John's Pass Inlet Management Plan

Division of Water Resource Management

Florida Department of Environmental Protection

January 2018

Final Order Adopting
John's Pass - Inlet Management Plan

WHEREAS in 2008, the Florida Legislature amended Section 161.142, Florida Statutes, finding, "The Legislature recognizes the need for maintaining navigation inlets to promote commercial and recreational uses of our coastal waters and their resources. The Legislature further recognizes that inlets interrupt or alter the natural drift of beach-quality sand resources, which often results in these sand resources being deposited in nearshore areas or in the inlet channel, or in the inland waterway adjacent to the inlet, instead of providing natural nourishment to the adjacent eroding beaches. Accordingly, the Legislature finds it is in the public interest to replicate the natural drift of sand which is interrupted or altered by inlets to be replaced and for each level of government to undertake all reasonable efforts to maximize inlet sand bypassing to ensure that beach-quality sand is placed on adjacent eroding beaches. Such activities cannot make up for the historical sand deficits caused by inlets but shall be designed to balance the sediment budget of the inlet and adjacent beaches and extend the life of proximate beach-restoration projects so that periodic nourishment is needed less frequently."; and

WHEREAS in 2015, the Department of Environmental Protection (Department or DEP) and Pinellas County sponsored an inlet management study of John's Pass performed by the University of South Florida Coastal Research Laboratory (USF-CRL) to compile new and historical data and information regarding its coastal processes and inlet and shoreline dynamics, and update its sediment budget; and

WHEREAS in 2016, the USF-CRL completed the inlet management study for John's Pass, which included recommendations for inlet management alternatives; and

WHEREAS, on December 5, 2017, the Department developed an inlet management plan that contains corrective measures to mitigate the identified inlet erosion impacts to adjacent beaches; and

WHEREAS, Pinellas County and the U.S. Army Corps of Engineers are the entities responsible for the maintenance dredging of the navigation channel at John's Pass, and therefore, responsible for implementation of the inlet management plan; and

WHEREAS, this inlet management plan is consistent with the Department's program objectives under Chapter 161, Florida Statutes,

THEREFORE:

The Department does hereby adopt the following implementation strategies, as set forth in the attached **John's Pass - Inlet Management Plan**. Future inlet management activities shall be consistent with the following four strategies:

1) **A comprehensive beach and inlet hydrographic monitoring program** shall be conducted to evaluate the performance and impact of existing sand bypassing and nourishment projects and to periodically update the inlet sediment budget.

2) **Sand bypassing shall be performed by transferring beach compatible material from the John's Pass navigation channel, channel side borrow area, and ebb shoal borrow areas to the adjacent designated critically eroded gulf-fronting beaches to the south of the inlet, giving first priority to the eroding segment between DEP Range Survey Monuments R126 and R130, and second priority to the southern Treasure Island beaches between R135 and R143.** The quantity of fill to be placed shall be based on observed beach erosion patterns and quantities within the areas of inlet influence documented through the monitoring protocol of Strategy #1 above.

3) **The initial target inlet sand bypassing quantity shall be 21,000 cubic yards per year to Sunshine Beach south of the inlet (R126-R130).** This target quantity may be modified based on a minimum of four years of monitoring indicating a change in the sediment budget. In the interim, should the volume of sand accumulating in the John's Pass navigation channel, channel side borrow area, or ebb shoal borrow area exceed these quantities, the additional sand may be dredged and placed on the southern Treasure Island beaches to extend the life of the Treasure Island beach restoration project.

4) **The source of sediment for meeting the target sand bypassing quantity in Strategy #3 above shall be the John's Pass navigation channel and the channel side borrow area.** Acceptable beach quality sand may also be obtained from the 2010 ebb shoal borrow area or the alternate ebb shoal borrow area immediately landward of the 2010 ebb shoal borrow area as described in the inlet management study alternative 3.

Inlet management actions that implement the strategies contained in this plan are subject to further evaluation, and subsequent authorization or denial, as part of the Department's permitting process.

Activities that implement these adopted strategies shall be eligible for state financial participation pursuant to Section 161.143, Florida Statutes, subject to Department approval and an appropriation from the Florida Legislature. The level of State funding shall be determined based on the activity being conducted and the Department's rules. The Department may choose not to participate financially if the proposed method of implementation is not cost effective or fails to meet the intent of Section 161.142, Florida Statutes, and this final order. Nothing in this plan precludes the evaluation and potential adoption of other strategies for the effective management of John's Pass and the adjacent beaches.

Execution of this Final Order constitutes agency action. Any Florida corporation not for profit which meets the requirements of Subsection 403.412(6), Florida Statutes, and any person whose substantial interests will be determined or affected by the Final Order may petition the Department for a formal or informal administrative hearing pursuant to Section 120.569 or 120.57, Florida Statutes, as set forth in the attached Notice of Rights, to challenge the provisions of this Final Order.

