot revetment on south side of John's Pass		60-95.2%
Pass-A-Grille Pass	2.9 mile channel	10 feet x 150 feet across bar 8 feet x 100 feet in IWW			57%
Clearwater Pass	3 mile channel	10 feet x 150 feet from GOM through pass; 8 feet x 100 feet IWW 8 feet x 150-450 feet, turning basin			86.6%
Intracoastal Waterway Caloosahatchee River to Anclote River		9 feet x 100 feet 6 feet x 80 feet			

(USACE, 1980; 1984; 1994; 1995; 2010)

## **Federal Navigation Projects**

The Federal navigation projects in Pinellas County include the North Channel (Pass-A-Grille Pass), St. Petersburg Harbor, John's Pass, Clearwater Pass, Ozona Channel, Anclote River, and the Intracoastal Waterway from the Caloosahatchee River to the Anclote River. The following sections summarize the authorizations for the inlet navigation projects pertinent to the CMP.

### **Section 107 River and Harbor Act of 1960**

The Federal navigation projects in Pinellas County were authorized under the authority of Section 107 the River and Harbor Act of 1960. Under this authority, the USACE adopts small navigation projects that are feasible to construct and economically justified after a detailed investigation. Projects may include construction of entrance channels with structural protection, major channels and turning basins. Each project is limited to a maximum Federal expenditure of \$4 million including costs for feasibility studies, planning, engineering, construction, administration and supervision. The national program limit is \$35 million annually.

The non-Federal cost-share of a feasibility study under \$100,000 is 0%. Costs in excess of \$100,000 are split equally between the non-Federal and Federal sponsors. Cost sharing of the construction costs is dependent on channel depth. If the depth of the channel is less than 20 feet below mean low water, the non-Federal share is 10%. For channel depths between 21 and 45 feet, the non-Federal share is 25%. If channel depths exceed 45 feet, the non-Federal share is 50%. Post-construction, the non-Federal sponsor must pay an additional 10% of the navigation project costs, which may be financed for thirty years with interest. The value of the easements, lands, rights-of-way relocations and disposal areas may be credited towards the 10% payment. The local sponsor is responsible for providing and maintaining basic marina facilities and public access to shore facilities. Construction and maintenance of these facilities cannot be paid by the Federal sponsor.

### **John's Pass**

The John's Pass Federal navigation project was constructed under the authority of Section 107 of the River and Harbor Act of 1960 (USACE, 1970). The original 1,800-foot cut was authorized to begin 1,000 feet offshore and extend seaward. No dredging in the channel inside the pass was needed. The dredge spoils were placed offshore south of the pass in 1966. The navigation project was modified under the authorization of Public Law 89-789 (89<sup>th</sup> Congress, 2d Session) to include a 700-foot rubblestone revetment to protect the pass from eroding material approaching from the south. Public Law 89-789 stated the non-Federal cost share of the revetment was to be 40%. Construction of the revetment was completed in May 1968. The total cost of the initial project was \$1,120,605 with a 95.2% Federal share and 4.8% non-Federal share (USACE, 2010).

The authorized channel in 1965, modified from the original, was 10 feet deep with a bottom width of 150 feet from the Gulf of Mexico to State Road 699 Bridge, 8 feet deep with a 100-foot bottom width from State Road 699 Bridge north to Mile 0.92 and 6 feet deep with a 100 feet bottom width from Mile 0.92 north to the intersection with the Gulf Intracoastal Waterway

(authorized under the River and Harbor Act of 1965, House Document Number 214, 89<sup>th</sup> Congress, First Session) (Figure 2-4). Since the original dredging of John's Pass in 1966, the pass has been dredged 6 times during 1979 (77,650 cubic yards), 1981 (80,000 cubic yards), 1983 (80,000 cubic yards), 1991 (56,000), 2000 (390,000 cubic yards) and 2010 (275,000 cubic yards) (ASBPA, 2009). Additional management history of John's Pass, including structural stabilization of the inlet, is discussed in Section 3, John's Pass.

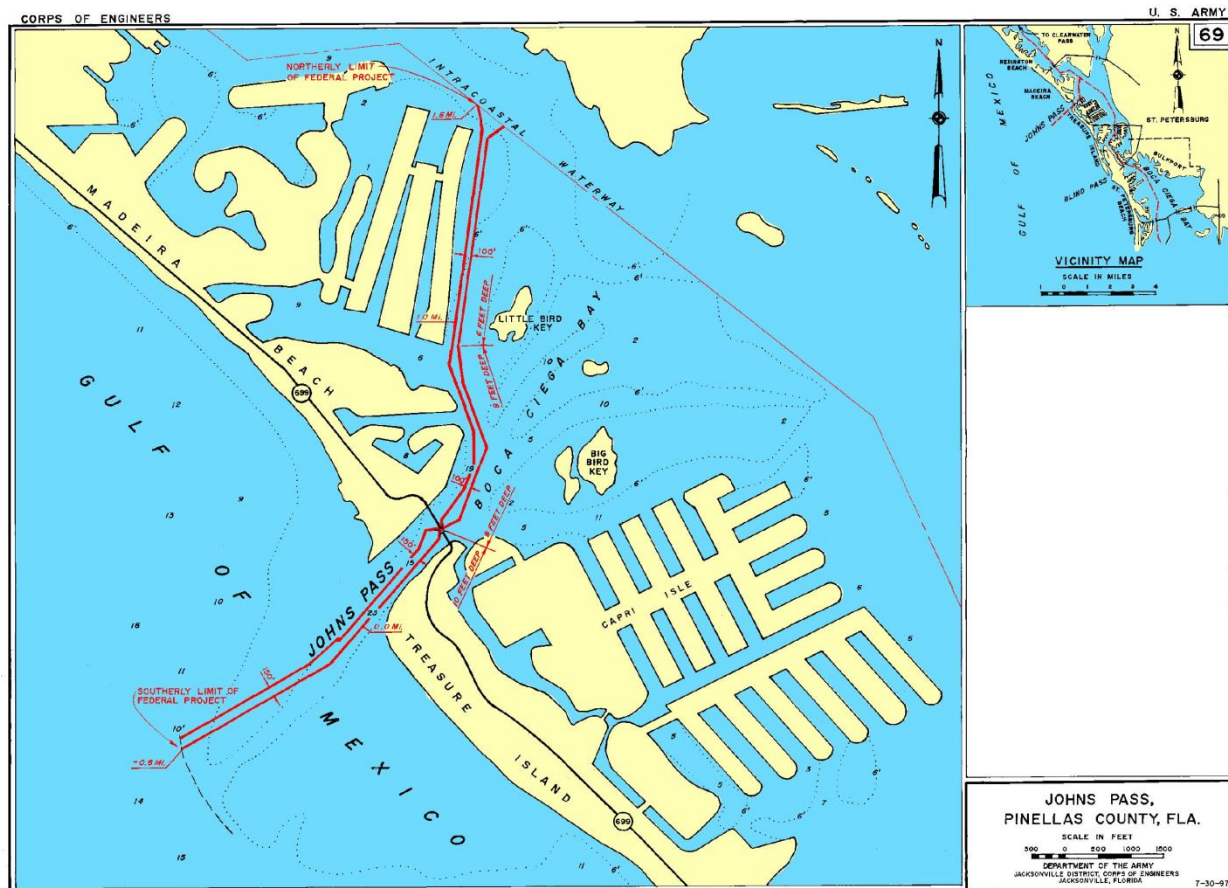


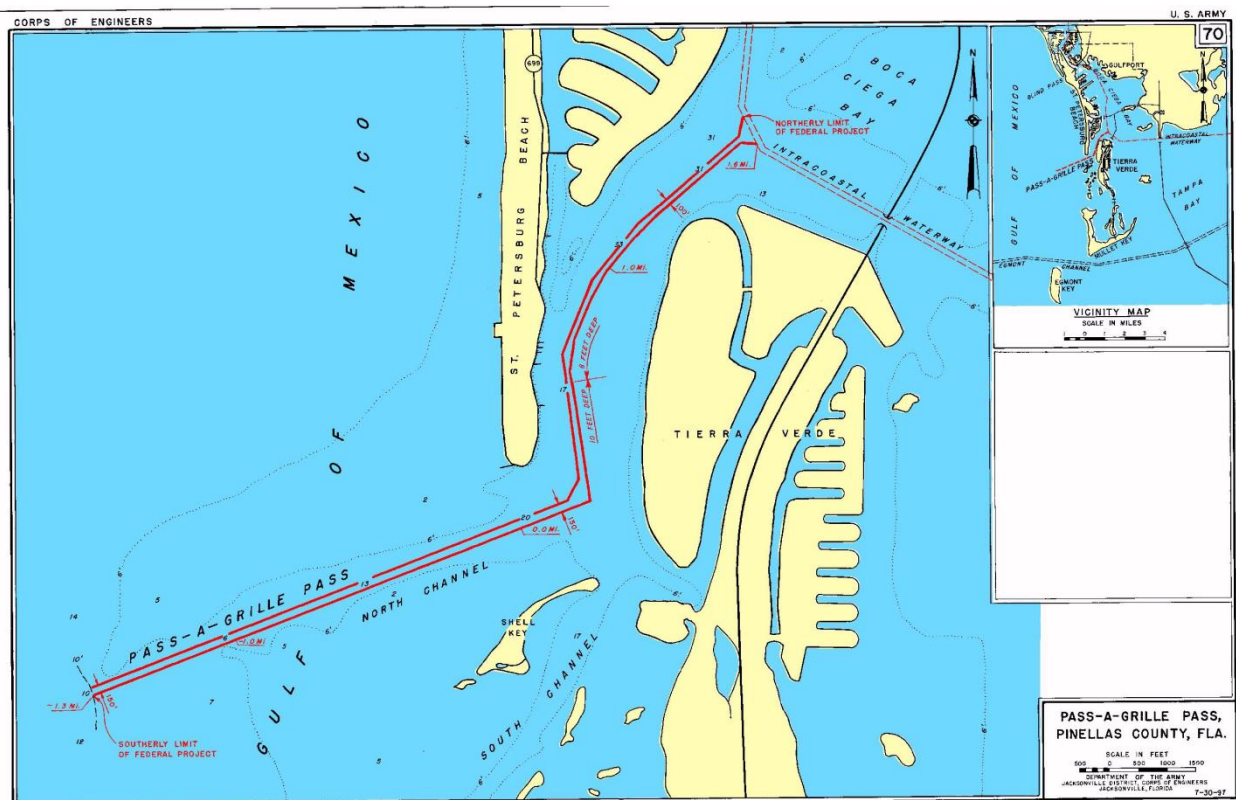
Figure 2-4. John's Pass Federal Navigation Channel (USACE, 2010)

### North Channel, Pass-A-Grille Pass

Improvement of the north entrance channel of Pass-A-Grille Pass was authorized in 1964 under the terms set by the 1960 River and Harbor Act. Dredging was first completed in 1966 (USACE, 1980b). The total cost of the initial project was \$96,188. The project was cost shared using Federal (57%) and non-Federal (43%) funds (USACE, 2010).

The authorized channel is 10 feet deep by 150 feet wide at the seaward end and 8 feet by 100 feet at the Intracoastal Waterway boundary (Figure 2-5). Maintenance dredging has not been required to maintain a navigable channel (FDEP, 2008). However, North Channel, Pass-A-Grille Pass was dredged in conjunction with the Federal Shore Protection project to provide sand for Treasure

Island in 1986 (73,000 cubic yards) and 2004 (95,000) (USACE, 2010; ASBPA, 2009). Additional management history of North Channel, including structural stabilization of the inlet by local government, is discussed in Section 3, North Channel.





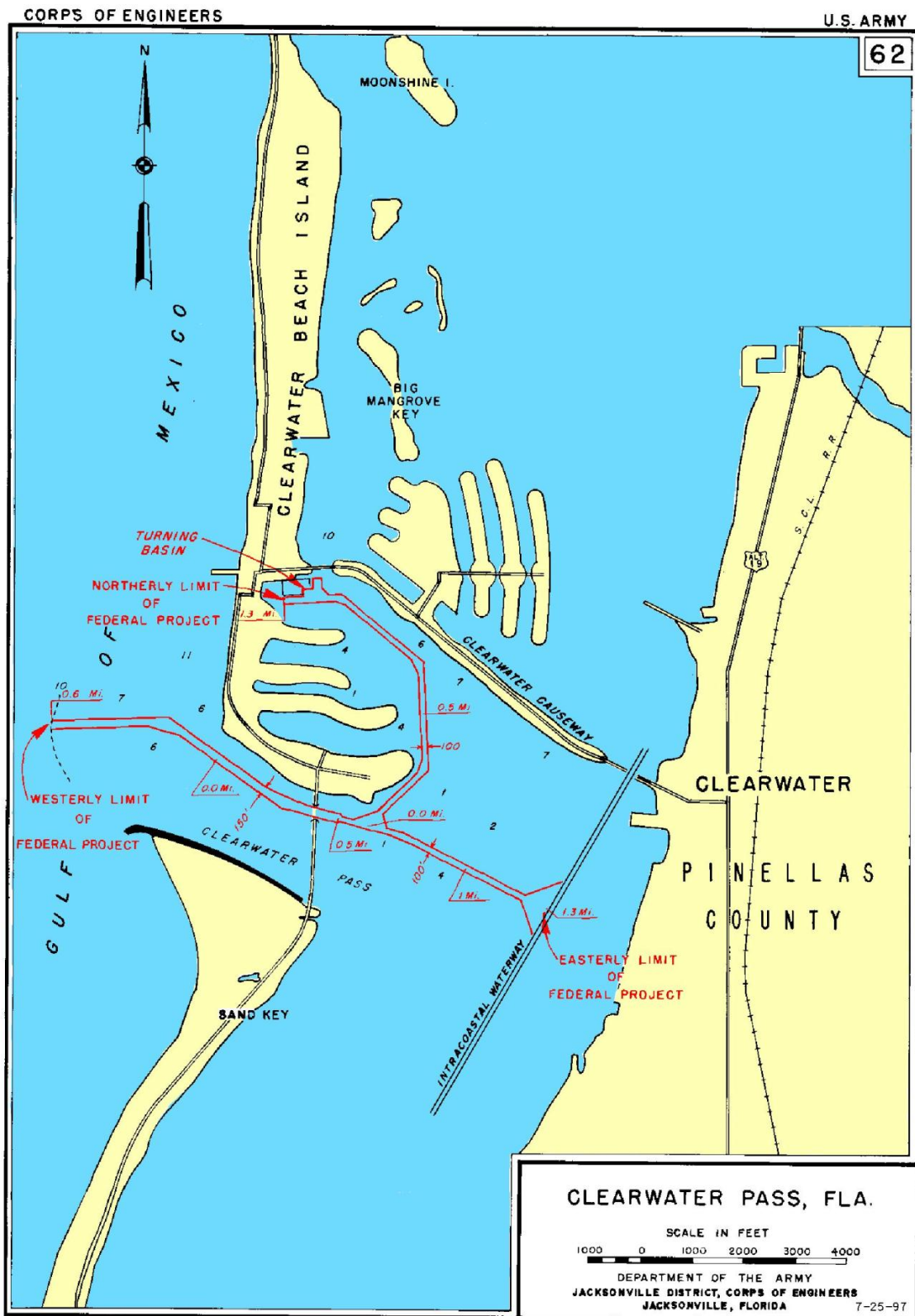


Figure 2-6. Clearwater Pass Federal Navigation Channel (USACE, 2010)

## **Gulf Intracoastal Waterway**

The Gulf Intracoastal Waterway, extending from the Caloosahatchee River to the Anclote River, was first federally authorized in 1945 (House Document 371/76/1). The channel was 100 feet wide and 9 feet deep. In 1963, the channel in Boca Ciega Bay was added (6 feet deep by 80 feet wide).

### **Pertinent Authorizations:**

Section 145 of the Water Resources Development Act of 1976 authorizes the placement of beach quality sand obtained from dredging operations on adjacent beaches if requested by the interested state government and in public interest.

Section 933 of Water Resources Development Act of 1986 allows 50/50 cost sharing of cost increase resulting from placing dredge spoils. This dredging authority applied to material being dredged from channels for navigation purposes not for beach placement.

Section 207 of Water Resources Development Act of 1992 allows political subdivisions of the state to place dredge spoils at a 65/35 (Federal/non-Federal) cost share.

Section 206 of the Water Resources Development Act of 1996, Beneficial Use of Dredged Material allows Federal interest in a disposal option that is not the least cost option if cost difference is reasonable in relation to environmental benefits. The cost share is 75/25 (Federal/non-Federal) of the costs in excess of the disposal costs.

## **Recommendations for Management of Federal Projects**

To maintain the Federal authorizations for the existing projects, the County should:

- Continue to pursue the reauthorization of funding for the Treasure Island Federal project whose authorization expires in 2019.
  - Pursue Federal funding for 50% of the cost of Investigations by the USACE necessary for the reauthorization of the project.
  - The County received a FDEP-BIP's grant of \$80,000 (FDEP Grant 12PI3) that expires October 31, 2015. Matching federal and county funds of \$160,000 and \$80,000, respectively would be needed for \$320,000 of work on USACE investigations.
  - Once the funding is available, the County should request the USACE begin Investigations for the reauthorization of funding for the Treasure Island project.



- Assuming the Investigations conclude the project is eligible for 50 more years of Federal funding, the County will be eligible to request Federal funding until 2069.
- If the Investigations or recommendation of the USACE does not result in the reauthorization of Federal funding for the project. The County may pursue Federal funding by requesting direct sponsorship of the project from the USACE, obtaining Federal authorization for a new project on Treasure Island, or using Congressional Adds to get Federal authorizations and appropriations.

The Federal authorizations could be modified in the following ways to better serve the needs of the Pinellas County CMP.

- Merge multiple project segments into one project for the entire county to avoid the independent schedule of the authorizations. The authorization would need to be included in a Water Resources Development Act bill. Merging the segments may take several years to complete.

The current PCA does not clearly allow for in-kind services (PCA, 1995). Therefore, an official in-kind services agreement should be developed, allowing Pinellas County to contribute engineering, planning and management services rather than funds towards cost of the project, so Pinellas County can control some aspects of the Federal projects. This is an important item to have in place prior to any potential future changes in USACE project management, USACE project prioritization, and Congressional support.

If the Federal authorizations cannot be reauthorized or modified to address the County's needs, or if future Federal funding for the County's projects becomes difficult to obtain, the County needs to prepare to take control of the shore protection project. Management responsibilities would include maintaining a design beach, identifying beach-compatible sand sources, addressing remaining hotspots to reduce erosion rates, developing new funding mechanisms and administering contracts.

## SECTION 3: SUMMARY ASSESSMENT OF HISTORICAL AND EXISTING CONDITIONS FOR EACH PHYSICAL CMP ELEMENT

### Historical and Existing Conditions

The historical and existing conditions of CMP elements are presented in the following sections. The barrier island and beach elements are presented first, followed by the inlet elements. The elements are presented in order of their location from north to south. The barrier island and beach elements include Anclore Key, Three Rooker Bar, Honeymoon Island, Caladesi Island, Clearwater Beach Island, Sand Key, Treasure Island, Long Key, Shell Key, Bunces Key and Mullet Key. The inlet elements include Hurricane Pass, Clearwater Pass, John's Pass, Blind Pass, North Channel (Pass-A-Grille Pass), South Channel (Shell Key Pass) and Bunces Pass. Following the discussion of inlet elements is a discussion of the known sediment borrow areas.

### Anclore Key

Anclore Key is a wave dominated barrier island approximately 3.5 miles offshore of the Pinellas/Pasco County line (Figure 3-1a and 3-1b). The pristine 4-mile island is subdivided into the Anclore Key State Preserve and the Anclore National Wildlife Refuge. The state park includes Anclore Key, the north and south sand bars and Three Rooker Bar. The area is habitat for 43 species of birds including the American Oystercatchers, bald eagles, and piping plovers (Florida Division of Recreation and Parks, 2011). The southern end of Anclore Key is under the jurisdiction of the Pinellas County Board of County Commissioners (Loeb, 1994). The park is only accessible by private boat or ferry.

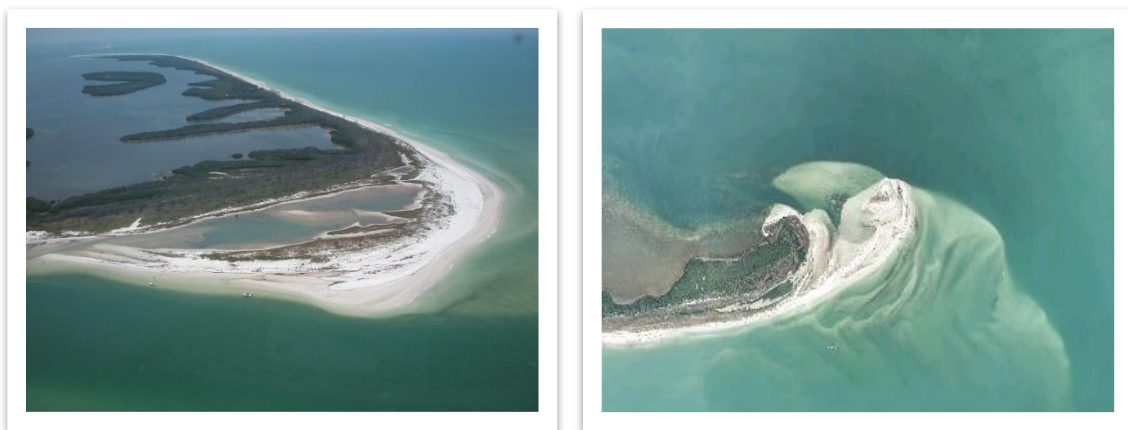


Figure 3-1. Anclore Key Spits (CPE, 2010)  
a) Northern Spit                      b) Southern spit on Anclore Key

Major morphological changes have occurred on Anclore Key over the past few decades (Davis Fitzgerald, 2004; Hine et al., 1987). Despite being located in a sediment starved region, Anclore Key has gained land area. An analysis of aerial photographs from the 1950s and 1960s led to the conclusion that the loss of seagrass beds adjacent to the Key (extending to a depth of 10 feet or more) destabilized a large amount of sand that was later driven to shore by waves and

transported alongshore to the north spit (Davis and Fitzgerald, 2004). As a result of the loss of the seagrass beds, the spit at the north end of the island has grown by more than a half mile since the 1960s (Figure 3-1a). The terminus of the north spit is driven by the location of the tidal channel. The southern end of the island accreted from the 1880s to the 1960s due to the landward migration and attachment of swash bars (Figure 3-1b) (Davis and Fitzgerald, 2004). As of June 2012, Anclote Key has been designated as non-critically eroded (FDEP, 2012a).

### Three Rooker Bar

Three Rooker Bar is part of the Anclote Key State Park (Figure 3-2). The island has formed over the past 25 years (Elko, 2003). The sand supply may have come from the release of sand that occurred after a substantial loss of seagrass beds in the area (Evans et al., 1987). The rapid establishment of upland vegetation has helped stabilize the island. Vegetation was continuous along the spine of the semi-circle island in 1995 (Google Earth, 2012). Overwash during storms caused shoreline recession in the center of the island and loss of vegetation (1998). By 2005, the island had breached near the north end. As the breach widened, the north end of the island eroded to the vegetation line. By 2010, the center of the island was submerged at low tide.

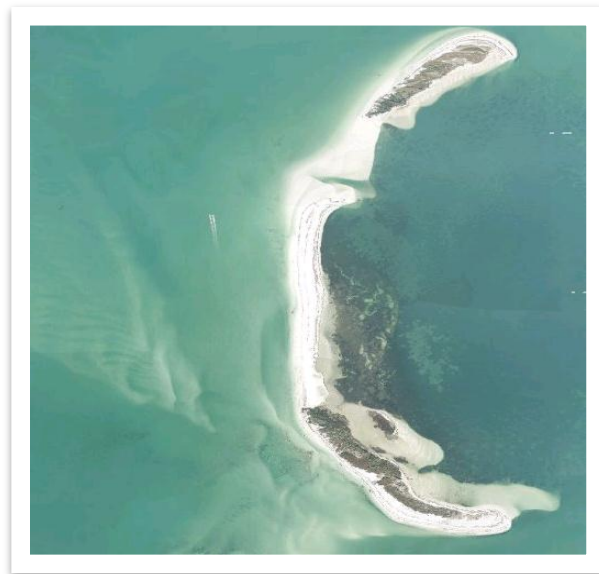


Figure 3-2. Three Rooker Bar (PCPA, 2011)

### Honeymoon Island

Honeymoon Island is a 3.6-mile long wave dominated barrier island bordered by Hurricane Pass to the south (Figure 3-43 and 3-4). Honeymoon Island was originally the north end of Hog Island, which breached during the 1921 Hurricane that formed Hurricane Pass (Pinellas County Government Online, 2008a). Prior to World War II, the island was a popular and well-advertised honeymoon location. In 1965, the causeway to the island was constructed (see Dunedin Pass and Hurricane Pass for effects of causeway on tidal prism). In 1969, developers dredged over one million cubic yards of sand and rock directly offshore of the island and placed it along the midsection of the island (FDEP, 1999; 2008). The southern half of the island severely eroded as a result. The placed fill eroded quickly leaving behind limestone rubble and creating a headland.

The unnatural shoreline orientation and headland has resulted in a nodal point near the middle of the island, preventing a stable beach from being maintained in the area (Davis and Elko, 2003).



Figure 3-3 Honeymoon Island (PCPA, 2011)

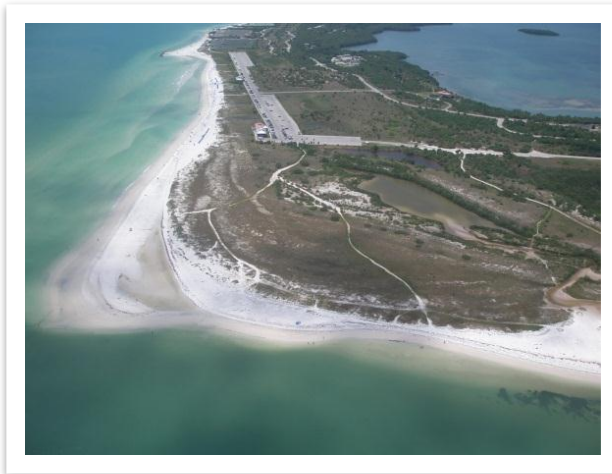


Figure 3-4. Honeymoon Island (CPE, 2010)

3-3

Honeymoon Island was acquired by the state in 1974 (southerly 2,500 feet of island, with options to buy more parcels) (USACE, 1980b). In 1979, the average annual net change in volume on the island was a loss of 15,200 cubic yards per year (USACE, 1980b). Reddish hued upland sand was used to nourish the island in 1989 (230,000 cubic yards). The sand rapidly migrated south into Hurricane Pass (Davis and Elko, 2003).

In 1999, the County applied for and was issued a permit to create a non-federal navigation channel, 50 feet wide by 7 feet deep (from mean low water) in Hurricane Pass and use the dredge spoils (12,500 cubic yards) to nourish the southwest beach on Honeymoon Island, USACE Permit No. 199904338 (IP-TF) (USACE, 1999). The permit did not require regular maintenance or compensatory mitigation. Approximately 12,500 cubic yards was removed from the channel in 2000 and placed between R-10 and R-12 (FDEP, 2008).

In 2002, the County applied for a permit (USACE Permit Application No. 200208266) to place 100,000 cubic yards of sand on the south end of the island (200 feet north of R-10 to 300 feet south of R-12) and construct a 450 feet long by 84 feet wide terminal groin at the south end of the project (south of R-12). The proposed borrow area was offshore of Hurricane Pass and contained sand of grain size 0.17 mm (native grain size was 0.19 mm). Mofatt & Nichol Engineers designed the project. This project was not constructed.

In 2006, the County was issued a Joint Coastal Permit (JCP No. 0249602-001-JC) to place 130,000 to 155,000 cubic yards of sand along Honeymoon Island (R-8 to R-10.5). In addition, Phase I of the project included reconfiguring an existing groin near R-10 into a longer, lower T-head groin (250 feet long, 15 feet wide at stem). To prevent overwashing of shorebird nests near R-12 and R-13, approximately 580 cubic yards of fill was to raise the elevation. In 2008, the County, in cooperation with the FDEP's Division of Recreation and Parks, completed the construction of the T-head groin and nourishment (Phase I).

The permitted borrow area was the Hurricane Pass ebb shoal (dredged to a depth of 9 feet with 1 additional foot of overdredge). The berm height was +5 feet NGVD and the slope was 1V:10H. A variance was also issued to expand the mixing zone (300 meters offshore, 1000 meters downcurrent from point of discharge). Originally, hourly turbidity samples were required by the permit when dredging below 9.5 feet due to high silt content. The permit was modified to allow sampling to be conducted every 4 to 6 hours since a cutter-head dredge was to be used.

Phase II of the project includes the construction of three additional T-head groins with fill (at R-8, R-8.5, and R-9), vegetation removal, reconfiguration of the existing parking lot, and removal of 50 feet of an existing submerged groin (near R-8.5). A joint coastal permit application was submitted in July 2011 by Humiston & Moore Engineers, on behalf the FDEP Division of Recreation and Parks and Pinellas County, to construct Phase II. Construction is scheduled to begin in 2013. The County is fronting the estimated \$5.63 million for construction costs. Since Honeymoon Island is a State Park, the State is expected to reimburse 100% of the construction costs and 75% of non-construction costs (i.e. design, permitting and monitoring).

## Caladesi Island

Caladesi Island is an undeveloped 2.3-mile long barrier island located 1.5 miles offshore of the City of Dunedin (Figure 3-5). In the 1600s, the Tocobaga Indians built shell mounds on the island to be used as burial grounds (FDEP, 1999; 2007). The mounds were excavated in 1903 (Moore, 1903). In the late 1800s, the island was homesteaded by a single family (Heritage Village, 2012). Some components of the original structures remain. Prior to the Hurricane of 1921, Caladesi Island was connected to Honeymoon Island forming Hog Island (Elko and Davis, 2006). The hurricane resulted in the opening of Hurricane Pass and the splitting of Hog Island into separate islands. Caladesi Island was acquired by the state in 1966 and designated as a state park (USACE, 1980b). In 1978, Dunedin Pass, the island's southern boundary at the time, filled in. After Dunedin Pass closed, Clearwater Island Beach was connected to Caladesi Island. No structures or nourishment projects have been constructed on the island.



Figure 3-5 Caladesi Island  
(PCPA, 2011)

Caladesi Island has consistently been accretional. In 1979, the average annual net volume change was 15,000 cubic yards per year (USACE, 1980b). In the 1980s, the southern end of the island remained wide as swash bars, formed prior to the closure of Dunedin Pass, moved onshore. In the early 2000s, the north end of Caladesi Island rapidly accreted due to an increase in littoral drift from the south (Elko, 2001). Storm overwash is common on the island. Certain sections of the island are protected from storm erosion by peat beds formed by mangrove detritus (Elko, 2001).

### *Dunedin Pass (now closed)*

Dunedin Pass, once a large tidal inlet, began to rapidly decrease in size in the 1920s after the opening of Hurricane Pass (1921) and the construction of the Clearwater Causeway (1926). The tidal prism was diverted to Hurricane Pass and to the south by the Causeway. The construction of the Dunedin Causeway (1965) further reduced the size of Dunedin Pass. Navigation aids were removed from the pass in 1969. In 1978, Dunedin Pass had reportedly closed (USACE, 1980). By 1984, the pass had reopened (Pinellas County Government Online, 2011). However, the loss of the ebb shoal during Hurricane Elena (1985) resulted in the infilling and eventual closure of the pass (Elko, 2003). The existing closed pass is shown in Figure 3-6.





Figure 3-6. Dunedin Pass (CPE, 2010)

The City of Clearwater requested a study by the Federal government for a Dunedin Pass navigation channel in 1970. An unfavorable reconnaissance report was submitted stating further study was not economically feasible. In 1971, the County requested a study for a project that disposed of dredged material from Dunedin Pass on the southern end of Honeymoon Island. Litigation issues over the ownership of Dunedin Beach (Figure 3-7) led to a discontinuation of the study and an unfavorable report from the USACE (USACE, 1980a).

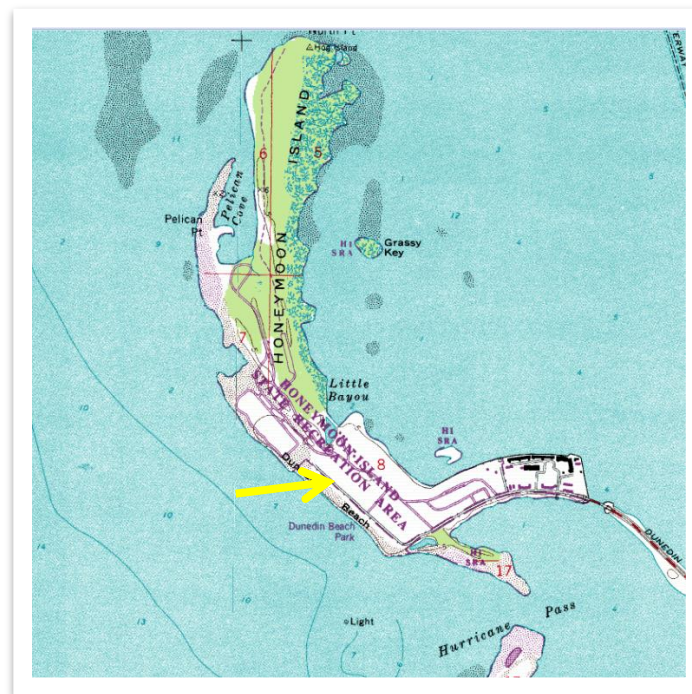


Figure 3-7. Dunedin Beach on Honeymoon Island (USGS, 1987)

3-6



After a request by the County, the USACE completed a brief reconnaissance report of the feasibility of Federal navigation improvements in the Dunedin Pass area in 1976 (USACE, 1980a). In 1977, Congress adopted a resolution (Section 107 of the River and Harbor Act) which authorized the Board of Engineers for Rivers and Harbors to review the feasibility of a navigation channel at Dunedin Pass. The recommended plan combined the Dunedin Pass and Hurricane Pass improvements and included excavating 389,000 cubic yards of material to be placed on the adjacent beaches and the construction of a rock revetment along Dunedin Pass for an initial cost of \$1,403,000 and \$286,000 in annual maintenance costs.

In 1984, the County applied for a permit to remove the shoals within Dunedin Pass (Coastal Tech, 1992). The agencies responded with concerns regarding negative impacts to foraging habitat of the piping plover and recommended the use of Hurricane Pass and Clearwater Pass for navigational needs. The County withdrew the permit application. In 1989, 66% of voters wanted the pass opened (total of 8,334 votes). In 1990, the County submitted a joint coastal permit application to reopen Dunedin Pass at a location 1,500 feet south of the natural location. The Florida Game and Fresh Water Fish Commission recommended denial based on potential adverse impacts to the environment. The County withdrew the application. The City of Clearwater funded a feasibility study to open the pass (1992). The study suggested a project with an initial cost of \$900,000 and annual maintenance costs of \$275,000 that would require maintenance dredging every two years. Due to the low cost to benefit ratio of opening the pass, the project was not pursued further. The location of the pass in an aquatic preserve, its proximity to Caladesi State Park, and the potential impacts to nesting grounds, seagrasses and benthic communities further inhibits the likelihood opening the pass would be permitted.

In 2011, the United States Coast Guard stated that they would prefer to transfer maintenance responsibilities of the channel markers along the entrance channel from the GIWW to the now closed Dunedin Pass (Squires, 2011). The City of Clearwater may take over maintenance responsibilities.

### Clearwater Beach Island

Clearwater Beach Island extends 3.3 miles south-southwest of Caladesi Island to Clearwater Pass (Figure 3-8). The construction of the Clearwater Memorial Causeway in 1926 led to the rapid development of the island. The island was first nourished in 1950 (Table 3-1) (USACE, 1966). Reportedly, Clearwater Beach Island accreted 26,000 cubic yards per year during the 1950s and 1960s (USACE, 1966). However, the shoreline fluctuated significantly, prompting residents to construct seawalls to protect their property (USACE, 1980b). In addition, the City of Clearwater constructed many groins including a terminal groin to reduce end losses to Clearwater Pass (Figure 3-9 Figure 3-10, Table 3-1). The average annual volume change remained relatively



Figure 3-8. Clearwater Beach Island (PCPA, 2011)

constant through the 1970s (27,200 cubic yards) (USACE, 1980b). In 1982, the jetty at Clearwater Pass was extended and the elevation of the beach was increased via nourishment (Figure 3-10) (USACE, 1994). Since then, Clearwater Beach has not required nourishment.

A discussion of Clearwater Pass is included in Section 3, Clearwater Pass. Clearwater Pass was dredged August – September 2012. Approximately 30,000 cubic yards of dredged material was placed in the nearshore (between -8 feet NGVD and -12 feet NGVD) adjacent to the south end of Clearwater Beach Island (FDEP, 2002, Squires, 2012).

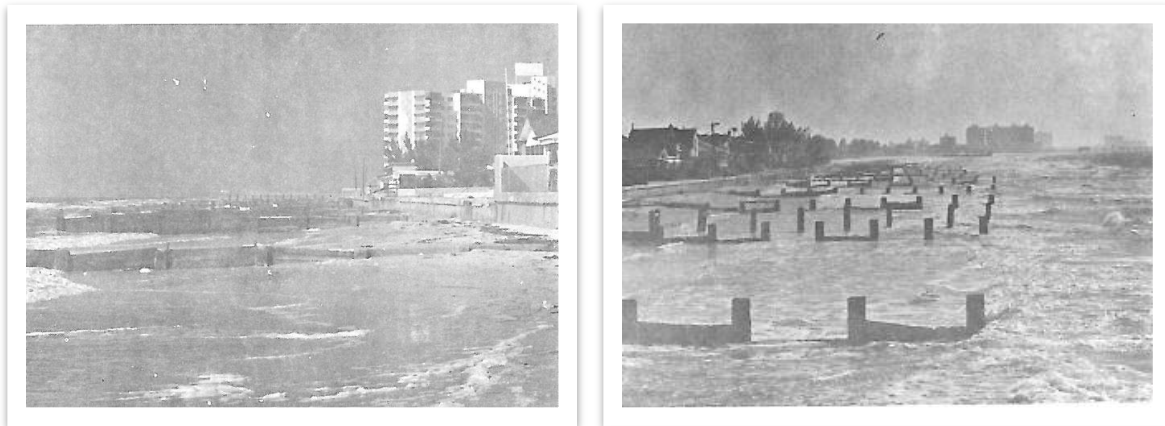


Figure 3-9. Pile and panel groins on Clearwater Beach in 1978 (USACE, 1980b)

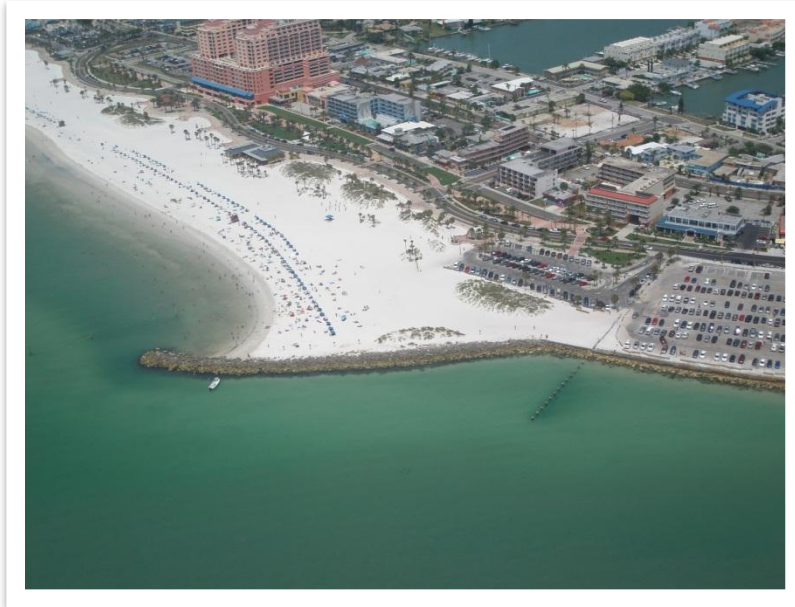


Figure 3-10. Southern Terminal Groin at Clearwater Beach Island (PCPA, 2011)

Table 3-1. Coastal Management Projects on Clearwater Beach Island

Year	Description of Coastal Management Project	Sponsor	Cost
1950	Nourishment: 150,000 cubic yards on southern end of island	City of Clearwater	N/A
1950	Construction of two groins at southern end of public property	City of Clearwater	\$12,000
1952	Construction of 500-foot concrete pier groin	City of Clearwater	\$42,000
1961	Construction of seven groins	City of Clearwater	\$40,000
1963	Construction of concrete pier groin, placement of rubble and fill north of Clearwater Pass	City of Clearwater	\$55,000
1975	Construction of curved jetty at Clearwater Pass	City of Clearwater	\$2.5 million
1982	Extension of jetty at Clearwater Pass into 800-foot long curved jetty and nourishment of beach north of jetty	USACE/ Pinellas County	N/A

### Sand Key

Attempts at coastal management on Sand Key began in the 1950s when severe erosion threatened homes and infrastructure. In response, private owners and the local municipalities constructed groins and seawalls. By 1965, most of the island was armored by seawalls. The average net erosion rate along the entire island during this time period was approximately 2,000 cubic yards per year (USACE, 1966). The northern two-thirds of the island were eroding and the south end was accreting. The accretion at the south end resulted from the construction of groins and a jetty at John's Pass (Figure 3-11). The beach benefited from multiple nourishments during the 1970s (Table 3-2). Two emergency fill projects were funded by the Federal Disaster Assistance Administration, after Hurricane Gladys (1969) and Hurricane Agnes (1973) using material from the intracoastal waterway and Clearwater Pass (Table 3-2). In addition, material dredged from the Clearwater Pass Federal Navigation Project was placed on Sand Key in 1974 and 1977 (USACE, 1984b).

By 1979, the average beach width was 50 feet. The shoreline at the north end of Sand Key was retreating at a rate of 83 feet per year (USACE, 1984b). Little to no beach existed between the ends of the island. The southern end of island was advancing at a rate of 83 feet per year. In addition, the jetty at John's Pass was in need of major rehabilitation. Overall, the net annual volume change was a loss of 107,800 cubic yards per year (USACE, 1984b).



Figure 3-11. Sand Key in 1978 (USACE, 1980b)

Table 3-2. Coastal Management Projects on Sand Key

Year	Description of Coastal Management Project	Sponsor	Cost
1957	Construction of 37 adjustable timber pile and concrete panel groins	City of Madeira Beach	\$10,000
1961	Construction of curved jetties on north side of John's Pass; Nourishment: 30,000 cubic yards on north side of jetty, dredged from pass	City of Madeira Beach	\$300,000
1966	Authorization of nourishment of 9.3 miles of Sand Key as part of Pinellas County Federal Shore Protection Project	USACE/ Pinellas County	
1969	Nourishment: 143,000 cubic yards of emergency fill from intracoastal waterway placed on Indian Rocks Beach (5,500 ft) after Hurricane Gladys	Federal Disaster Assistance Administration	\$856,000
1973	Nourishment: 400,000 cubic yards of emergency fill on Indian Rocks Beach (5 miles) after Hurricane Agnes	Federal Disaster Assistance Administration	\$1,677,600
1974-5	Construction of jetty at north end of Sand Key	Local	\$2,500,000
1974	Beach disposal of 126,000 cubic yards from maintenance dredging of Clearwater Pass	USACE	
1977	Beach disposal of 186,000 cubic yards from maintenance dredging of Clearwater Pass	USACE	
1982-3	Beach disposal of ~600,000 cubic yards from Clearwater's program for inlet improvement for bridge stability placed along north end of Sand Key (2 miles)	City of Clearwater	
1985	Nourishment: 60,000 cubic yards placed at Redington Shores beach after being dredged from John's Pass, stockpiled on Treasure Island and moved by land to fill site	USACE/ Pinellas County	
1986	Construction of 350-foot long breakwater at elevation +1.5 feet mean low water located 340 feet offshore of Redington Shores seawall	USACE/ Pinellas County	\$719,000
1988	First Federal Nourishment: 380,000 cy placed on N Redington Beach & Redington Shores; Breakwater lowered by one foot	USACE/ Pinellas County	\$2.9 million



1990-1	Second Federal Nourishment: 1,325,000 cubic yards placed on Indian Rocks Beach (2.65 miles)	USACE/ Pinellas County	\$14.5 million
1990-1	Truck Fill: 19,000 cubic yards		
1992	Third Federal Nourishment: 1,002,000 cubic yards placed on Indian Shores (2.6 miles); 58,000 cubic yards placed on North Redington Beach (1,800 feet)	USACE/ Pinellas County	\$10 million
1994	GIWW Dredge Spoil Placement: 7,000 cubic yards		
1998-9	Federal Nourishment: Seven beach communities	USACE/ Pinellas County	\$26 million
2005- 2006	Federal Nourishment: 2 million cubic yards from Egmont Shoal Borrow Area placed on Sand Key (9 miles) includes Sand Key (Clearwater), Belleair Beach, Indian Rocks Beach, Indian Shores, Redington Shores and North Redington Beach	USACE/ Pinellas County	\$45 million
2012	Federal Nourishment: Approx. 1.25 million cubic yards placed	USACE/ Pinellas County	\$31.54 million

Sources: (USACE, 1984b; 1994; ASBPA, 2009; FDEP, 2011e)

Three hurricanes impacted Pinellas County in 1985 (Davis and Andronaco, 1987). Pinellas County had not had a significant hurricane season since 1921 (see Section 3, Hurricane Pass). The strongest storm in 1985, Hurricane Elena, stalled for 24 hours offshore of Cedar Key (80 miles to the north of Sand Key). Storm wave heights were on the order of 7.5 feet. The hurricane caused severe damage to seawalls and some damage to buildings (Davis and Andronaco, 1987). The post storm conditions of the beach on Sand Key prompted the first Federal Shore Protection Project on Sand Key (originally authorized in 1966). As mentioned above, the Federal Disaster Administration funded emergency fill projects in 1969 and 1973.

The first Federal nourishment was constructed in phases from 1988 to 1992 (Table 3-2) (Davis et al., 2000). The first phase was constructed at Redington Beach and included the lowering of the Redington Beach breakwater (originally constructed in 1986). The breakwater was intended to reduce erosion at the public access and extend the design lifetime of the nourishment by one year (USACE, 1984b). The formation of a tombolo, attached to the breakwater, prompted the USACE to remove stones and lower the elevation of the breakwater during the nourishment project. The nourishment was constructed using borrow material taken via suction dredge from the John's Pass ebb shoal (Davis et al., 2000).

The Indian Rocks Beach (Phase II) nourishment utilized the Egmont Key shoal. Material was collected from the shoal via suction dredge, transported by barge, offloaded offshore of Sand Key and pumped onshore via suction dredge (Davis et al., 2012). The Indian Shores project (Phase III) used a series of draglines and conveyor belts to excavate sand from the Egmont Key



shoal, load it onto barges and offload the sand onto the beach. The transportation method resulted in a cost savings (Table 3-2); however, the material placed was looser than the other projects and eroded slightly faster. Overall, the project performed very well, exceeding the design life times (Davis et al., 2000).

Six years later (1998), the second nourishment occurred as a single project instead of in phases to reduce construction costs. Due to the proximity of hardbottom and the potential impacts of the nourishment, the permit required the construction of 7.95 acres of reef (*See Mitigation Reefs*). The nourishment did not include Belleair Shore and subsequently a hotspot formed in that area and erosion increased at the adjacent beach, Indian Rocks (BMP, 2004).

Eight years later (2006), Sand Key was renourished again as part of the Federal Shore Protection Project. At the time, the majority of Sand Key was eroding, with the exception of 2 miles of shoreline adjacent to Clearwater Pass (nourished by the City of Clearwater) and 3 miles of shoreline just north of John's Pass at Madeira Beach (BMP, 2004). The 2006 project was the largest in volume and most costly yet, relative to previous Sand Key nourishments (Table 3-2). The fill was sourced from the Egmont Key borrow area (*See Section 3, Borrow Areas*).

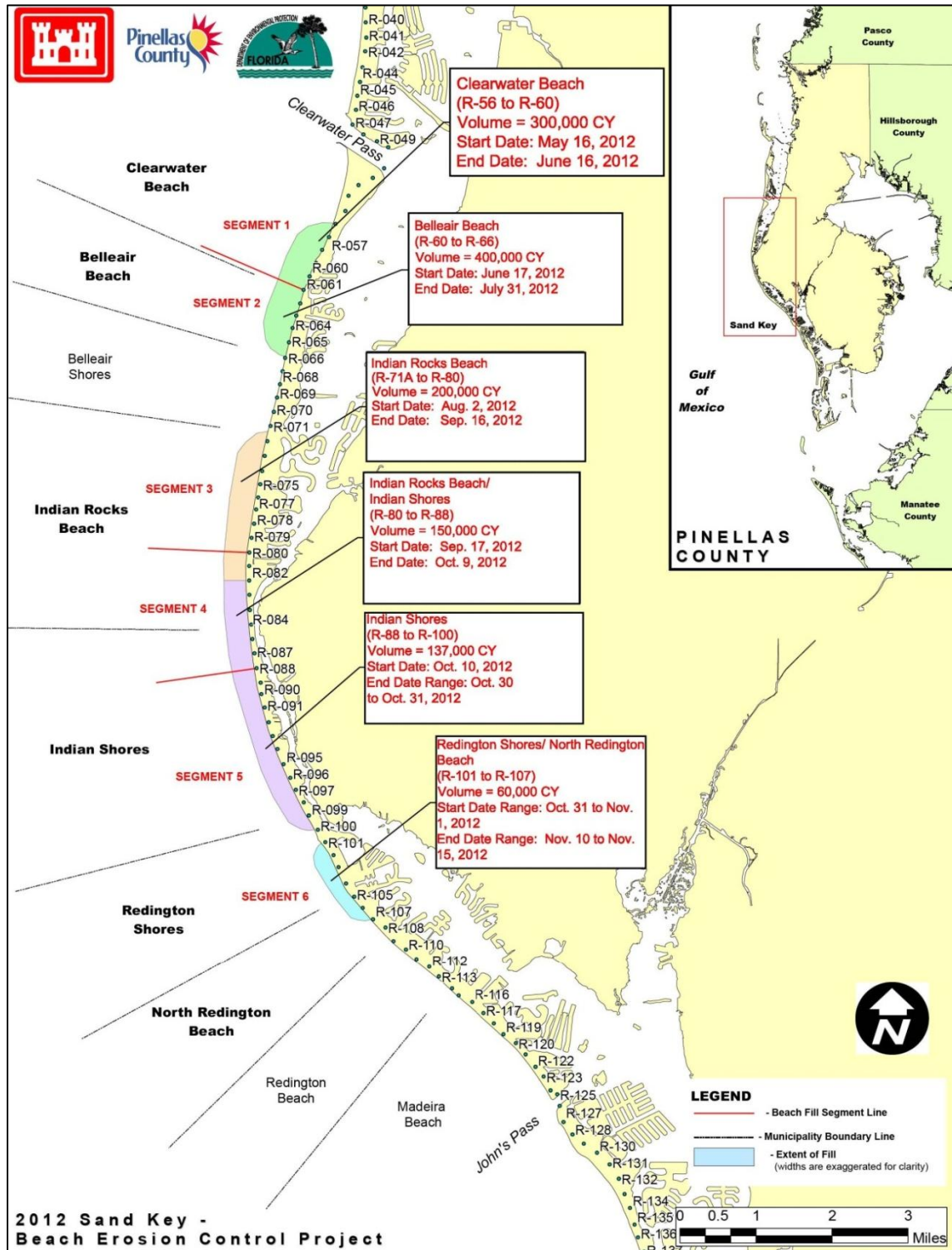
Six years after the last nourishment, Sand Key began the 2012 nourishment project in May (Figure 3-12). Norfolk Dredging Company bid \$31.54 million and placed approximately 1.25 million cubic yards of sand. Sand was sourced from Borrow Area L, designed by CPE (*see Section 3, Borrow Areas*). The project construction was completed in November 2012. The permit (FDEP Permit # 0238664-001-JC) authorizes multiple nourishments, as needed until the permit expiration on July 26, 2021.

### ***Funding Eligibility of Belleair Shore and Belleair Beach***

Belleair Shore does not accept federal funding for beaches so that they do not have to grant access and parking to non-residents. In the 1940s, the original developers deeded three beach parks in Belleair Shore to the residents. The towns have interpreted the deeds as exclusionary to others. In 1974, town officials cited violation of deed restrictions may result in legal issues and potentially a reversion of property to the original owners or their heirs (Bridges, 1974).

Belleair Beach Park at Morgan Drive, however, does not have the same deed restrictions (Bridges, 1974). In 2011, Belleair Beach wanted to be included in the Sand Key federal nourishment. However, they were short 28 parking spaces in order to be eligible for state funding (total needed was 79). The location of the Belleair Beach Resort Motel in the middle of an ineligible area and the USACE's reluctance to reduce the length of shoreline renourished prompted the County to agree to nourish all of Belleair Beach in 2012. However, the Town must work to meet the state's eligibility requirements in order to ensure receiving nourishments in the future (Estrada, 2011; Squires, 2012). The Belleair City Council voted to not meet the additional parking requirements on April 23, 2012 (Ayers, 2012). On July 25, 2012, the Pinellas County Administrator presented a draft agreement to the BIG-C requiring beach communities to maintain the number of public parking spaces necessary to qualify for state nourishment funding

or reimburse the county for any funds the county spends nourishing an ineligible shoreline (McClure, 2012).



### *Existing Conditions Snapshot Summary for Sand Key*

In 2006, fill was placed along North Sand Key (R-56 – R-60), Indian Rocks Beach (R-70-R-81), the Headland (R-81- R-89), Indian Shores (R-89- R-100) and North Redington Beach (R-100- R-107). No fill was placed along Belleair Shore (R-65- R-70), Madeira Beach (R-107- R-113) or immediately adjacent to the John's Pass terminal groin. By 2010, approximately 78% of the fill placed during the 2006 nourishment remained on Sand Key (Roberts and Wang, 2011, appended 2012).

While the most recent nourishment project was completed in November 2012, a summary of the previous monitoring results for Sand Key from the 2010 Beach Summary Report developed by the University of South Florida is presented below and in Figure 3-13 (Roberts and Wang, 2011):

#### North Sand Key (R-52 to R-65)

- No fill was placed from R-52 to R-55 in 2006. Therefore, no monitoring of the beach immediately adjacent to Clearwater Pass was conducted in 2011.
- The North Sand Key project area extends 1.7 miles from 1290 Gulf Boulevard (R-56) to 23<sup>rd</sup> Street (R-65).
- A nodal point exists at the north end of Sand Key between R-56 to R-65 as a result of wave refraction that occurs over the Clearwater Pass ebb shoal (Figure 3-13, 3-14 and 3-15). The divergence of alongshore sediment transport results in a substantial accretion at the Clearwater Pass jetty (to the north) and an erosional hotspot between R-59 and R-61 (to the south) (Figure 3-15).
- Beach profile lacks a sandbar. Lack of sand bar and divergent alongshore transport has resulted in significant erosion of total active profile (Figure 3-16a).
- Hotspot exists near R-60-R-61 (Dan's Island) (Figure 3-14).



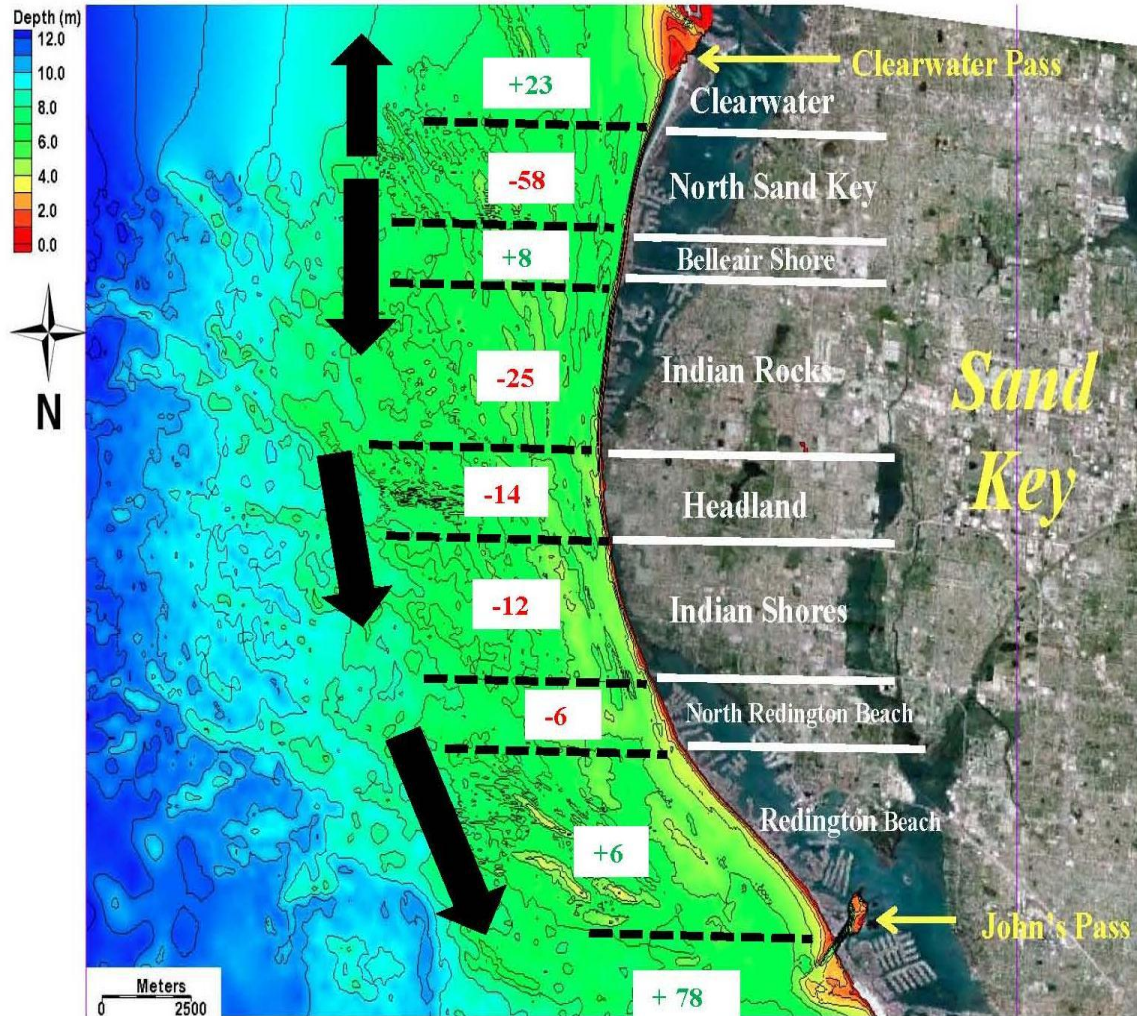


Figure 3-13. Sediment transport on Sand Key (units of cubic meters of sand)  
(Roberts and Wang, 2012)

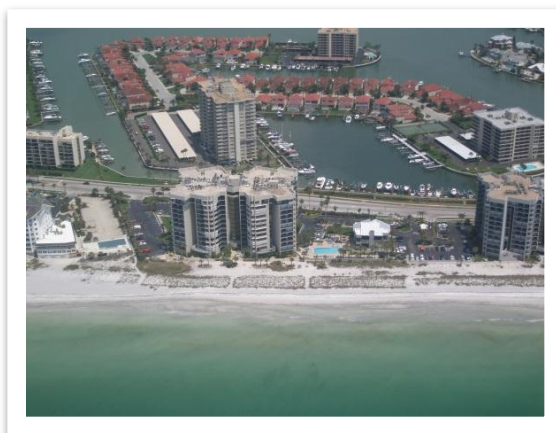


Figure 3-14. Dan's Island Hotspot (R60)



Figure 3-15. North Sand Key

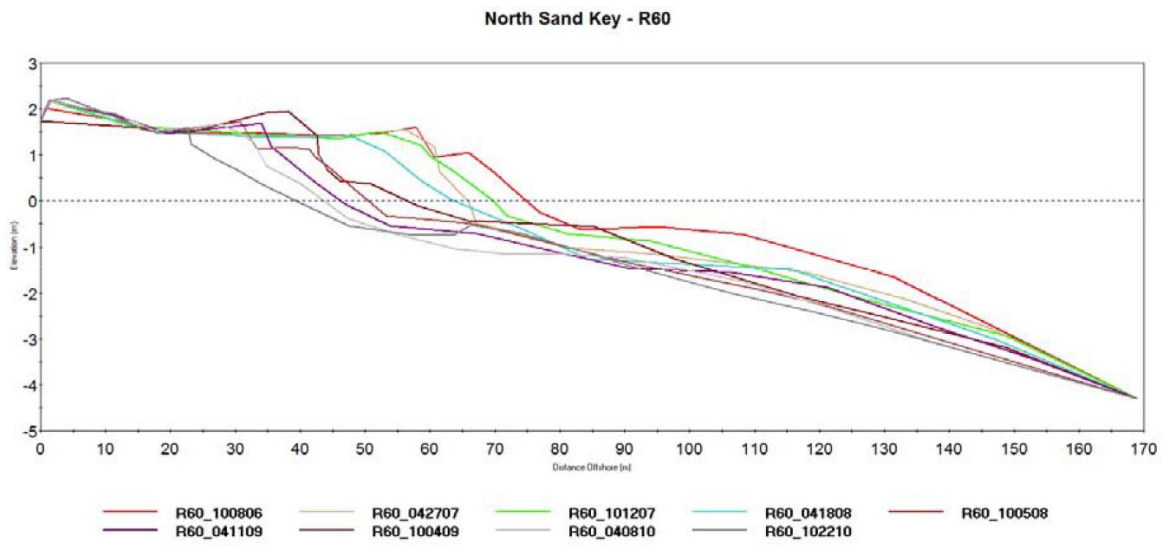
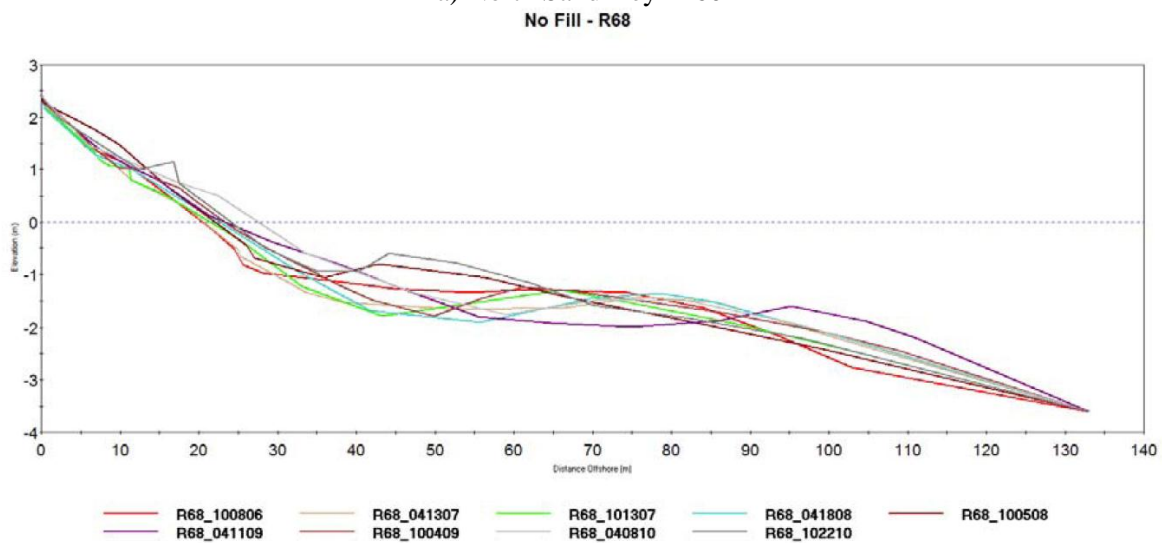
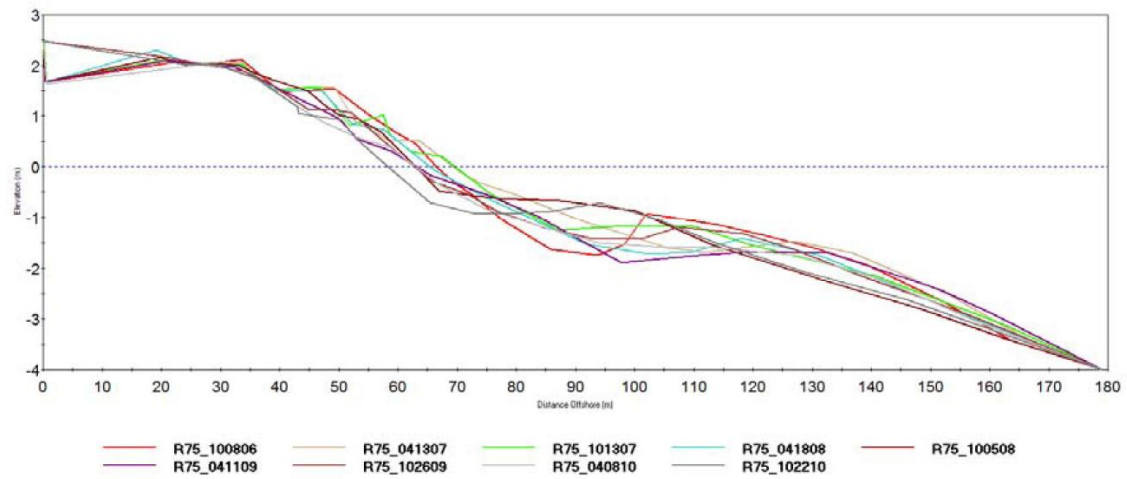


Figure 3-16a-g. Sand Key Beach Profiles (Roberts and Wang, 2012)  
a) North Sand Key R-60

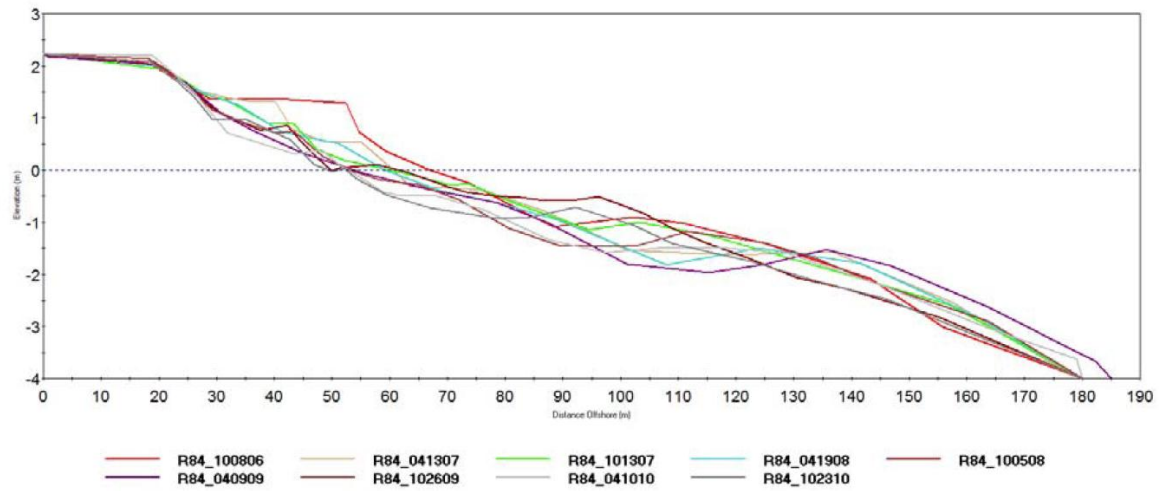


b) Belleair Shore (R-68)

Indian Rocks - R75



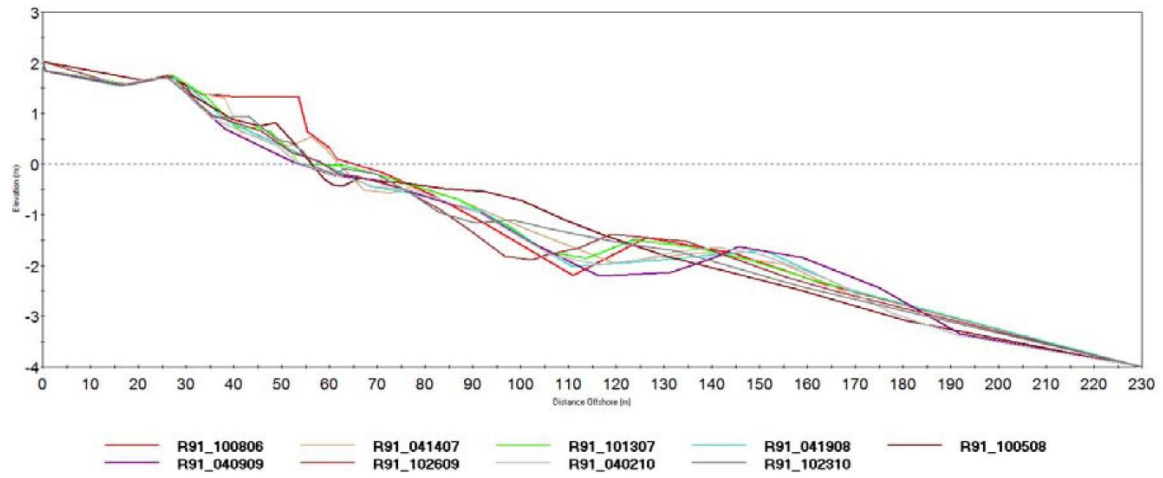
c) Indian Rocks Beach  
Headland - R84



d) Headland (R-84)

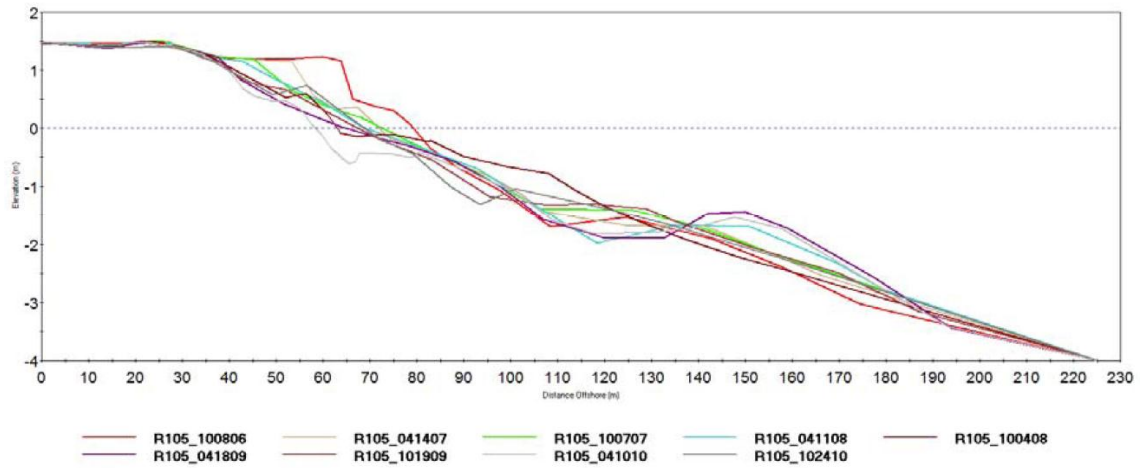


### Indian Shores - R91

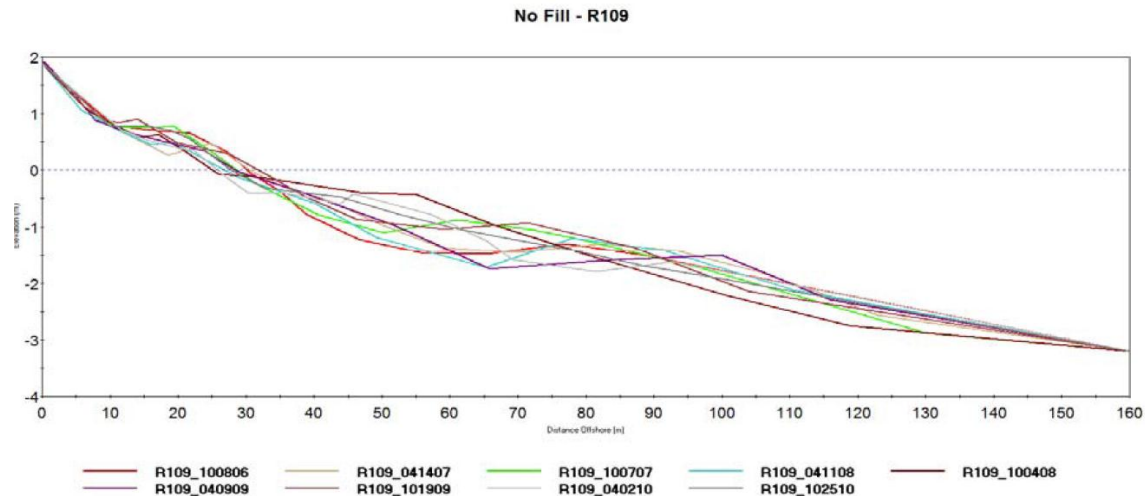


### e) Indian Shores (R-91)

#### North Redington - R105



### f) North Redington (R-105)



g) Madeira Beach (R-109)

#### Belleair Shore (R-65 to R-70) (Figure 3-16b)

- Belleair Shore extends approximately one mile from 23<sup>rd</sup> Street (R-65) to 5<sup>th</sup> Street (R-70). No fill was placed at Belleair Shore in 2006.
- Sandbar-like feature formed offshore after 2006 nourishment. The sand bar moves onshore and offshore seasonally.
- The shoreline has advanced and the nearshore area has had volumetric gains due to longshore spreading.
- Volumetric loss from updrift and downdrift beaches is greater than gains at Belleair Shore.

#### Indian Rocks Beach (R-70 to R-81) (Figure 3-16c)

- Indian Rocks Beach extends approximately 2 miles from 5<sup>th</sup> Street (R-70) to 5<sup>th</sup> Avenue North (R-81).
- Sandbar migrates offshore and onshore during winter and summer, respectively.
- Shoreline is stable after the initial profile equilibration.
- Volume loss is likely due to the lack of sand input from the unnourished updrift beaches.

#### Headland (R-82 to R-89) (Figure 3-16d)

- The Headland area is the 1.4-mile section of beach from 4<sup>th</sup> Avenue (R-82) to 199<sup>th</sup> Avenue (R-89).

- In winter, the shoreline retreats and the sandbar moves offshore. The sandbar moves onshore during the summer, nearly attaching to the shoreline in 2008 and 2010.
- The profile had equilibrated three years post-construction.

#### Indian Shores (R-89 to R-106) (Figure 3-16e)

- Indian Shores extends approximately 3.2 miles from 199<sup>th</sup> Avenue (R-89) to 171<sup>st</sup> Avenue East (R-106).
- The profile had equilibrated four years post-construction.
- The sandbar migrates seasonally and nearly attached in 2008, as a result of distal hurricanes.
- Hotspots have occurred near R-99 and between R-104A and R-106 (Figure 3-16f, Figure 3-17a and Figure 3-17b).
- The Long Pier, 1,000 feet in length, is located at R-104A (17490 Gulf Boulevard).

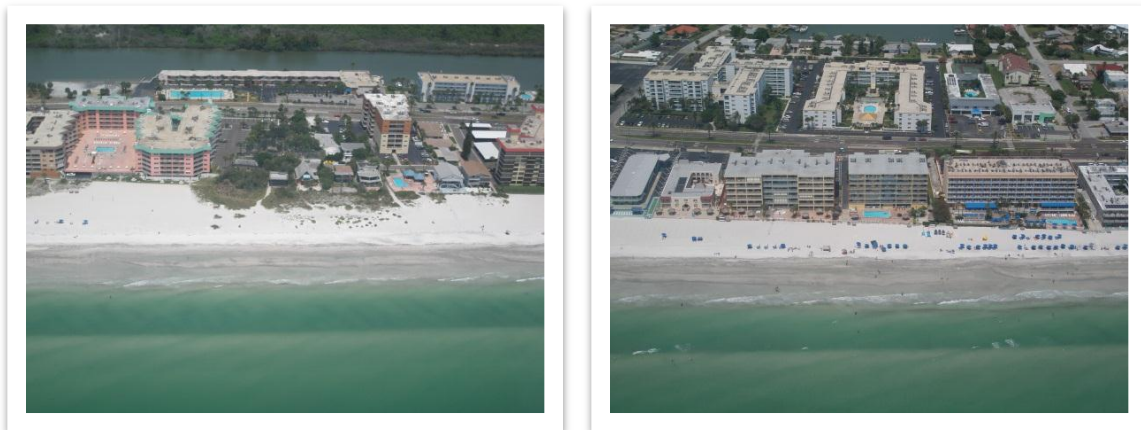


Figure 3-17 Indian Shores Hotspots  
a) at R-99                      b) between R-104A and R-106

#### Redington Breakwater (R-100A to R-101)

- The Redington Breakwater is adjacent to the Redington Shores Beach Access at 18200 Gulf Boulevard (Figure 3-18).
- A broad tombolo has formed landward of the breakwater (not directly related to the 2006 nourishment). Immediately south of the breakwater, the shoreline advanced.
- The shoreline north of the breakwater (R-99) has retreated 90 feet between 2006 and 2010.

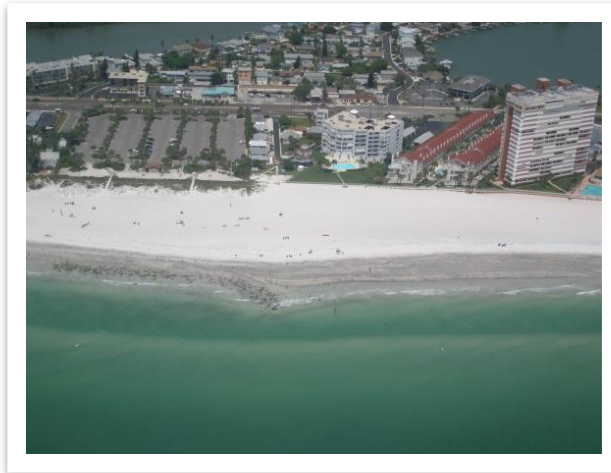


Figure 3-18. Redington Breakwater

#### Madeira Beach and Southern End of Sand Key (R-107 to R-124) (Figure 3-16g)

- Madeira Beach extends approximately 1.1 miles from 169<sup>th</sup> Avenue (R-107) to 157<sup>th</sup> Avenue (R-113).
- The Madeira Beach shoreline was relatively stable (R-107 to R-113).
- The southernmost profile adjacent to the John's Pass ebb shoal has a slight gain in dry beach (R-124).

#### Overall

- The north end of Sand Key is accreting as a result of sand transported north from the nodal point near R-60. Within the vicinity of the nodal point (R-59-R-64), hotspot erosion is occurring. The rest of the island is stable except for the headland area along the bend in the island, Indian Rocks Beach and Indian Shores Beach, which is moderately erosional.
- Except in the divergent zone at the north end of Sand Key, the longshore transport gradient is not persistent or significant. Cross-shore transport gradients dominate beach profile changes, as evidenced by onshore-offshore movement of the nearshore bar and relatively stable shorelines.
- The majority of fill was retained four years post construction.

#### *Recommendations from Sand Key Stakeholders*

In 2004, the community of Indian Rocks Beach developed their own Beach Management Plan. The plan recommended a Dune Preservation Zone with a minimum width of 50 feet. Within the zone, the planning committee suggested developing slow growth dunes as opposed to artificial dunes, preventing the construction of dune fencing, planting a diversity of locally native species, and preventing beach raking. In addition, the planning committee recommended unmetered free parking and no new parking areas.

## Treasure Island

Treasure Island is a 3.3-mile barrier island bordered by John's Pass to the north and Blind Pass to the south (Figure 3-19). Development of resorts on the island began in the 1920s. There was a surge in development in the 1950s. By the 1960s, the island was facing serious erosion problems. In response, the City of Treasure Island constructed 56 concrete (originally timber) groins and a rubble mound jetty on the north side of Blind Pass (USACE, 1984). These groins are no longer present or were buried by beach nourishments.

The first Federal nourishment project on the west coast of Florida was on Treasure Island in 1969 (Table 3-3) (USACE, 1984b). After the initial construction and repair following Hurricane Gladys, Treasure Island was renourished every two to three years. The material used for the nourishments was sourced from Blind Pass, John's Pass and an offshore sand pit parallel to the island. Sunshine and Sunset beaches required frequent nourishment.

Sunshine Beach, at the north end of Treasure Island, is historically erosional as a result of inlet effects. The only time periods Sunshine Beach has been accretional was after a nourishment or in the 1970s when dredge spoils disposed offshore migrated onshore. In 1989, an angled structure was constructed near 126<sup>th</sup> Avenue to protect development to the south (Figure 3-20a) (Krock, 2005). No evidence was found on why or when it was removed. A terminal groin was constructed at John's Pass in 2000 to limit the end losses from Sunshine Beach to the inlet (Krock, 2005). Prior to its construction, the shape and beach width at Sunshine Beach fluctuated significantly. After the groin's construction, the beach was fixed and straight, in proportion to the effective length of the groin (Figure 3-20b).

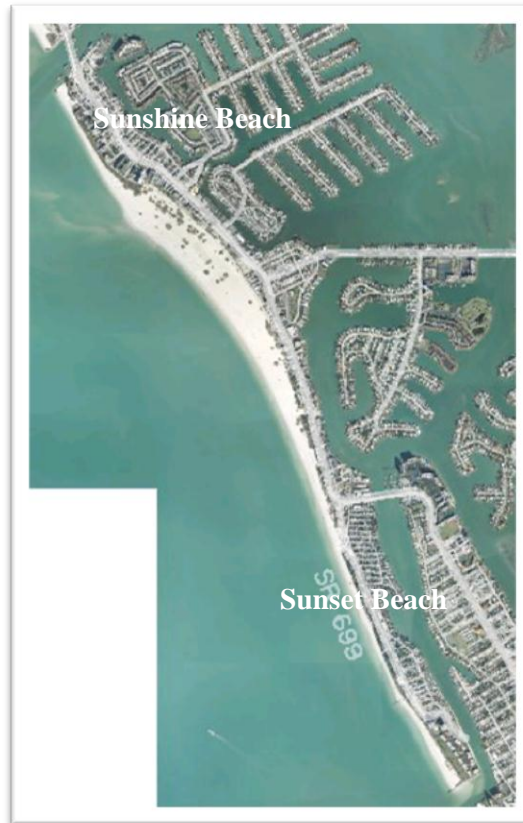


Figure 3-19. Treasure Island  
(PCPA, 2011)





Figure 3-20. Structures at North End of Treasure Island  
a) in 1989 (Krock, 2005)      b) in 2010 (CPE, 2010)

Sunset Beach, at the south end of Treasure Island, extends from R-127 to Blind Pass (Figure 3-21). Sunset Beach is sediment starved due to the sediment trapping that occurs in the center of the island and wave focusing that results from an offshore borrow area used in the 1960s (Roberts and Wang, 2011). The center of the island accretes in response to sand bypassing John's Pass and migrating onshore. The wave climate, potentially influenced by the island-parallel offshore borrow pit, is eroding the southern end of the island rather than dispersing sand from the center of the island. Despite nourishment in 2010, Sunset Beach continues to rapidly erode between FDEP monuments R-137 to R-141.5 (Caddy's on the Beach Restaurant to 77<sup>th</sup> Street).



Figure 3-21. Treasure Island in January 2012. Photograph (looking north) shows shoreline from R-129 (ebb shoal attachment point) to R-143 (Sunset Beach). Blind Pass is south of Treasure Island.



As a safeguard, the County, the City of Treasure Island and the State organized a sand sharing program to redistribute sand on the island quickly if needed (FDEP Permit Number 0196309-001-JC). During a shoreline emergency, the City of Treasure Island is authorized to move up to 134,000 cubic yards of sand from the wide section of beach to the narrow sections at the ends until the Federal shore protection project can be mobilized. The onshore borrow area is considered to be filled sovereignty lands; however, an Erosion Control Line was not required to implement the sand sharing program. The City of Treasure Island renounced their rights to lands seaward of the 1968 mean high water line via Resolution (07-114), transferring their interest to the Board of Trustees of the Internal Improvement Trust Fund under governance of the FDEP Division of State Lands. The portion of beach within the City of St. Petersburg was not included due to their reluctance to issue a similar resolution. In 2010, the City of Treasure Island hired Coastal Tech to design an emergency sand sharing project. The City plans on bidding the project and retaining a contractor to be ready in case of emergency. The City's emergency reserves budget is \$500,000. If the project is constructed, the City is expected to be reimbursed by the County, which in turn could receive 50% reimbursement by the State (City of Treasure Island Beach Stewardship Committee, 2010; Squires, 2011).

### *Existing Conditions Snapshot Summary for Treasure Island*

A summary of the monitoring results for Treasure Island from the 2010 Beach Summary Report developed by the University of South Florida is presented below (Roberts and Wang, 2011):

#### Sunshine Beach (R-127 to R-128)

- Sunshine Beach (Figure 3-22), at the north end of Treasure Island, extends 0.38 miles from John's Pass to 121<sup>st</sup> Avenue. The beach width from the vegetation line varied from 45 to 158 feet in 2010 and erodes at a rate of 30 feet per year.
- Wave refraction around the John's Pass ebb shoal causes a reversal in sediment transport along Sunshine Beach (Figure 3-23).
- Sunshine Beach is dominated by the longshore transport gradient, lacks bar formation and continues to retreat landward (Figure 3-24a). Substantial erosion occurred during the El Nino winter months of 2010.
- The cross-shore morphology of John's Pass ebb shoal changes from year to year. In 2009, natural sand bypassing (and longshore transport) across John's Pass formed a large shoal in an area that was previously a trough. In 2010, the eastern side of the

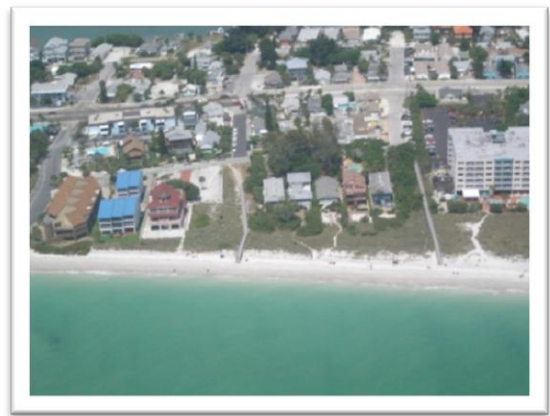


Figure 3-22. Sunshine Beach  
(CPE, 2010)

shoal began to erode. The western side of the shoal migrated onshore (Volume II, Roberts and Wang, 2011).