If the Department proposes to issue a permit that implements the strategies in this Final Order, any Florida corporation not for profit which meets the requirements of subsection 403.412(6), Florida Statutes, and any person whose substantial interests will be determined or affected by the proposed permit may petition the Department for a formal or informal administrative hearing pursuant to Section 120.569 or 120.57, Florida Statutes, as set forth in the Notice of Rights attached to the permit. The scope of a challenge to a permit approval or denial is limited to whether the agency action complies with the permitting criteria. Agency action previously subject to challenge or administrative review will not be subject to challenge at the time of permit approval or denial.

Approval of Adoption

Alex Reed

Alex Reed
Deputy Director of Division of Water Resource Management
Florida Department of Environmental Protection

Filing and Acknowledgement

FILED, on this date with the designated Department Clerk, pursuant to

Section 120.52, F.S., receipt of which is hereby acknowledged.

Kira Carmichael

Deputy Clerk

1/31/2018

Date

Notice of Rights

This Order is final and effective on the date filed with the clerk of the Department unless a petition is filed in accordance with the paragraphs below or unless a request for extension of time in which to file a petition is filed within the required timeframe and conforms to Rule 62-110.106(4), F.A.C. Upon timely filing of a petition or a request for an extension, this Order will not be effective until further Order of the Department.

A person whose substantial interests are affected by this Order may petition for an administrative proceeding (hearing) in accordance with sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received) with the Agency Clerk for the Department of Environmental Protection, at Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000, or by electronic mail at: Agency_Clerk@dep.state.fl.us, within 21 days of receipt of this Notice. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under sections 120.569 and 120.57 of the Florida Statutes. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-106.205, F.A.C.

A petition must contain the following information:

(a) The name and address of each agency affected and each agency's file or identification number, if known;

(b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination;

(c) A statement of how and when the petitioner received notice of the agency decision;

(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;

(e) A concise statement of the ultimate facts alleged, including the specific facts which petitioner contends warrant reversal or modification of the Department's action;

(f) A statement of the specific rules or statutes the petitioner contends requires reversal or modification of the Department's action, including an explanation of how the alleged facts relate to the specific rules or statutes; and

(g) A statement of the relief sought by petitioner, stating precisely the action that the petitioner wants the Department to take.

A petition that does not dispute the materials facts on which the Department's action is based shall state that no such facts are in dispute and otherwise contain the same information as set forth above, as required by Rule 28-106.301, F.A.C.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any such final decision of the Department on the petition have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

When the Order is final, any party to the Order has the right to seek judicial review of the Order pursuant to section 120.68 of the Florida Statutes, by filing a Notice of Appeal pursuant to Rule 9.110 of the Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000; and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within 30 days from the date when the final order is filed with the Clerk of the Department.

John's Pass in Pinellas County, Florida.
Photo courtesy of Paul Miselis, P.E., Public Works of Pinellas County, August 6th, 2017.

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Introduction

Pursuant to Subsection 161.101(2), Florida Statutes, the Florida Department of Environmental Protection (Department or DEP) is the beach and shore preservation authority for the State of Florida. As part of the Department's statewide beach management plan, adopted pursuant to Section 161.161, Florida Statutes, the Department is adopting this inlet management plan for John's Pass in Pinellas County, Florida.

John's Pass - Inlet Management Plan updates the strategies for John's Pass previously adopted in the Strategic Beach Management Plan (DEP, 2015), to be consistent with current statutes and observed erosion[1] conditions. As a first step towards adoption of this inlet management plan, in 2014-16, the Department and Pinellas County sponsored a study of John's Pass, performed by the University of South Florida Coastal Research Laboratory (USF-CRL), to compile new and historical data and information regarding beach and inlet changes and the dynamic coastal littoral processes in this area, and to develop an updated sediment budget.

Program Objectives and Statutory Responsibilities for Inlet Management

In 2008, the Florida Legislature amended Section 161.142, Florida Statutes, finding:

> "It is in the public interest to replicate the natural drift of sand which is interrupted or altered by inlets to be replaced and for each level of government to undertake all reasonable efforts to maximize inlet sand bypassing to ensure that beach-quality sand is placed on adjacent eroding[1] beaches. Such activities cannot make up for the historical sand deficits caused by inlets but shall be designed to balance the sediment budget of the inlet and adjacent beaches and extend the life of proximate beach-restoration projects so that periodic nourishment is needed less frequently."

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[1] As used in this document, the term "erosion" means wearing away of land or the removal of consolidated or unconsolidated material from the coastal system by wind or wave action, storm surge, tidal or littoral currents or surface water runoff. As used in this document, the term "accretion" means the buildup of land or accumulation of unconsolidated material within the coastal system caused by wind and wave action, storm surge, or tidal or littoral currents. The descriptions of coastal processes in this document are not intended to affect title to real property or real property boundaries.

Pursuant to Section 161.143, Florida Statutes,

> "Studies, projects and activities for the purpose of mitigating the erosive effects of inlets and balancing the sediment budget on the inlet and adjacent beaches must be supported by separately approved inlet management plans or inlet components of the statewide comprehensive beach management plan."