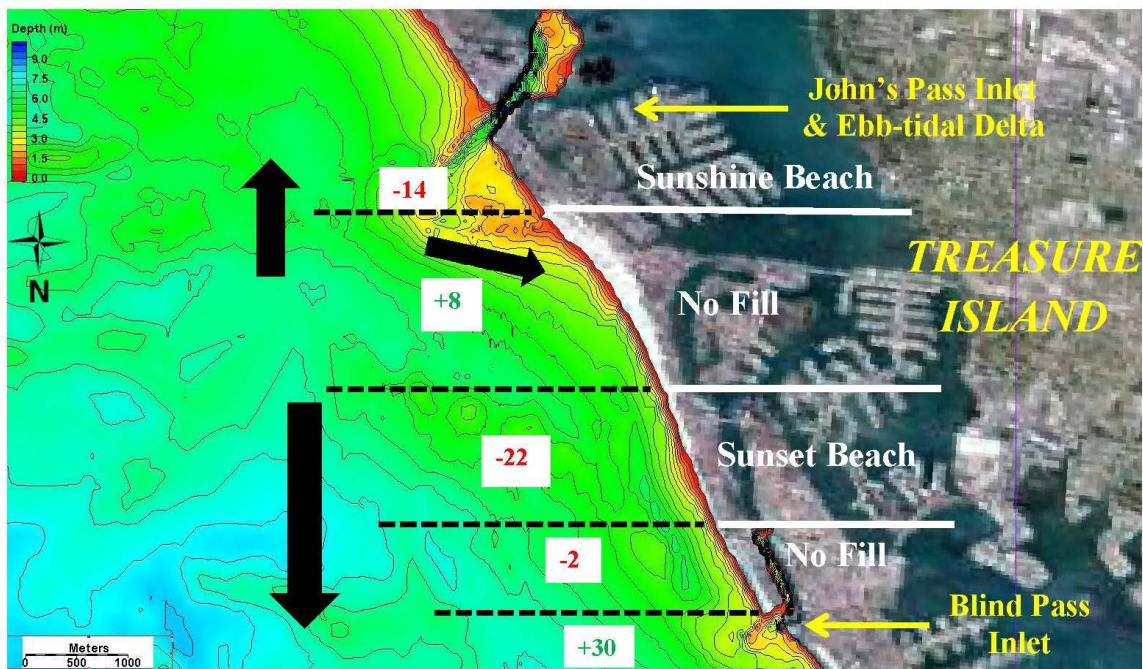
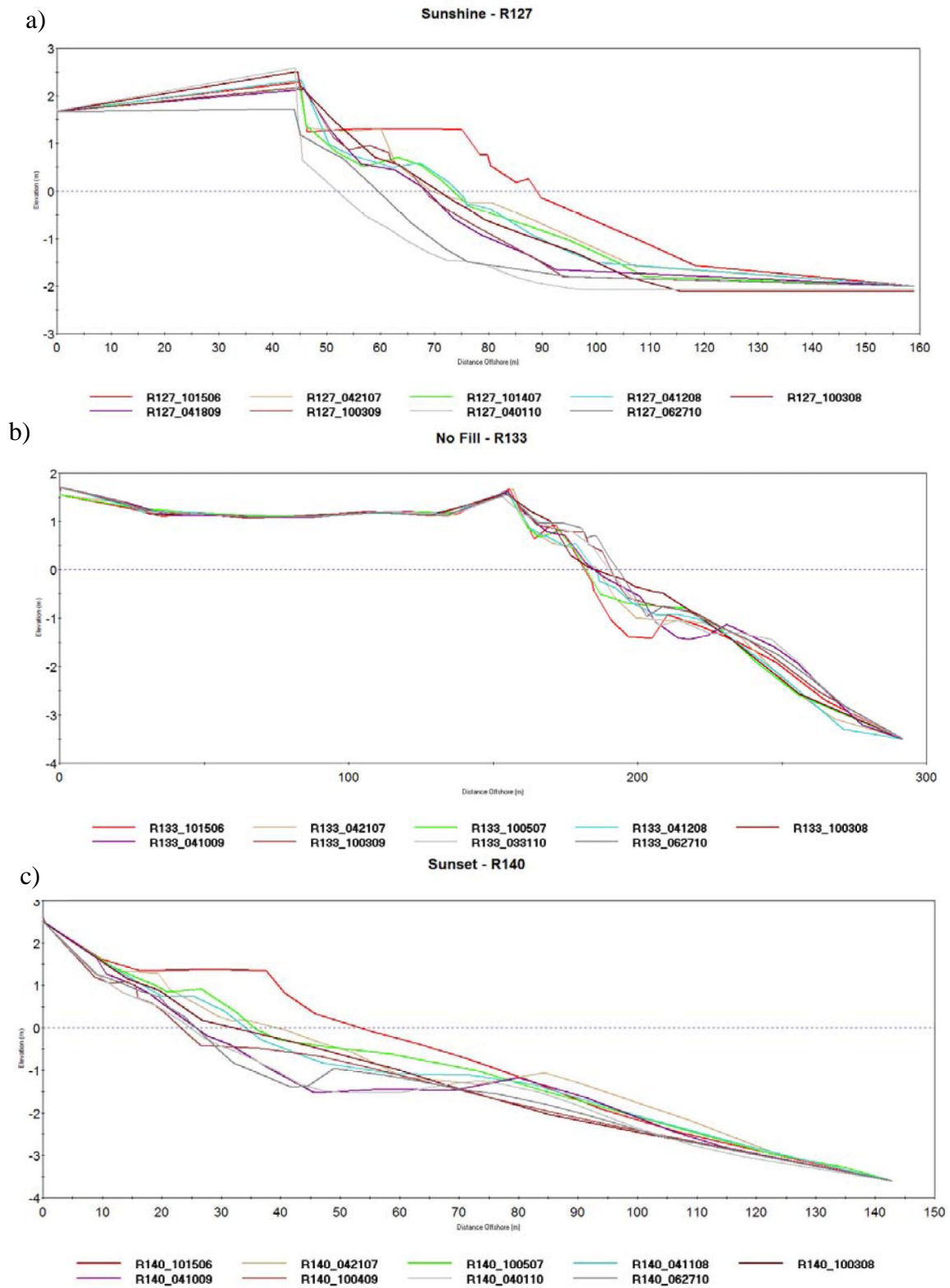


Figure 3-23. Accreting and Eroding Areas on Treasure Island (units of cubic meters of sand) (Roberts and Wang, 2012)



#### Central Treasure Island (R-129-R-133)

- The John's Pass ebb shoal attachment point is located near R-129 (Figure 3-25). The shoreline has advanced at this location (Figure 3-24b), especially after winter due to the transport driven by the energetic northerly approaching waves. Onshore sandbar migration and shoreline accretion occurred during the winter months between 2006 and 2010. The wide beach between R-131 and R-133 is also due to the filling in of O'Brien's lagoon in 1980 (Wang and Beck, 2012).



Figure 3-25. Central Treasure Island  
(CPE, 2010)

#### Sunset Beach (R-137 to R-141)

- During the first winter post construction (2007), the shoreline at Sunset Beach retreated and a large volume of sand was lost. The shoreline has continued to retreat since 2006 (Figure 3-24c).
- Sandbars formed in 2007, 2009, and 2010 but not in 2008. The sandbar migrated onshore during summer months with little benefit to the shoreline.
- The greatest erosion occurred at R-140 (Figure 3-26).
- A slight advancement of the shoreline occurred just north of the Blind Pass jetty between 2006 and 2010.

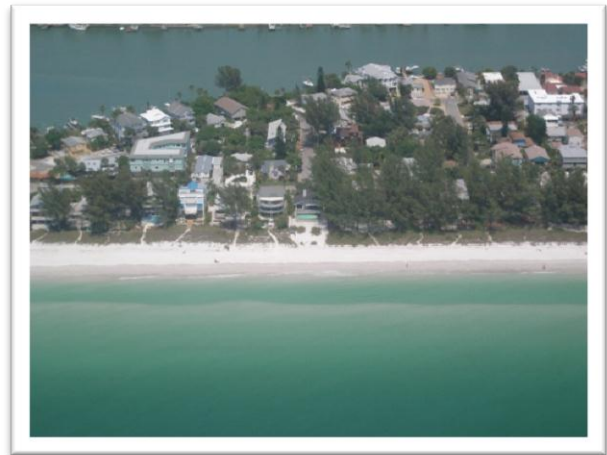


Figure 3-26. Sunset Beach, R-140  
(CPE, 2010)



Table 3-3. Coastal Management Projects on Treasure Island (USACE, 1994; Pinellas County, 2010)

Year	Description of Coastal Management Project	Sponsor	Cost
1960	Construction of 56 concrete groins	City of Treasure Island	\$228,000
1962	Construction of native stone, rubble mound jetty on north side of Blind Pass	City of Treasure Island	\$18,000
1964	Nourishment: 10,000 cubic yards of fill dredged from Blind Pass placed on adjacent public beach	City of Treasure Island	
1969	First Federal Nourishment: 790,000 cubic yards from Blind Pass (108,000 cubic yards) and offshore (682,000 cubic yards) placed along 9,200 feet of shoreline	USACE/ Pinellas County	
1969	Nourishment: 143,000 cubic yards of emergency fill placed after Hurricane Gladys	Federal Disaster Assistance Administration	
1971	Nourishment: 75,000 cubic yards of fill from the shore connected bar was placed at the north end	USACE/ Pinellas County	
1972	Nourishment: 155,000 cubic yards of fill from the 1969 borrow area was placed at the south end	USACE/ Pinellas County	
1972	Construction of two groins at south end	USACE/ Pinellas County	
1976	Nourishment: 380,000 cubic yards from offshore borrow area placed on southern 1.5 miles of island	USACE/ Pinellas County	
1978	Modification of Blind Pass north jetty: jetty was raised 2.5 feet		
1978	Nourishment: 50,000 cubic yards of dredge spoils from Blind Pass	USACE/ Pinellas County	
1980	Dredge spoils (119,000 cubic yards) from John's Pass placed in O'Brien's Lagoon at north end of island		
1981	Dredge spoils (70,000 cubic yards) from maintenance of John's Pass placed	USACE/ Pinellas County	
1983	Nourishment: 220,000 cubic yards from Blind Pass placed on southern 4,200 feet of island	USACE/ Pinellas County	

1986	Nourishment: 445,000 cubic yards of emergency fill from Pass-A-Grille ebb shoal placed on southern 10,400 feet of island after Hurricane Elena	Federal Disaster Assistance Administration	
1989	Construction of angled erosion control structure at 126 <sup>th</sup> Avenue (Figure 3-20a)	Unknown	
1991	Nourishment: 56,000 cubic yards of fill dredged from John's Pass and placed along the shoreline 1000 feet south of the pass	USACE/ Pinellas County	
1996	Nourishment: 51,280 cubic yards of fill placed along Sunset Beach	USACE/ Pinellas County	
2000	Nourishment: 348,772 cubic yards dredged from John's Pass and placed along the southern third of the island (5,100 feet)	USACE/ Pinellas County	
2000	Construction of 400-foot long jetty at north end of island at John's Pass	FDEP/ Pinellas County	\$1.3 million
2004	Nourishment: 225,000 cubic yards of fill from the Pass-A-Grille channel placed on Sunset Beach	USACE/ Pinellas County	
2006	Nourishment: 270,000 cubic yards of fill from the Egmont shoals used to repair the beach after the 2005 hurricane season (included Long Key)	USACE (Flood Control and Coastal Emergencies)	\$6 million
2010	Nourishment: 253,000 cubic yards of fill from John's Pass placed on Sunshine Beach and Sunset Beach	USACE/ Pinellas County	\$3.5 million (total cost including Upham Beach was \$5.2 million)

### Long Key (Upham Beach and Pass-A-Grille Beach)

Long Key is a drumstick shaped barrier island that extends 4.1 miles from Blind Pass to North Channel, Pass-A-Grille Pass (Figure 3-27). Long Key was a popular destination for wealthy tourists in the 1920s. As a result, beach management began early on Long Key with the construction of the first terminal groin adjacent to Blind Pass in 1936 (Table 3-4) (ASBPA, 2009). The groin was constructed to reduce land loss at the north end caused by the southern migration of Blind Pass (Figure 3-28a). The City of St. Petersburg Beach (now St. Pete Beach) armored the rapidly eroding ends of the island with seawalls and groins during the 1950s, including a terminal groin at Pass-A-Grille Pass



Figure 3-27. Long Key (PCPA, 2011)



(USACE, 1980b). Development rapidly increased after the construction of two causeways to the island in 1962 and 1966. The construction of the causeways caused a reduction in the tidal prism and destabilization of the ebb shoal. Unregulated development allowed construction seaward of the dunes. In response to the erosion, the City continued constructing and extending groins during the 1960s and 1970s.

In 1974 and 1975, the terminal groin at the north end of Long Key was extended by the City and two kingpile groins were constructed with fill south of the pass (USACE, 1980b). Within two years, the shoreline receded to its pre-construction position (Figure 3-28a). Additionally, Pass-A-Grille beach had lost nearly 500 feet of beach in 25 years, exposing properties to increased wave energy and erosion (Pinellas County Government Online, 2011).

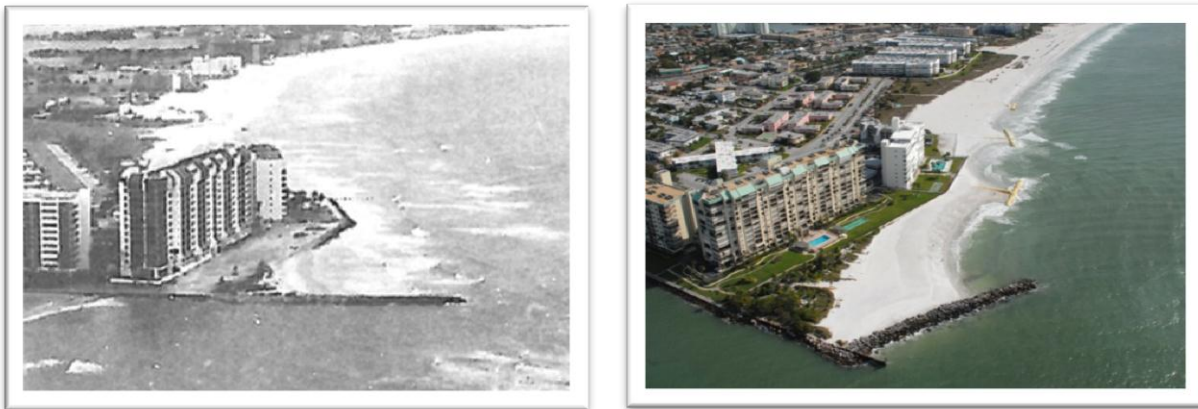


Figure 3-28. North End of Long Key  
a) in 1978 (USACE, 1980)                      b) in January 2012

In 1980, the island's first Federal nourishment project was constructed (USACE, 1984b). The Federal project nourished the north end of the island (Table 3-4). In addition to the nourishment, a breakwater made of sand was constructed offshore of the north end (100,000 cubic yards) (USACE, 1980b). Post-construction, the artificial sand bar moved onshore as expected. At the time, the Pass-A-Grille jetty was performing well and holding the shoreline at the south end of the island.

Periodic nourishment continued on a five-year interval as part of the Federal project. Data indicate the fill erodes within two to five years after construction (Elko et al., 2001). The north end of the island (Upham Beach) was severely erosional, eroding within two years after nourishment. The central segment was accretional and the south end (Pass-A-Grille) was relatively stable (Elko et al., 2001). Hurricane Frances caused significant erosion of Pass-A-Grille beach in 2004 (Wang, 2012).

In response to the erosion at Upham Beach on the north end of the island, five geotextile T-head groins were constructed in 2005-2006 (Figure 3-28b and 3-29) (CPE, 2010b). The intent of the project was to increase the interval between nourishments, maintain the 40-foot wide design beach, and reduce downdrift erosion. The performance of the T-groins was monitored for 25 months by the University of South Florida Department of Geology. The groins were observed to

have reduced erosion by approximately 40% as compared to losses after the previous nourishment and to have no clear impact on the downdrift beach. Repair of the geotextile T-groins at Upham Beach was conducted between November 2010 and July 2011 and included the removal and replacement of several geotextile tubes and scour aprons, patching and the application of a UV coating (CPE, 2011). In October 2011, a joint coastal permit application (FDEP Permit Number 0308348-001-JC) was submitted to reconstruct the T-groins out of rock and make them permanent structures. The orientation and design of the permanent structures was altered from the temporary geotextile groins to provide an increased level of storm protection, maintain a 40-foot wide beach and more open space for surfing and recreation. Groin T4 was proposed to be moved north about 130 feet to compensate for the removal of T3 based on results from the associated numerical modeling study (CPE, 2010b).

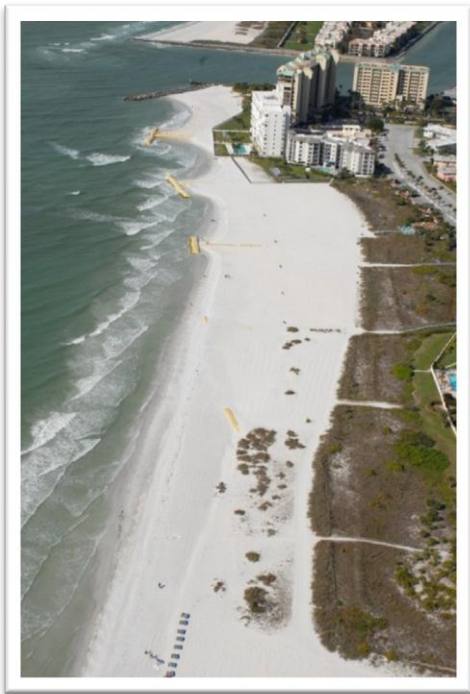


Figure 3-29. Upham Beach on Long Key in January 2012, facing north. Yellow shoreline structures are the temporary T-head groins installed in 2006 and repaired in 2010/2011. Blind Pass is the inlet north of Long Key (top of photograph). Treasure Island (Sunset Beach) is north of Blind Pass (top of photograph).

FDEP-BIP's issued a joint coastal permit for the permanent Upham Beach groins on October 30, 2012 (FDEP File No. 0308348-001-JC). The permit will expire 5 years from the date of issuance. The permit authorizes the replacement of the five temporary geotextile tubes with four limestone rock T-head groin structures. The average armor unit sizes will be 2.4 tons in the stem of the groin and 6.9 tons in the head section. A one-foot thick marine gabion mattress foundation will support the groins.

### *Pass-A-Grille Beach*

Pass-A-Grille Beach, the southern Long Key segment, was authorized under the Rivers and Harbors Act of 1966, Public Law 89-789, as part of the federal Pinellas County Beach Erosion Control Project. The beach was nourished as part of the Federal project in 1989 and 1992. Since 1992, Pass-A-Grille Beach has not been nourished regularly or monitored. The lack of

nourishment was due to the belief that Upham Beach was acting as a feeder beach and adequately supplying Pass-A-Grille Beach with sand. The 2004 hurricanes caused significant erosion of Pass-A-Grille Beach and led to an emergency nourishment. Hurricanes impacted the shoreline again in 2005 but Pass-A-Grille Beach was not eligible for rehabilitation funding under the Flood Control Coastal Emergency Act (PL 84-99), likely as a result of a lack of monitoring data.

In 2006, a sediment transport analysis was conducted for Pass-A-Grille Beach (Elko, 2006). The analysis found that the majority of sand from Upham Beach bypassed Pass-A-Grille Beach due to the interaction of inshore sand bars and the ebb shoal. Following the analysis, Pinellas County initiated a joint coastal permit application to nourish Pass-A-Grille Beach and planned to add the southern Long Key segment into the Federal nourishment plan. Additionally, the County planned for future monitoring of the project in order to qualify for emergency funding. As of December 2011, the permit application was incomplete and USF was under contract to monitor Long Key.



Figure 3-30. Upham Beach on Long Key in April 2012 (Google Earth, 2012b).

### *Existing Conditions Snapshot Summary for Long Key*

A summary of the monitoring results for Long Key from the 2010 Beach Summary Report developed by the University of South Florida is presented below (Roberts and Wang, 2011):

#### Upham Beach (Blind Pass to LK5) (Figure 3-30)

- The shoreline has progressively retreated landward due to large negative longshore sand transport gradient (Figure 3-31). The greatest dry beach loss occurred at LK3 (Figure 3-32a). Little to no shoreline retreat occurred at LK6.
- Magnitude of volumetric loss at Upham Beach exceeds loss at Sunshine Beach (the beach just south of structures at John's Pass). Terminal structures at Blind Pass prevent sand bypassing to Upham Beach. LK3 had the greatest losses from the active profile in Pinellas County (2006 to 2010).
- In 2009 and 2010, sand accumulated offshore at LK2, suggesting the growth of the Blind Pass ebb shoal. Growth of the ebb shoal was also documented by Wang et al. (2011).

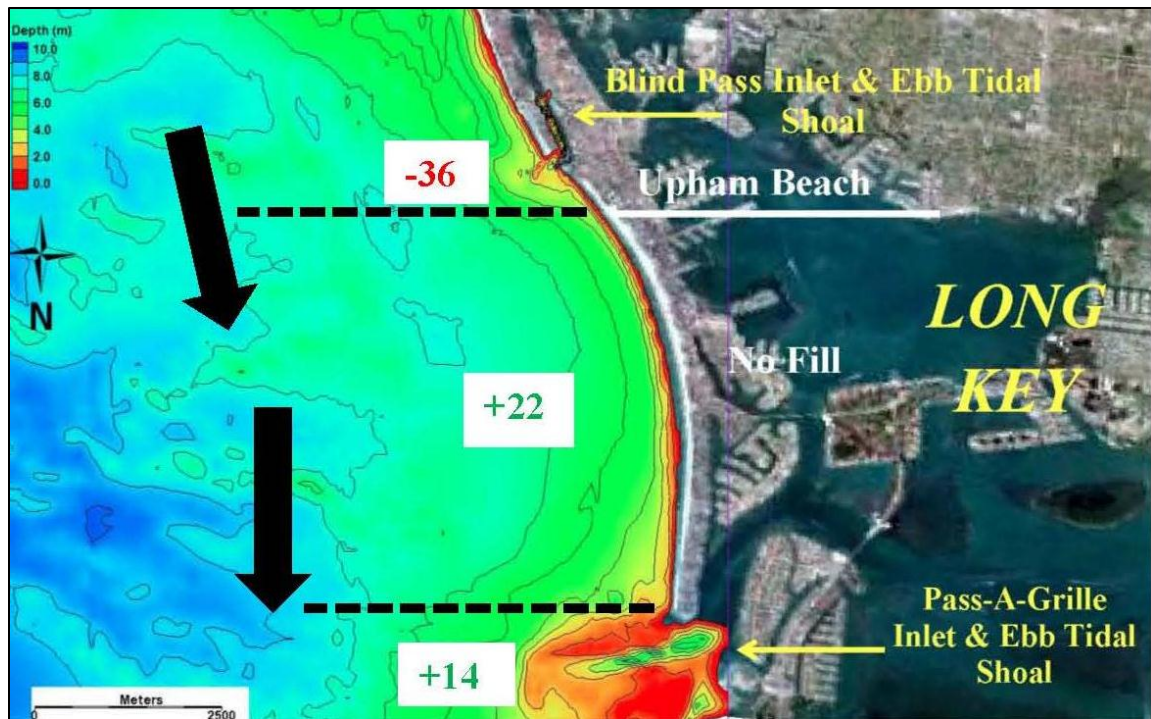


Figure 3-31. Sediment transport along Long Key (units of cubic meters of sand)  
(Roberts and Wang, 2012)



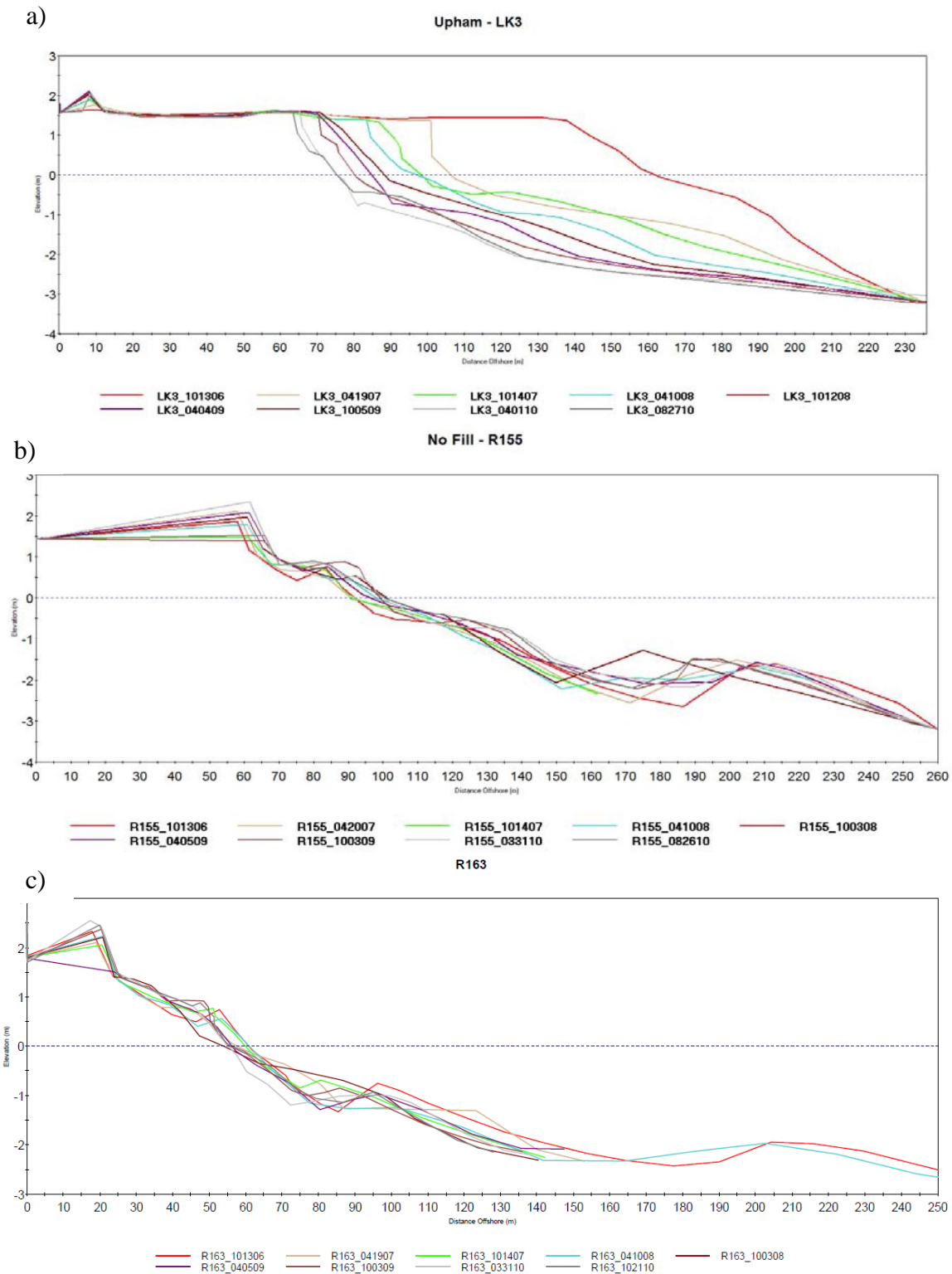






Figure 3-33. Central Long Key, R-152  
(CPE, 2010)

#### Central Long Key (R-149 to R-157)

- Downdrift of nourished area at Upham Beach, volumetric gains have occurred. The largest gain and dry beach advancement occurred at R-152 (Figure 3-33). The shoreline between R-149 and R-160 has advanced.
- Sandbar migrates onshore and offshore seasonally (Figure 3-32b).

#### Pass-A-Grille Beach R-160 to R-165

- Volumetric losses occurred offshore between 2006 and 2010 due to inlet effects. Little to no change in volume occurred in the nearshore. Minor shoreline retreat (0 to 5 feet) and minor dry beach gains (0 to 8 feet) occurred between R-160 and R-165 (Figure 3-32c and Figure 3-34a and 3-34b).

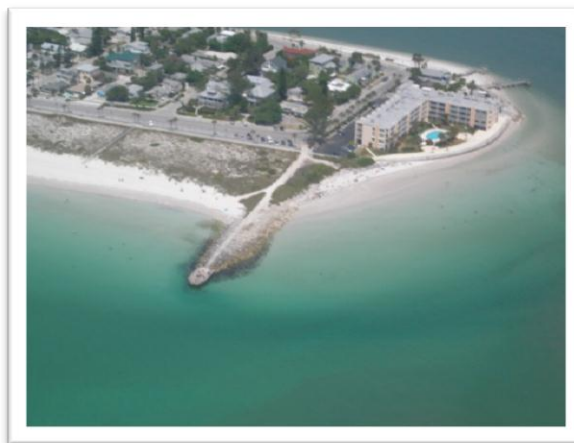
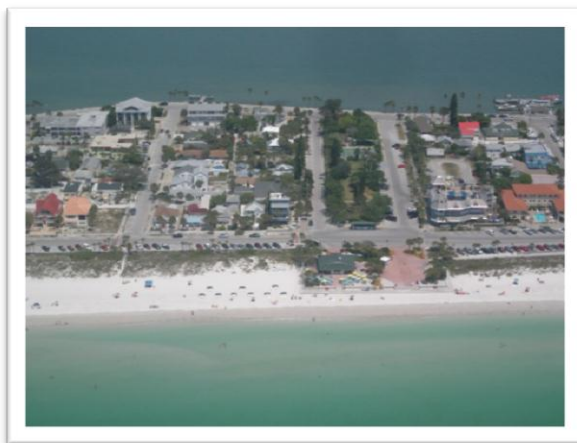


Figure 3-34. Pass-A-Grille Beach (CPE, 2010)  
a) at Paradise Grille (R-163.5)      b) South Groin at Long Key

Table 3-4. Coastal Management Projects on Long Key

Year	Description of Coastal Management Project	Sponsor	Cost
1937	Construction of jetty on south side of Blind Pass (100 feet in length)	Local	
1950s	Construction of groins and seawall at south end of the island	City of St. Petersburg Beach	\$115,000
1960	Construction of rubble mound jetty at North Channel, Pass-A-Grille Pass	City of St. Petersburg Beach	\$23,000
1960	Construction of bulkhead at Upham Beach (~900 feet in length)	Local	
1962	Extension of jetty and addition of fishing platform	City of St. Petersburg Beach	\$36,500
1968	Dredging of Blind Pass; spoils placed south of Pass	USACE	
1974	Extension of South Blind Pass jetty by 171 feet (total of 261 feet)	USACE	
1975	Construction of two king pile and panel groins south of Blind Pass; Placement of 75,000 cubic yards of fill	City of St. Petersburg Beach	
1980	Federal Nourishment: 143,000 cubic yards of fill placed at north end; advance nourishment was placed offshore to act as partial breakwater (100,000 cubic yards)	USACE/ Pinellas County	
1986	Nourishment: 170,000 cy placed at southern end and at Upham Beach dredged from Pass-A-Grille channel		
1986	Construction of attached breakwater on the south side of Blind Pass		
1991	Nourishment: 223,700 cubic yards placed at Upham Beach dredged from Blind Pass		
1991-2	Nourishment near Pass-A-Grille		
1996	Nourishment: 252,400 cubic yards placed at Upham Beach dredged from Egmont Channel		\$1.5 million
2000	Nourishment: 309,000 cubic yards placed at Upham Beach dredged from Blind Pass		\$1.73 million

2004	Nourishment: 366,000 cubic yards placed at Upham Beach, 147,000 cubic yards placed at Pass-A-Grille	USACE/ Pinellas County	\$804,500
2006	Nourishment: 270,000 cubic yards of fill from the Egmont shoals used to repair the beach after the 2005 hurricane season (included Treasure Island)	USACE (Flood Control and Coastal Emergencies)	\$6 million
2006	Construction of geotextile T-groins at Upham Beach		
2010	Nourishment: 160,000 cubic yards of fill from Blind Pass placed on Upham Beach	USACE/ Pinellas County	\$1.73 million (total incl. T.I.: \$5.2 million)
2010	Repair of geotextile T-groins at Upham Beach		

(Beach Performance of Long Key, Pinellas County, FL: Final Report, 2001; Long-term Beach Performance and Sediment Budget of Long Key, Pinellas County, Florida, 1999; Rehabilitation Effort for the Pinellas County Shore Protection Project, 2006; Beach Performance of Long Key, Pinellas County, FL: Final Report, 2001; Limited Re-Evaluation Report and Environmental Summary, 1994; USACE, 1978)

### Shell Key

The Shell Key Preserve (Figure 3-35) includes a barrier island, a series of mangrove islands, seagrass beds and sand flats. The barrier island was formed by the amalgamation of sand bars in the 1950s (ASBPA, 2009). In 1998, the channel flowing through the center of the island closed (Google Earth, 2012c). Over the next ten years, the island stabilized and the line of vegetation became continuous (CPE, 2010).

Pinellas County has leased the preserve from the state since 2000 (Lease No. 4228), with the exception of a few privately owned parcels. The Pinellas County Board of County Commissioners manages the preserve through the County Department of Parks and Conservation Resources (formerly managed through the Department of Environmental Management, Environmental Lands Division).

In 2007, the Shell Key Preserve Management Plan was developed by stakeholders. Stakeholders include the FDEP, the County, the Florida Audubon Society, the St. Petersburg Audubon Society, the FWC, and the public. Management of Shell Key includes the removal of Australian pines,

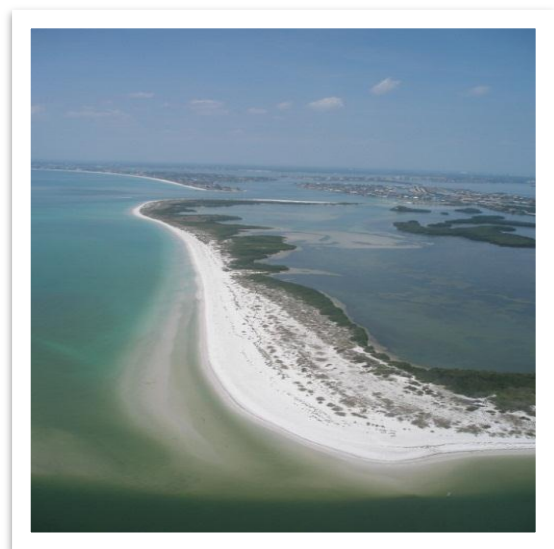


Figure 3-35. Shell Key (CPE, 2010)

management of nest-threatening species (raccoons and gulls), and implementation of public ordinances to preserve natural resources. Funding for removal of the Australian pines was budgeted in 2007 through the Penny for Pinellas program, with matching grants from the USFWS. From 2007 to 2019, two hundred thousand dollars was budgeted in the County's Capital Improvement Program funded by the Penny for Pinellas tax (Pinellas County Department of Environmental Management, 2007).

## Bunces Key

Prior to 1997, Pass-A-Grille Pass had a north and south channel (Wilhoit, 2004) (Figure 3-36a). Bunces Key was formed from sediments from the ephemeral south channel of the Pass-A-Grille Pass (Wilhoit, 2004). North Bunces Key formed from the northern swash bar in 1963 (Wilhoit, 2004) (Figure 3-36b). Over the next decade, North Bunces Key lengthened, eventually causing the closure of the south channel (Wilhoit, 2004). Simultaneously, the Bunces Pass ebb shoal grew and South Bunces Key emerged from the swash bar in 1975 (Figure 3-36c). The islands were breached and overwashed by several severe storms. The overwash widened North Bunces Key. By 1997, North Bunces Key extended north, closing the south channel of Pass-A-Grille Pass and connecting to Shell Key. South Bunces Key migrated east and formed the northern tip of Mullet Key (Wilhoit, 2004). Bunces Pass is discussed in a following section.

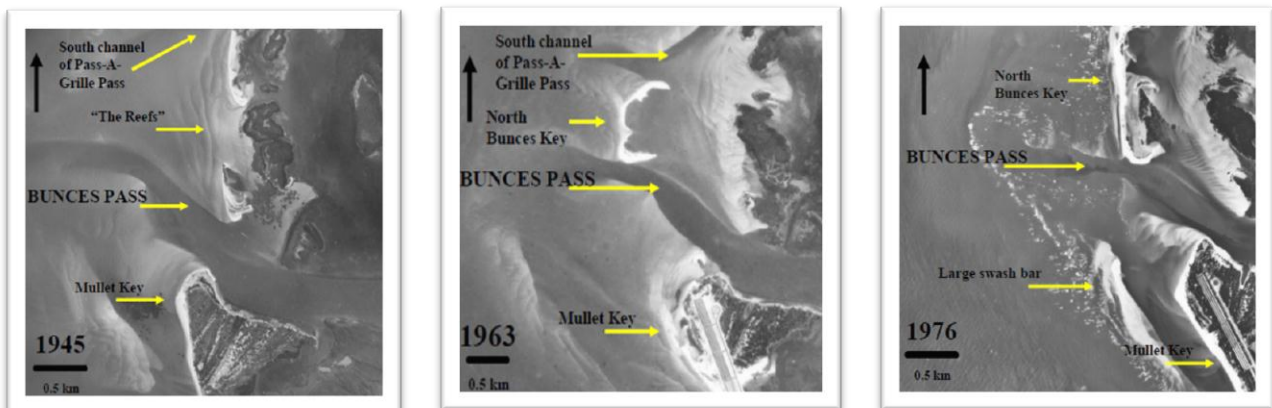


Figure 3-36. Evolution of Bunces Key  
a) 1945 b) 1963 c) 1976 (Wilhoit, 2004)

## Mullet Key

Mullet Key is a V-shaped island at the south end of Pinellas County, surrounded by Class II Waters (F.A.C 17-3) (Figure 3-37). One of six surface water designations given by the state, Class II waters require the second highest degree of protection due to their use for shellfish propagation or harvesting (potable water supplies are the first, Class I). The north end of the Key contains the historically-significant and



Figure 3-37. Mullet Key (PCPA, 2011)



recreationally-popular Fort DeSoto Park. Mullet Key was utilized as a blockade during the Civil War and occupied again during the Spanish- American War (Pinellas County, 2011). Hillsborough County used the eastern side of the island as a quarantine station for foreign immigrants entering the country from 1889 to 1937 (Pinellas County, 2011). In 1938, Pinellas County purchased the island for \$12,500. In 1941, the Federal government purchased the property back for use as a bombing range. The County regained ownership of the island in 1948. Fort De Soto Park opened in 1962 after the completion of the Pinellas Bayway, which connected the island to the mainland (Pinellas County, 2011). In 1964, an L-shaped groin was constructed at the south end of the island (Figure 3-38a) and the back bay area was dredged in order to nourish the beach.



Figure 3-38. Mullet Key Structures  
a) L-shaped groin b) revetment.

The Mullet Key Beach Erosion Control Study was authorized in 1963. A General Design Memorandum was released by the USACE in 1971 (USACE, 1971). The recommended design included the use of a shore parallel borrow area (Figure 3-39) and construction of a 60-foot wide berm. Federal nourishment projects using the offshore borrow area were constructed in 1973 and 1977. The 1973 project included the construction of a 1,150-foot long revetment at the south bend of the island (Figure 3-38b).

The Mullet Key Federal shore protection project was reportedly deauthorized in 1990 as a result of a lack of funding obligations (USACE, 2010; USACE, 2009; FDEP, 2008). WRDA 1986 (Public Law 99-662) deauthorized projects that had not received obligations of funds in the preceding 10 years. However, a reference to the Mullet Key Beach Erosion Control Project was not found in the Federal Register or the WRDA 1988 (Public Law 100-676) (as referenced by the USACE (2010)).



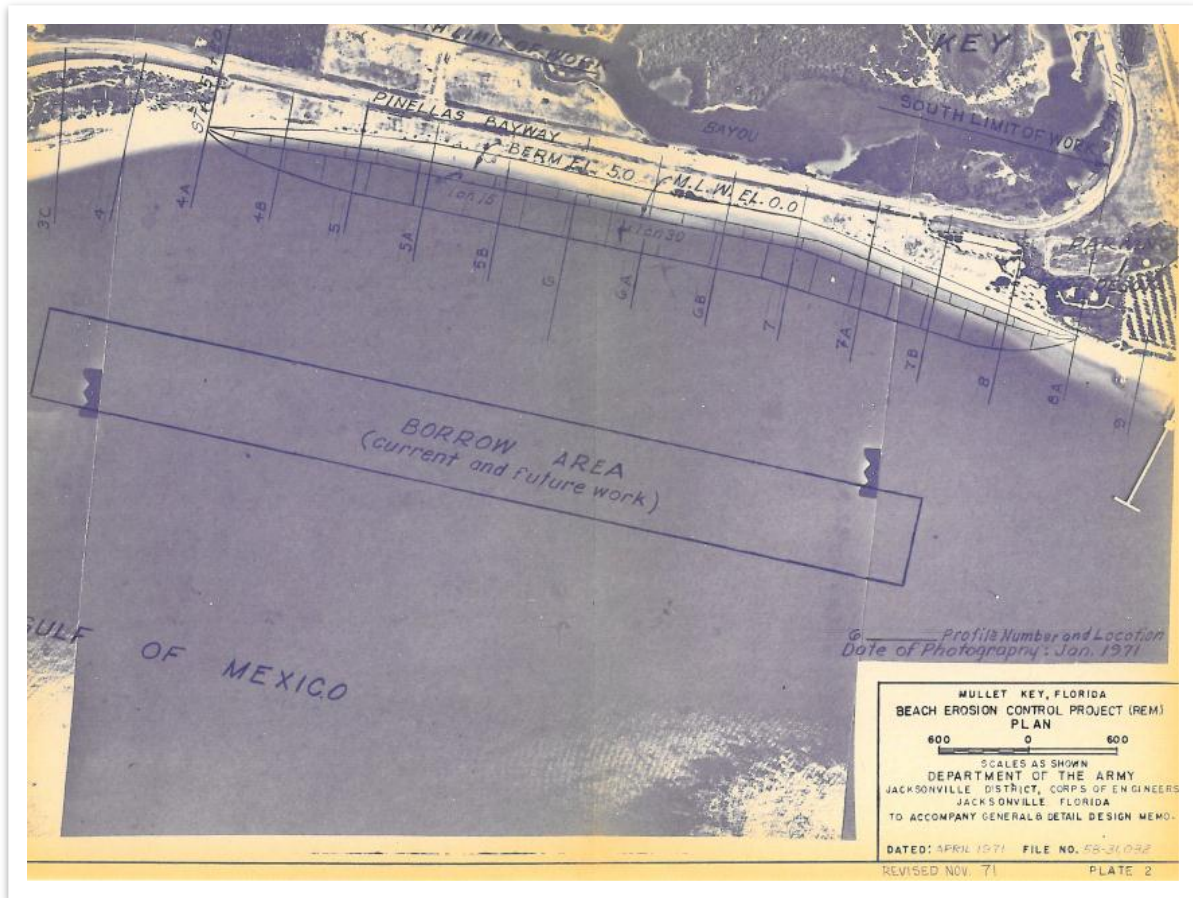


Figure 3-39. Shore Parallel Borrow Area Offshore of Mullet Key (USACE, 1971)

In response to erosion on the island, Pinellas County partnered with the USACE on a beneficial use of dredged material project at Fort De Soto Park in 2006. Dredge spoils from Tampa Bay were placed on Fort De Soto Park and Egmont Key. Between 100,000 and 350,000 cubic yards were placed by Bean Stuyvesent and Wilkinson & Jenkins (exact volumes listed in references were conflicting) (Squires, 2011; Pinellas County, 2010; FDEP, 2008). In 2007, the L-groin terminal structure adjacent to the pier was rehabilitated (Pinellas County, 2010).

### Hurricane Pass

The Hurricane of 1921 breached Hog Island (a composite of Caladesi Island and Honeymoon Island) and formed Hurricane Pass (Figure 3-40). The ebb-dominated pass increased in size until the construction of the causeways (Barnard, 1998). The causeways' effect on the tidal prism and the northern migration of the Caladesi Island spit has since reduced the size of the pass.



Figure 3-40. Hurricane Pass (PCPA, 2011)

Hurricane Pass has been a sand source for Honeymoon Island since it was first dredged in 1969 (Taylor, 2001). A non-Federal navigation channel was dredged through the pass in 1989. Maintenance dredging of the pass occurred in 2000 (12,500 cubic yards) and 2007 (Phase I of the Honeymoon Island Restoration project, 140,000 cubic yards) with the placement of dredge spoils on Honeymoon Island (FDEP, 2008).

The Florida Department of Environmental Protection Division of Recreation and Parks and Pinellas County have applied for a joint coastal permit to construct Phase II of the Honeymoon Island Beach Restoration project and use the Hurricane Pass ebb shoal as a borrow area. Approximately 110,000 cubic yards is planned to be dredged from the ebb shoal in 2013.

Note: In 2001, the County was issued a permit from the USACE (Permit No. 199904338 IP-TF) to dredge a non-federal navigation channel in Hurricane Pass, designed by Moffat & Nichol Engineers (50 feet wide, depth of -7 feet mean low water with 1-foot overdredge) (USACE, 2001). The project was completed in 2002 (Squires, 2012).

### Clearwater Pass

Clearwater Pass, the inlet bordered by Clearwater Beach Island and Sand Key (Figure 3-41), was known as Little Pass in the late 1800s (Pinellas County Government Online, 2008b). The pass increased in width from approximately 300 feet to over a half a mile wide after the Hurricane of 1921. Over the next 50 years, the channel narrowed and deepened in response to changes in the tidal prism and the northern migration of Sand Key (Pinellas County Government Online, 2008b). The depth of the channel increased from 10 to 20 feet in the late 1960s, scouring bridge pilings and threatening the stability of the structure (Pinellas County Government Online, 2008b). In response, the City of Clearwater constructed a curved jetty on the south side of Clearwater Pass (Sand Key) to stabilize the pass in 1975 (Pinellas County Government Online, 2008b) (Figure 3-42). In 1982, the City of Clearwater constructed an 800-foot long jetty at the south end of Clearwater Beach Island where a rubble mound had previously been placed in 1963 (USACE, 1984b).



Figure 3-41. Clearwater Pass  
(PCPA, 2011)



Figure 3-42. Clearwater Pass in 1970, 1975 and 1980 (left to right)  
(Tackney & Associates, Inc., 2006)

The initial dredging of the navigation channel was completed in 1961 (USACE, 2010). The design channel is 8 to 10 feet deep, 100 feet wide and 850 feet long (USACE, 1986; 2010). Dredged material was disposed of in the gulf and the Intracoastal Waterway (FDEP, 2008). Maintenance dredging of the channel has since occurred in 1974 (126,000 cubic yards), 1977 (186,000 cubic yards), 1994 (6,000 cubic yards) and 2002 (Taylor, 2001; Pinellas County Government Online, 2008b). The USACE has been responsible for maintaining and stabilizing the channel. However, the City of Clearwater has conducted some maintenance dredging. For example in 2011, the City of Clearwater approved the dredging of 70,000 cubic yards at a cost of \$1,000,000 to allow navigation from Clearwater Beach Marina to Clearwater Pass (Harwell, 2011). Approximately 40,000 cubic yards of dredged material was placed in the nearshore (between -8 feet NGVD and -12 feet NGVD), adjacent to the south end of Clearwater Beach Island (FDEP, 2002; Mora, 2012). The work was completed in 2012 by a USACE dredging vessel (Harwell, 2011). The USACE holds the joint coastal permit to conduct the maintenance dredging (FDEP Permit No. 0184778-003-JN). On November 15, 2011, a statutory time extension was granted to postpone the expiration of the permit from January 15, 2012 to January 15, 2014.

In 1986, a group of property owners on the north side of Clearwater Pass sponsored the construction of five rubble mound groins (Figure 3-43). The purpose of the groins was to stabilize the shoreline and prevent the fill placed in 1984 by the City of Clearwater from migrating east. A dredge and fill permit (DF-635) was issued by the Pinellas County Water and Navigation Control Authority for one of these groins (the other four were located outside of the Authority's jurisdiction at that time). In 2006, the South Beach Association, consisting of six resort owners, applied for a joint coastal permit to modify three of the existing groins and construct one new groin and eight pre-filled breakwaters (Tackney & Associates, Inc., 2006). The project is still in the permitting process and no new information has been provided to the state since August 2007. The Association also presented their proposal to Pinellas County at that time. Concerns were raised by County staff about aspects of the project and a formal application was never submitted (Squires, 2011). There is no erosion control line in the project area. The Coastal Construction Control Line terminates at the Gulfview Resort. A public easement exists



for the land more than 50 feet water-ward of the property owners' bulkheads (underwater in 2011) (Tackney & Associates, Inc., 2006).

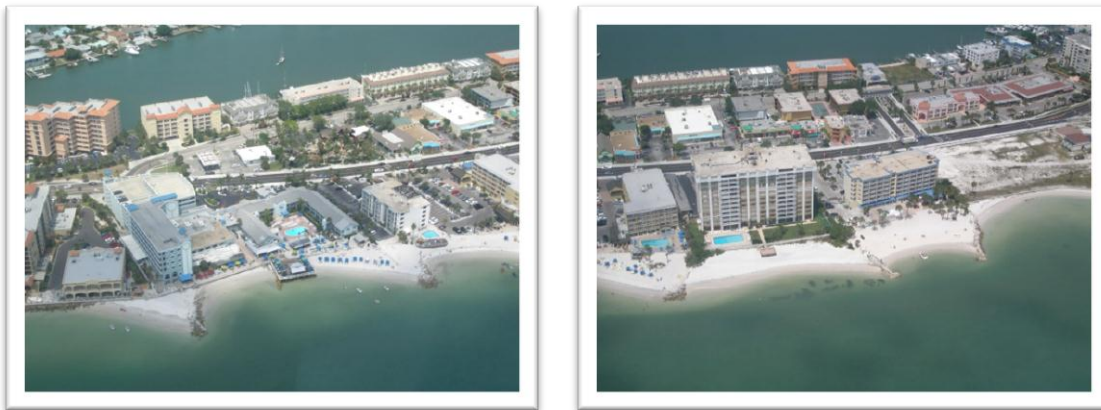


Figure 3-43. Rubblemound Groins on North Side of Clearwater Pass (CPE, 2010)

### John's Pass

John's Pass is a mixed energy federally maintained navigation channel with a large ebb-tidal delta, adjacent to Sand Key and Treasure Island (Figure 3-44) (Wang and Beck, 2012). John's pass has continually become the dominant inlet, over Blind Pass, capturing the majority of the tidal prism (Wang and Beck, 2012). Bypassed sediment accretes at the ebb shoal attachment point just south of Sunshine Beach (Wang and Beck, 2012).

The channel was cut during the Gale of 1848, a severe storm with storm surge of approximately 15 feet (Coastal Tech, 1993; Dunn and Miller, 1964). In 1926, the causeway connecting Long Key to the mainland was constructed, reducing the hydraulic efficiency of Blind Pass and increasing flow through John's Pass (USACE, 1970). After the artificial closure of Indian Pass by the USACE (5 miles to the north) in 1929, John's Pass migrated south 700 feet and widened 80 feet from 1939 to 1948 (USACE, 1970). The channel continued to increase in volume during the 1950s as a result of the construction of the causeways and dredge and fill operations in the bay (USACE, 1970).

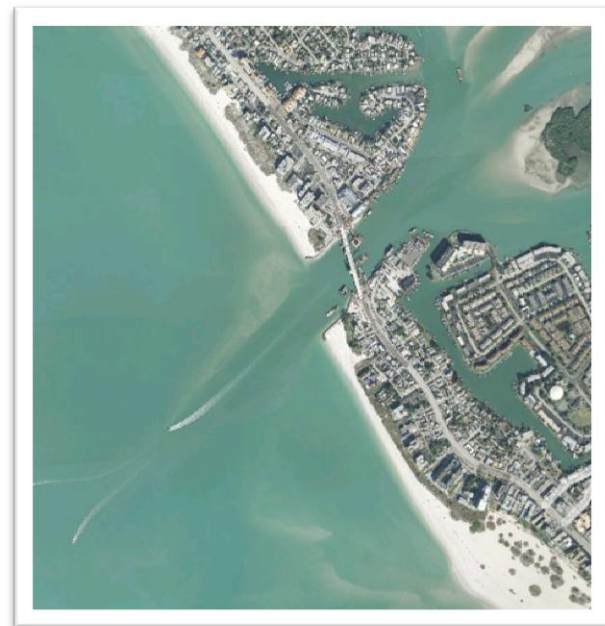


Figure 3-44. John's Pass (PCPA, 2011)

To reduce erosion from the south end of Sand Key, the City of Madeira Beach constructed a rubble mound terminal groin on the north side of John's Pass in 1960 (USACE, 1970). To reduce erosion on the south side of John's Pass, local interests sponsored the dredging of a newly formed northern channel and disposal of material into the shoaling southern channel, effectively closing the southern channel. Despite the shoaling, sand was effectively bypassing the inlet and being stored in the offshore southern ebb shoal during this time. In 1961, the shoal was observed to migrate towards the shore, simultaneously forcing the swash channel closer to shore. As a result, the previously accretional north end of Treasure Island began eroding (USACE, 1970).

In 1966, the first Federal navigation project was constructed in John's Pass (USACE, 1970). The dredge spoils were placed on the offshore bar, southwest of the inlet. The dredged material eventually merged with the two shoals to form a single bar (Figure 3-45). As the bar migrated onshore, the influence of the swash channel contributed to continued erosion on the north end of Treasure Island (USACE, 1970). However, once the crescent shaped bar attached to the shore (forming O'Brien's Lagoon), the area was considered accretional.

In 2000, a terminal groin was constructed by Durocher Dock & Dredge of Jacksonville on the south side of John's Pass (Treasure Island) (SPTO, 2000). The function of the jetty is to reduce erosion and force the swash channel further offshore.



Figure 3-45. Crescent Bar Migrating Towards Treasure Island in October 1969 (CPE, 1992)

### *Maintenance Dredging*

Federal maintenance dredging of John's Pass occurred in 1966, 1979, 1981, 1983, 1991, 2000 and 2010 (Table 3-5). Shoaling rates have decreased since the initial dredging from 22,000 cubic



yards per year to 11,000 cubic yards per year (Coastal Tech, 1993; Taylor, 2001). The low rate of shoaling has resulted in the postponement of schedule dredging projects. To further delay projects, navigation aids have been moved to deeper waters to maintain navigable waters.

**Table 3-5. Coastal Management Projects in John's Pass**

<b>Year</b>	<b>Description of Coastal Management Project</b>	<b>Shoaling Rate</b>
1926 to 1952		20,000 to 22,000 cy per year
1960	Local dredging of 30,000 cy from the north side of the pass for placement on the south end of Sand Key	
1960	Construction of 460-foot long jetty on north side of John's Pass (Sand Key) by City of Madeira Beach	
1961	Locally sponsored infilling of southern channel w/fill dredged from newly formed northern channel (15,000 cy)	
1966	Initial Federal dredging of 77,650 cy placed on offshore bar	
1966	Construction of a 920-foot long revetment along south bank of John's Pass	
1979	Federal maintenance dredging of 80,000 cy	
1980		17,000 cy per year
1981	Federal maintenance dredging of 70,000 cy	
1983	Federal maintenance dredging of 80,000 cy	
1985 to 1990		11,000 cy per year
1988	Dredging of 529,150 cy from John's Pass ebb shoal for Redington Shores nourishment	
1991	Federal maintenance dredging of 56,000 cy	
2000	Construction of 760-foot long jetty on south side of John's Pass (Treasure Island)	
2000	Federal maintenance dredging of 390,000 cy	
2010	Federal maintenance dredging of 252,683 cy	

(Coastal Tech, 1993; FDEP, 2008; ASBPA, 2009; Pinellas County, 2010)

A permit for maintenance dredging was issued to the USACE on March 29, 2010 and expires on March 29, 2020 (FDEP Permit Number: 0270453-001-JC). The permitted dredging includes maintenance of the authorized channel and widening the seaward end of the channel an additional 225 feet. The authorized channel is 6 to 10 feet deep, 100 to 150 feet wide. The total project length is 2.6 miles. The authorized dredge depths of the channel, northeastern subarea of the ebb shoal borrow area and southwestern subarea of the ebb shoal borrow area are -14.0 feet NAVD, -14.4 feet NAVD and -13.5 feet NAVD, respectively. Spoil may be placed 1) at Sunshine Beach (R-126 to R-129, 160,000 cubic yards per event) and 2) south of 97<sup>th</sup> Street (R-136 to R-141, 200,000 cubic yards per event) (FDEP, 2010).

## Scour

In line with the net direction of littoral transport, the channel in John's Pass migrates to the south side of the pass. The armoring of the south side of the pass with a jetty and seawall prevents the channel from migrating further south. As a result, the channel deepens. The 1998 Scour Evaluation Report produced by the Florida Department of Transportation has suggested the south side of the pass may deepen by 25 feet before an equilibrium state is reached. The report recommends planning for any future coastal projects in the area must consider the critical scour elevations of the bridge piles. Dredging of the inlet is expected to have a temporary effect and not expected to increase the equilibrium depth of the inlet (FDOT, 1998). A new three-lane bridge was constructed over John's Pass, adjacent to the existing bridge, between 2006 and 2009 which may have altered the erosional and depositional patterns in the inlet since the FDOT study.

Since the construction of the new bridge over John's Pass, shoaling has occurred on the north side of the pass (Figure 3-46) (CPE, 2010). The shoaling may affect the navigation of vessels traveling outside of the channel. Areas outside of the authorized channel are not eligible for federal maintenance dredging under existing agreements, authorizations and permits.



Figure 3-46. John's Pass

- a) January 2006 without visible shoaling along north side of pass
- b) John's Pass in 2010 with visible shoaling adjacent to marina (CPE, 2010)

## John's Pass Inlet Management Plan

Coastal Technology Corporation developed an inlet management plan for John's Pass in 1993 (Coastal Tech, 1993). The inlet maintenance and alternative bypassing systems evaluated include:

- Do Nothing
- Inlet Closure
- Alternative Bypassing Systems

- Construction of a north jetty and excavation of a deposition basin adjacent to the jetty
- Channel maintenance dredging with use of Pass-A-Grille or Egmont Key borrow sediments to offset inlet impacts
- Channel maintenance dredging and use of ebb shoal as borrow area
- A fixed dredge plant at the north groin to transfer sand to Treasure Island
- Jet pump system
- Mobile bypassing plant
- Construction of a terminal groin on the south side of the pass

The recommended Comprehensive Management Plan included continued maintenance dredging of the channel as needed funded by the Federal sponsor, the construction of a terminal groin on the south side of the pass if eligible for Federal funding, and the placement of dredge spoils where needed after construction of the terminal groin. The terminal groin was constructed in 2000 using state and local funds and federal maintenance dredging has occurred in 2000 and 2010 (Table 3-5).

### Blind Pass

Blind Pass flows between Treasure Island and Long Key (Figure 3-47). Blind Pass is a wave-dominated inlet with a characteristic 90-degree bend (Wang and Beck, 2012). The bend causes weak ebb flushing and contributed to the historic southern migration of the inlet (Wang and Beck, 2012).

After the formation of John's Pass in 1848, Blind Pass destabilized and migrated almost a mile south (CPE, 1992). Small passes opened north of Blind Pass but were filled naturally or with dredge spoils. In the 1950's, the construction of the causeways and engineered islands built by dredge and fill operations in the bay caused a severe reduction in the back-bay open water area and tidal prism (CPE, 1992; Wang and Beck, 2012). The Blind Pass ebb shoal destabilized and migrated to shore during this time. The ebb shoal amalgamation was a singular episode of sand bypassing, dissimilar to the continuous sand bypassing that occurs at John's Pass (Wang and Beck, 2012). The shoreline just north of Upham Beach accreted significantly as the shoal moved onshore. The migration of the pass and change in tidal prism have resulted in an extension in Treasure Island, the accretion of St. Pete Beach, the migration and/or degradation of the ebb shoals, and erosion of beaches previously protected by the ebb shoals (Upham Beach) (CPE, 1992).

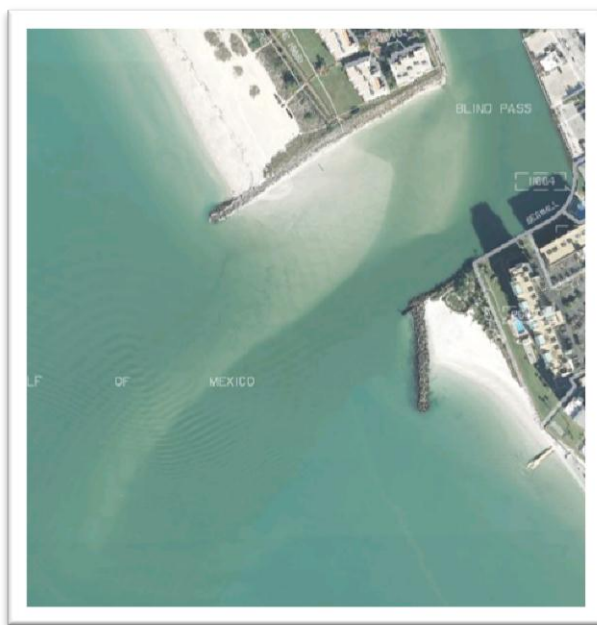


Figure 3-47. Blind Pass (PCPA, 2011)

Blind Pass was an unstable inlet that could not maintain its cross-section, despite the use of stabilization structures (Figure 3-48). The pass is fully armored by jetties, revetments and seawalls. Terminal groins were constructed on the south and north sides of Blind Pass in 1937 and 1962, respectively, by the local municipalities to stabilize the inlet (Table 3-6) (CPE, 1992). The terminal groins were extended, raised and modified over the years. Despite the structural stability, the pass closed naturally several times (last reopened in 1979 when dredged for nourishment of Long Key). The closure of the pass is evidence of high rates of shoaling suspected to be related to a reduced tidal prism. The estimated shoaling of Blind Pass in 1960 was 30,000 cubic yards per year (USACE, 1980b). Shoaling of the inlet has provided a sand source for Federal nourishment projects on Treasure Island and Long Key. Dredging of the pass is necessary to maintain navigation. Approximately 1.6 million cubic yards of material was dredged from Blind Pass for the nourishment of Treasure Island (1964 to 1983) and Upham Beach (1975 to 2010).



Figure 3-48. Blind Pass Aerials  
from 1960, 1978, 1991 (in order from left to right) (CPE,1992)

### *Impact of 1993 Tampa Bay Oil Spill on Blind Pass*

In 1993, two tanker barges collided resulting in the release of 330,000 gallons of No. 6 fuel oil, 32,000 gallons of Jet A diesel and an unknown quantity of gasoline into lower Tampa Bay (Featherstone et al., 2009). A few days after the spill, a storm drove oil into inlets and onto the beaches. Some of the oil reportedly sank, depositing in mats in the depressions of Blind Pass and Boca Ciega Bay. In preparation for the maintenance dredging of Blind Pass in 1999, geotechnical borings were collected from the pass. Oil was not observed in the borings, with the exception of one sample smelling of oil. Blind Pass was dredged in 2000 and 50 gallon pockets of petroleum hydrocarbons were discovered. Dredging of the pass continued in an effort to remove the oil (2,000 gallons of oil/water were recovered) (Featherstone et al., 2009). Oiled sediments were placed unintentionally along several sections of Long Key. Dark bands of oil cohesive material were observed in the scarp and large clumps of oiled material were observed in the swash zone (Figure 3-49). An attempt to remove the oiled material was made in 2003 and the scarps were regraded. Some of the cohesive material remained (Saint John, 2004).





Figure 3-49. Oiled Sediments on Long Key (Saint John, 2004)

a) Dark cohesive bands of oiled sediments in scarp (2004)

b) Clumps of oiled material in swash zone (2003)

As a result of the discovery of oil during past dredging events, the 2004 Joint Coastal Permit required measures to detect the presence of an oil sheen during night time dredging, measures to contain sheen, measures to detect and avoid placement of contaminated material on the beach and an oil spill contingency plan if oiled sediments were placed to be included in the final plans and specifications.

### *Blind Pass Inlet Management Plan*

CPE developed an inlet management plan for Blind Pass in 1992 (CPE, 1992). The plan evaluated management alternatives including

- Closing the inlet
  - No Action
  - Remove jetties and fill channels
  - Nourish Upham Beach from an offshore source
- Implementing Sand Bypassing Systems
  - Dredge Blind Pass and nourish Upham Beach every 6 years
  - Construct a groin field at Upham Beach, dredge Blind Pass, nourish Upham Beach every 6 years
  - Dredge Blind Pass and deposition basin and nourish Upham Beach every 4 years
  - Purchase and operate a dedicated dredge
  - Crane mounted jet pump on Treasure Island Beach
  - Jet pump/ fluidizer system in the inlet
  - Dredge Blind Pass every 6 years and nourish Upham Beach every 3 years
  - Construct detached breakwaters at Upham Beach and dredge Blind Pass and nourish Upham Beach every 6 years

Pinellas County initially selected the second option for implementing a sand bypassing system including constructing two groins at Upham Beach, dredging Blind Pass, and placing 172,000 cubic yards of sand initially and maintenance fill every 6 years (Terry, 1993). However, this plan was not implemented.

In 2005-2006, five temporary geotextile T-head tubes were constructed at Upham Beach on Long Key, south of Blind Pass, to control erosion. The success of the temporary groins prompted the design and permitting of permanent structures. In October 2012, FDEP-BIP's issued a joint coastal permit authorizing the replacement of the five temporary geotextile tubes with four limestone rock T-head groin structures (*see Section 3: Long Key, Upham Beach*).

### *Environmental Resources*

Blind Pass has several artificial reefs approximately one mile offshore. The reefs were constructed out of automobile tires in a semi-circle (Mehta et al., 1976).

Table 3-6. Coastal Management Projects in Blind Pass

Year	Description of Coastal Management Project	Shoaling Rate
1926	Construction of Blind Pass bridge	
1937	Construction of a 90-foot long low groin along the south side of Blind Pass (Long Key) and dredging of channel	
1950	Landward extension of south groin (Long Key)	
1960		30,000 cubic yards per year
1962	Construction of 425- foot groin on north side of Blind Pass (Treasure Island)	
1964	Dredging of 10,000 cubic yards for placement at Sunset Beach	
1969	Federal dredging of 108,000 cubic yards of fill from Blind Pass to nourish Treasure Island after Hurricane Gladys	
1971-1972	Federal dredging of 230,000 cubic yards	
1975	Seaward extension of south groin to a total length of 261 feet (Long Key)	
1975	City of St. Petersburg Beach dredges 75,000 cubic yards of material for placement at Upham Beach	

1976	Extension of north groin (Treasure Island)
1978	Blind Pass closed naturally
1978	North groin was raised 2.5 feet (Treasure Island)
1978	Federal dredging of 50,000 cubic yards to nourish Sunset Beach
1979- 1980	Dredging of 253,000 cubic yards of sand from Blind Pass for placement at Upham Beach (cost \$780,000)
1983	Extension of north groin by 520 feet (Treasure Island)
1983	Federal dredging of 220,000 cubic yards of sand from Blind Pass ebb shoal for nourishment of Treasure Island
1986	Construction of a 315-foot long breakwater, attached to south groin (Long Key)
1986	Federal dredging of 75,000 cubic yards of material from Blind Pass to nourish Treasure Island
1990- 1991	Federal dredging of 280,000 cubic yards of material from Blind Pass to nourish Long Key
1992	47,000 cubic yards per year
2000	Federal dredging of 309,000 cubic yards, placed at Upham Beach
2006	Blind Pass South Terminal Groin Modification
2010	Federal dredging of 160,000 cubic yards, placed on Upham Beach

(USACE, 1950; CPE, 1992; Taylor, 2001)

### North Channel, Pass-A-Grille Pass

North Channel, Pass-A-Grille Pass flows between Long Key and Shell Key (Figure 3-50). The inlet is dominated by tides and influenced by waves. The inlet is skewed to the south as a result of the net longshore transport in the area (Elko, 2006). A jetty was constructed by the City of St. Petersburg Beach (now St. Pete Beach) on the north side of the pass (Long Key) to reduce erosion from Pass-A-Grille beach to the inlet. Although, sand continues to bypass the jetty via a nearshore sandbar, the strong tidal flow maintains the navigable water depths in the channel (Elko, 2006).

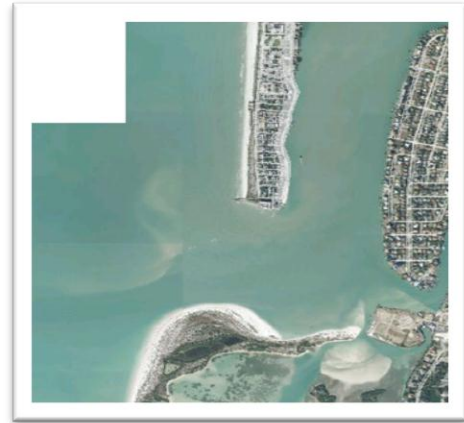


Figure 3-50. Pass-a-Grille Pass  
(PCPA, 2011)

The channel was federally authorized as a navigation project in 1964 under the 1960 River and Harbors Act. The first Federal navigation project was completed in 1966 (Table 3-7). Dredging has occurred twice since the initial navigation project to provide sand for the Federal Shore Protection projects on Treasure Island. However, maintenance dredging has not been required to maintain navigable depths (FDEP, 2008). North Channel, Pass-A-Grille Pass does not have an inlet management plan.

The USACE did not hold a permit to dredge the navigation channel in 2011. Pinellas County does hold a Joint Coastal Permit to dredge the pass as part of the Federal Shore Protection Project, which expires May 17, 2014.

Table 3-7. Coastal Management Projects in North Channel, Pass-A-Grille Pass

Year	Description of Coastal Management Project	Annual Shoaling Rate
1960	Construction of rubble mound jetty on north side of North Channel, Pass-A-Grille Pass by City of St. Petersburg Beach	
1960	Dredging of 160,000 cubic yards of material	
1964	Federal authorization for navigation project at North Channel, Pass-A-Grille Pass; channel is 8-10 feet deep and 100 to 150 feet wide (1960 River and Harbors Act)	
1962	Extension of north jetty and addition of fishing platform by City of St. Petersburg Beach	
1966	Federal navigation project completed, 205,650 cubic yards of material dredged (cost of \$63,508)	

1980		20,000 cubic yards
1984	Rehabilitation of north jetty by local interests	
1986-1987	Federal dredging of 520,000 cubic yards of material for placement on Treasure Island and Upham Beach after Hurricane Elena (cost of \$435,357)	
2004	Federal dredging of 590,000 cubic yards of material for placement on Treasure Island and Upham Beach	

(Taylor, 2001; FDEP, 2008; Elko, 2006).

### South Channel, Pass-A-Grille Pass (Shell Key Pass)

South Channel, Pass-A-Grille Pass (also referred to as Shell Key Pass) is a small tidal pass in between Shell Key and Colony Key that flows in a north-south direction into North Channel, Pass-A-Grille Pass (Figure 3-51). The channel width is approximately 60 feet and 8 to 10 feet deep. In 2011, a large sand bar had developed on the southwest side of the channel in an area protected by the Shell Key spit. Observations of the flow velocities in the pass in March 2011 suggest it is unlikely to close naturally (CPE, 2011). Continued shoaling of the pass has raised concerns for navigation through the pass by local residents. Two small marina facilities and twenty-eight residents have docks within one mile of the pass.



Figure 3-51. South Channel (Shell Key Pass) (CPE, 2011)

Colony Key has four rubble mound groins varying in length from 30 to 90 feet along the east side of South Channel (Shell Key Pass) (Figure 3-51). The northernmost groin has a submerged attached breakwater. In 2007, Colony Key was cleared for development and the shoreline between the groins was armored with revetments. In 2011, homeowners on Tierra Verde (the island facing the landward side of Shell Key) received a permit to dredge South Channel (Squires, 2012). Prior to dredging, the County must be notified.





Figure 3-52. Bunces Pass (PCPA, 2011)

To gain an understanding of the coastal processes occurring in the area, CPE recommended surveys of the channel and shorelines, a review of historic aerial photography, monitoring of water quality and predictive modeling in an observation report dated March 2011 (CPE, 2011). As of September 2012, these recommendations have not been implemented.

### **Bunces Pass**

Bunces Pass is a natural (un-engineered) tide dominated inlet that flows between Shell Key and Mullet Key (Figure 3-52). The shape, size and orientation of the inlet have not changed in the past 130 years (Willhoit, 2004). Strong ebb tidal currents and a large tidal prism are responsible for keeping the pass in equilibrium and supporting the formation of a large elongated ebb shoal.

The entrance to the pass is shallow and unmarked. Bunces Pass is not considered a navigable waterway; however, skilled boaters do travel through the pass. Depths in the pass vary from 4 to 35 feet.

### **Summary of Known Borrow Areas**

The barrier islands in Pinellas County have a history of serious shoreline erosion caused by storms, wave action and currents. In an attempt to control this erosion and increase storm protection, fill material has been placed at several locations along the Pinellas County shoreline. Early nourishment projects were constructed using sediment excavated from Pinellas County's inlets and ebb shoals, shore-parallel nearshore borrow areas, bay areas, and upland sources.

### *Existing Borrow Areas*

A brief history outlining the development of Pinellas County's existing borrow areas is provided below. Table 3-8 summarizes the characteristics and status of these borrow areas. The locations of existing borrow areas are provided in Figure 3-53.

### *USACE Sand Resource Survey*

In 1994, the U.S. Army Corps of Engineers (USACE) conducted a sand resource survey offshore of Sand Key to identify sand resources to be used as borrow areas for future nourishment projects. Over the course of the survey, they identified nine (9) study areas (Study Areas A-I) containing potentially beach compatible material. The locations of these nine (9) areas are shown in Figure 3-53. Further analysis of these areas led to the development of twenty (20) potential borrow areas. These borrow areas were developed by the USACE in 2004.

### *CPE Constructability Analysis*

In 2007, Pinellas County requested that CPE re-evaluate the USACE data for dredgeability and beach compatibility (Forrest et al., 2007). The borrow areas designed by the USACE in 2004 were re-analyzed and revised using current FDEP-BIP's sediment quality standards and guidelines. Core logs from each study area were reviewed and a 2-ft buffer was placed above any obviously unsuitable material. Material that was considered unsuitable included >5% silt, >5% gravel, green clay, brown sandstone, etc. The revised cut elevations were compared to NOAA bathymetry to estimate the thickness of potential beach quality material in each borrow area. The limits of each USACE designed borrow area were then refined to encompass only areas thick enough to efficiently dredge, and thereby imposing a minimum 2-ft cut thickness. Each borrow area was further refined to include only areas having a minimum 150-ft wide swath, which is the space required for most cutterhead dredges to operate efficiently. Based on CPE's re-evaluation of the USACE data, the three (3) most promising sources of beach compatible material were Study Areas C, D and H.

### *Study Area C*

This study area is located 5 to 7 miles west of R-60, off the northern end of Sand Key. It is a broad, low-relief sand shoal located under 19 to 30 ft of water. Study Area C covers an area of 419 acres. A total of twenty-seven (27) vibracores were collected from Study Area C (twenty-five (25) cores from Ardaman & Associates and two (2) cores from USGS). The material is described as a gray, fine to coarse grained, poorly graded carbonate sand with trace sand and gravel.

Two (2) borrow areas were developed by the USACE in Study Area C in 2004. Borrow Area C-West consisted of eleven (11) dredge cuts with elevations ranging from -23 ft MLW to -32 ft MLW. Borrow Area C-East consisted of three (3) dredge cuts with elevations ranging from -22 ft MLW to -25 ft MLW.

Table 3-8. Summary of Known Borrow Areas										
Study Area	Approximate Location	Estimated volume of beach compatible material (cubic yards)	Mean Grain Size Range (mm)	Silt Content (%)	Average Carbonate Content (%)	Wet Color/Munsell Values	Water depth (ft)	Borrow Area Development	Borrow Area Permit Status	Recommendation
A	7 miles offshore of Sand Key	26,000 <sup>1</sup>	0.62	3.7	-	Light Gray	-20 to -30	2 borrow areas developed by USACE in 2004 based on reconnaissance data; revisions recommended by CPE in 2007	None permitted	Require additional investigation
B	7 miles offshore of northern Sand Key	85,000 <sup>1</sup>	0.25	3.39	-	Gray	-20 to -30	1 borrow area developed by USACE in 2004 based on reconnaissance data; revisions recommended by CPE in 2007	None permitted	Require additional investigation
C	5 miles offshore of northern Sand Key	326,000 <sup>1</sup>	0.21	2.8	-	Gray	-19 to -30	2 borrow areas developed by USACE in 2004 based on reconnaissance data; revisions recommended by CPE in 2007	None permitted	Require additional investigation
D	2 miles offshore of northern Sand Key	72,000 <sup>2</sup>	0.17 to 0.22	0.85 to 1.79	55 to 86	5.2 to 5.9	-14 to -23	4 borrow areas developed by USACE in 2004 based on reconnaissance data; revisions recommended by CPE in 2007; reconnaissance and design level data collected in 2008; diver verification of hardbottom conducted in 2008; 3 borrow areas designed by CPE in 2009	None permitted	Permit/re-evaluate as needed
E	3 miles offshore of Sand Key	0 <sup>1</sup>	0.37	3.2	-	Gray	-14 to -17	1 borrow area developed by USACE in 2004 based on reconnaissance data; revisions recommended by CPE in 2007	None permitted	Require additional investigation
F	3 miles offshore of Sand Key	88,000 <sup>1</sup>	0.31	1.6	-	Gray	-16 to -25	2 borrow areas developed by USACE in 2004 based on reconnaissance data; revisions recommended by CPE in 2007; reconnaissance and design level data collected in 2008; diver verification of hardbottom conducted in 2008	None permitted	Require additional investigation
G	1 mile offshore of Sand Key	63,000 <sup>1</sup>	0.30	1.8	-	Gray	-10 to -20	2 borrow areas developed by USACE in 2004 based on reconnaissance data; revisions recommended by CPE in 2007; reconnaissance and design level data collected in 2008; diver verification of hardbottom conducted in 2008	None permitted	Require additional investigation
H	3 miles offshore of Sand Key	817,000 <sup>2</sup>	0.26 to 0.31	0.64 and 1.02	49 to 60	5.0 to 5.5	-11 to -20	5 borrow areas developed by USACE in 2004 based on reconnaissance data; revisions recommended by CPE in 2007; reconnaissance and design level data collected in 2008; diver verification of hardbottom conducted in 2008; 3 borrow areas designed by CPE in 2009	None permitted	Permit/re-evaluate as needed
I	3 miles offshore of Sand Key	86,000 <sup>1</sup>	0.33	1.8	-	Gray	-15 to -20	1 borrow area developed by USACE in 2004 based on reconnaissance data; revisions recommended by CPE in 2007; reconnaissance level data collected in 2008	None permitted	Require additional investigation
J	5 miles offshore of Sand Key	305,000 <sup>2</sup>	0.35	1.20	46	4.9	-17 to -28	potential sand resource identified during 2008 reconnaissance investigation; 1 borrow area developed by CPE in 2009	None permitted	Permit/re-evaluate as needed
K	7 miles offshore of northern Sand Key	-	-	-	-	-	-	potential sand resource identified during 2008 reconnaissance investigation; no borrow area development	None permitted	Require additional investigation
L	12 miles offshore of northern Sand Key in Federal waters	463,000 <sup>3</sup>	0.16	3.01	22	6.3	-38 to -52	potential sand resource identified during 2008 reconnaissance investigation; 1 borrow area developed by CPE in 2009	Permitted and scheduled for 2012 use	Will require post construction survey quantify volume remaining
Egmont Channel Shoal	3.5 miles offshore of Mullet Key	4,600,000	0.17 to 0.42	-	-	-	-	2 borrow areas exist (West and East); borrow area delineation has not changed since 1980	Egmont West's permit is expired; Egmont East was not permitted	Permit with possible design-level investigation.
Ebb Tidal Shoals	John's Pass, Blind Pass, Pass-A-Grille north, Pass-A-Grille south	unknown	unknown	unknown	unknown	unknown	unknown	borrow areas have been developed and used numerous times in the past	unknown	Re-permit/Re-evaluate as needed
Additional Potential Offshore resources	ebb shoals, shoreface sands, sand ridges	unknown	unknown	unknown	unknown	unknown	unknown	some geophysical and geotechnical data exist; no borrow area development	None permitted	Require additional investigation

<sup>1</sup>Estimated volumes of dredgeable material based on 2007 CPE recommendations

<sup>2</sup>Estimated volumes of dredgeable material based on 2009 CPE borrow area development

<sup>3</sup>Estimated volume remaining after the 2012 Sand Key nourishment.

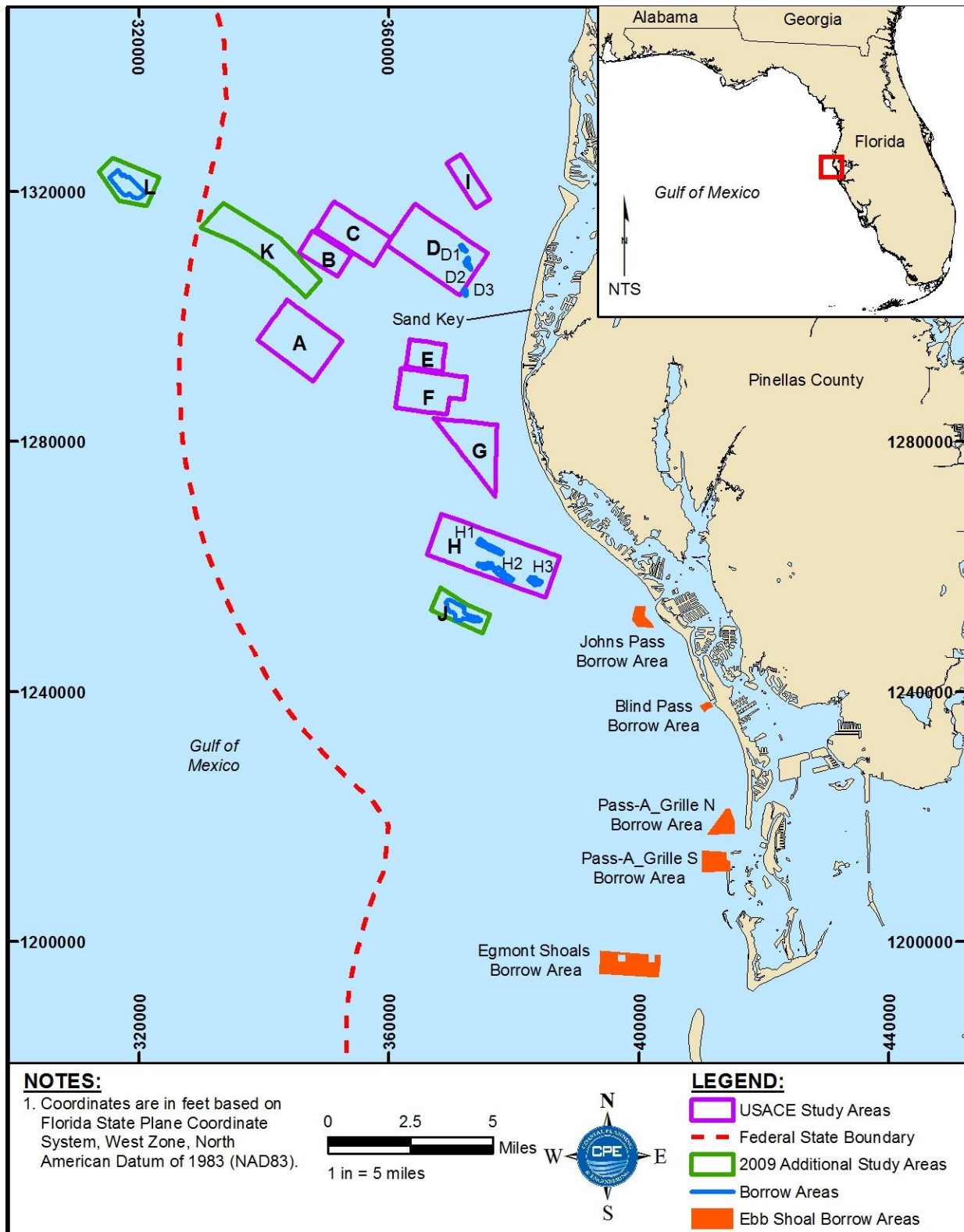


Figure 3-53. Map of current potential borrow areas  
(Map compiled from Dial Cordy and Associates, 2007; Forrest et al., 2009; and GEC, 2011).



CPE recommended refining Borrow Area C-West to include five (5) smaller areas with cut elevations ranging from -27 ft MLW to -32 ft MLW. Borrow Area C-East did not contain any dredgable sediment based on CPE's review. Based on the recommendations made the estimated volume of dredgable material in Study Area C is 326,400 cy. It should be noted that Area C-West has not been cleared for potential cultural resources or hardbottom. Thus, no buffers have been applied and potential volume estimates may be further reduced.

### *Study Area D*

Study Area D is located approximately 2 miles offshore from the northern end of Sand Key, in water depths ranging from -14 to -23 ft. (NAVD88). Four (4) borrow areas were developed by the USACE in or around Study Area D in 2004. Borrow Area D- Southwest consisted of three (3) dredge cuts with elevations ranging from -20 ft MLW to -21 ft MLW. Borrow Area D- Southeast had one (1) dredge cut to elevation -19 ft MLW. Borrow Area D- Northwest consisted of three (3) dredge cuts with elevations ranging from -19 ft MLW to -23 ft MLW. Borrow Area D- Northeast consisted of five (5) dredge cuts with elevations ranging from -16 ft MLW to -32 ft MLW.

Based on the recommendations made by CPE, Borrow Area D-Southwest should be reduced in size to four (4) smaller areas with dredge cut elevations ranging from -20.0 ft MLW to -21.0 ft MLW. Borrow Area D-Southeast should be reduced in size and have a dredge cut elevation of -17.2 ft MLW. It is recommended that Borrow Area D-Northwest be reduced to three (3) smaller areas with dredge cut elevations at -21.7 ft MLW. Borrow Area D-Northeast should be reduced to six (6) smaller areas with dredge cut elevations that range from -18.2 ft MLW to -21.5 ft MLW. Based on the recommendations made, the estimated volume of material in Study Area D is 467,400 cy.

### *Study Area H*

Study Area H is located approximately 3 miles offshore from Sand Key, with water depths ranging from approximately -11 to -20 ft. (NAVD88). Five (5) borrow areas were developed within this study area in 2004. Borrow Area H- Southeast consisted of two (2) dredge cuts with elevations ranging from -16 ft MLW to -18 ft MLW. Borrow Area H- Northeast consisted of four (4) dredge cuts with elevations ranging from -17 ft MLW to -19 ft MLW. Borrow Area H- North had one (1) dredge cut to -18 ft MLW. Borrow Area H- Northwest consisted of four (4) dredge cuts with elevations ranging from -13 ft MLW to -19 ft MLW. Borrow Area H- Southwest consisted of three (3) dredge cuts with elevations ranging from -16 ft MLW to -18 ft MLW.

CPE recommends that Borrow Area H-Southeast should be refined to one (1) smaller area with a cut elevation of -18 ft MLW. Borrow Area H-Northeast should be refined to four (4) areas with elevations ranging from -14.4 ft MLW to -17.8 MLW. Borrow Area H-North's one (1) cut should be reduced in size and have an elevation of -17.6 ft MLW. Borrow Area H-Northwest should be refined to two (2) areas with elevations of -17 ft MLW and -19 ft MLW. Borrow Area H-Southwest should be refined to two (2) areas with elevations of -16 ft MLW and -18 MLW.



Based on the recommendations made, the estimated volume of dredgeable material in Study Area H is 585,600 cy.

### *Borrow Area Development*

Following the constructability analysis discussed above, Pinellas County directed CPE to collect geophysical data from the northern study areas (USACE Study Areas I and D), central study areas (USACE Study Areas F and G) and southern study areas (USACE Study Area H). In 2008 reconnaissance level data was collected across the five (5) study areas. The survey plan was modified during the reconnaissance survey and design level data was collected within the most promising areas. Vibracores were then collected from the areas most likely to contain the greatest volume of beach quality material (Study Areas D and H).

The 2008 investigations confirmed the results of the 2007 constructability analysis. Study Areas D and H contained beach quality material. However, they did not contain significant volumes of material. No additional material was identified within Area G. In response, CPE was contracted by Pinellas County in 2009 to conduct reconnaissance and detailed investigations to identify additional material. Pinellas County directed CPE to conduct a reconnaissance geophysical survey within Study Areas A, B and C, despite the low probability of identifying additional material. Due to the low probability of identifying additional material in these areas, several prominent sand ridges in the vicinity of the USACE Study Areas were also investigated. Vibracores were collected from locations selected based on the results of the reconnaissance geophysical survey. The geophysical data, coupled with analysis of the vibracores was used to determine sediment quality and to ascertain the presence of material unsuitable for dredging. Three (3) new sand resource areas, designated Areas J, K and L, were identified during the reconnaissance investigation. These three (3) areas were presented to Pinellas County and the FDEP-BIP's, who expressed a preference for developing areas J and L.

Eight (8) borrow areas that contain potentially beach compatible material were designed in or around areas D, H, J and L. Three (3) borrow areas, containing an estimated 72,000 cy of potentially beach compatible material were developed within Study Area D (Borrow Area D1, D2 and D3). Three (3) borrow areas containing an estimated 817,300 cy of potentially beach compatible material were developed within Study Area H (Borrow Areas H1, H2 and H3). A single borrow area containing 305,300 cy of potentially beach compatible material was developed within Study Area J. A single borrow area containing 1,480,600 cy of potentially beach compatible material was developed within Study Area L. The locations of these eight (8) borrow areas are shown in Figure 3-53. It is important to note that, Area L was used as the sand source for the 2012 Sand Key nourishment project.

### *Previously Used Borrow Areas*

For decades, ebb-tidal shoal deposits have been used for beach nourishment projects in Pinellas County. Egmont Shoals is an ebb-tidal shoal located approximately 3.5 miles west of Mullet Key. The shoal covers 1,596 acres and contains an estimated 19 to 23 million cy of sand suitable for beach nourishment (GEC, 2011). Egmont Shoals has been used as a sand source numerous

times in the past for projects including Indian Rocks Beach Nourishment (1990), Indian Shores Beach Nourishment (1992), Treasure Island Beach Renourishment (1996), Long Key Beach Renourishment (1996) and Sand Key Renourishment (1999 and 2005). The Egmont Shoals Borrow Area has also been previously authorized as the borrow area for Clearwater Beach Island and Mullet Key.

Egmont Shoals is currently divided into two (2) sections, East and West (Barbara Nist USACE, personal communication, March 23, 2012). Egmont West's permit is currently expired, while Egmont East has never been permitted. After the 2005 Sand Key Beach Renourishment, Egmont West contains approximately 4,600,000 cy of previously permitted beach compatible material (GEC, 2011). The delineation of the borrow area has not changed since 1980 (Elko, 2006).

John's Pass, Blind Pass, Pass-A-Grille north, and Pass-A-Grille south ebb-tidal shoals have all been investigated by the USACE and used in the past multiple times. These shoals consist of wide, shallow areas of sand with portions exposed during low tide events. Further investigations are needed to estimate the total amount of sand remaining and beach compatibility. No hardbottom or seagrass has been documented within these ebb shoal areas (DC&A, 2002). John's Pass was used in 1988 for the Redington Beach Nourishment Project. In 2000, John's Pass and Blind Pass were used for the Treasure Island Beach Renourishment Project and the Long Key Beach Renourishment Project.

### *Identification of Additional Potential Offshore Sand Resources*

Sand resources along the west coast of Florida typically fall within three (3) broad categories: (1) ebb-tidal shoals, (2) shoreface sands and (3) sand ridges. The sediment-starved continental shelf off the central west coast of Florida has traditionally supplied beach quality sediment from ebb-tidal shoals and shoreface sands (Finkl et al 2007). Recently, studies of seafloor deposits off west-central Florida indicate the presence of sedimentary environments, such as sand ridges, that warrant further exploration (Locker et al., 2003 and Twichell et al., 2003, Finkl et al 2007). Figure 3-54 shows mapped units including ebb shoals, sand sheets and sand ridges.

### *Ebb-Tidal Shoals*

Inlets along the west coast of Florida constitute an important source of clean sand for beach nourishment. Ebb-tidal shoals accumulate sediments that are transported by alongshore currents in the surf zone. These high energy conditions result in the accumulation of sediment that is devoid of fines and organic materials, which makes the material suitable for beach nourishment.

Most of these inlets have been modified by engineering works including maintenance dredging to improve navigation conditions, sand removal for beach restoration, and stabilization by coastal structures, inlet opening and closure, etc. Even though the tide range is relatively small (less than 3 ft), low wave energy and large back bay (lagoonal) areas contribute to the opening and maintenance of tidal inlets. Additionally, low wave energy facilitates the build-up and maintenance of large ebb-tidal shoals that store large volumes of sand.

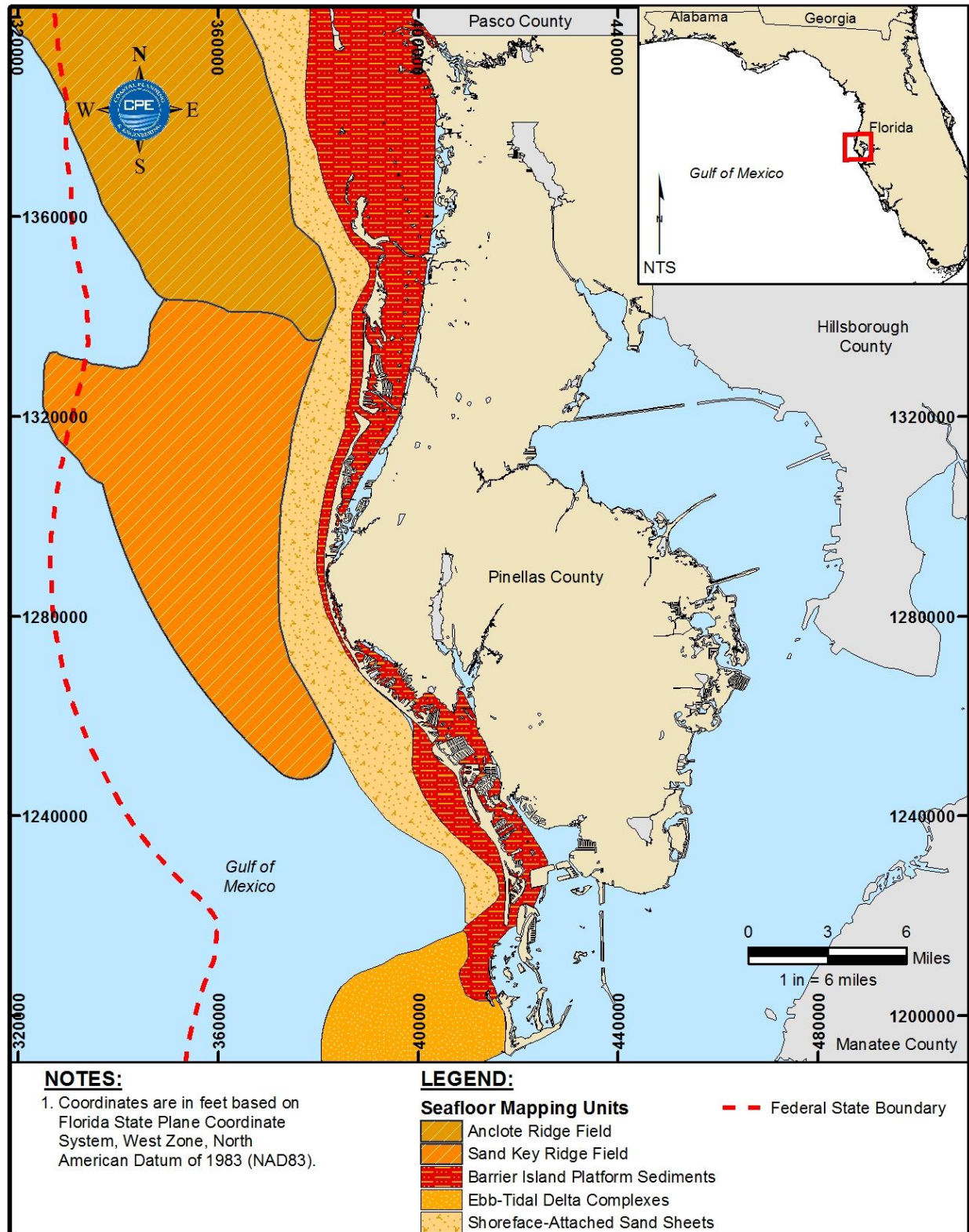


Figure 3-54. Potential sand resources identified offshore of Pinellas County  
(modified from Finkl et al., 2007)

### *Shoreface Sands*

Shoreface sands along the west coast of Florida occur at relatively shallow depths (7 to 20 ft) and are generally thin and discontinuous (Finkl et al., 2007). The extent of these deposits is limited because of the sediment starved nature of the west coast of Florida (Finkl et al., 2007). Although uncommon, there are some sand deposits that blanket shallow (10 to 33 ft) waters. Locker et al. (2003) provide evidence of nearshore sand blankets that are 3 to 13 ft thick located offshore Anclote Key, Mullet Key and Treasure Island. These deposits may be worth exploring for coastal restoration.

### *Sand Ridges*

Sand ridges generally occur in water depths from 13 to 98 ft and are associated with modern shelf processes and relict geological and geomorphological controls (e.g. bedrock slope) (Finkl et al., 2007). The ridges off the southwest coast may be associated with cusped forelands and sedimentary headlands or with reworked paleo-ebb tidal shoals and barriers. The ridges are obliquely oriented to the coast, although shore parallel and shore transverse ridges occur in restricted locations (Finkl et al., 2007).

The Anclote Ridge Field (Finkl et al., 2007), covers an area of approximately 1,236 square miles, and lies offshore southern Pasco and northern Pinellas counties on the northern portion of the west-central Florida coast. These well-developed ridges range up to 0.6 miles wide and 9 miles in length. Their slightly variable azimuths average about 290°, 3 to 12 miles from shore.

The Sand Key Ridge Field (Finkl et al., 2007), covers an area of approximately 1,042 square miles and lies offshore from the Indian Rocks headland in Pinellas County. This ridge field contains well-developed sand waves that can reach sizes up to 0.9 miles wide by 6 miles long by 13 ft high.

### *West Central Florida Coastal Studies Project*

The West Central Florida Coastal Studies Project was an extensive five-year collaborative regional coastal study between the U.S. Geological Survey, the University of South Florida College of Marine Science, the University of South Florida Department of Geology, and Eckerd College.

This project was a regional study examining the geologic framework of the west central Florida coastal zone and inner shelf. The primary goal was to understand the natural variability of coastal morphology, seafloor bathymetry, surface sediment distribution and subsurface stratigraphy of the west Florida coastal system. Research efforts focused on the northern half of the west central Florida barrier island coast (Anclote Key to the Venice headland).

As part of this project, USGS scientists and collaborators systematically mapped the thickness of sand deposits near the coast through seismic surveys and vibracoring. The first phase was a regional mapping with widely spaced geophysical and sample data that found that most beach



quality sand is concentrated in active ebb-tidal deltas located just off tidal inlets and in long, linear ridges found on the inner shelf. Across the entire study area, bottom samples and core samples were collected and analyzed to develop a map of sea-floor sediment types. USGS scientists and collaborators also completed detailed studies north and south of the entrance to Tampa Bay. Detailed sidescan sonar maps were made of localized areas which were used to understand the variability in sediment distribution of beach-quality sand, carbonate shell material, and hardgrounds.

The wealth of geophysical and geotechnical data compiled during this study should be further assessed. This data may help target new potential sites that could be further investigated and developed.

### *Recommendations*

Pinellas County has a number of options available to address the County's long term sediment needs.

CPE's recommendations include the following:

- Historic National Ocean Service (NOS) bathymetry from the National Oceanographic and Atmospheric Administration (NOAA) covering the nine (9) USACE study areas shows what appear to be a series of prominent sand ridges offshore of Sand Key. These ridges are oriented roughly northwest/southeast and range from approximately 3,000 to 30,000 ft. in length. Several of these fifteen (15) ridges were targeted by the USACE but extended beyond the limits of their study areas. These areas should be further investigated to evaluate their potential for future borrow area development.
- Similarly, several uninvestigated sand hills are present in Federal waters that have potential for containing beach compatible material. These areas should also be further investigated to evaluate their potential for future borrow area development.
- Although eight (8) potential borrow areas were identified as a result of the constructability analysis and subsequent 2008 and 2009 sand search investigations, the volume of material in these areas could potentially be increased.
  - Borrow Area L was dredged in 2012.
  - Three (3) borrow areas were identified in or around Study Area D. The total volume of material identified in this area is 72,000 cy. Because the volume of this material is small, these areas should be considered to supplement other sand sources.
  - Three (3) borrow areas were developed in area H and one (1) borrow area was developed in area J. These areas contain relatively dark, coarse, high-



carbonate sand having grain sizes ranging from 0.26 to 0.35 mm. The grain size of the material found in areas H and J is coarser than the Egmont Shoal Borrow Area that was used for several previous nourishments. This sand is therefore likely to perform well and require the placement of less material to achieve the same results that would be accomplished using sand from Egmont Shoals and areas L or D. While color was not identified as a requirement as part of the original sand search investigation and was not considered during borrow area design, color and carbonate content of these borrow areas may indeed be an aesthetic concern of importance to local communities as well as a marine turtle nesting issue. The carbonate content is significantly higher, and color of this material is significantly darker than the existing beach.

- CPE recommends the design-level investigation of area K as well as reconnaissance level investigations of previously uninvestigated sand hills in order to identify beach compatible sand resources for future Sand Key (and other Pinellas County) shore protection projects. Based on reconnaissance level vibracores, area K contains material similar in quality to that identified in Borrow Area L, making it a promising target for future work.
- Material may still exist in the Egmont Shoals Borrow Area. Potentially beach quality sediment may also still exist in the ebb shoals at John's Pass, Blind Pass and Pass-A-Grille. These areas should be further investigated.
- Re-evaluate the geophysical and geotechnical data collected during the West Central Florida Coastal Studies Project to identify potential sand resource that could be further investigated and developed into borrow areas.

### Artificial Reef Program

The Pinellas County Solid Waste Operations Department presently manages a much reduced Pinellas County Artificial Reef Program. Since 1975, Pinellas County Utilities has placed approximately 50,000 tons of clean inert debris offshore to create artificial reefs. The materials used to construct the reefs have evolved over time. Tires were once dumped within a few miles of shore, which led to tires washing up on the beach (TBRPC, 2011). The program, as of 2011, primarily uses concrete construction materials including bridge debris, telephone poles and culverts.

The County holds six active permits from the USACE for construction and maintenance of four offshore reefs (20 feet of water, concrete structures and barges) and two deep water reefs (40 to 60 feet of water, large ships). The permits expire in 2018 and 2019 (Mangio, 2009).

In 2004, the operational budget of the program was \$387,610 funded by Solid Waste Management (Internal Audit Division, 2004). Budget cuts in 2007 led to a reduction in staff and services. At present, the County allocates \$60,000 annually for artificial reef related activities (Sea Grant, 2011). Additional funds are provided by the FWC statewide artificial reef program.

Maintenance of the reefs includes replacing ineffective material and repairing buoy markers. Monitoring of the reefs is conducted by volunteers several times a year.

In 2009, a study was conducted by the University of Florida and Florida Sea Grant to evaluate income generated by the artificial reefs in six southwest Florida counties including Pinellas County. The study reported more than 1800 people use the artificial reefs daily in Pinellas County and the economic output of the reefs is \$75.84 million annually. The study also found that 89% of reef users and 71% of non- reef users supported the use of public funds for the maintenance of artificial reefs (Sea Grant, 2011).

Artificial reefs have been discussed as a disposal option for the upcoming demolition of the Friendship Trail (Gandy) bridge. Material may be stored at an upland location prior to disposal to reduce transportation costs. A new reef will not be created for the upcoming project but existing reefs may be expanded in accordance with permit conditions (TBRPC, 2011).

### *Mitigation Reefs*

The construction of artificial reefs was required as mitigation for impacts related to the 1998 Sand Key Nourishment (FDEP Permit No. 52-2923209). The permit required the construction of 7.95 acres of hardbottom habitat to offset the project's anticipated impact to 5.3 acres of hardbottom. The FDEP-BIP's approved the locations of sixteen artificial reef sites (Figure 3-55). The reefs were to be constructed within two years of the permit issuance. The success of the artificial reefs depended on their biological similarity to the natural hardbottom areas after two years. The permit stipulated additional remedial action would be required if the reefs were unsuccessful after two years and further monitoring would be required until the FDEP-BIP's determined the reefs to be functionally equivalent.

Two years after the 1997 permit was issued, only three reefs had been constructed. The remaining reefs were constructed over the next six years (1999-2005). Not until the County began the permit application process for the 2005 Sand Key Nourishment was it discovered that certain biological and physical monitoring requirements from the previous permit had not been satisfied. As-built surveys and post construction video surveys were not conducted for each reef. To address the issues, the County conducted a biological assessment of 14 of the reefs in 2004 (the remaining two reefs were constructed in 2005-2006). The FDEP-BIP's found the construction and submittals to be in violation of the permit and issued a warning letter on June 1, 2006. The County contracted CPE to coordinate with the FDEP-BIP's and develop a biological monitoring and research plan to bring the County's reef mitigation program into compliance.

In May 2007, CPE assessed five artificial reefs identified by FDEP-BIP's to be inadequately constructed (believed to consist of exposed rebar and steel). The divers observed some metal in the reefs which may have been exposed due to the deterioration of the concrete (CPE, 2007). The reefs were surveyed again, one year later. Based on the biologists' observations, the artificial reefs reached functional equivalency with the natural hardbottom between two and five years post-construction. Ten years after construction, the artificial reefs were observed to contain a community complexity greater than that of the natural hardbottom (Craft and Kruempel, 2007).

Additional monitoring of the reefs has not been required by the FDEP-BIP's. However, a local non-profit organization, Reef Monitoring, has organized a volunteer monitoring program. The organization has been active since 2005.

Future mitigation would only be necessary if any project has the potential to negatively impact environmental resources. A mitigation plan will be required as part of the permitting process if planned nourishments, structures or activities are likely to impact seagrass beds, hardbottom or other environmental resources.

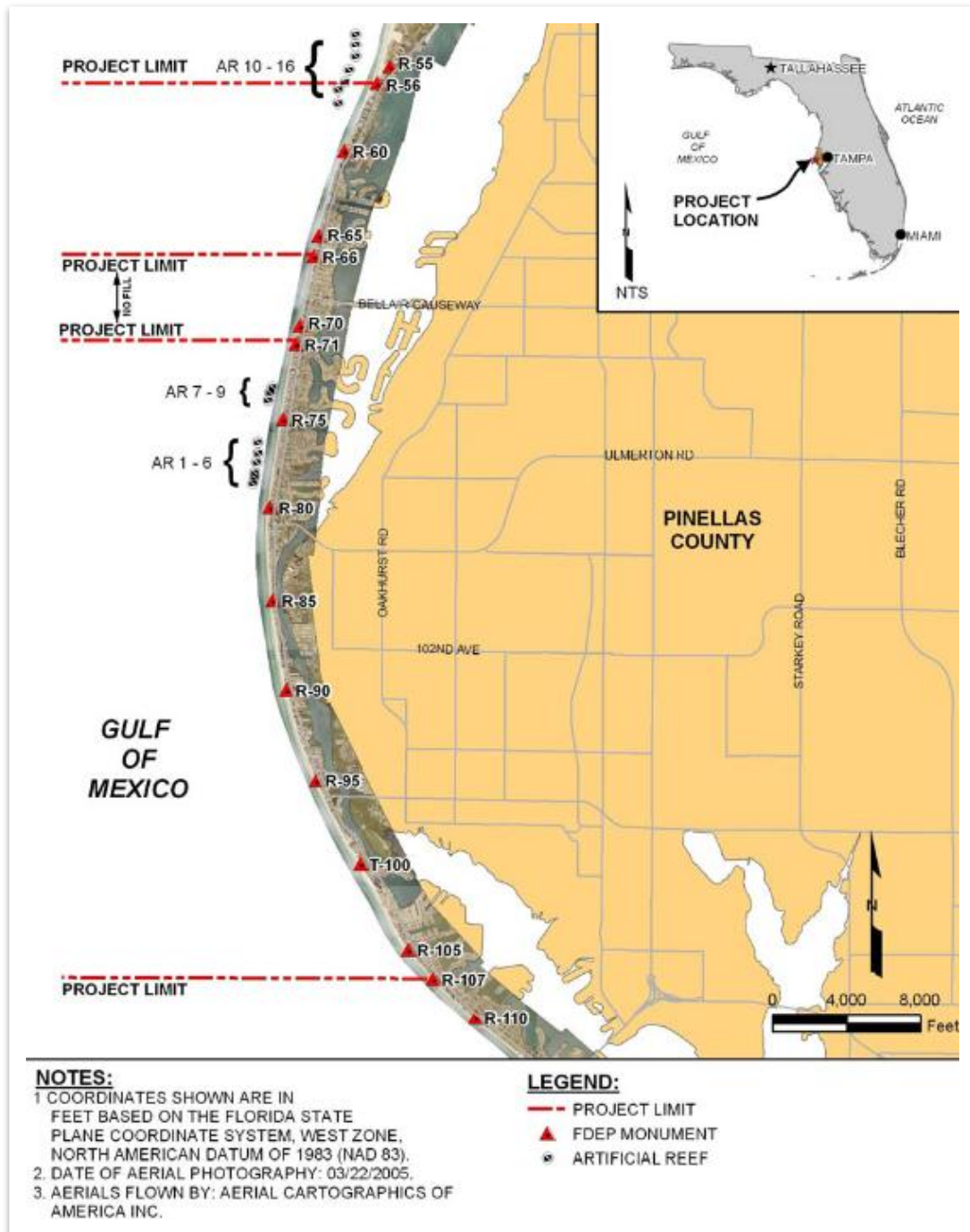


Figure 3-55. Artificial reef locations (modified from Craft and Kruempel, 2007)

## **SECTION 4: NEEDS ANALYSIS AND SCHEDULE OF FUTURE ACTIVITIES**

We have identified needs and milestones recommended for inclusion in the Coastal Management Program based on the analysis of the historical management and the existing conditions of the CMP elements. A schedule of future activities and planning milestones has been suggested to address erosional hotspots and ensure continuity and consistency in program management (Figures 4-1, 4-2, and 4-3). Funding needs for the period from 2012 to 2018 were estimated based on the anticipated activities and milestones, the Capital Improvement Budget and the FDEP-BIP's 2013/2014 Long Range Budget Plan. The funding needs of each CMP element are summarized in Table A-1, Appendix A. As the political and environmental conditions change, these milestones and funding needs will need to be updated.

The analysis of the conditions of the CMP elements suggests the CMP plan should be updated to include the following components, planning milestones and funding apportionments:

### **Program Management**

Project milestones, funding requirements, and suggested activities for each Coastal Management Plan Program Management items are described below individually.

#### **Project Planning**

The County should continue to identify potential opportunities to align project schedules and save on mobilization costs. By scheduling maintenance dredging and nourishments together, dredge spoils can be used to benefit adjacent beaches. The County needs to analyze the feasibility of aligning schedules for the dredging of Blind Pass and the nourishment of Long Key.

Additional cost savings may result from continuing to link projects, i.e. Treasure Island and Long Key for construction. Regional monitoring of the combined projects should also be continued.

#### **Policy for Non-Public Beaches**

Pinellas County contains private beaches that are not included in federal or state projects including Belleair Beach. The County needs to study the value of including or excluding Belleair Shore with the nourishment of Sand Key. The study's findings can then be used to establish and adopt a policy for the case when a non-public section of beach is adjacent to public beaches with plans to be nourished. The best source of funding must also be determined.

#### **Emergency Response**

Storm damage to the beaches and erosion control structures of Pinellas County can trigger the need to perform unscheduled maintenance nourishment or repairs. The County



must be prepared to assess the damage, estimate losses and request emergency funding from state and federal agencies. In order for any non-Federal beaches to qualify for FEMA funding, records from monitoring and a beach design template must be kept on file. In preparation for potential application for FEMA funding, the eligibility of non-federal beaches should be assessed.

Emergency response plans for state parks and other non-federal beaches need to be developed. Plans should include a post-storm visual inspection of beaches and structures, reporting to the appropriate agencies, topographic and bathymetric surveys, decision making guidelines for response level and permitting, financing and bidding procedures.

### **Monitoring**

Monitoring is a key component of Pinellas County's CMP. Nourished beaches are required to be monitored according to permit conditions. Additionally, emergency funding of projects is contingent upon monitoring records. The County has had two-year contracts with USF to survey Sand Key, the mean high water line on several coastal elements, and the Upham Beach T-groin project area. These contracts expire on December 31, 2012, December 30, 2013 and March 30, 2013, respectively. The County must continue to plan for continuous annual physical monitoring in accordance with permits.

Sea turtle and shorebird nest monitoring is also required by permit on nourished beaches. At present, CMA is contracted to survey the barrier islands of St. Pete Beach (Upham and Pass-A-Grille beaches only), Treasure Island, Sand Key, and Clearwater Beach during the period between the months of April and October. In addition, the CMA is under contract to provide two lighting surveys to the County per year (in May and late June). The estimated cost for sea turtle and shorebird monitoring annually is \$130,000 (Pinellas County Environmental Management, 2009).

### **Data Archive**

The CMP needs to develop a digital data archive for reports and geotechnical data. Preserving relevant information from plans and studies may prevent the need for duplicative field efforts and potentially reduce front end investigation work. Requesting data in digital format (i.e. CAD files and shape files) from consultants for the archive will be helpful for future design projects and modeling studies.

### **Funding Sources**

Pinellas County will need to prepare to extend the Penny for Pinellas program and/or pursue alternate funding sources. The ten-year program expires in 2020.

## **Overall Program Funding Needs**

The total expenditure of County funds on coastal management is estimated to be \$24,519,410 over the next six years according to the 2012 Capital Improvement Plan FY 2012 through 2017. State and federal programs will contribute an additional \$25,848,800 and \$37,831,619, respectively, according to the FDEP-BIP's FY 2013/2014 Long Range Budget Plan (FDEP, 2012b). The majority of funds are dedicated to the construction of upcoming projects on Sand Key, Treasure Island, Long Key and Honeymoon Island. Additional funds are needed for physical and environmental monitoring, design, permitting, federal reauthorization, programmatic management and evolution, inlet management and coastal research, and other improvements.

## **Management of CMP Elements**

Project milestones, funding requirements, and suggested activities for each Coastal Management Plan element are described below individually.

### **Anclote Key & Three Rooker Bar**

No funding is anticipated to be needed for Anclote Key or Three Rooker Bar in the next five years. The undeveloped barrier islands appear to be sustainable systems.

### **Honeymoon Island**

The County should continue its pursuit of a JCP for Phase II of the Honeymoon Island Restoration (JCP No. 0249602-006-JC). Construction of Phase II is planned for 2013. Phase II of the Honeymoon Island Restoration is expected to be constructed in 2013 at a cost of \$5,630,000. Although the project is fully funded by the state, Pinellas County will be required to front the funds and be reimbursed after the completion of the project. Following construction, monitoring will be required by permit. Pinellas County is anticipated to fund 25% of the post-construction monitoring, at a cost of \$21,250. For the following four years, Pinellas County will be responsible for 25% of the cost of the physical monitoring required by the permit (\$21,250 annually) (CIP, 2012).

Offshore sand sources for future Honeymoon Island nourishments need to be identified. The Hurricane Pass ebb shoal was permitted for use in Phase I and Phase II of the restoration; however, alternative offshore resources may be needed in the future. FDEP-BIP's has included a renourishment in 2018 in their long range budget plan (FDEP, 2011b). Borrow area investigations and design need to be completed in time to modify the permit prior to construction.

Additionally, Honeymoon Island should continue to be monitored even if not required by permit conditions. Monitoring provides data for design purposes and assists in calculations of sand volume loss due to storms.

### Caladesi Island

No funding is anticipated to be needed for Caladesi Island in the next five years.

### Clearwater Beach Island

No funding is anticipated to be needed for Clearwater Beach Island in the next five years.

### Sand Key

The last federal nourishment of Sand Key was completed in 2012. The cost of the project was \$31,540,000. The County's local share (18.6%) was expected to be \$5,866,440. Following construction, tilling and monitoring will be required by permit. For the following four years, Pinellas County will be responsible for 50% of the cost of the physical monitoring required by the permit (\$75,000 annually according to CIP budget, \$70,532 annually if the USF contract is renewed).

The subsequent re-nourishment is expected to be constructed in 2019 at a cost of \$35 million (62.8% federal, 18.6% state and 18.6% local share). Prior to designing this nourishment, the following should be considered and pursued:

- A sand source needs to be identified for the next Sand Key project. Borrow Area L was used for the 2012 project. Borrow Area L does not have enough volume for multiple large projects, however, some material remained within Borrow Area L after the 2012 Sand Key project for potential use on smaller volume projects in the future. *See Section 3, Summary of Known Borrow Areas for options.*
- An analysis of the coastal processes near the hotspot at the north end of Sand Key (Dan's Island) is necessary to identify management options to slow the erosion rate in the area. The analysis may be part of the development of an inlet management plan for Clearwater Pass.
- The necessity and feasibility of removing the Redington Beach breakwater needs to be evaluated. The exposed rip rap may be a public safety hazard and the performance of the structure has not been evaluated.
- The fill template for the Federal Shore Protection Project does not include the very north end of Sand Key (R-52- R-56), Belleair Shore (R-66-R-72) or the south end of Sand Key (R-107-R-125). The County may need to consider proposing to extend the fill template at their cost as betterment to the federal project. If these beaches are included in the federal project, they would be eligible for post-storm emergency nourishment funds.

- As part of the coastal processes analysis of John's Pass (see Inlet Management section), the performance of the terminal groin at the south end of Sand Key should be evaluated.
- The County should evaluate the benefits of extending construction pipeline corridors farther offshore Sand Key into deeper water. This would increase the efficiency of current construction methodologies while adding the potential for additional construction method options in the future, resulting in increased bidding competition from contractors. Investigation and permitting longer pipeline corridors will require sidescan sonar surveys with potential diver verification of environmental resources.

Additionally, future management of Sand Key should include the following:

- The County must continue to monitor the Madeira Beach groin system. The groins may periodically require maintenance, safety inspections and performance evaluations.
- The County should pursue long term nourishment permits. FDEP-BIP's has recently considered issuing permits for 15 years.

### **Treasure Island**

The next planned nourishment of Treasure Island and Long Key is expected to be constructed in 2013/2014 pending funding availability. The estimated cost of the Treasure Island project is \$12,000,000 (FDEP, 2012b). The County's local share (20%) is expected to be \$2,400,000 (2013 CIP budget lists \$1,823,400 from TDC funds). For the following two years, the County will be responsible for 50% of the cost of the physical and turtle monitoring and tilling required by the permit (\$12,500 annually).

Nourishments are anticipated to occur every three years (2016 and 2019). A new joint coastal permit will be required for any projects constructed after May 17, 2014. Prior to designing and permitting these nourishments, the following should be considered and pursued:

- The shoreline at Sunset Beach, at the southern end of Treasure Island, has continued to retreat since 2006. A feasibility study including morphology modeling of management options to address the hotspot should be conducted with the goal of extending the nourishment interval. The potential for reducing the permeability of the groin at R-141 or adding additional structures should be evaluated as part of the study. Funds for a coastal processes analysis of Sunset Beach and a feasibility study of alternatives to address erosion at Sunset Beach including morphology modeling will be required prior to the 2016 nourishment. Recommendations from the study can then be incorporated

into the design and permit to address hotspots on Treasure Island. The approximate cost of the study and modeling was included in the summary table in Appendix A as \$40,000 in 2013 and \$80,000 in 2014.

- As part of the coastal processes analysis of John's Pass (see Inlet Management section), management options for the hotspot at Sunshine Beach at the north end of Treasure Island should be evaluated.
- Costs associated with the design, permitting, construction and monitoring of the 2016 project were assumed to be the same as the 2013/2014 project and were included in the 5-year budget (Appendix A).

Additionally, a new joint coastal permit for emergency sand sharing will be required after June 7, 2016. Prior to permitting, discussions with the stakeholders need to be held to determine if the City of St. Petersburg or any other communities have changed their position on their beaches being used as a borrow area for the emergency sand sharing plan. An estimated cost of \$100,000 was included in FY 2015, split equally between the County and municipalities (Appendix A).

In order to pursue the reauthorization of funding for the Treasure Island Federal project, whose authorization expires in 2019, the USACE will have to conduct investigations. The cost will be \$1,000,000. The County will be responsible for half of the costs, or \$500,000.

### **Long Key**

The construction of four permanent rock groin structures as part of the Upham Beach Stabilization Project is scheduled to begin in 2013. The estimated cost of the groins is \$8,000,000 of which the County and State will each be responsible for half depending on funding availability (FDEP, 2012b). The groins will require monitoring and maintenance after construction. Physical monitoring required by the permit for the structures is expected to cost between \$45,000 and \$75,000 annually (2013 CIP budget, 2012). The County will be responsible for \$22,500 to \$37,500 annually.

The next planned nourishment of Long Key will be in conjunction with the Treasure Island project expected to be constructed in 2013/2014 pending funding availability. The estimated total cost of the project is \$5,289,286 (2013 CIP budget, 2012). The local share (20%) is expected to be \$1,036,700. For the following two years, the County will be responsible for 50% of the cost of the physical and turtle monitoring and tilling required by the permit (\$12,500 CIP budget, \$20,000 FDEP LRBP).

The nourishment interval for Long Key and Treasure Island is approximately three years. Costs associated with the design and permitting for the 2016/2017 project are estimated at \$165,000. A new joint coastal permit will be required for any projects constructed after



May 17, 2014. The new permit will likely require physical and environmental monitoring after construction which will require additional funds.

The County needs to continue pursuit of the joint coastal permit to nourish Pass-A-Grille Beach and evaluate the potential of adding the southern Long Key segment to the Federal Shore Protection Project. Additionally, monitoring and design records need to be kept on file for use in requesting emergency funding as needed.

### Shell Key

Limited funding is anticipated to be needed for Shell Key over the next five years. The Shell Key Management Plan was developed in 2007. If environmental conditions or management goals for the island change within the next five years an update to the plan and funding apportionment may be required. Funding resources for Shell Key need to be reviewed.

### Mullet Key

The County should continue to take advantage of dredge spoils from Tampa Bay ship channel to nourish Mullet Key and plan projects accordingly. Pinellas County Parks and Conservation Resources Department intends to apply for RESTORE Act funds to repair the North Beach of Ft. DeSoto Park from TS Debby damage. They have requested \$8,000,000 for the project.

### Inlet Management

Inlet management is a critical component of the CMP. The following actions should be pursued to improve performance of projects, preserve adjacent beaches and take advantage of inlet resources and funding opportunities:

- An updated coastal processes analysis of the inlet dynamics at John's Pass needs to be conducted to evaluate the performance of the inlet stabilization structures and their potential need for modification, the wave focusing on the north end of Treasure Island and the shoaling inside the pass. The study will require wave and morphology modeling. The ongoing study of John's Pass and Blind Pass by USF and the USACE may provide some or all of this information (Wang and Beck, 2012). Results from the study can be used to update the inlet management plan (IMP). The latest John's Pass IMP was developed in 1993.
- IMPs for Clearwater Pass and Pass-A-Grille Pass need to be developed. Additionally, the management strategies in the Blind Pass and John's Pass IMPs should be updated to reflect current operations and needs. IMPs are a critical component in improving eligibility for state funding. IMPs can be adopted by the FDEP-BIP's and incorporated into the SBMP, thus making some management activities eligible for state funding.

- The County should develop an IMP for Hurricane Pass. Hurricane Pass is a locally maintained navigation inlet and has been a long term sand source for nourishment projects on Honeymoon Island. A complete coastal processes analysis of Hurricane Pass should be conducted. The study should consider the maintenance needs of the channel through Hurricane Pass, identify trigger points for maintenance dredging and develop a plan for future dredging. An estimated cost of \$150,000 was included in the budget for FY2015 for this study (Appendix A).
- Several of the undeveloped barrier islands have naturally opening and closing passes. The County should have a response plan for their potential occurrence.

Nourishment projects should be planned concurrently with inlet maintenance dredging projects to ensure any dredge spoils are placed on the adjacent beaches.

- Clearwater Pass was dredged in 2012. To date, maintenance dredging of Clearwater Pass has occurred every 9.5 years. The inlet management plan should evaluate the opportunities for the use of Clearwater Pass dredge spoils and recommend a regular maintenance dredging interval. Prior to the next maintenance dredging, the permit for maintenance dredging of Clearwater Pass needs to be renewed (JCP No. 0184778-001-JC expires January 15, 2014).
- Dredge spoil from North Channel, Pass-A-Grille Pass should be placed as part of the 2013/2014 Long Key Nourishment.
- As mentioned previously, the Hurricane Pass ebb shoal is scheduled to be dredged as part of the Honeymoon Island Phase II Restoration project, at a cost of \$1,040,000 in 2013.
- The Blind Pass Inlet Management Plan recommended a maintenance dredging interval of 6 years. The next maintenance dredging of Blind Pass is therefore scheduled to occur in 2016. The dredge spoils have previously been placed at Upham Beach.
- The John's Pass Inlet Management Plan recommended a maintenance dredging interval of 9 years. The next maintenance dredging of John's Pass is therefore scheduled to occur in 2019. The 2019 maintenance dredging could be coordinated with a nourishment project as feasible. In preparation for future maintenance dredging, a permit extension request or new JCP application to dredge John's Pass should be filed to avoid permit expiration during construction, if delays occur. JCP No. 0270453-001-JC expires March 29, 2020.

## **Sediment Management**

The following sediment management objectives should be pursued by the CMP:

- Pinellas County needs to maintain a regional sand inventory including comprehensive mapping of offshore sediment resources including federal resources. A better understanding of available resources will facilitate design and decision making.
- Further investigation is needed to determine if dredged material from the Tampa Harbor or other Federal navigation maintenance projects could be placed in the nearshore zone adjacent to the Mullet and/or Egmont Key gulf shorelines.
- A regional sediment management strategy that uses beach quality sand from upland dredged material management areas and the maintenance dredging of the navigation projects should continue to be incorporated into the maintenance of the beach restoration projects.
- An investigation is needed to determine the potential applications and resources available for the use of upland beach compatible sand hauled by truck for small nourishments.

## **Construction**

The County should evaluate alternative nourishment construction methods to potentially lower costs and add flexibility to the construction schedule. Contractors with small hopper dredges may be able to dredge large shallow areas or small hills at a reduced cost and during times when other dredges are not available.

## **Environmental Resource Planning**

The following environmental resource objectives should be pursued by the CMP:

- Mapping of the nearshore hardbottom in the vicinity of North Madeira Beach needs to be updated to assist in design and permitting of fill protection projects.
- Projects located within and near the aquatic preserve boundaries require additional protection, including more stringent water quality standards than in non-aquatic preserve waters, during permitting and construction to ensure preservation of the existing conditions.
- The Shell Key Management Plan recommends collaborating with the Environmental Land Division to reduce propeller scarring and nutrient loads and to promote healthy seagrass beds around Shell Key (PCDEM, 2007). Pinellas County Parks and Conservation Resources staff took over Shell Key Preserve management in October 2010.
- The County should continue to encourage dune restoration by local municipalities in order to increase storm protection and improve habitat.

Figure 4-1. Pinellas County Coastal Management Program Planning Milestones (Program Management, Honeymoon Island, and Sand Key)

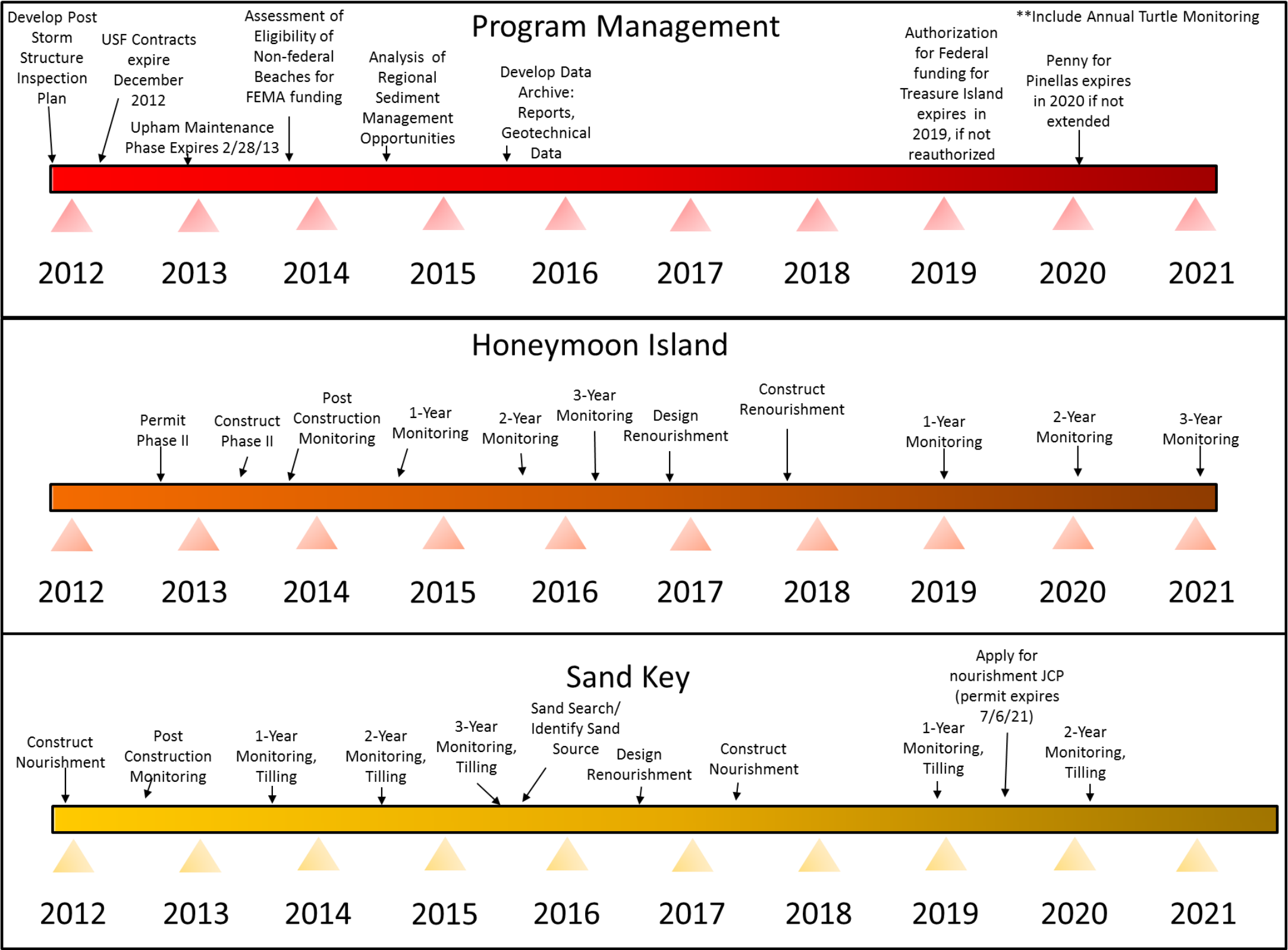


Figure 4-2. Pinellas County Coastal Management Program Planning Milestones (Treasure Island and Long Key)

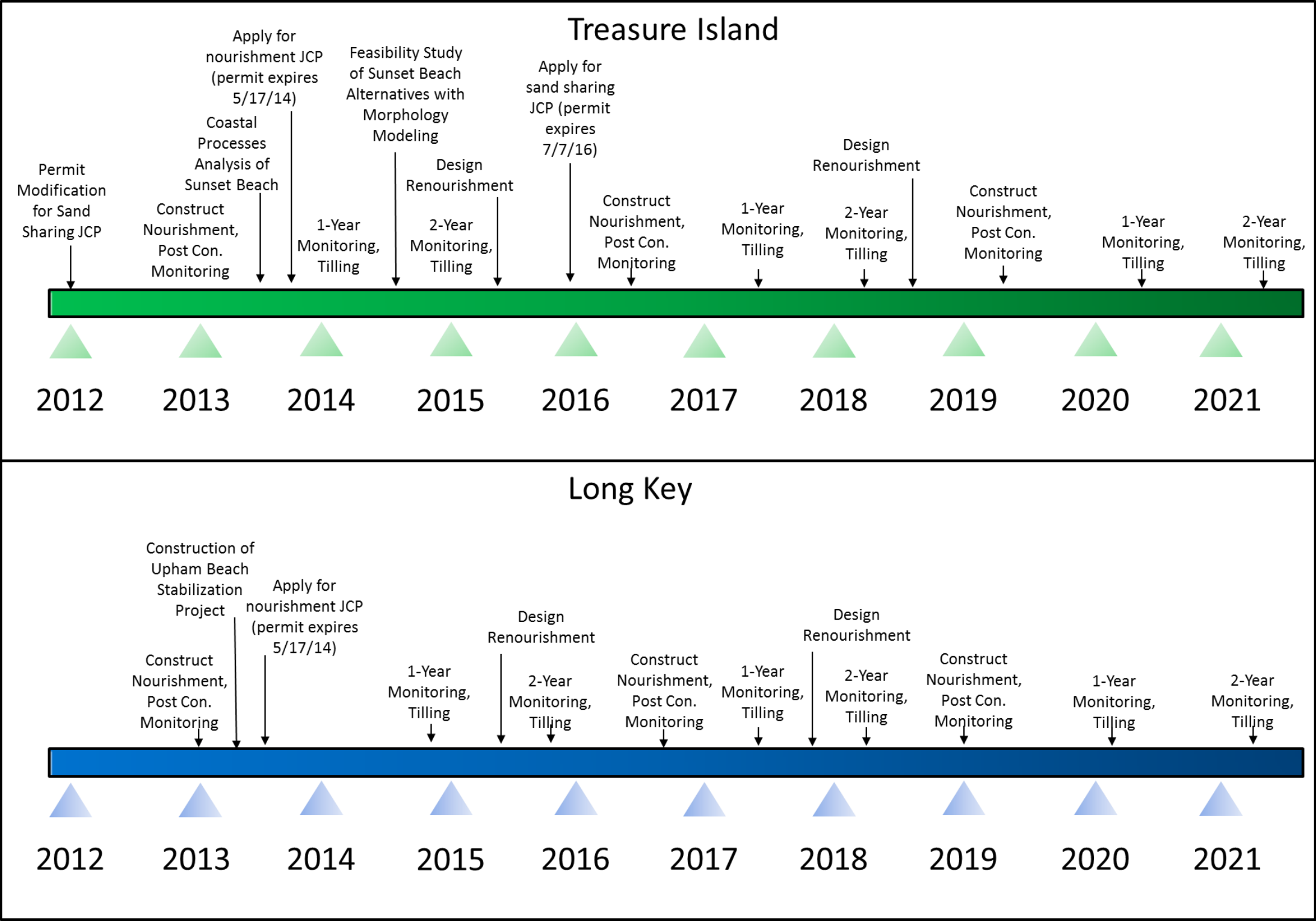
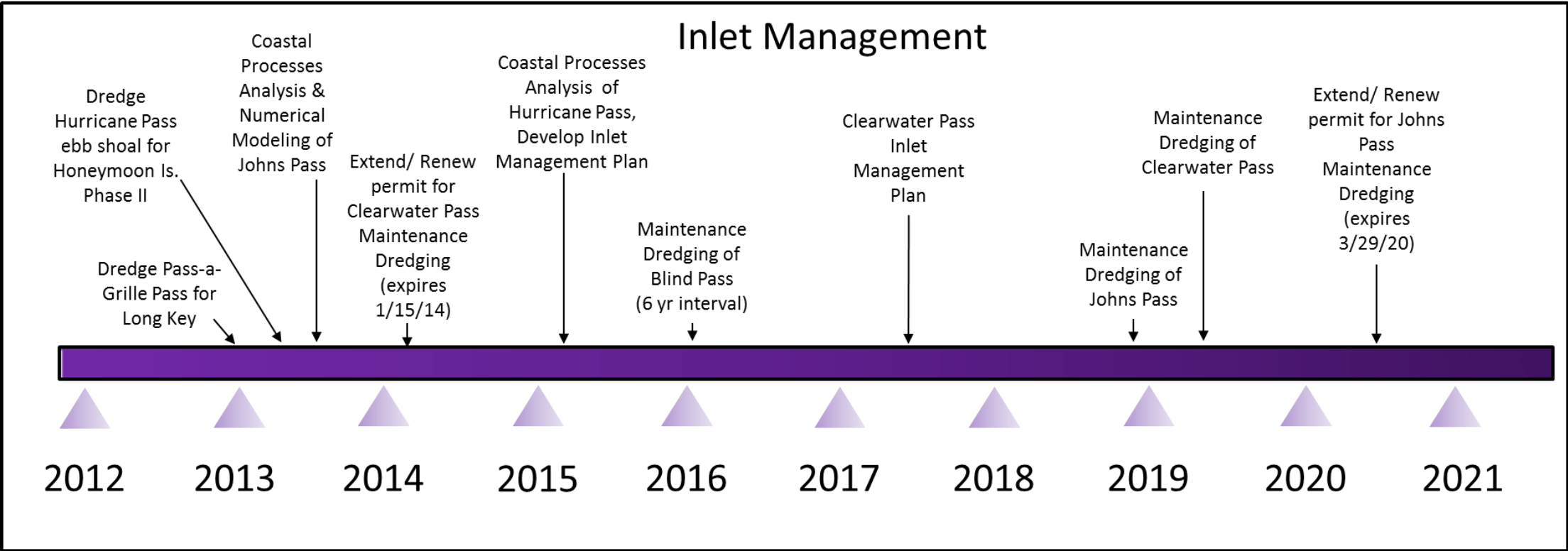




Figure 4-3. Pinellas County Coastal Management Program Planning Milestones (Inlet Management)



## **SECTION 5: DESCRIPTION OF OTHER COMMUNITIES COASTAL MANAGEMENT PLANS (3)**

The structure, responsibilities and strategies of three coastal management programs were reviewed as part of the development of this document in order to provide information and example coastal management strategies to Pinellas County for their information and consideration. The coastal management programs of Manatee County, Bay County and Collier County were included in the review (CPE, 2011b; 2011c). A summary table of the findings is provided at the end of this section (Table 5-1).

### **Manatee County**

#### **Structure and Responsibilities of the CMP**

Coastal management responsibilities in Manatee County are part of the Marine Resources program under direction of the Department of Natural Resources. The mission of the Manatee County Department of Natural Resources is to protect the area's natural resources. The Marine Resources program is responsible for beach nourishment projects on Anna Maria Island's nine miles of sandy beaches, artificial reefs and waterways, Aids to Navigation and abandoned vessel removal.

In Manatee County, the engineering, design, permitting, and coordination of beach nourishment projects, and development of artificial reefs is contracted to outside consultants (Coastal Planning and Engineering, Inc.) with oversight by the Natural Resources Department Director. Three in-house employees work on coastal management. Primarily the director and his staff handle the coastal work. The director and his primary staff oversee work of consultants and coordinate with the Board of County Commissioners. Approximately 20% of staff time (or about 1664 hours per year) is spent on coastal management issues.

The Manatee County Department of Natural Resources coordinates and maintains a positive working relationship with the stakeholders and coastal cities (City of Anna Maria, the City of Holmes Beach, City of Bradenton Beach and the Town of Longboat Key). Stakeholders involved with the CMP include the USACE, FDEP-BIP's, USFWS, NMFS, FWC, County consultants, WCIND, the Manatee County Board of County Commissioners, Turtle Time, and the Town of Longboat Key.

The engineering consultants coordinate with the regulatory agencies and Turtle Time (the company hired to monitor sea turtle and shorebird nesting) on behalf of the County and are present at County Commission meetings as needed. The County coordinates with the West Coast Inland Navigation District (WCIND) and Longboat Key on issues related to the dredging of the adjacent passes.

## **Program Elements**

The County's responsibility extends the length of Anna Maria Island from R-1 to R-41 approximately 37,300 feet. There are four public beaches along Anna Maria Island; Anna Maria Bayfront Park, Manatee County Public Beach in Holmes Beach, Bradenton Beach/Cortez Beach, and Coquina Beach.

The existing coastal management strategy consists of shore protection in the form of beach nourishment and implementation of well-designed coastal structures with ongoing monitoring programs. Beach Nourishment and coastal structures as needed for the maintenance of recreational areas, storm protection and for the protection of the natural resources (shorebirds, turtles, hardbottom and reefs). Physical and environmental monitoring are large parts of the coastal protection program in Manatee County as data is utilized for engineering design decisions.

## ***Environmental Resources***

Anna Maria Island has both natural and man-made offshore reefs, habitat for nesting shorebirds, sea turtles and both an open ocean and a bay environment. There is both naturally existing hardbottom and artificial reef along Anna Maria Island. Manatee County constructs and monitors reefs offshore of Anna Maria Island both as mitigation for the impacts of beach nourishment and as part of the County's material of opportunity program. The County has constructed recreational reefs with material of opportunity for nearly 30 years.

The three mitigative artificial reefs combined approximately 19.4 ac:

- 1993 One Mile artificial reefs – 7.3 ac
- 1993 Nearshore artificial reefs – 6.7 ac
- 2005 AR (limestone boulders) – 0.5 ac
- 2011 AR (limestone boulders) – 4.9 ac

In 2011, the County constructed a 4.87 ac limestone boulder reef near the 1993 Nearshore artificial reefs and the 2005 artificial reefs towards the southern end of the island.

Due to the low elevation of the dunes along Anna Maria Island and the wide beach widths Manatee County does not typically prioritize dune restoration. There was a dune vegetation planting project in 2004 within the City of Anna Maria 2002 Beach Nourishment Area.

## ***Inlet Management***

Passage Key Inlet is a natural, unimproved inlet at the north end of Anna Maria Island. Passage Key is not maintained; however, material from the Passage Key ebb shoal was utilized for the 2002 beach nourishment project and the 2005 hurricane damage repair fill project.

Longboat Pass is located to the south of Anna Maria Island and is a federally managed inlet. The USACE constructed the Longboat Pass Federal navigation project in 1977, which provided a 12-foot by 150-foot channel from the Gulf of Mexico to Longboat Bridge, and a 10-foot by 100-foot channel from the Longboat Bridge to deep water in Sarasota Bay. The U.S. Army Corps of Engineers maintains Longboat Pass and was the last to dredge the inlet.

Manatee County coordinates with the Town of Longboat Key on projects related to Longboat Pass. An Inlet Management Plan for Longboat Pass was developed in 1993. In 2011, Manatee County and the Town of Longboat Key coordinated in the development of an updated Inlet Management Study for Longboat Pass. The primary focus of the Inlet Management Plan was to assess the existing coastal processes of Longboat Pass and vicinity. This information will be used to improve regional sediment management in order to better conserve the sediment resources of the area and improve the efficiencies of the erosion control programs, while maintaining navigation through the pass and protecting local natural resources.

### *Borrow Areas*

The USACE defined the borrow area for the 1992/93 initial beach nourishment project. The ebb tidal shoal complex of Passage Key Inlet underwent sand search studies associated with the 2002 and the 2005/06 beach nourishment projects. There has been no need to investigate alternate sand sources. The upcoming Port Dolphin project will be a beneficial use project with the borrow area available on a one-time basis associated with the Port Dolphin pipeline construction.

The County will utilize the approximately 500,000 cy available within the Port Dolphin Pipeline Corridor for placement along portions of the north end of Anna Maria Island with construction occurring in 2013. The sediment placement on the previously unnourished north end of Anna Maria Island will help to alleviate some of the erosion pressures along that stretch of shoreline and will act as a Beneficial Use project for the sediment contained within the pipeline corridor.

### *Nourishment Interval*

Historically, the federally authorized project area has been maintained every 10 years. The upcoming nourishment project will be timed with other projects along Anna Maria Island for cost savings on project mobilization costs. Additionally, storms are a trigger point for beach nourishments on Anna Maria Island.

The April 2000 Limited Reevaluation Report for Manatee County indicates that, based upon the minimum annual cost, the optimum nourishment interval for the Central Project Area (Federal project) is 10 years. The nourishment interval for the Northern Project Area is 8 years; the Central Project Area nourishment interval is 10 years; and the Coquina Beach Project Area is 3 years; however it will be incorporated into the Central Project in 2014/2015 for cost savings.

## *Federal Projects*

The Federal Shore Protection Project for Manatee County, Florida was authorized by Public Law 89-298 dated October 27, 1965, Title II – Flood Control Act of 1965, and was amended by Section 131 of the 1976 Water Resources Development Act. Resolutions approving the project under the provisions of Section 201 of Public Law 89-298 were adopted by the Senate Public Works Committee on November 20, 1975. The Chief of Engineers authorized the shore protection project for Manatee County on December 19, 1975.

The entire island (R-1 to R-41) was initially congressionally authorized, but the entire shore protection project was not constructed as a Federal project. Other components have been constructed locally. The end date of the Federal Authorization is 2043. The Federal project R-12 to R-36 has been constructed twice (1992/93 and 2002) with one hurricane repair (2005/2006). FEMA funded a portion of the 2011 nourishment. The third Federal nourishment is planned for 2014/2015.

Manatee County assumed control of the Federal project under the provisions of the 1992 Water Resources Development Act (WRDA) which provided for local government project control and Federal cost-sharing on a reimbursable basis. As the non-Federal sponsor, Manatee County proceeded under the authority of Section 206 of the Water Resources Development Act of 1992, Public Law 102-580, with the first periodic beach nourishment project. Section 206 allows a local sponsor, Manatee County in this case, to engineer and construct the beach nourishment project and then receive reimbursement for the Federal share of the project costs. For the 2002 project, USACE reviewed the County's engineering products, issued a permit for the project and participated in project cost-sharing.

### Summarized Federal Project Descriptions

- 1992/93 initial shore protection project
  - 2.32 million cubic yards,
  - 4.6-mile project,
  - R-12 and R-36,
  - December 1992 to February 1993,
  - The design berm width was 75 feet on average with an advanced fill of 85 feet. The borrow area was located approximately 1,300 feet offshore of the project area, seaward of FDEP monuments R-24 to R-36. The 1992 beach nourishment project was constructed under the direct supervision of the U.S. Army Corps of Engineers (USACE).
- 2002 first beach nourishment project
  - 1.9 million cubic yards,
  - 5.2-mile project,
  - R-12 and R-36 and the City of Anna Maria segment R-7 and R-10 (State and local government funded),
  - March and May, 2002



- 2005/2006 minor hurricane damage repair fill project
  - 213,000 cubic yards added within the Federal project area to replace sediment lost due to 2004 hurricane activity,
  - R-12 and R-27+954
- 2011 Coquina Beach and City of Anna Maria Segments
  - 24,700 cy City of Anna Maria between R-7 and R-10 (FEMA Funded),
  - 204,800 cy on Coquina Beach between R-35+790 to R-41+305, which includes a 600-foot gap between R-37+250 and R-38. The fill placement in the gap was limited to landward of MHW,
  - April 14, 2011 to April 16, 2011

## **Funding**

### ***Local Funding***

Federal, state and local sources provide the primary funding for the coastal projects. The local sponsor, Manatee County, provides support through the use of funds dedicated to beach nourishment provided by a one cent sales tax administered by the Tourist Development Council (TDC). The one cent sales tax is to be used solely for beach preservation and maintenance of the Gulf of Mexico beaches of Manatee County. Additionally, the County has adopted a Capital Improvement Program, which appropriates the funding necessary to cost share the Anna Maria Island Beach Renourishment Program with the State.

The Cities of Anna Maria Island (Anna Maria, Holmes Beach and Bradenton Beach) have also adopted an annual operating budget to fund the Cities' on-going maintenance of the beach and park systems (outside of nourishment costs). The Town of Longboat Key shared in the cost of the Longboat Pass Inlet Management Plan.

### ***State and Federal Funding***

State and Federal cost sharing are required to continue the program at this time. The FDEP-BIP's has previously assisted in funding the 1992/1993 Anna Maria Island Beach Nourishment Project and the 2002 Anna Maria Island Beach Renourishment Project. The Longboat Pass Inlet Management Plan, the construction of the Cortez groins and the geotextile tube place and subsequent reconstruction at the south end jetty are all shared 50/50 between the state and local governments.

Four nourishment projects have been federally funded in Manatee County. The Federal project R-12 to R-36 has been constructed twice (1992/93 and 2002) with one hurricane repair (2005/2006). In addition, FEMA funded a portion of the 2011 nourishment. The 2014/2015 islandwide nourishment will be a federally project.

Cost Share percentages:

- North Project Area (R-7 to R-10): 50% state cost share; 50% local cost share. The north project area was nourished in 2002
- Central Project Area (R-12 to R-36): 56.4% Federal cost share; 21.8% state cost share; 21.8% local cost share.
- Coquina Beach Project Area: 50% state cost share; 50% local cost share

### *Other Funding*

The Port Dolphin project is a beneficial use project. This project will be funded through the Port Dolphin escrow account (funded by Port Dolphin LLC).

### *Upcoming Projects*

#### *Structures*

In 2012, the County placed a geotextile tube along the island's southern jetty to sand tighten the structure. Additionally, a permanent structural solution was being considered for the south jetty, as part of the inlet management study. It is anticipated that repair and/or replacement of the existing rock jetty at the south end of Anna Maria Island will occur in 2014/2015.

The three existing, deteriorated groins, located between R-34 and R-36 at Cortez Beach are proposed to be removed and replaced with three permeable adjustable groins. The replacement groins will continue to protect Gulf Drive. A feasibility study for the replacement of these groins has been approved and was under development in 2012/2013.

As part of the 2011 beach restoration project, CPE designed a 4.9-acre artificial reef approximately 1,100 feet off the coast of Coquina Beach. The reef consists of 13,500 limestone boulders, each weighing an average of 2.5 tons. The reef was designed to mitigate impacts to nearshore habitat, which may become covered by sand as waves readjust the constructed beach into the natural varying shape of its profile. It is also a part of Manatee County's artificial reef program, developed to increase and enhance recreational fishing and diving in addition to creating and restoring marine habitats.

#### *Nourishment*

In 2013, material dredged from the pathway of the Port Dolphin Pipeline will be placed on Manatee County beaches (funding from Port Dolphin LLC). An island-wide nourishment is scheduled to be constructed in 2014/2015 (Federal funding).

#### *Public Opinion*

Beach nourishment and coastal protection receive wide public support. Residents of Anna Maria Island are particularly supportive. The three Cortez groin structures are popular with surfers.

### *Future of the Program*

Coastal protection within Manatee County is a large and complex program with many features and multiple funding sources. Manatee County relies heavily on their coastal engineering consultant (CPE) to manage their coastal program. Manatee County has seen the benefits of creating well maintained beaches with scheduled nourishment. The Manatee County Natural Resources Department is of the opinion that the present shoreline management strategy is functioning well and they intend to maintain a similar program management strategy into the future.

### **Bay County**

#### **Structure and Responsibilities of the CMP**

The Bay County Tourist Development Council (TDC), a semi-independent County department, maintains the recreational beaches of Panama City to support the local economy and provide storm protection. The TDC is comprised of nine members appointed by the Bay County Board of County Commissioners. The members include tourist development tax collectors, representatives of tourist-related businesses and elected officials. The primary responsibility of the TDC is to manage marketing and promotional activities with the Panama City Beach Convention & Visitors Bureau. The TDC has hired a consultant to manage the beach program.

The beach management program is managed by one consultant, who was formerly an employee of the County. The TDC and County staff provide in house support to the consultant. The consultant and staff manage the beach nourishment projects, monitoring and beach cleaning programs and provide design and permitting-related services. In addition, the consultant is responsible for coordinating with stakeholders on behalf of the County. The stakeholders include the USACE, FDEP-BIP's, other consultants and the City of Panama City Beach. The consultant spends 100% of their time on coastal management related issues on an as needed basis.

#### **Program Elements**

The Bay County coastline extends 17.5 miles along the Gulf of Mexico. The County includes two state parks, five inlets, a federally authorized shore protection project, and a Federal navigation project. The strategy of the beach management program is to maintain active permits and have sufficient sand sources available to restore the beach at regular intervals and in response to emergencies.

### *Environmental Resources*

The county is known for its wide white sand beaches. There is no artificial reef program. Dune restoration is not prioritized by the county due the difficulty in obtaining easements and the associated costs. However, a dune restoration project was funded by the County and the State in 1999.

### *Inlet Management*

St. Andrews Inlet, a man made inlet, is federally maintained and provides access to the Port of Panama City. The inlet was cut and stabilized with jetties in 1934. Maintenance dredging occurs every 1.5 to 2 years. Dredge spoils have been disposed of offshore and along the interior shoreline of the inlet.

The interior shoreline of the inlet has continuously eroded since the construction of the inlet. The erosion threatens environmental resources in St. Andrews State Park, which lines both sides of the inlet. In response to the erosion, the USACE deposited dredge spoils on the interior shorelines. An Inlet Management Plan was developed in 2004. The plan recommended bypassing, placing spoils along the adjacent beaches and the construction of four segmented breakwaters along the interior shoreline.

Bay County has four other inlets besides St. Andrews Pass. Two of the inlets are ephemeral. The County, in cooperation with the Florida Park Service, has periodically reopened the ephemeral channels or cut an adjacent channel. The Town of Mexico Beach maintains its own channel for small watercraft navigation. The fourth inlet is naturally widening and is not maintained.

### *Borrow Areas*

Since 1997, the TDC has continuously searched for sand sources. The Federal Panama City Beaches Shore Protection Project utilizes sand obtained from multiple offshore borrow areas. Several of these shore parallel borrow areas are within a few miles from shore. Additionally, the St. Andrews Inlet ebb shoal was suggested as a potential sand source by the Inlet Management Plan.

### *Nourishment Interval*

The planned nourishment interval for Panama City Beaches is 6 years; however, construction schedules have deviated in the past. The schedule has accelerated or been delayed depending on Federal funding availability and the existing conditions relative to the beach width standard. Emergency restorations have also occurred after hurricanes in between regularly scheduled nourishments.

### *Federal Projects*

The Panama City Beaches Federal Shore Protection Project was initially federally authorized under the Water Resources Development Act of 1986. The Bay County TDC, on behalf of the County, assumed control of the Federal project under Section 206 of the Water Resources Development Act of 1992, Public Law 102-580. The authority of Section 206 provides for local government project control and Federal cost-sharing on a reimbursable basis. The local sponsor, the Bay County TDC is authorized to engineer and construct the beach nourishment project and then receive reimbursement for the Federal share of the project costs.

The Panama City Beaches Federal Shore Protection Project has been constructed twice (1999 and 2005) with two hurricane repairs (1995 and 1999). The third nourishment was completed 2011. The initial restoration (1999) placed approximately 8.3 million cubic yards of sand along 16.3 miles of shoreline to build a berm 30 to 50 feet wide at elevation 6.6 feet NAVD. The second nourishment (2005) placed approximately 3.3 million cubic yards. The third nourishment (2011) placed approximately 1.2 million cubic yards in selected sections of the authorized project area, including a new reach added to the Federal project in 2009.

The Federal shore protection project area does not contain structures or inlets. Additionally, the project area is not immediately adjacent to any inlets. However, at one end of the project area, near the Federal navigation project, there is a moderate inlet effect which is mitigated by increased Federal cost sharing.

The St. Andrews Inlet Federal Navigation Project has included periodic maintenance dredging and the construction of structures on both sides of the inlet. Maintenance dredging occurs every 1.5 to 2 years with spoils deposited on the shorelines of the adjacent St. Andrews State Park.

## **Funding**

### ***State and Federal Funding***

The cost of the 2005 Federal nourishment project was \$9.8 million and was entirely federally funded. The TDC and their consultants secured Federal Flood Control and Coastal Emergencies funds for the project to replace sands lost during the 2005 storms. This funding opportunity was available because the project was previously constructed and federally authorized.

Previous projects received funding from the USACE, FEMA, the FDEP-BIP's and the Bay County TDC. The USACE funds the Federal navigation project in St. Andrews Inlet, including maintenance of the jetties. Additionally, the Federal government funds its share of the Panama City Beaches Shore Protection Project. FEMA has funded emergency restoration projects.

### ***Local Funding***

The local source of funding for beach nourishment projects is a 5% bed tax collected from a special taxing district within the county. The Board of County Commissioners of Bay County levied the tourist development tax under the authority of the Florida Local Option Tourist Development Tax, Florida Statute 125.0104. The tourist development tax is locally administered by the Clerk of Circuit Court. The Tourist Development Council manages the programs funded by the tax. Of the 5% tax, 3% is used for the promotion of Panama City Beaches, beach cleaning, maintenance and improvements. A separate taxing district funds nourishment projects in Mexico Beach. Funds from the tourist development tax have been enough to fund nourishment projects and generate reserves.



## **Recent and Upcoming Projects**

In 2010, Bay County completed an emergency closing of Philips Inlet in response to the Deepwater Horizon oil spill. Upcoming projects include potential storm recovery nourishments and the initial construction of a new reach within the county. The next planned nourishment is scheduled for 2014/2015.

## ***Public Opinion***

The public is supportive of wide white sandy beaches. The public is in favor of financing beach projects under the 2011 TDC program. Structures are not needed; therefore, the public has not been polled on the issue.

## ***Future of the Program***

Bay County would prefer to continue to receive funding from the USACE and the State. However, the TDC has built up reserves to be able to fund projects on its own, at a lower level of service, possibly meaning smaller or more infrequent projects. In an effort to prepare for future projects, the TDC submitted a ten-year multi-use joint coastal permit application in 2011.

## **Collier County**

### **Structure and Responsibilities of the CMP**

The Coastal Zone Management (CZM) Department, a department under the Public Services Division, manages the coastal programs for Collier County. With a staff of six employees, the Department's Staff Director administers contracts, conducts construction and maintenance inspections, and performs environmental monitoring. The staff also manages contracts with consultants hired for engineering, permitting, monitoring and construction services. The majority of the staff's time is spent on coastal management related issues.

The Coastal Zone Management Department implements the County's objectives after coordination with several stakeholders. The Board of County Commissioners (BCC), a panel of five elected officials, is responsible for the legislation necessary for the CZM to provide services to Collier County. The BCC is advised by the Coastal Advisory Committee, a nine member appointed committee. The Committee advises the Commission on project priorities and funding availability. In addition, the CZM coordinates with the municipalities of the City of Naples and the City of Marco Island.

## **Program Elements**

The Coastal Zone Management Department is responsible for preserving and protecting Collier County's coastal ecosystem while providing access and complementary facilities. The elements of the program include:

- Artificial Reef Deployments, Inspection and Management

- Beach Maintenance and Management
- Beach Park Facilities
- Channel Marker Maintenance and Management
- Derelict Vessel Removal
- Estuary Management
- Inlet Maintenance and Management

### *Environmental Resources*

Environmental resources found in Collier County include vegetated dunes, nearshore hardbottom, parks and others resources common to south Florida. The restoration of dune vegetation is the primary dune preservation strategy employed by the County. Mitigation of impacted nearshore hardbottom began with the construction of 1.1 acres of artificial reef as part of the first nourishment in 2006. Additionally, the County preserves several natural coastal areas adjacent to public access areas.

### *Inlet Management*

The CZM maintains four of the six inlets within Collier County. The USACE maintains one of the other two inlets. Four of the inlets have Inlet Management Plans. The Inlet Management Plans help in obtaining permits for navigation projects. In 2000, Wiggins Pass, a rapidly infilling channel, was widened and deepened providing dredge spoils to nourish the adjacent state parks. Clam Pass, a tidal inlet, is periodically dredged to improve the hydrology of the inland waters. Fine dredged material is disposed of upland. Doctors Pass, a structurally stabilized inlet, is dredged every four years to meet minimum bypassing goals. Gordon Pass, a Federal navigation project, is maintained by the USACE. The inlet is armored and is dredged every seven years. The other inlets are natural or maintained in collaboration with the adjacent municipalities.

### *Borrow Areas*

Collier County has a large but distant offshore borrow area. The offshore source is a product of the sand search investigations conducted prior to the 1999 and 2005 nourishments. Inlet bypassing has provided sand for smaller nourishments of the inlet adjacent beaches. Upland borrow areas have been used for interim nourishments of non-Federal projects.

### *Nourishment Interval*

Nourishments are planned at regular intervals, but proceed to construction based on trigger points. The 2005 nourishment was designed for a six-year interval. The nourishment interval was driven by the need to avoid impacting nearshore hardbottom and the reluctance of the regulators to approve additional fill. The County plans to transition to a 10-year interval with the next nourishment by altering design parameters.

### *Federal Projects*

Collier County does not yet have a Federal shore protection project but has been pursuing one over the past several years. The County received authorization for a feasibility study of its first beach restoration project under the 2007 Water Resource and Development Act. The County has requested \$100,000 from the Federal government to fund engineering studies and permitting in 2012.

In addition, Collier County has one federally authorized and maintained navigation project, at Gordon Pass. The project was initially constructed in 1962. Groins and armoring structures have been constructed on the north and south sides of the inlet. Maintenance dredging has occurred seven times, at approximately a seven-year interval.

### **Funding**

#### *Local Funding*

Beach nourishment programs in Collier County are funded in part by tourist development taxes. The County levies a four percent (4%) tourist development tax on all rental income rented for less than 6 months (Ordinance 2005-43). Approximately two thirds of two percent (2%) is allocated to fund beach improvement, nourishment, restoration and inlet management. One third of two percent (2%) is allocated for beach park facilities. The remaining tax is allocated to tourism promotion and museums.

Additionally, Collier County collects funds from parking permits, meter collections and parking tickets. Collier County sells a \$50 annual parking permit to nonresidents and visitors. Alternatively, visitors can pay the daily parking fee at the beach parks. Residents pay for the parking permit through property taxes. The County issues approximately 84,000 parking permits including residents and visitors.

The remaining funds required are sourced from property tax revenue or contributions by local municipalities. Collier County property tax revenue provides \$500,000 per year for the County's beach fund, part of a \$1 million annual contribution for parks and recreation services. Private beaches are funded by local municipalities.

#### *State and Federal Funding*

FDEP-BIP's has provided funding to Collier County for feasibility studies, design, construction and monitoring. Projects partially funded by the State include Wiggins Pass Inlet Management Plan study, the Collier County Beach Renourishment and the Marco Island Beach Nourishment. Collier County has requested \$15 million from FDEP-BIP's for projects in FY 12/13 through FY 16/17.

Collier County requested and received Federal funding for beach nourishment through FEMA in 2011. Collier County has requested \$7.6 million from FEMA for beach nourishment projects

through FY 13/14. Other than emergency funding, Collier County is not yet receiving funds from the Federal government.

### **Recent and Upcoming Projects**

Collier County has an active nourishment and inlet management program. Collier County nourished two hotspots with truck hauled sand in 2011. Maintenance dredging of Wiggins Pass occurred in 2011. In 2012, CPE conducted an inlet management study for Wiggins Pass and recommended straightening the channel, restoring an ebb shoal and restoring an eroded shoreline. In addition, the CPE is developing conceptual design report for the 2013/2014 nourishment, which includes a larger wider beach.

### ***Public Opinion***

Overall, the public values the storm protection added from beach nourishments. However, there are environmental non-governmental organizations that would prefer less interference with natural areas. Some discord exists over the allocation of funds by the Tourist Development Council, but it does not overshadow the program. The public prefers light colored sand and is generally not adverse to structures.

### ***Future of the Program***

The Coastal Zone Management Department will continue to optimize inlet maintenance, sand bypassing and beach maintenance. Securing funding for future projects will continue to be a major issue for the County and they are taking various cost saving steps that include pursuing Federal funding and altering beach designs.

Coastal Management Program	Shoreline Length (miles)	Program Elements	Annual Staff Time (hours)		Funding Sources	Local Cost Share (%)	TDC Tax	No. of Nourish-ments	Nourish- ment Interval (years)	Year of Initial Federal SPP	Relationship with Consultants
<b>Manatee County Marine Resources Program</b>	7	Five County parks, Federal SPP, two inlets, one Federal Navigation Project	1664 employees)	(3	TDC, Captial Improvement Program, State, Federal, Municipalities	21.8 to 50	One cent sales tax	4	North: 8, Central: 10, South: 10 (previously 3)	1992	Consultant responsible for engineering, design, permitting, coordination of projects and development of artificial reefs
<b>Bay County Tourist Development Council</b>	17.5	Two state parks, five inlets, Federal SPP, Federal Navigation Project	2080 consultant)	(1	TDC, Federal, State	0 to 25	5% bed tax (3% to CMP)	3	6	1999	Consultant manages beach program with support from County staff. Responsibilities include design, permitting and project coordination, monitoring and beach cleaning programs, and coordinating with stakeholders on behalf of the County.
<b>Collier County Coastal Zone Management Department</b>	28	Four County parks, six inlets, two Federal Navigation Projects	12480 (6 employees)		TDC, local municipalities, property taxes	50 to 100	4% bed tax (1.3% to CMP), \$50 annual parking permit	3	6 (10 in future)	TBD	Consultant hired for engineering, permitting, monitoring and construction services.
<b>Pinellas County Environmental Management (Coastal Division)</b>	35	Three County parks, two state parks, seven inlets, three Federal Navigation Projects, Federal SPP	2080 employee)	(1	TDC, sales tax, parking, municipal, Federal, State	38.6 to 50	5% bed tax (1/2 of 1% to CIP),	25+	Sand Key: 7 years; Treasure Is./ Long Key: 3 years	1954; 1966 (partially built in 1969)	Consultants hired for engineering, permitting, monitoring and construction services.



## **SECTION 6: MANAGEMENT OPTIONS FOR PINELLAS COUNTY**

As the Pinellas County CMP evolves, successful and proven management strategies should continue to be implemented. In Section 5, the elements, objectives and strategies of three coastal communities were discussed. Based on an analysis of the management styles of these communities and Pinellas County, there are currently three general options for managing coastal resources in implementation. These options are presented in this section for reference. The County may find one option fits the needs of the community better than another depending on the economic, social and environmental conditions at the time.

### **Option 1: Coordination & Cooperation**

#### **Overview**

The Coordination and Cooperation management option is similar to Pinellas County's existing coastal management program. The approach entails relying on external agencies and consultants to perform monitoring and design, permit and construct coastal management program projects. The program administrator coordinates with stakeholders and facilitates the local sponsorship necessary for state and federal projects. Federal shore protection projects and Federal navigation channel maintenance projects are administered by the Jacksonville District of the United States Army Corps of Engineers (USACE). Non-federal elements of the program should be administered by the State if possible. The management of the remaining elements can be outsourced to consultants, under the direction of the County's program administrator.

#### **Project Planning**

With this approach, less planning effort is required by the local sponsor with respect to design and decision making. The USACE is responsible for evaluating nourishment design alternatives and providing a recommendation to Congress. Congress authorizes and appropriates the funding for studies and construction. The need for congressional authorization and appropriations in advance of a project requires federal projects to be extensively planned. Adjustment to project design is minimal. Coordination between agencies and stakeholders, as well as strong Congressional support, is critical to making this approach functional.

#### **Requirements**

The management approach requires a coordinator that is fully informed on the details of all cooperation agreements, funding resources and stakeholder interests. Funding resources include Federal and state appropriations, Tourist Development taxes, contributions from the local municipalities, the Capital Improvement Program, public access to beaches and beach parking fees.

## Advantages and Disadvantages

The advantage of the Coordination and Cooperation is the limited work and funding required by the County. Disadvantages of this approach include its lack of control over federal project design and schedule and the need for strong political and Congressional support. The process of authorization and appropriation of funds can take multiple years and result in construction schedule delays.

## Option 2: Autonomous Management

### Overview

The Autonomous Management approach relies on in-house expertise for program management and coordinates with stakeholders to construct projects with federal and state reimbursements. The CMP would administer contracts, coordinate with regulatory agencies to obtain permits and funding, conduct construction and maintenance inspections, and perform environmental monitoring. The CMP may or may not contract with consultants for engineering and additional construction services. The County may setup an advisory panel to direct the project priorities and manage funding resources.

Under Section 206 of WRDA 1992, the County can assume responsibility for the preparation of all preliminary project documentation with USACE review and approval. If appropriated by Congress, the County can receive federal reimbursement for construction costs. Similarly, the State can approve and reimburse eligible project costs. While the County continues to benefit from Federal and State funding, under this approach, the CMP has more control over the design and schedule.

### Project Planning

The Autonomous approach allows adaptive planning. Prior to the construction of each project, the design can be modified by the County based on existing conditions and stakeholders interests. The design would be continuously altered with each project based on feedback from the previous project. Under Section 206, the County can construct projects on their own schedule and plan for reimbursement. Reimbursements are dependent on the successful negotiation and execution of a Federal Cost Sharing Agreement (FCSA) and a Project Cooperation Agreement (PCA) and the availability of congressional appropriations to fund the reimbursements.

### Requirements

The Autonomous approach requires an in-house staff of experts capable of completing tasks typically delegated to a consultant i.e. monitoring, engineering and administration. In order to fund all costs up front, the CMP will need substantial continuous funding sources. Funding resources would include Tourist Development taxes, property taxes, beach parking fees, local municipality contributions and federal and state reimbursement.

## **Advantages and Disadvantages**

The advantage of the autonomous approach is the control over project design, schedule, and implementation. The disadvantage is the need to compete for federal reimbursement. Federal reimbursement is limited on reimbursable projects to \$50 million annually (nationwide) with no project receiving more than \$10 million in any given year. Reimbursement may occur over several appropriations (a portion of the requested funds are received with each appropriation).

## **Option 3: Consultant Management**

### **Overview**

The Consultant Management option is similar to Bay County's existing coastal management program. The approach entails relying on consultants to perform all services required to run the coastal management program including coordinating with stakeholders and facilitating the local sponsorship necessary for state and federal projects. The hired consultants report directly to the BCC or a CMP advisory board. This option could be implemented for either a Section 206 reimbursable project or a standard USACE administered project.

### **Project Planning**

With this approach, planning efforts are coordinated by consultants with direction from County advisors. The approach takes advantage of private sector managers and coastal experts having the best knowledge about regulatory issues and the engineering required to address coastal issues.

### **Requirements**

This approach likely requires the least amount of staff due to its reliance on consultants. The consultants will be responsible for coordinating projects with federal and state agencies when funding is available and adapting the project design and schedule when funding is not available.

## **Advantages and Disadvantages**

The advantage of hiring consultants to manage the program is the relief of the County's workload, the access to coastal experts and the continuity provided by allowing one expert source to coordinate projects and tasks. The disadvantage may be the consultant's fees and the dependence of the CMP on the consultant.

## **SECTION 7: FINAL RECOMMENDATION**

CPE recommends that Pinellas County pursue a hybrid management strategy that incorporates coordination and cooperation with Federal and State agencies and the flexibility to transition to a more financially self-reliant program aided by consultants and in house staff. This recommendation is based on the existing conditions at this time, including:

- The unpredictability of federal appropriations,
- The unknown outcome of reauthorizations for expiring Federal projects,
- The need for the flexibility to align construction schedules, conducting maintenance dredging and nourishment projects simultaneously, when possible,
- The opportunity to control project schedule under Section 206.

The County needs to explore ways to be prepared to take over management and maintenance of any federal projects when federal funds are not available. Steps towards developing a new strategy include the following:

- The County needs to enter into a formal agreement with the USACE for in-kind services so that the county can expend their cost-matching funds on specific project-related tasks under the direct control of the County. This will allow the County to assume some control over important components of the overall project without impacting their cost-sharing equations.
- The County should consider pursuing a Section 206 federally reimbursable project, giving the County the authority to construct federal projects based on the County's design standards and schedules independent of USACE project appropriations.
- The County needs to develop a management mechanism to regularly maintain non-federal priority dredging projects when funding is not available. Examples of how this may be accomplished include using local government/ TDC funds for an emergency dredging project (similar to Bay County or Collier County) or developing multiple self-taxing erosion control districts capable of funding special projects (similar to the Town of Longboat Key).
- The County should maintain their relationship with the USACE since having federally authorized projects is critical for obtaining a good ranking for state funding.

The County needs to optimize design and project construction by implementing hotspot management to both increase renourishment intervals while decreasing the volume of sand resources needed to maintain the County's beaches. The success of the structures at Upham Beach is an example of using engineering and hotspot management to achieve these goals. The

County should also prioritize emergency response planning by maintaining design and monitoring records to maintain eligibility for emergency funding. By addressing hot spots, maintaining funding eligibility and planning for times when federal and state funds are not available, the CMP will evolve into a manageable and sustainable program.



## SECTION 8: REFERENCES

- Ayers, W. 2012. "Nourishment rules called an attack." *Belleair Bee*. June 6, 2012
- Barnard, P.L. 1998. Historical Morphodynamics of Inlet Channels: West-central Florida, unpubl. Master's thesis, University of S. Florida, Tampa, 179 p.
- Beach Management Plan Committee. 2004. Beach Management Plan: Final Report to the City Commission, Indian Rocks Beach. February 19, 2004. 51 p.
- Bridges, P. 1974. "Private beaches may be against the law." *St. Petersburg Independent*. August 6, 1974. p. 3A.
- Capital Improvement Program Budget. 2012. 2013 Pinellas County Capital Improvement Program Project Budget Detail Report. Released October 18, 2012.
- City of Treasure Island Stewardship Committee. 2010. Meeting Minutes from March 10, 2010.
- Coastal Planning & Engineering, Inc. 1992. Blind Pass Inlet Management Plan. Submitted to Board of County Commissioners, Pinellas County, Florida.
- Coastal Planning & Engineering, Inc. 2010a. Aerial photographs of Pinellas County taken in response to Deepwater Horizon spill. May 2010.
- Coastal Planning & Engineering, Inc. 2010b. Upham Beach Stabilization Project: Structural Alternatives Development and Analysis Report. Prepared for Pinellas County. Boca Raton, Florida.
- Coastal Planning & Engineering, Inc. 2011. Project Completion Report, Geotextile T-head Groin Repair at Upham Beach. Prepared for Pinellas County in compliance with FDEP Permit No. 0221569-008-JM.
- Coastal Planning & Engineering, Inc. 2011. Personal Interview with Steve Keehn, Project Manager and Consultant for Bay County and Collier County Coastal Management Projects. Boca Raton, Florida.
- Coastal Planning & Engineering, Inc. 2011. Personal Interview with Manatee County: Project Managers and Consultants for Manatee County. Boca Raton, Florida.
- Coastal Technology Corporation. 1993. John's Pass Inlet Management Plan. Prepared for Pinellas County, Florida. Capital Improvement No. 921628.

- Craft, J., and Kruempel, C. 2007. Sand Key Beach Renourishment Project: Biological Monitoring Report. Boca Raton, Florida. Coastal Planning & Engineering, Inc. 31 p. (Prepared for Pinellas County).
- Davis, R.A. Jr., Andronaco, M. 1987. Impact of Hurricanes on Pinellas County, Florida, 1985. Florida Sea Grant College Publication. Technical Paper No. 51.
- Davis, R.A. Jr., Wang, P., Silverman, B. 2000. Comparison of the Performance of Three Adjacent and Differently Constructed Beach Nourishment Projects on the Gulf Peninsula of Florida. 16(2)396-407.
- Davis, R.A. Jr., Elko, N. 2003. Geology and Morphodynamics of Caladesi and Honeymoon Islands, Florida. Field Trip Guidebook for Coastal Sediments 2003.
- Davis, R.A. Jr., Fitzgerald, D.M. 2004. Beaches and Coasts. Blackwell Publishing Company. Victoria, Australia. pp. 162.
- Dial Cordy and Associates. 2002. Pinellas County Shore Protection Project Comprehensive Borrow Area Study Borrow Area Resource Identification and Impact Assessment. Jacksonville Beach, Florida: Dial Cordy and Associates Inc. 35p (Prepared for U.S. Army Corps of Engineers).
- Dial Cordy and Associates. 2002. Alternative Sand Source Utilization for the Pinellas County Beach Erosion Control Project. Final Environmental Assessment. Prepared for USACE, Jacksonville District.
- Dunn, G. Miller, B. 1964. Atlantic Hurricanes, 2nd Edition. Louisiana University Press. Library of Congress Catalogue Number: 64-21598.
- EDR (Office of Economic & Demographic Research). 2011. Documentary Stamp Tax Collections and Distributions Post-session 2011. March 18, 2011. [http://edr.state.fl.us/content/conferences/docstamp/archives/110701docstamp\\_post-session.pdf](http://edr.state.fl.us/content/conferences/docstamp/archives/110701docstamp_post-session.pdf)
- Elko, N. 2001. Morphodynamics of Caladesi Island, Pinellas County, Florida. U.S. Geologic Survey, Center for Coastal Geology, St. Petersburg, FL, 18 p.
- Elko, N., Bortnick, B. Davis, R. 2001. Beach Performance of Long Key, Pinellas County, FL. Pinellas County Board of County Commissioners. Coastal Research Laboratory, Department of Geology, University of South Florida.
- Elko, N., Davis, Jr., R.A. 2006. Morphologic Evolution of Similar Barrier Islands with Different Coastal Management. Journal of Coastal Research, Special Issue 39. P. 127-131.

- Elko, N. 2006a. Joint Coastal Permit Application, Pass-A-Grille Beach Nourishment Project, Permit No. 0265575-001-JC.
- Elko, N. 2006b. Storm-influenced sediment transport gradients on a nourished beach. Tampa, Florida: University of South Florida, Ph.D. dissertation, 194p.
- Elko, N. 2007. Request for Additional Information #2. Joint Coastal Permit Application, Pass-A-Grille Beach Nourishment Project, Permit No. 0265575-001-JC.
- Estrada, S. M. 2011. "Belleair Beach to discuss options for getting beach renourishment funds." Tampa Bay Times. September 21, 2011.
- Evans, A., Davis, Jr., R.A., Belknap, D. 1987. Depositional response to seagrass mortality along a low-energy barrier-island coast: west-central Florida. *Journal of Sedimentary Petrology*. 57(3) p. 431-439.
- Featherstone, C., Proni, J., Carsey, T., Brown, C., Adler, M., Blackwelder, P., Alsayegh, H., Hood, T., Piela, C., McCorquodale, D. 2009. Spatial distribution of petroleum hydrocarbons in sediment cores from Blind Pass, St. Pete Beach, Florida. Atlantic Oceanographic and Meteorological Laboratory. Miami, Florida. NOAA Technical Memorandum, OAR AOML-97.
- FEMA. 2009. Disaster Assistance Fact Sheet DAP9580.8, Eligible Sand Replacement on Public Beaches. U.S. Department of Homeland Security. Washington, DC.
- Finkl, C.W.; Benedet, L.; Andrews, J.L.; Suthard, B.C., and Locker, S.D., 2007. Sediment ridges on the west Florida inner continental shelf: Sand resources for beach nourishment. *Journal of Coastal Research*, 23(1), 143-158.
- Florida Department of Environmental Protection 1999. Honeymoon Island State Park Unit Management Plan. Division of Recreation and Parks. Approved October 21, 1999.
- Florida Department of Environmental Protection. 2002a Pinellas County Island Management Plan. Office of Coastal and Aquatic Managed Areas, Tampa Bay Aquatic and Buffer Preserves Program, Terra Ceia, Florida.
- Florida Department of Environmental Protection. 2002. Consolidated Joint Coastal Permit and Intent to Grant Sovereign Submerged Lands Authorization, Permit No. 0184778-001-JC, Clearwater Pass Maintenance Dredging Project. Date of Issue: January 15, 2002.
- Florida Department of Environmental Protection. 2006. Consolidated Joint Coastal Permit and Intent to Grant Sovereign Submerged Lands Authorization, No. 0249602-001-JC. July 28, 2006.

- Florida Department of Environmental Protection 2007. Caladesi Island State Park Unit Management Plan. Division of Recreation and Parks. Approved June 18, 2007.
- Florida Department of Environmental Protection. 2008. Strategic Beach Management Plan for the Southwest Gulf Coast Region. Bureau of Beaches and Coastal Systems. May 2008. 54 p.
- Florida Department of Environmental Protection. 2010a. Aquatic Preserve Maps for Pinellas County and Boca Ciega Bay.  
<http://www.dep.state.fl.us/coastal/sites/pinellas/publications.htm>
- Florida Department of Environmental Protection. 2010b. Consolidated Joint Coastal Permit and Intent to Grant Sovereign Submerged Lands Authorization, Permit Number 0270453-001-JC, John's Pass Maintenance Dredging. March 29, 2010.
- Florida Department of Environmental Protection. 2011a. Beach Erosion Control Program.  
<http://www.dep.state.fl.us/beaches/programs/bcherosn.htm> December 15, 2011.
- Florida Department of Environmental Protection. 2011b. Fixed Capital Outlay Local Government Funding Requests for FY 2011/2012. Beach Management Funding Assistance Program. January 5, 2011.
- Florida Department of Environmental Protection. 2011c. FDEP-BBCS.  
<http://www.dep.state.fl.us/beaches/>
- Florida Department of Environmental Protection. 2011e. Consolidated Joint Coastal Permit and Sovereign Submerged Lands Authorization. Permit number: 0238664-001-JC, Sand Key Beach Nourishment.
- Florida Department of Environmental Protection. 2012. FY 2013/ 2014 Long Range Budget Plan. Draft version.
- Florida Department of Environmental Protection. 2012. Critical Eroded Beaches in Florida. Bureau of Beaches and Coastal Systems, Division of Water Resource Management, Department of Environmental Protection, State of Florida, Tallahassee, FL.
- Florida Department of Environmental Protection. 2012. DRAFT Consolidated Joint Coastal Permit and Intent to Grant Sovereign Lands Authorization. FDEP File No. 0308348-01-JC. September 28, 2012.
- Florida Division of Recreation and Parks. 2011. Anclote Key.  
<http://www.floridastateparks.org/anclotekey/>
- Florida Department of Natural Resources. 1986. A proposed comprehensive beach management program for the state of Florida. Tallahassee, Florida.

Florida Department of Transportation. 1998. Sour Evaluation Report: Bridge Numbers 150027/150076, John's Pass Boca Ciega Bay. Prepared by Hartenstein & Associates, Inc.

Florida Senate. 2009. Senate Bill 2600. Tallahassee, Florida.  
[http://www.myfloridahouse.gov/FileStores/Adhoc/Appropriations/gaa/2009-Senate/SB2600\\_Enrolled\\_2nd\\_Engrossed.pdf](http://www.myfloridahouse.gov/FileStores/Adhoc/Appropriations/gaa/2009-Senate/SB2600_Enrolled_2nd_Engrossed.pdf)

Florida Senate. 2010. House Bill 5001. Tallahassee, Florida.  
<http://archive.flsenate.gov/data/session/2010/House/bills/amendments/pdf/hb5001e1561933.pdf>

Florida Senate. 2011. Senate Bill 2000. Tallahassee, Florida.  
<http://www.flsenate.gov/usercontent/session/2011/appropriations/senate/pdf/ConferenceReportonSenateBill2000.pdf>

Forrest, B., Larenas, M., Mann, D. and Rupert, M., 2007. Sand Key Sand Source Investigation Constructability Analysis. Boca Raton, Florida: Coastal Planning & Engineering, Inc. 37 p. (Prepared for Pinellas County).

Forrest, B.M.; Larenas, M.; Suthard, B. and Andrews, J.L., 2009 Geophysical and Geotechnical Investigations to Identify Sand Resources for Beach Nourishment on Sand Key, Pinellas County, Florida. Boca Raton, Florida: Coastal Planning & Engineering, Inc. 70p. (Prepared for Pinellas County).

GEC, 2011 Final Supplemental Environmental Assessment, Supplemental Sand Source for Sand Key Beach Renourishment Pinellas County Beach Erosion Control Project, Pinellas County, Florida. Baton Rouge, Louisiana: Gulf Engineers & Consultants. 81p (Prepared for U.S. Army Corps of Engineers).

Goff, B. 2012. "Dredging planned for Clearwater Pass." *TBN Weekly*. February 29, 2012.  
[http://www.tbnweekly.com/pubs/belleair\\_bee/content\\_articles/022912\\_bee-02.txt](http://www.tbnweekly.com/pubs/belleair_bee/content_articles/022912_bee-02.txt)

Google Earth. 2012a. "Three rooker bar." 28°07'07.05"N, 82°57'46.37"W. January 27, 1995. Accessed on October 26, 2012.

Google Earth. 2012c. "Shell Key." 27°39'51.30"N, 82°44'37.58"W. December 29, 1998. Accessed on October 26, 2012.

Harms, J. 2012. Personal Communication with CPE. Marlowe & Company.

Harwell, D. 2011. "Dredging of channel may cost Clearwater up to \$1 million." *St. Petersburg Times*. April 20, 2011. <http://www.tampabay.com/news/localgovernment/dredging-of-channel-may-cost-clearwater-up-to-1-million/1164755>



- Hepner, T. 2000. Effect of El Nino (1997-1998) on the Peninsular Gulf Coast of Florida. Master's Thesis. Department of Geology, University of South Florida.
- Heritage Village. 2012. "Caladesi Memories." [http://www.pinellascounty.org/heritage/streaming\\_video.htm](http://www.pinellascounty.org/heritage/streaming_video.htm)
- Hine, A., Evans, M., Davis, R.A. Jr., Belknap, D.F. 1987. Depositional response to seagrass mortality along a low energy, barrier-island coast: west-central Florida. J. Sed. Petrology. V.57, No.3, May, 1987, p. 431-439.
- Hine, A.C., Brooks, G.R., Davis, R.A., Jr., Doyle, L.J., Gelfenbaum, G., Locker, S.D., Twichell, D. C., and Weisberg, R. H. 2001. A Summary of Findings of the West-Central Florida Coastal Studies Project. USGS Open File Report 01-303. <http://pubs.usgs.gov/of/2001/of01-303/index.html>
- Humiston & Moore. 2011a. Honeymoon Island Beach Restoration Project 42-Month Post Construction Monitoring Report No. 5, HM File No. 13006. Submitted to: FDEP File No. 0249602-001-JC; USACE Permit SAJ-2002-8266 (IP-MN), November 29, 2011.
- Humiston & Moore. 2011b. Honeymoon Island Beach Restoration Project- Phase II. Submitted to: FDEP, DEP File No. 0249602-001-JC; USACE Permit SAJ-2002-8266 (IP-MN), June 1, 2011.
- Humiston & Moore. 2011a. Honeymoon Island Beach Restoration Project 42-Month Post Construction Monitoring Report No. 5, HM File No. 13006. Submitted to: FDEP, DEP File No. 0249602-001-JC; USACE Permit SAJ-2002-8266 (IP-MN), November 29, 2011.
- Krock, J. 2005. Historical morphodynamics of John's Pass, west-central Florida. *Theses and Dissertations*. Paper 731. <http://scholarcommons.usf.edu/etd/731>.
- Locker, S.D.; Hine, A.C. and Brooks, G.R., 2003. Regional stratigraphic framework linking continental shelf and coastal sedimentary deposits of west-central Florida. *Marine Geology*, 200, 351-378.
- McClure, B. 2011. "Beach nourishment to start in March." *Belleaire Bee*. October 5, 2011.
- McClure, B. 2012 "Agreement targets beach nourishment." *TBNweekly.com*. July 30, 2012.
- Mehta, A.J., Jones, C.P., Adams, W.D. 1976. John's Pass and Blind Pass Glossary of Inlets Report #4. Florida Sea Grant Program. Report Number 18.
- Moore, C.B. 1903. Certain aboriginal mounds of the Florida Central West-Coast. Available from the Florida State Geological Survey, Tallahassee, FL.

Mora, Milan. 2012. E-mail communication with Andrew Squires. United States Army Corps of Engineers.

Pinellas County Department of Environmental Management. 2007. 2007 Shell Key Preserve Management Plan.

<http://www.pinellascounty.org/park/managedlands/pdf/SKP/SKPMngmtPlan07/SKP%20Mgmt%20Plan%202007%20web.pdf>

Pinellas County Planning Department. 2008a. Pinellas County Historical Background. Prepared for the Pinellas County Board of Commissioners.

Pinellas County Planning Department. 2008b. Coastal Management Element of the Pinellas County Comprehensive Plan. Prepared for the Board of County Commissioners of Pinellas County, Florida.

Pinellas County (ASBPA). 2009. The History of Pinellas County's Federal Shore Protection Project. Field Trip Guidebook for the American Shore and Beach Preservation Association (ASBPA) 2009 National Coastal Conference. St. Pete Beach, Florida.

Pinellas County. 2010. "Coastal Management: Treasure Island- Long Key Nourishment." [www.pinellascounty.org](http://www.pinellascounty.org)

Pinellas County. 2011. Fort De Soto County Park Historic Guide.

[http://www.pinellascounty.org/park/pdf/Fort\\_DeSoto\\_historic\\_guide.pdf](http://www.pinellascounty.org/park/pdf/Fort_DeSoto_historic_guide.pdf)

Pinellas County Government Online. 2008a. Hurricane Pass Coastal Management History.

<http://www.pinellascounty.org/environment/coastalMngmt/pdfs/HurricanePassHistory.pdf>

Pinellas County Government Online. 2008b. Clearwater Pass Coastal Management History.

<http://www.pinellascounty.org/environment/coastalMngmt/pdfs/ClearwaterPassHistory.pdf>

Pinellas County Government Online. 2008c. John's Pass Coastal Management History.

<http://www.pinellascounty.org/environment/coastalMngmt/pdfs/JohnsPassHistory.pdf>

Pinellas County Government Online. 2010. Sand Key.

<http://www.pinellascounty.org/environment/coastalMngmt/pdfs/SK-Final.pdf>

Pinellas County Government Online. 2011a. Penny for Pinellas.

<http://www.pinellascounty.org/penny/default.htm>

Pinellas County Government Online. 2011b. Pinellas County Beaches and Beach Access.

<http://www.pinellascounty.org/park/beaches.htm>

Pinellas County. 2011c. Shell Key Preserve History.

<http://www.pinellascounty.org/park/managedlands/skp-history.htm>

- Pinellas County Tax Collector. 2011. Millage Rates.  
<http://www.taxcollect.com/Content.aspx?ContentID=42>
- Project Cooperation Agreement. 1995. Project cooperation agreement between the Department of the Army and Pinellas County for continued participation in the Pinellas County Shore Protection Project at Sand Key, Treasure Island and Long Key. Executed April 7, 1995.
- Roberts, T., Wang, P. 2011. Four-year Performance of the 2006 Pinellas County Beach Nourishment along Sand Key, Treasure Island, and Long Key: 2006-2010. University of South Florida. vol. I & II.
- Roberts, T., Wang, P. 2012. Four-year performance and associated controlling factors of several beach nourishment projects along three adjacent barrier islands, west-central Florida, USA. *Coastal Engineering*. v. 70. pp. 21-39.
- Saint John, A. 2004. Characteristics of a chronically, rapidly eroding beach: Long Key, Pinellas County, Florida. Thesis and Dissertations. Paper 1231.  
<http://scholarcommons.usf.edu/etd/1231>
- Squires, A. 2012, May. Comments on draft report. Pinellas County Coastal Management Program. Coastal Planning & Engineering, Inc. Boca Raton, Florida.
- Squires, A. 2011, August 25. Personal interview. Pinellas County Coastal Management Program. Coastal Planning & Engineering, Inc. Boca Raton, Florida.
- St. Petersburg/ Clearwater Area Convention & Visitors Bureau. 2011. Bed tax information.  
<http://www.pinellascvb.com/cms/index.php?id=6>
- St. Petersburg Times Online. 2000. "Jetty and pier near completion."  
[http://www.sptimes.com/News/092400/SouthPinellas/ Jetty\\_and\\_pier\\_near\\_.shtml](http://www.sptimes.com/News/092400/SouthPinellas/ Jetty_and_pier_near_.shtml)  
Accessed on January 28, 2012.
- Suncoast Shorebird Partnership. 2012. Shorebirds.  
<http://www.suncoastshorebirdpartnership.org/home> Accessed January 28, 2012.
- Suncoast Seabird Sanctuary, Inc. 2012. "About the Suncoast Seabird Sanctuary."  
<http://www.seabirdsanctuary.com/>
- Tackney & Associates, Inc. 2006. Cover Letter: JCP File Number 0266352-001-JC, South Beach Association, Clearwater Pass Stabilization Project. July 7, 2006.
- Taylor Engineering, Inc. 2001. Regional Sediment Management Southwest Gulf Coast Regional Sediment Budget. Prepared for the USACE.

- Twichell, D.; Brooks, G.; Gelfenbaum, G.; Paskevich, V. and Donahue, B., 2003. Sand Ridges off Sarasota, Florida: a complex facies boundary on a low-energy shelf environment. *Marine Geology*, 200, 243-262.
- USACE. 1950. John's, Blind, and Pass-A-Grille Passes, Pinellas County, Florida. Office of the District Engineer. Jacksonville, Florida. SAKGW 827.
- USACE. 1953. Summary of formal report dated February 1, 1937. House Document No.380, 83d Congress, 2d session.
- USACE. 1966. Letter from the Secretary of the Army. 89<sup>th</sup> Congress, 2d Session. House Document No. 519.
- USACE. 1970. Section 111 Reconnaissance Report John's Pass, Pinellas County, Florida. Report No. 20. Department of the Army, Jacksonville District, Corps of Engineers, Jacksonville, Florida.
- USACE. 1971. General Detail Design Memorandum: Mulley Key, Florida Beach Erosion Control Project. Jacksonville, Florida. Serial No. 29.
- USACE. 1978. Pinellas County Beach Erosion Control Project General and Detail Design Memorandum Addendum (Long Key). Jacksonville District Corps of Engineers, Jacksonville, Florida.
- USACE. 1980a. Dunedin and Hurricane Passes, Pinellas County, Detailed Project Report, Improvements for Small Boat Navigation.
- USACE. 1980b. Beach Erosion Control Project Review Study for Pinellas County, Stage II Documentation. Jacksonville District, Corps of Engineers. 58 p.
- USACE. 1984. Beach Erosion Project Review Study and Environmental Impact Statement for Pinellas County, Florida. US Army Corps of Engineers, Jacksonville District, Jacksonville, FL.
- USACE. 1984b. Pinellas County Florida, Sand Key Segment, Addendum IV to the GDM (Beach Nourishment). Prepared by: Jacksonville District, South Atlantic Division, U.S. Army Corps of Engineers. 250 p.
- USACE. 1986. Working Papers for Clearwater, Florida (Spoil Disposal). U.S. Army Corps of Engineers, Jacksonville District, Jacksonville, FL. 29 p.
- USACE. 1989. Water Resources Policies and Authorities - Federal Participation in Shore Protection. Washington, DC. Publication No. ER 1165-2-130.

- USACE. 1994. Limited Re-evaluation Report and Environmental Summary. US Army Corps of Engineers, Jacksonville District, Jacksonville, FL.
- USACE, 1995. Public Notice Number PN-JPA-201, Joint Application for Works in the Waterways of Florida.
- USACE. 1996. 1<sup>st</sup> Renourishment Sand Key Segment Design Memorandum with Environmental Assessment Pinellas County, Florida Beach Erosion Project. US Army Corps of Engineers, Jacksonville District, Jacksonville, FL.
- USACE. 1999. Permit No. 199904338 (IP-TF). U.S. Army Engineer District, Jacksonville, Florida.
- USACE. 2001. Department of the Army Permit No. 199904338 (IP-TF), Hurricane Pass.
- USACE. 2002. Environmental Assessment, Maintenance Dredging John's Pass, Pinellas County, Florida. U.S. Army Engineer District, Jacksonville, Florida.
- USACE. 2004. Pinellas County Shore Protection. <http://www.saj.usace.army.mil/Divisions/ProgramProjectMgt/Branches/WtrRes/Navigation/DOCS/ProjectMaps/pinellas.pdf>
- USACE, 2009. Report of the Secretary of the Army on Civil Works Activities for FY 2009. [http://www.usace.army.mil/Portals/2/docs/civilworks/annual\\_report/fy08/fy09anrep\\_mvd.pdf](http://www.usace.army.mil/Portals/2/docs/civilworks/annual_report/fy08/fy09anrep_mvd.pdf)
- USACE. 2010. Digital Project Notebook. U.S. Army Corps of Engineers- Jacksonville District. Programs and Project Management Division. <http://www.saj.usace.army.mil/Divisions/ProgramProjectMgt/DigitalProjectNotebook.htm>
- USACE. 2011. [http://www.mvn.usace.army.mil/pd/pppmd\\_sec107.asp](http://www.mvn.usace.army.mil/pd/pppmd_sec107.asp)
- Vallianos, L. 1990. Beach and Nearshore Placement of Material Dredged from Federally Authorized Navigation Projects. Institute for Water Resources. Policy Study-90-PS-I.
- Wang, P., Beck, T.M., and Roberts, T.M., 2011. Modeling regional-scale sediment transport and medium-term morphology change at a dual inlet system examined with the Coastal Modeling System (CMS): A case study at John's Pass and Blind Pass, west-central Florida. *Journal of Coastal Research*, Special Issue 59, 49-60.
- Wang, P. 2012. Review of draft report. University of South Florida. Coastal Planning & Engineering, Inc. Boca Raton, Florida.

- Wang, P., Roberts, T., 2012. Volume and shoreline changes along Pinellas County beaches during Tropical storm Debby. Coastal Research laboratory. University of South Florida. 141 pp.
- Wang, P., Beck, T. 2012. Morphodynamics of an anthropogenically altered dual-inlet system: John's Pass and Blind Pass, west-central Florida, USA. *Marine Geology*. 291-291 (2012) 162-175.
- Wilhoit, J. 2004. Morphodynamics of Bunces Pass, Florida. Thesis and Dissertations. Paper 1303. <http://scholarcommons.usf.edu/etd/1303>



**APPENDIX A**  
**SUMMARY OF FUNDING NEEDS**

TABLE A-1  
SUMMARY OF FUNDING NEEDS FOR PINELLAS COUNTY  
2012 THROUGH 2017

Project	Description	Funding Source	2011		2012		2013		2014		2015		2016		2017	
Coastal Management (Includes all projects listed in table)	Professional Services, construction, and monitoring	Penny for Pinellas	\$0		\$500,000		\$0		\$0		\$0		\$0		\$0	
		Tourist Development Tax	\$7,766,500		\$2,628,260		\$8,938,260		\$740,760		\$7,575,760		\$3,330,760		\$589,260	
		FDEP	\$7,787,480		\$4,501,740	*\$5,921,250 in 2012/2013 LRBP	\$8,791,740	*\$4,557,910 in 2012/2013 LRBP	\$554,240	*\$1,991,340 in 2012/2013 LRBP	\$7,509,240	*\$151,750 in 2012/2013 LRBP	\$3,244,240	*\$170,500 in 2012/2013 LRBP	\$650,740	
		Federal	<b>\$0</b>		<b>\$22,704,138</b>		<b>\$12,263,498</b>		<b>\$0</b>		<b>\$22,348,726</b>		<b>\$0</b>		\$0	
		Municipalities	<b>\$0</b>		<b>\$0</b>		<b>\$0</b>		<b>\$0</b>		<b>\$50,000</b>		<b>\$0</b>		<b>\$0</b>	
		TOTAL	\$15,553,980		\$7,630,000		\$17,730,000		\$1,295,000		\$15,085,000		\$6,575,000			
Beach Lighting	Install lighting at access points	Tourist Development	\$0		\$100,000		\$0		\$100,000		\$0		\$100,000		\$0	
		TOTAL	\$0		\$100,000	Construction	\$0		\$100,000	Construction	\$0		\$100,000	Construction	\$0	
Coastal Research/ Improvements	Monitoring storm effects and nourishment performance (USF)	Tourist Development Tax	\$140,000		\$140,000		\$140,000		\$140,000		\$140,000		\$140,000		\$140,000	
		FDEP	\$140,000		\$140,000		\$140,000		\$140,000		\$140,000		\$140,000		\$140,000	
		TOTAL	\$280,000	\$150,000 for Prof. Svcs, \$130,000 for Monitoring	\$280,000	\$150,000 for Prof. Svcs, \$130,000 for Monitoring	\$280,000	\$150,000 for Prof. Svcs, \$130,000 for Monitoring	\$280,000	\$150,000 for Prof. Svcs, \$130,000 for Monitoring	\$280,000	\$150,000 for Prof. Svcs, \$130,000 for Monitoring	\$280,000	\$150,000 for Prof. Svcs, \$130,000 for Monitoring	\$280,000	\$150,000 for Prof. Svcs, \$130,000 for Monitoring
Recommended Coastal Research		Tourist Development Tax	\$0		\$20,000	Post storm inspection plan	\$20,000	FEMA funding review	\$20,000	Analysis of Regional Sediment Mgmt	\$0		\$0		\$0	
Dune Construction & Walk-overs	Funding for municipalities to construct walkovers and plant dune veg	Tourist Development Tax	\$45,000		\$37,500		\$37,500		\$40,000		\$40,000		\$40,000		\$40,000	
		FDEP	\$45,000		\$37,500		\$37,500		\$40,000		\$40,000		\$40,000		\$40,000	
		TOTAL	\$90,000		\$75,000		\$75,000		\$80,000		\$80,000		\$80,000		\$80,000	
Turtle Monitoring	Daily turtle nest monitoring by CMA	Tourist Development Tax	\$89,510		\$89,510		\$89,510		\$89,510		\$89,510		\$89,510		\$89,510	
		FDEP	\$40,490		\$40,490		\$40,490		\$40,490		\$40,490		\$40,490		\$40,490	
		TOTAL	\$130,000		\$130,000		\$130,000		\$130,000		\$130,000		\$130,000		\$130,000	

Notes: The amounts listed in the left column of each year were included in the Pinellas Capital Improvement Plan, FY2011 through FY2016 Budget. The amounts and notes in the right column of each year pertain to the FY 2012/2013 FDEP Long-Range Budget Plan (LRBP). Amounts **bolded in green** are estimates based on the federal cost share percentage and the amounts included in the Pinellas County 2011 CIP Budget. Amounts in **purple** denote a difference between the CIP and LRBP reports.

TABLE A-1  
SUMMARY OF FUNDING NEEDS FOR PINELLAS COUNTY  
2012 THROUGH 2017

Project	Description	Funding Source	2011		2012		2013		2014		2015		2016		2017	
Honeymoon Island Improvements	Phase II: Renourishment and construction of structures in state park	Tourist Development Tax	\$35,000		\$46,250		\$31,250	*LRBP \$56,250 County	\$31,250	*LRBP \$67,500 County	\$31,250	*LRBP \$56,250 County	\$31,250	*LRBP \$67,500 County	\$31,250	
		FDEP	\$105,000		\$2,138,750	*LRBP \$2,380,000 for nourishment, \$3,250,000 for structures	\$93,750	*LRBP \$18,750 County	\$93,750	*LRBP \$22,500 County	\$93,750	*LRBP \$18,750 County	\$93,750	*LRBP \$22,500 County	\$93,750	
		TOTAL	\$140,000	Prof. Svcs	\$2,185,000	\$60,000 Prof. Svcs, \$2,000,000 Construction, \$125,000 Monitoring	\$125,000	Monitoring	\$125,000	Monitoring	\$125,000	Monitoring	\$125,000	Monitoring not required this year by permit; Need \$0	\$125,000	Monitoring
2018 Honeymoon Island Renourishment	Phase III: Renourishment	Tourist Development Tax	\$0		\$0		\$0		\$0		\$0		\$0		\$6,000	
		FDEP	\$0		\$0		\$0		\$0		\$0		\$0		\$54,000	
		TOTAL	\$0		\$0		\$0		\$0		\$0		\$0		\$60,000	Prof. Svcs
Hurricane Pass Improvements	Design and construction of Hurricane Pass Navigation Channel	Tourist Development Tax	\$0		\$520,000		\$0		\$0		\$75,000		\$0		\$0	
		FDEP	\$0		\$520,000		\$0		\$0		\$75,000	*Potential funding if IMP is approved	\$0		\$0	
		TOTAL	\$0		\$1,040,000	\$1,000,000 for construction, \$40,000 for Prof.Svcs	\$0		\$0		\$150,000	Inlet Management Plan	\$0		\$0	
Clearwater Pass	Research and modeling	Tourist Development Tax	\$0		\$0		\$0		\$0		\$0		\$0		\$75,000	
		FDEP	\$0		\$0		\$0		\$0		\$0		\$0		\$75,000	*Potential funding if IMP update
		TOTAL	\$0		\$0		\$0		\$0		\$0		\$0		\$150,000	

Notes: The amounts listed in the left column of each year were included in the Pinellas Capital Improvement Plan, FY2011 through FY2016 Budget. The amounts and notes in the right column of each year pertain to the FY 2012/2013 FDEP Long-Range Budget Plan (LRBP). Amounts **bolded in green** are estimates based on the federal cost share percentage and the amounts included in the Pinellas County 2011 CIP Budget. Amounts in purple denote a difference between the CIP and LRBP reports.

**TABLE A-1**  
**SUMMARY OF FUNDING NEEDS FOR PINELLAS COUNTY**  
**2012 THROUGH 2017**

Project	Description	Funding Source	2011		2012		2013		2014		2015		2016		2017	
Sand Key Nourishment 2010 * Project construction delayed until 2012	Design, construction and monitoring of Sand Key	Tourist Development Tax	\$7,384,490		\$1,077,500		\$62,500		\$62,500	*LRBP \$125,000 County	\$0	*LRBP \$125,000 County	\$0		\$62,500	
		FDEP	\$7,384,490	*Not in 2012/2013 LRBP	\$1,077,500	*Not in 2012/2013 LRBP	\$62,500	*LRBP \$125,000 FDEP	\$62,500	*LRBP \$125,000 FDEP	\$0	*LRBP \$125,000 FDEP	\$0		\$62,500	
		Federal (62.8%)	\$0		<b>\$21,980,000</b>	*\$10,657,000 appropriated in 2010, \$11,323,000 requested in 2011	\$0		\$0		\$0		\$0		\$0	
		TOTAL	\$14,768,980		\$24,135,000		\$125,000	Prof. Svcs, Monitoring	\$125,000	Prof. Svcs, Monitoring	\$0	Monitoring; Need \$125,000	\$0		\$125,000	Monitoring
Sand Key Nourishment 2015 *Project could be delayed until 2019	Design, construction and monitoring of 2015 project	Tourist Development Tax	\$0		\$125,000	*LRBP \$0	\$125,000	*LRBP \$0			\$7,017,500	*LRBP \$30,000 sand search	\$1,067,500	*LRBP \$120,000 sand search	\$62,500	
		FDEP	\$0		\$125,000	*LRBP \$0	\$125,000	*LRBP \$0			\$7,017,500	*LRBP \$30,000 sand search	\$1,067,500	*LRBP \$40,000 sand search	\$62,500	
		Federal (62.8%)	\$0		\$0		\$0		\$0		<b>\$22,348,726</b>	*LRBP \$90,000 sand search	\$0	*LRBP \$40,000 sand search	\$0	
		TOTAL	\$0		\$250,000	Prof. Svcs	\$250,000	Prof. Svcs	\$0		\$36,383,726	Prof. Svcs, Construction	\$2,135,000	Prof. Svcs, Construction, Monitoring	\$125,000	Monitoring
Madeira Beach Groin Replacement	Replace groin	Tourist Development Tax	\$0		\$50,000	Construction	\$0		\$0		\$0		\$0		\$0	
Johns Pass	Research and modeling	Tourist Development Tax	\$0		\$0		\$75,000		\$0		\$0		\$0		\$0	
		FDEP	\$0		\$0		\$75,000	*Potential funding if IMP update	\$0		\$0		\$0		\$0	
		TOTAL	\$0		\$0		\$150,000		\$0		\$0		\$0		\$0	
Treasure Island Nourishment 2010	Monitoring of 2010 project	Tourist Development Tax	\$12,500		\$12,500		\$12,500		\$0		\$0		\$0		\$0	
		FDEP	\$12,500		\$12,500		\$12,500		\$0		\$0		\$0		\$0	
		Federal (58%)	\$0		\$0		\$0		\$0		\$0		\$0		\$0	
		TOTAL	\$25,000		\$25,000		\$25,000		\$0		\$0		\$0		\$0	

Notes: The amounts listed in the left column of each year were included in the Pinellas Capital Improvement Plan, FY2011 through FY2016 Budget. The amounts and notes in the right column of each year pertain to the FY 2012/2013 FDEP Long-Range Budget Plan (LRBP). Amounts **bolded in green** are estimates based on the federal cost share percentage and the amounts included in the Pinellas County 2011 CIP Budget. Amounts in **purple** denote a difference between the CIP and LRBP reports.

**TABLE A-1**  
**SUMMARY OF FUNDING NEEDS FOR PINELLAS COUNTY**  
**2012 THROUGH 2017**

Project	Description	Funding Source	2011		2012		2013		2014		2015		2016		2017	
Treasure Island Nourishment 2013	Design, construction and monitoring of 2013 project	Tourist Development Tax	\$0		\$65,000	*LRBP \$35,000 County	\$1,825,000	*LRBP \$30,000 County	\$82,500	*LRBP \$1,733,340 County	\$12,500	*LRBP \$35,000 County	\$12,500	*LRBP \$35,000 County	\$0	
		FDEP	\$0		\$65,000	*LRBP \$35,000 FDEP	\$1,825,000	*LRBP \$30,000 FDEP	\$82,500	*LRBP \$1,733,340 FDEP	\$12,500	*LRBP \$35,000 FDEP	\$12,500	*LRBP \$35,000 FDEP	\$0	
		Federal (58%)	\$0		<b>\$224,138</b>	*Not requested yet	<b>\$6,293,103</b>		\$0		\$0		\$0		\$0	
		TOTAL	\$0		\$354,138	Prof. Svcs	\$9,943,103	Prof. Svcs, Construction	\$165,000	Prof. Svcs, Monitoring	\$25,000	Monitoring	\$25,000	Monitoring	\$0	
Treasure Island Nourishment 2016	Design, construction and monitoring of 2016 project	Tourist Development Tax	\$0		\$0		\$0		\$0		\$65,000	*LRBP \$35,000 County	\$1,825,000	*LRBP \$30,000 County	\$82,500	*LRBP \$1,733,340 County
		FDEP	\$0		\$0		\$0		\$0		\$65,000	*LRBP \$35,000 FDEP	\$1,825,000	*LRBP \$30,000 FDEP	\$82,500	*LRBP \$1,733,340 FDEP
		Federal (58%)	\$0		<b>\$0</b>		<b>\$0</b>		\$0		<b>\$224,138</b>	*Not requested yet	<b>\$6,293,103</b>		\$0	
		TOTAL	\$0		\$0		\$0		\$0		\$354,138	Prof. Svcs	\$9,943,103	Prof. Svcs, Construction	\$165,000	Prof. Svcs, Monitoring
Treasure Island Federal Reauthorization	Reauthorization investigation, current authorization expires in 2019	Tourist Development Tax	\$0		\$250,000	*Not in CIP 2012 budget	\$0		\$0		\$0		\$0		\$0	
		FDEP	\$0		\$250,000	*Not in 2012/2013 LRBP	\$0		\$0		\$0		\$0		\$0	
		Federal (50%)	\$0		<b>\$500,000</b>	*Requested appropriation in 2011	\$0		\$0		\$0		\$0		\$0	
		TOTAL	\$0		\$1,000,000		\$0		\$0		\$0		\$0		\$0	
Sunset Beach Hotspot Management		Tourist Development Tax	\$0		\$0		\$40,000	*Coastal processes analysis	\$80,000	*Feasibility study with morphology modeling	\$0		\$0		\$0	
Treasure Island Sand Sharing Permit Renewal	*Expires 7/7/2016	Tourist Development Tax	\$0		\$0		\$0		\$0		\$50,000		\$0		\$0	
		Municipalities	\$0		\$0		\$0		\$0		\$50,000		\$0		\$0	
		TOTAL	\$0		\$0		\$0		\$0		\$100,000		\$0		\$0	

Notes: The amounts listed in the left column of each year were included in the Pinellas Capital Improvement Plan, FY2011 through FY2016 Budget. The amounts and notes in the right column of each year pertain to the FY 2012/2013 FDEP Long-Range Budget Plan (LRBP). Amounts **bolded in green** are estimates based on the federal cost share percentage and the amounts included in the Pinellas County 2011 CIP Budget. Amounts in **purple** denote a difference between the CIP and LRBP reports.

TABLE A-1  
SUMMARY OF FUNDING NEEDS FOR PINELLAS COUNTY  
2012 THROUGH 2017

Project	Description	Funding Source	2011		2012		2013		2014		2015		2016		2017	
Long Key - Upham Beach 2010	Monitoring of 2010 project	Tourist Development Tax	\$10,000		\$10,000	*LRBP \$17,500 County	\$10,000	*LRBP \$17,500 County	\$0		\$0		\$0		\$0	
		FDEP	\$10,000		\$10,000	*LRBP \$17,500 FDEP	\$10,000	*LRBP \$17,500 FDEP	\$0		\$0		\$0		\$0	
		TOTAL	\$20,000		\$20,000		\$20,000		\$0		\$0		\$0		\$0	
Long Key - Upham Beach 2013	Design, construction and monitoring of 2013 project	Tourist Development Tax	\$0		\$65,000	Prof. Svcs	\$1,815,000	*LRBP \$866,660 County	\$80,000	*LRBP \$17,500 County	\$10,000	*LRBP \$17,500 County	\$10,000	*LRBP \$15,000 County	\$0	
		FDEP	\$0		\$65,000	Prof. Svcs	\$1,815,000	*LRBP \$866,660 FDEP	\$80,000	*LRBP \$17,500 FDEP	\$10,000	*LRBP \$17,500 FDEP	\$10,000	*LRBP \$15,000 FDEP	\$0	
		Federal (60.8%)	\$0		\$0		\$5,970,395	*LRBP \$2,600,000 Fed	\$0		\$0		\$0		\$0	
		TOTAL	\$0		\$130,000		\$9,600,395	Prof. Svcs, Construction	\$160,000	Prof. Svcs, Monitoring	\$20,000	Monitoring	\$20,000	Monitoring	\$0	
Upham Beach Stabilization	Design, construction and maintenance of temporary and permanent structures at Upham Beach	Tourist Development Tax	\$50,000		\$20,000		\$3,555,000	*LRBP \$3,500,000 County	\$15,000	*LRBP \$13,000 County	\$15,000	*LRBP \$13,000 County	\$15,000	*LRBP \$13,000 County	\$0	
		FDEP	\$50,000		\$20,000		\$3,555,000	*LRBP \$3,500,000 FDEP	\$15,000	*LRBP \$13,000 FDEP	\$15,000	*LRBP \$13,000 FDEP	\$15,000	*LRBP \$13,000 FDEP	\$0	
		TOTAL	\$100,000	Prof. Svcs	\$40,000	Prof. Svcs	\$7,110,000	\$110,000 for Prof. Svcs, \$7,000,000 for Construction	\$30,000	Monitoring	\$30,000	Monitoring	\$30,000	Monitoring	\$0	
Long Key Joint Coastal Permit	*Expires 5/17/2014	Tourist Development Tax	\$0		\$0		\$100,000		\$0		\$30,000		\$0		\$0	
Pass-a-Grille Nourishment	Construction of project from 1st St N to 20th St. in St. Pete Beach as needed, combined with other 2013 projects	Tourist Development Tax	\$0		\$0		\$1,000,000		\$0		\$0		\$0		\$0	
		FDEP	\$0		\$0		\$1,000,000		\$0		\$0		\$0		\$0	
		TOTAL	\$0		\$0		\$2,000,000	Construction	\$0		\$0		\$0		\$0	



**APPENDIX B**

**BEACH NOURISHMENT, INLET DREDGING, AND SHORE PROTECTION  
PROJECTS  
PINELLAS COUNTY, FLORIDA**

TABLE B-1

BEACH NOURISHMENT, INLET DREDGING, AND SHORE PROTECTION PROJECTS  
PINELLAS COUNTY, FL

Project	Fill, Dredge Spoil or Structure Location	Dates	Volume (c.y.)	Fill Source	References
Gulf Intracoastal Waterway	Not Available	1962-1963	Not Avail.	Gulf Intracoastal Waterway	USACE (2010, 2011)
Anclote River Channel (initial project)	Not Available	1958	Not Avail.	Anclote River Channel	USACE (2010)
HONEYMOON ISLAND:					
Honeymoon Island State Park Beach Restoration	R8-R12	1969	1,440,000	Nearshore borrow area	Pinellas County (2010), Taylor (2005), FDEP (2008) FDEP (2008), Taylor (2005) FDEP (2008) Pinellas County (2010), FDEP (2008)
Honeymoon Island State Park Beach Restoration	R8-R12	1989	230,000	Upland sand mines	
Hurricane Pass Maintenance Dredging	R10-R12	2000	12,500	Hurricane Pass	
Honeymoon Island Beach Restoration Phase I & T-head groin construction	R8-R10.5	Aug. - Nov. 2007	150,000	Hurricane Pass	
CLEARWATER BEACH ISLAND:					
Beach Fills:					
Clearwater Beach Fill	R44-R47?	1949	150,000	Not Available	USACE (1984)
Clearwater Beach Nourishment	R40-R47?	1981-1982	180,000	Clearwater Pass	Hillyer (1996), Taylor (2005), USACE (1984)
Clearwater Beach Nourishment	R40-R47?	1984	80,000	Not Available	Taylor (2005)
Structures:					
Clearwater Beach - 2 groins	R46-R47?	1950	0	-N/A-	USACE (1984)
Clearwater Beach Pier Groin	R44	1952	0	-N/A-	USACE (1984)
Clearwater Beach Groin Field (7 groins)	R36-R41?	1961	0	-N/A-	USACE (1984)
Clearwater Beach Pier Groin & Fill	R41.5 (groin)	1963	Not Avail.	Not Available	USACE (1984)
Clearwater Beach Groins at Clearwater Pass	R48-R49	1986	0	-N/A-	FDEP (2008)
CLEARWATER PASS:					
Dredging:					
Clearwater Pass Dredging (initial project)	Not Available	1961	Not Avail.	Clearwater Pass	USACE (2010)
Clearwater Pass Dredging	R52-R61?	1972	66,000	Clearwater Pass	EPA (1994)
Clearwater Pass Dredging	R52-R61?	1973-1974	126,000	Clearwater Pass	Taylor (2005)
Clearwater Pass Dredging	R52-R61?	1977	186,000	Clearwater Pass	USACE/GEC (2011), EPA (1994)
Clearwater Beach Nourishment	R40-R47?	1981-1982	180,000	Clearwater Pass	Hillyer (1996), Taylor (2005), USACE (1984)
Sand Key Nourishment	R52-R61?	1982-1983	600,000	Clearwater Pass	USACE/GEC (2011), EPA (1994), Taylor (2005)
Sand Key Nourishment	R51-R66?	1984	240,000	Clearwater Pass	Taylor (2005)
Gulf Intracoastal Waterway Dredging	R51-R52	1994	7,000	Gulf Intracoastal Waterway	Taylor (2005), FDEP (2008)
Structures:					
Clearwater Pass Rubble Mound Placement (north side of pass)	R47	1963	0	-N/A-	USACE (1984)
Clearwater Pass North Jetty	R47	1981-1982	0	-N/A-	USACE (1984)
Clearwater Pass South Jetty	R52	1975	0	-N/A-	Pinellas County (2010)

TABLE B-1

BEACH NOURISHMENT, INLET DREDGING, AND SHORE PROTECTION PROJECTS  
PINELLAS COUNTY, FL

Project	Fill, Dredge Spoil or Structure Location	Dates	Volume (c.y.)	Fill Source	References
SAND KEY (Sand Key Park to Madeira Beach):					
Beach Fills:					
Indian Rocks Beach Storm Repair	R93-R99	Post Hur. Gladys 1969	143,000	Gulf Intracoastal Waterway	USACE/GEC (2011), Walton (1977)
Clearwater Pass Dredge Spoil Placement	R52-R56?	1972	66,000	Clearwater Pass	EPA (1994)
Indian Rocks Beach Storm Repair	R74-R100	Post Hur. Agnes 1973	400,000	Not Available	USACE/GEC (2011), Walton (1977)
Clearwater Pass Dredge Spoil Placement	R52-R56?	1973-1974	126,000	Clearwater Pass	Taylor (2005)
Clearwater Pass Dredge Spoil Placement	R52-R56?	1977	186,000	Clearwater Pass	USACE/GEC (2011), EPA (1994)
Redington to Madeira Beaches Nourishment	R99-R125?	1981-1983?	19,000	Not Available	Taylor (2005)
Sand Key Nourishment	R52-R56?	1982-1983	600,000	Clearwater Pass	USACE/GEC (2011), EPA (1994), Taylor (2005)
Sand Key Nourishment	R52-R56?	1984-1985	240,000	Clearwater Pass	Taylor (2005)
Redington Beach Nourishment & Breakwater Modification	R99-R107	July 1988	380,000-529,150	Johns Pass Ebb Shoal	FDEP (2008) & Hillyer (1996)
Sand Key Trucked Fill	R52-R61	1990-1991	19,000	Upland sand mines	EPA (1994)
Indian Rocks Beach Nourishment	R72-R85	December 1990	1,320,000	Egmont Channel Shoal	FDEP (2008)
Sand Key Nourishment	R52-R56?	1991-1992	82,000	Clearwater Pass	Taylor (2005)
North Reddington Beach Repair	R106.5-R108.5	1992	58,000	Not Available	Hillyer (1996)
Indian Shores Beach Nourishment	R85-R107	December 1992	850,000-1,002,000	Egmont Channel Shoal	FDEP (2008)
Gulf Intracoastal Waterway Dredge Spoil Placement	R51-R52	1994	7,000	Gulf Intracoastal Waterway	Taylor (2005), FDEP (2008)
Sand Key Renourishment	R56-R66 & R72-R107	October 1999	2,612,166	Egmont Channel Shoal	FDEP (2008)
Sand Key Post-Storm Renourishment	R56-R66 & R71-R107	August 2006	1,700,000	Egmont Channel Shoal	FDEP (2008)
Structures:					
Privately constructed seawalls, bulkheads, groins and revetments	R52-R125?	Before 1950	0	-N/A-	Hillyer (1996)
Post-storm seawall and groin construction	R52-R125?	1950 Post-Hurricane	0	-N/A-	Hillyer (1996)
37 Madeira Beach Groins	R114-R125	1957	0	-N/A-	USACE/GEC (2011)
Reddington Shores Breakwater & Fill	R100.5	1985-1986	30,000	Not Available	USACE/GEC (2011), Taylor (2005)
JOHNS PASS:					
Dredging:					
Johns Pass Federal Maintenance Dredging	Not Avail.	1966	77,650	Johns Pass	Pinellas County (2010)
Johns Pass Federal Maintenance Dredging	Not Avail.	1979	80,000	Johns Pass	Pinellas County (2010)
Johns Pass Federal Maintenance Dredging	R127-R130	1981	70,000	Johns Pass	Pinellas County (2010)
Johns Pass Federal Maintenance Dredging	Not Avail.	1983	80,000	Johns Pass	Pinellas County (2010)
Redington Beach Nourishment & Breakwater Modification	R99-R107	July 1988	529,150	Johns Pass Ebb Shoal	FDEP (2008) & Hillyer (1996)
Johns Pass Federal Maintenance Dredging	R127-R129	1991	56,000	Johns Pass	Pinellas County (2010)
Johns Pass Federal Maintenance Dredging	R127-R129 & R136-R141	2000	390,000	Johns Pass	Pinellas County (2010)
Johns Pass Federal Maintenance Dredging	R127-R129	Aug. - Oct. 2010	252,683	Johns Pass	Pinellas County (2010)
Structures:					
Johns Pass North Terminal Groin	R125	1960-1	30,000	-N/A-	Pinellas County (2010)
Johns Pass Revetment on Treasure Island		1966	0	-N/A-	Pinellas County (2010)
Johns Pass North Terminal Groin Modification	R125	1988	0	-N/A-	Pinellas County (2010)
Johns Pass South Terminal Groin	R126	2000	0	-N/A-	Pinellas County (2010)

TABLE B-1

BEACH NOURISHMENT, INLET DREDGING, AND SHORE PROTECTION PROJECTS  
PINELLAS COUNTY, FL

Project	Fill, Dredge Spoil or Structure Location	Dates	Volume (c.y.)	Fill Source	References
TREASURE ISLAND:					
Beach Fills:					
Sunset Beach Fill	R141	1964	10,000	Blind Pass	USACE (1984)
Treasure Island Segment, Pinellas County Shore Protection Project	R132-R141	1969	790,000	Shore-parallel borrow area	Pinellas County (2010)
Emergency Federal Fill Project after Hurricane Gladys	R132-R141	1969	143,000		Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R131-R132	1971	75,000	O'Brien's Lagoon	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R140-R141	1972	155,000	Blind Pass	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R135-R142	1976	380,000	Offshore borrow area	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R137-R143?	1978	50,000	Blind Pass	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project		1980	119,000		
Treasure Island Segment, Pinellas County Shore Protection Project	R127-R130	1981	70,000	Johns Pass	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R138-R142	1983	220,000	Blind Pass	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R129-R141	1986	550,000	Blind Pass & Pass-a-Grille Channel	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R127-R129	1991	56,000	Johns Pass	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R138-R141	1996	51,300	Egmont Channel Shoal	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R127-R129 & R136-R141	2000	350,000	Johns Pass	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R136-R141	2004	225,000	Pass-a-Grille Channel, Ebb Shoal	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R127-R129 & R136-R141	2006	110,000-270,000	Egmont Channel Shoal	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R127-R129 & R136-R141	Aug. - Oct. 2010	252,683	Johns Pass	Pinellas County (2010)
Structures:					
Treasure Island 56 Groins	Not Avail.	1960	0	-N/A-	Pinellas County (2010), USACE (1984)
Sunset Beach Groin	R141	1976	0	-N/A-	Pinellas County (2010)
Angled Erosion Control Structure at 126th Ave	R127	1989	0	-N/A-	Krock (2005)
BLIND PASS:					
Dredging:					
Blind Pass Dredging	Not Avail.	1937	Unknown	Blind Pass	Pinellas County (2010)
Blind Pass Dredging	Sunset Beach	1964	10,000		USACE (1984)
Blind Pass Dredging	R144-R146?	1968	30,000	Blind Pass	EPA (1994), USACE (1984)
Blind Pass Dredging	Not Avail.	1969	108,000	Blind Pass	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R140-R141	1972	155,000-230,000	Blind Pass	Pinellas County (2010)
Blind Pass Dredging	R144-R146?	1975	75,000	Blind Pass	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R137-R143?	1978	50,000	Blind Pass	Pinellas County (2010)
<i>Blind Pass closed in 1978 due to shoaling.</i>					Pinellas County (2010)
Upham Beach Segment, Pinellas County Shore Protection Project	R144-R146	1980	253,000	Blind Pass	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R138-R142	1983	220,000	Blind Pass	Pinellas County (2010)
Treasure Island Segment, Pinellas County Shore Protection Project	R129-R141	1986	75,000	Blind Pass	Pinellas County (2010)
Long Key Segments, Pinellas County Shore Protection Project	R144-R146 & R160-R165	1991	330,000	Blind Pass	Pinellas County (2010)
Upham Beach Segment, Pinellas County Shore Protection Project	R144-R146	2000	281,000-309,000	Blind Pass	Pinellas County (2010)
Upham Beach Segment, Pinellas County Shore Protection Project	R144-R148	Aug. - Oct. 2010	159,572	Blind Pass	Pinellas County (2010)
Structures:					
Blind Pass North Terminal Groin	R143	1962	0	-N/A-	Pinellas County (2010)
Blind Pass North Terminal Groin Modification	R143	1976	0	-N/A-	Pinellas County (2010)
Blind Pass North Terminal Groin Modification	R143	1978	0	-N/A-	Pinellas County (2010)
Blind Pass North Terminal Groin Modification	R143	1983	0	-N/A-	Pinellas County (2010)
Blind Pass South Terminal Groin	R144	1936-1937	0	-N/A-	Pinellas County (2010)
Blind Pass South Terminal Groin Modification	R144	1974	0	-N/A-	Pinellas County (2010)
Blind Pass South Terminal Groin Modification	R144	1986	0	-N/A-	Pinellas County (2010)
Blind Pass South Terminal Groin Modification	R144	2006	0	-N/A-	Pinellas County (2010)

TABLE B-1

BEACH NOURISHMENT, INLET DREDGING, AND SHORE PROTECTION PROJECTS  
PINELLAS COUNTY, FL

Project	Fill, Dredge Spoil or Structure Location	Dates	Volume (c.y.)	Fill Source	References
LONG KEY (St. Pete Beach):					
Beach Fills:					
Blind Pass Dredge Spoil Placement	R144-R146?	1968	30,000	Blind Pass	EPA (1994), USACE (1984)
Blind Pass Dredge Spoil Placement	R144-R146?	1975	75,000	Blind Pass	USACE (1984)
Upham Beach Segment, Pinellas County Shore Protection Project	R144-R146	1980	243,000	Blind Pass	Pinellas County (2010)
Upham Beach Segment, Pinellas County Shore Protection Project	R144-R146	1986	98,000	Pass-a-Grille Channel	Pinellas County (2010)
Pass-a-Grille Beach Segment, Pinellas County Shore Protection Project	R160-R165	1986	73,000	Pass-a-Grille Channel	Pinellas County (2010)
Upham Beach Segment, Pinellas County Shore Protection Project	R144-R146	1991	223,700	Blind Pass	Pinellas County (2010)
Pass-a-Grille Beach Segment, Pinellas County Shore Protection Project	R160-R165	1991	100,000	Blind Pass	Pinellas County (2010)
Upham Beach Segment, Pinellas County Shore Protection Project	R144-R146	1996	253,000	Egmont Channel Shoal	Pinellas County (2010)
Upham Beach Segment, Pinellas County Shore Protection Project	R144-R146	2000	309,000	Blind Pass	Pinellas County (2010)
Upham Beach Segment, Pinellas County Shore Protection Project	R144-R148	2004	366,000-408,000	Pass-a-Grille Channel	Pinellas County (2010)
Pass-a-Grille Beach Segment, Pinellas County Shore Protection Project	R160-R165	2004	95,000-147,000	Pass-a-Grille Channel	Pinellas County (2010)
Upham Beach Segment, Pinellas County Shore Protection Project	R144-R146	2006	90,000-270,000	Egmont Channel Shoal	Pinellas County (2010)
Upham Beach Segment, Pinellas County Shore Protection Project	R144-R148	Aug. - Oct. 2010	159,572	Blind Pass	Pinellas County (2010)
Structures:					
Groins & Seawall at Pass-A-Grille Beach	R144-R145	1950s	0	-N/A-	USACE (1984)
Upham Beach Bulkhead		1960	0	-N/A-	St. John (2004)
Two King Pile and Panel Groins at Upham Beach		1975	0	-N/A-	USACE (1984)
Upham Beach Geotextile T-Head Groins	R144-R146	2006	0	-N/A-	Pinellas County (2010)
NORTH CHANNEL (PASS-A-GRILLE CHANNEL):					
Dredging:					
Pass-a-Grille Channel Dredging	Not Available	1960	160,000	Pass-a-Grille Channel	USACE (2010)
Pass-a-Grille Channel Dredging (initial federal project)	Not Available	1966	205,650	Pass-a-Grille Channel	USACE (2010)
TI & Long Key Segments, Pinellas County Shore Protection Project	R129-R141 & R144-R146 & R160-R165	1986	520,000	Pass-a-Grille Channel	Pinellas County (2010)
TI & Long Key Segments, Pinellas County Shore Protection Project	R136-R141 & R144-R148 & R160-R165	2004	590,000-728,000	Pass-a-Grille Channel	Pinellas County (2010)
Structures:					
Pass-A-Grille Channel North Terminal Groin	R166	1959	0	-N/A-	Pinellas County (2010)
Pass-A-Grille Channel North Terminal Groin Modification	R166	1962	0	-N/A-	Pinellas County (2010)
Pass-A-Grille Channel North Terminal Groin Modification	R166	1984	0	-N/A-	Pinellas County (2010)
MULLET KEY (Fort DeSoto):					
Fort DeSoto Revetment, Groin, & Beach Fill	R173-R179	1964	138,000	Back barrier bay	Pinellas County (2010), EPA (1994)
Fort DeSoto Beach Fill	R173-R179	1973	700,000	Shore-parallel borrow area	Pinellas County (2010), FDEP (2008)
Fort DeSoto Beach Fill	R173-R179 & R181-R191	1977	1,100,000	Tampa Harbor	FDEP (2008), Taylor (2005), USACE (1984)
2006 Ft. DeSoto Park Beach Restoration & groin rehabilitation	R181-R191	April - June 2006	100,000-350,000	Tampa Shipping Channel	Pinellas County (2010), FDEP (2008)

Sources: Environmental Protection Agency (1994), Coastal and Shoreline Erosion Action Agenda for the Gulf of Mexico, First Generation-Management Committee Report.  
Florida Department of Environmental Protection (FDEP, 2008), Strategic Beach Management Plan for the Southwest Gulf Coast Region  
Hillyer, Theodore M. (1996), Shoreline Protection and Beach Erosion Control Study, Final Report, an Analysis of the U.S. Army Corps of Engineers Shore Protection Program  
Pinellas County (2010), <http://www.pinellascounty.org/environment/coastalMngmt/default.htm>  
St. John, Allysa L. (2004), Characteristics of a Chronically, Rapidly Eroding Beach: Long Key, Pinellas County, Florida, Master's Thesis, University of South Florida.  
Taylor Engineering, Inc. (2005), Regional Sediment Management, Southwest Gulf Coast Regional Sediment Budget  
U.S. Army Corps of Engineers (USACE, 1984), Beach Erosion Control Project Review Study and Environmental Impact Statement for Pinellas County, FL  
U.S. Army Corps of Engineers (USACE, 2010), <http://www.saj.usace.army.mil/Divisions/ProgramProjectMgt/DigitalProjectNotebook.htm>  
U.S. Army Corps of Engineers (USACE, 2011), Environmental Assessment, Sunshine Skyway Cuts (SC-2 and SC-3), Maintenance Dredging with Nearshore Placement  
U.S. Army Corps of Engineers (USACE) / Gulf Engineers & Consultants (GEC) (2011), Final Supplemental Environmental Assessment, Supplemental Sand Source for Sand Key Beach Renourishment  
Walton, Todd L. (1977), Beach Nourishments in Florida and on the Lower Atlantic and Gulf Coasts.

## **APPENDIX C**

### **COMPARISONS OF HISTORIC PHOTOGRAPHS OF PINELLAS COUNTY COASTAL ELEMENTS**



# Honeymoon Island & Caladesi Island



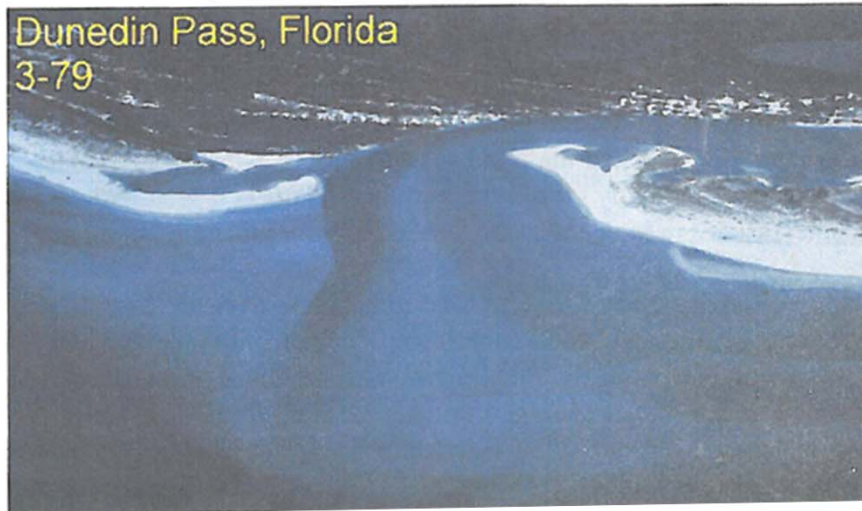
Remains of limestone rubble from 1960s fill project on Honeymoon Island beach (Davis & Elko, 2003)



1989 Honeymoon Island Nourishment with iron stained sands from upland borrow area (Davis & Elko, 2003)



Honeymoon Island (CPE, 2010)



Dunedin Pass in 1979. Channel was migrating north.(Davis & Elko, 2003).

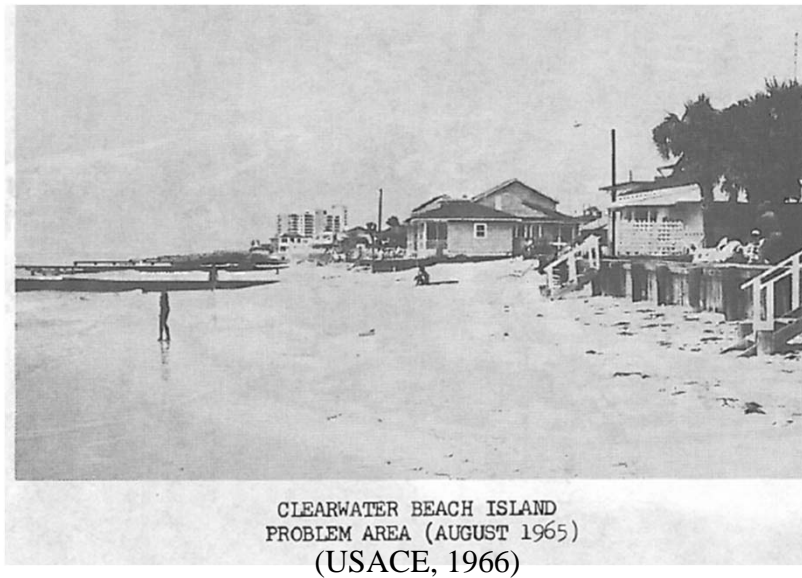


Aerial photo of Dunedin Pass in 1990, two years after closure. Washover is visible in former inlet (Davis & Elko, 2003)



Previous location of Dunedin Pass (PCPA, 2011)

# Clearwater Beach Island



**NORTHERMOST PIER, CLEARWATER BEACH, LOOKING SOUTH  
FEBRUARY 1978  
(USACE, 1980b)**



**700 BLOCK, ELDORADO AVE., CLEARWATER BEACH LOOKING NORTH  
FEBRUARY 1978  
(USACE, 1980b)**



**700 block Eldorado Ave., Clearwater Beach Island 2010 (CPE, 2010)**





CLEARWATER BEACH ISLAND  
MANDALAY PARK (MARCH 1965)  
ADEQUATE BEACH AREA

FIGURE 1

(USACE, 1966)



R41.5, Clearwater Beach Island 2010 (CPE, 2010)





CLEARWATER BEACH ISLAND  
PROBLEM AREA (MARCH 1965)  
(USACE, 1966)



R45, Clearwater Beach Island 2010 (CPE, 2010) R46, Clearwater Beach Island 2010 (CPE, 2010)



R47, Clearwater Beach Island 2010 (CPE, 2010)

# Sand Key



NORTHEND OF SAND KEY, LOOKING SOUTH FEBRUARY 1979  
(USACE, 1980b)



NORTH END OF SAND KEY FEBRUARY 1979  
17  
(USACE, 1980b)

FIGURE 8



North End of Sand Key 2010 (CPE, 2010)



North End of Sand Key 2010 (CPE, 2010)



**CHATEAU APARTMENTS, SAND KEY, LOOKING NORTH  
FEBRUARY 1978**

(USACE, 1980b)



**BELLEVIEW BILLMORE CABANA CLUB, SAND KEY, LOOKING NORTH  
FEBRUARY 1978**

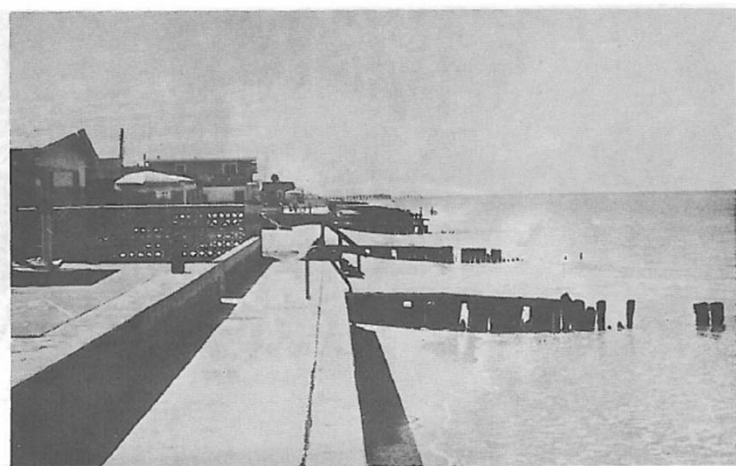
(USACE, 1980b)



**SAND KEY  
FEBRUARY 1979**

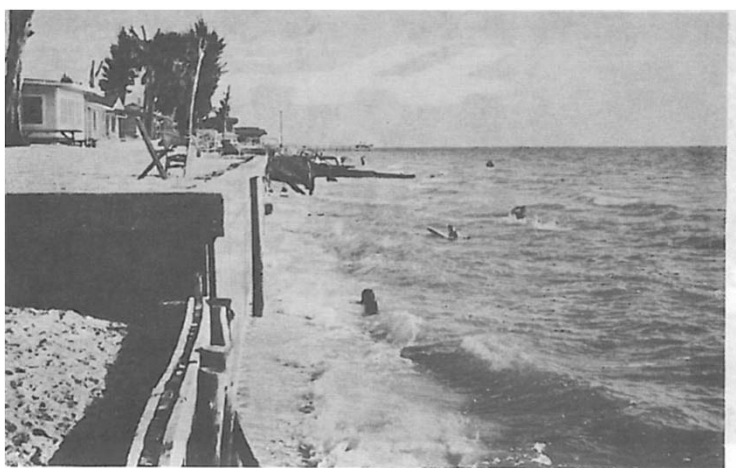
(USACE, 1980b)





SAND KEY  
INDIAN ROCKS BEACH SOUTH SHORE  
PROBLEM AREA (AUGUST 1965)

(USACE, 1966)

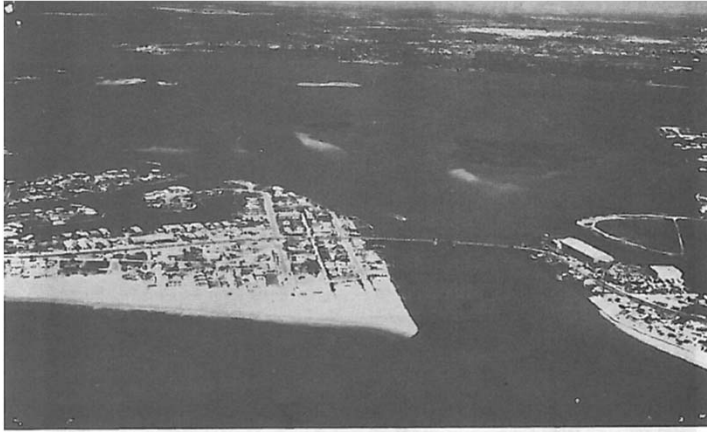


SAND KEY  
INDIAN ROCKS BEACH  
PROBLEM AREA (AUGUST 1965)

FIGURE 2



Indian Rocks Beach, Sand Key 2010 (CPE, 2010) Indian Rocks Beach, Sand Key 2010 (CPE, 2010)



SAND KEY  
MADEIRA BEACH AND CURVED JETTY AT JOHNS PASS  
(MARCH 1965)  
(USACE, 1966)

FIGURE 3

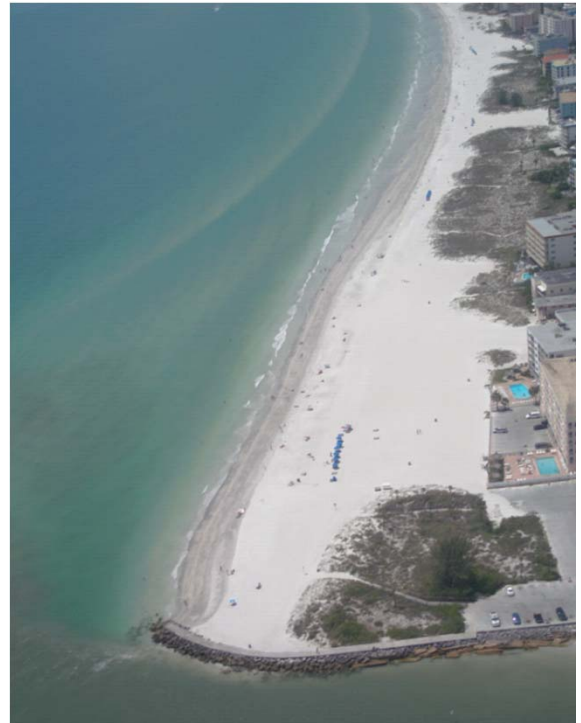


South End of Sand Key 2010 (CPE, 2010)



SOUTH END OF SAND KEY & JOHNS PASS  
FEBRUARY 1979

(USACE, 1980b)



South End of Sand Key 2010 (CPE, 2010)



# Johns Pass



Johns Pass 1942 (Krock, 2005)



Johns Pass 1951 (Krock, 2005)



Johns Pass 1957 (Krock, 2005)



Johns Pass 1969 (Krock, 2005)



TREASURE ISLAND AND JOHNS PASS  
MARCH 1980  
(USACE, 1980b)



Johns Pass 1989 (Krock, 2005)



Johns Pass (PCPA, 2011)

# Treasure Island



Treasure Island 1942 (Krock, 2005)



Treasure Island 2011 (PCPA, 2011)



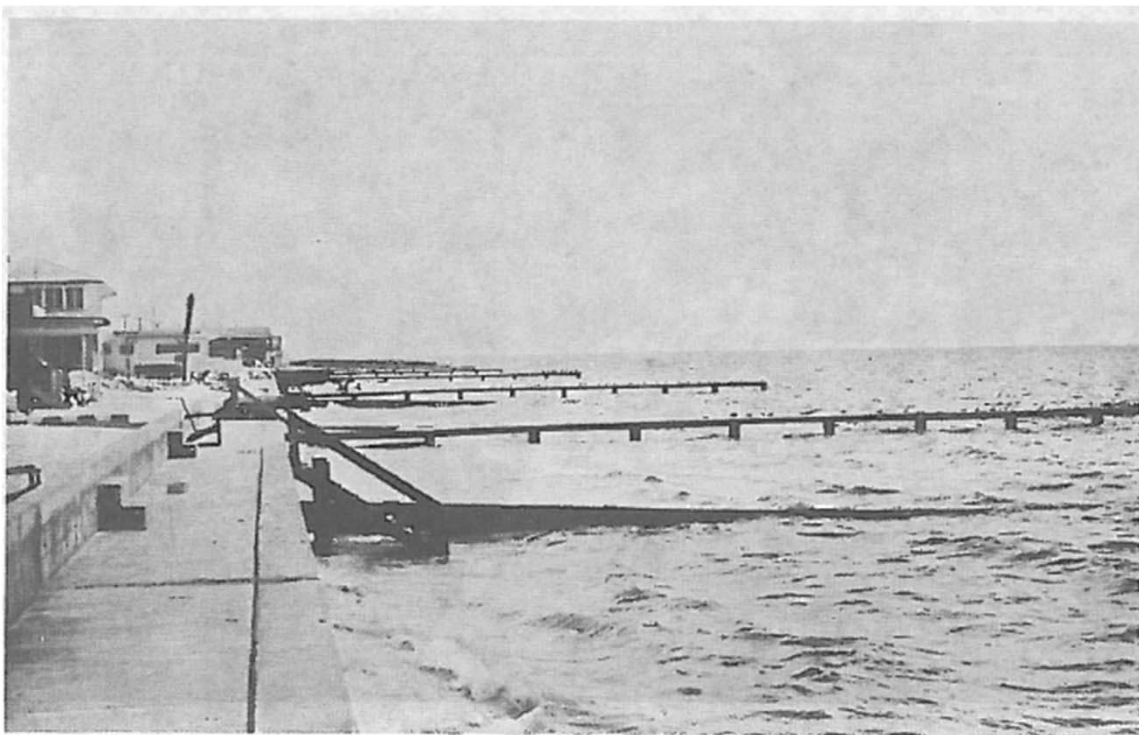


TREASURE ISLAND  
NORTH END TREASURE ISLAND SHOWING VERY GOOD BEACH (MARCH 1965)(USACE, 1966)



Treasure Island 2010 (CPE, 2010)





TREASURE ISLAND  
 PROBLEM AREA AT TREASURE ISLAND (AUGUST 1965)  
 (USACE, 1966)



TREASURE ISLAND  
 PROBLEM AREA AT TREASURE ISLAND PUBLIC BEACH (AUGUST 1965)  
 (USACE, 1966)



Sunset Beach, R137 facing south (January 2, 2012)



**SOUTH END TREASURE ISLAND, LOOKING NORTH  
FEBRUARY 1979**

(USACE, 1980b)



Sunset Beach, R141 to R138 (January 2, 2012)



Sunset Beach, Blind Pass Jetty (January 2, 2012)

# Blind Pass





Blind Pass 1945 (Krock, 2005)



Blind Pass 1960 (Krock, 2005)



Blind Pass 1969 (Krock, 2005)



Blind Pass 1976 (Krock, 2005)



Figure 10a. Aerial Photo – Southern Treasure Island, Blind Pass, Long Key – April 1976. (USACE, 1999)



Figure 10b. Aerial Photo – Near-closure of Blind Pass – December 1978. (USACE, 1999)





Blind Pass 1978 (CPE, 1992)



BLIND PASS

CONDITIONS OF LONG KEY INLET STRUCTURES (1978)  
(USACE, 1978)





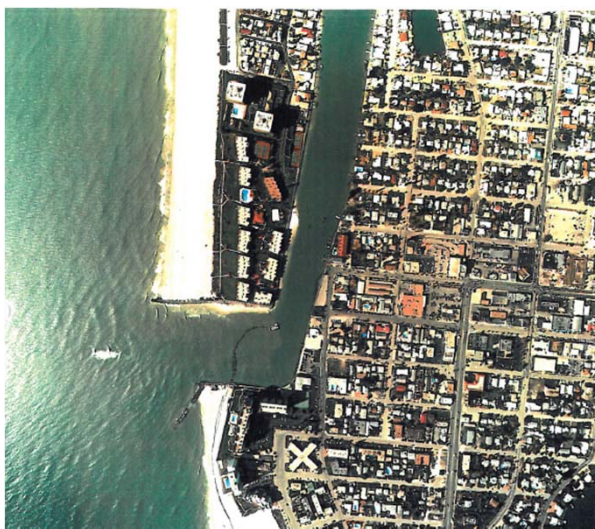
**SOUTH END OF TREASURE ISLAND, BLIND PASS, AND LONG KEY  
MARCH 1980**

(USACE, 1980)

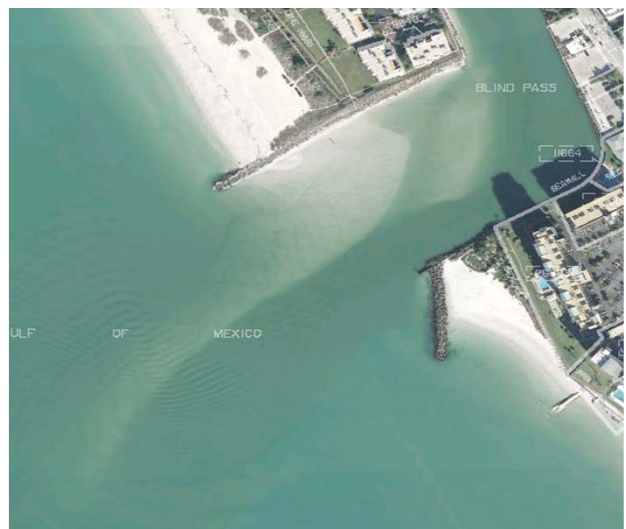


**NORTH END OF LONG KEY, BLIND PASS,  
AND SOUTH END OF TREASURE ISLAND  
MARCH 1980**

(USACE, 1980)

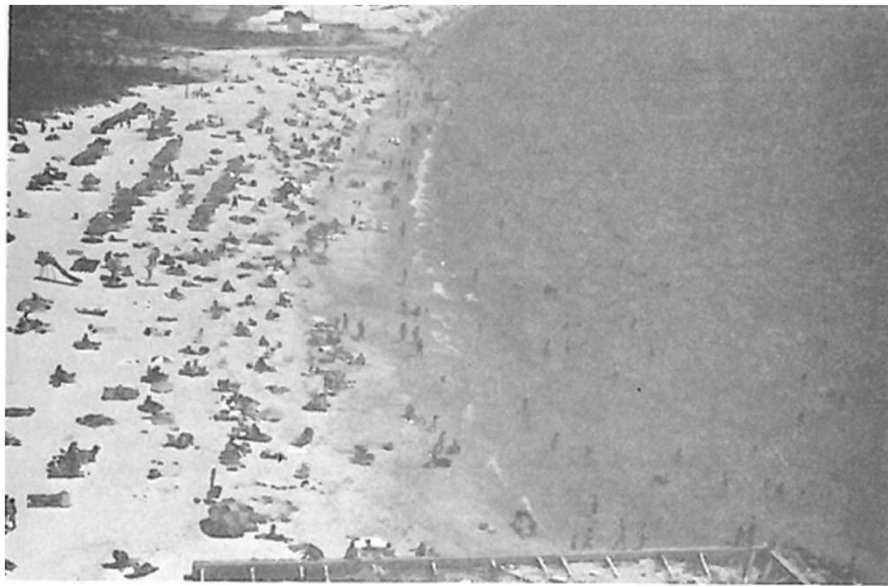


Blind Pass 1991 (CPE, 1992)



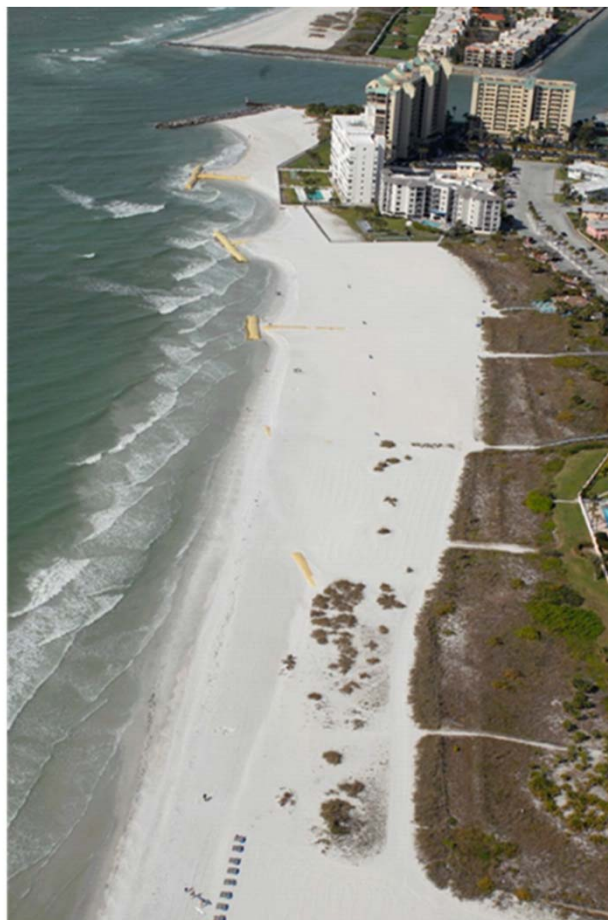
Blind Pass (PCPA, 2011)

Long Key



UPHAM PARK

RECREATIONAL DEMAND AT LONG KEY  
PUBLIC BEACHES - APRIL, 1978 (USACE, 1999)



Upham Beach, R146 to R144 (January 2, 2012)





**NORTH END OF LONG KEY LOOKING SOUTH  
FEBRUARY 1979  
(USACE, 1980)**



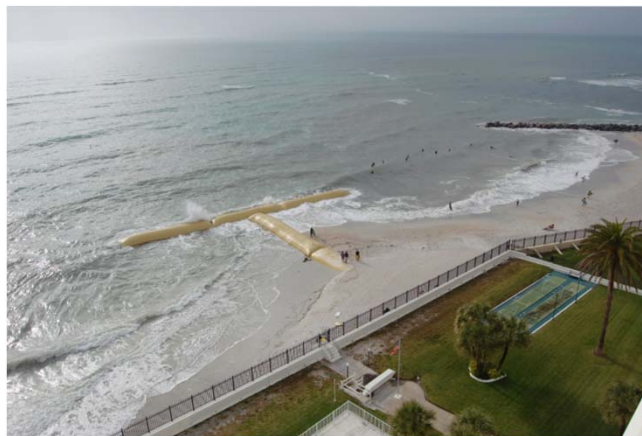
R145, Upham Beach , May 1994 (CPE, 1994)



Upham Beach, Johns Pass Jetty (January 2012)



Upham Beach, R145 (January 2012)



Upham Beach, Johns Pass Jetty (December 2011)



LONG KEY  
PUBLIC BEACH AT ST. PETERSBURG BEACH (AUGUST 1965)  
(USACE, 1966)

FIGURE 5

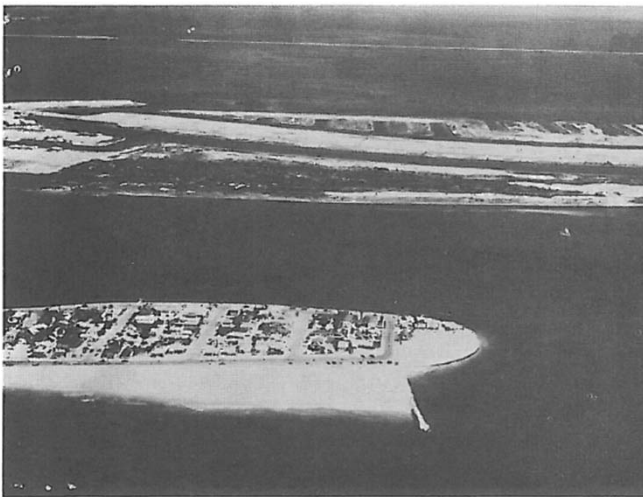


LONG KEY  
PUBLIC BEACH AT ST. PETERSBURG BEACH (AUGUST 1965)  
(USACE, 1966)





Pass-A-Grille 1978 (USACE, 1978)



Pass-A-Grille 1978 (USACE, 1978)

LONG KEY  
ST. PETERSBURG BEACH PUBLIC BEACH AND  
PASS-A-GRILLE JETTY (MARCH 1965)

(USACE, 1966)

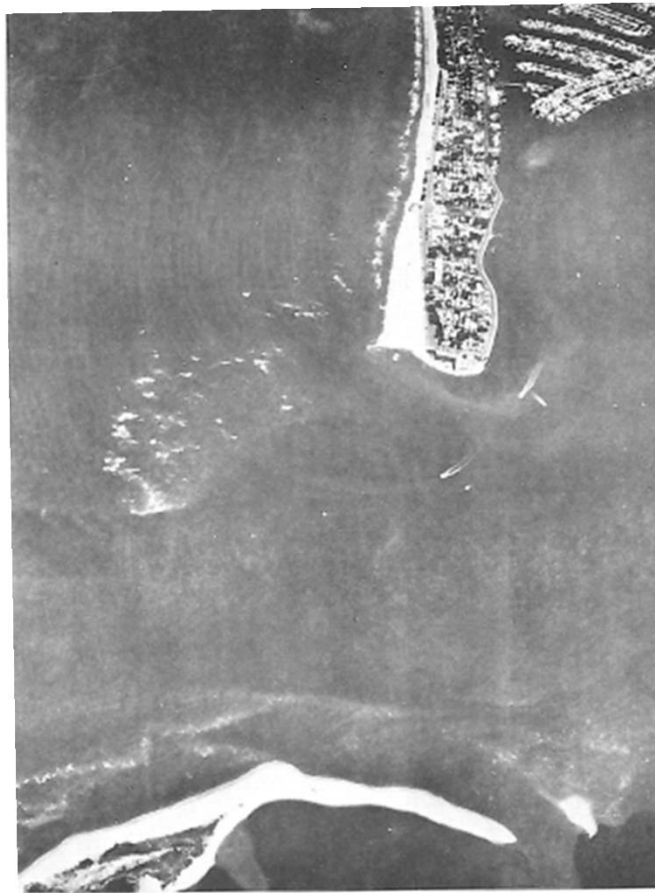


Pass-A-Grille Pass Jetty on Long Key (CPE, 2010)



Pass-A-Grille Pass Jetty on Long Key (CPE, 2010)

# Pass-A-Grille Pass



**SOUTH END OF LONG KEY AND PASS-A-GRILLE PASS  
MARCH 1980 (USACE, 1980)**



Pass-a-Grille Pass (PCPA, 2011)