The U.S. Army Corps of Engineers (USACE) and Pinellas County have been the entities responsible for maintenance dredging the John's Pass navigation channel and ebb shoal borrow area, and consequently, mitigating the extent of beach erosion caused by the inlet, as specified in Subsection 161.142 (6), Florida Statutes.

History of John's Pass (Mehta et al, 1976; USCOE, 1966; Wang et al, 2016)

John's Pass is located in Pinellas County on the southwest Gulf of Mexico coast of Florida, separating the barrier islands of Sand Key to the north and Treasure Island to the south (*Figure 1*).

The inlet connects the Gulf of Mexico to Boca Ciega Bay. The history of John's Pass, its geomorphological evolution and prior inlet management activities, and beach erosion control activities along the adjacent beaches add perspective on the inlet's dynamics and the need to change inlet management strategies over time. Growing demands for small craft navigation between interior tidal waters and the gulf require ongoing maintenance of deeper navigable depths through the inlet; hence, sediment management has become essential to offset the erosion of the adjacent beaches caused by navigation improvements.

A severe hurricane in September 1848 opened John's Pass, which was named for a local fisherman and citrus grower, John Levique. For the two-inlet system (John's Pass and Blind Pass) connecting Boca Ciega Bay to the Gulf of Mexico, John's Pass has been the hydraulically dominant inlet transporting between 70 and 80 percent of the tidal prism that flows into and out of Boca Ciega Bay. This tidal dominance has likely resulted in the hydraulic stability as well as the geomorphological stability of the inlet, as John's Pass has not experienced any significant migration in its location since its opening.

Figure 1. John's Pass in Pinellas County, FL.
Photo courtesy of the Southwest Florida Water Management District (SWFWMD).

Natural fluctuations in shoreline position along southern Sand Key and northern Treasure Island have been observed in the historical record of aerial photography, beach profiles, and shoreline surveys (*Figure 2*). Beach erosion control activities on Treasure Island and Sand Key have been conducted since 1934, and include shore-protection structures, beach restoration and nourishment, and inlet sand bypassing.

***Figure* 2.** Historical aerial photos of John's Pass from 1926 to 2010. Various sources: U.S. Department of Commerce; Florida Department of Transportation; USF-CRL.

The first structural influence on John's Pass was the construction of a bridge across the inlet in 1926. In 1934, two 150-foot groins were constructed on Madeira Beach to the north. In 1957, the City of Madeira Beach constructed a groin field of 37 groins along the entire city, which still exists today.

In 1960, 94,000 cubic yards of sand were dredged from John's Pass, and placed 2,000 feet offshore on the inlet's ebb shoal to the south of the inlet channel. In 1960, the University of Florida, Coastal and Oceanographic Engineering Laboratory studied erosion at Madeira Beach to the north of John's Pass, and recommended that a jetty be constructed north of the inlet. In 1961, a 460-foot curved jetty was constructed on the north side of John's Pass, and 30,000 cubic yards of sand dredged from John's Pass were placed on Madeira Beach to the north of the inlet. Placement of material over the John's Pass ebb shoal was conducted in 1960, and led to the formation of O'Brian's lagoon when the berm emerged and migrated shoreward attaching to Treasure Island. This resulted in the widening of Sunshine Beach. Note the emerged shoal developed from ebb shoal dredge disposal shown in the 1970 photo from *Figure 2*.

Section 107 of the 1964 River and Harbor Act authorized a federal navigation channel at John's Pass with the following dimensions: 10-feet-deep by 50-feet-wide across the outer bar, 8-feet-deep by 100-feet-wide through the inlet, and 6-feet-deep by 100-feet-wide between the inlet and the Intracoastal Waterway. The excavation of the federal navigation channel was completed in 1966, with the excavation of 95,000 cubic yards of sand that was placed in an offshore spoil area south of the dredged channel. Also in 1966, a 920-foot long revetment was constructed along the south shoreline of the inlet.

In 1968, the Board of Trustees for the Internal Improvement Trust Fund of the State of Florida granted the USACE an easement to conduct a beach restoration project on Treasure Island. The beach restoration project was constructed by the USACE in 1969, and included the placement of 790,000 cubic yards of beach fill along the gulf shoreline between range monuments R132 and R141, or from 104th Avenue to 77th Avenue. Approximately 108,000 cubic yards of sand was dredged from Blind Pass and spread along southern Treasure Island. The remainder was obtained from borrow pits located immediately offshore.

From 1969 to date, excavation of sand from the John's Pass navigation channel and ebb shoal, with placement of the sand along the adjacent beaches has been the principle management activity. From 1981 to date, John's Pass has been dredged on seven occasions, and the sand has been placed on Sand Key (Redington Shores and North Redington Beach) once, on Sunshine Beach (R126-R130) four times, and on Sunset Beach (R136-141) twice. The currently authorized navigation channel, the ebb shoal, and channel side borrow areas (*Figure 3*), were the areas dredged in 2010, and analyzed in the inlet management study by USF-CRL.

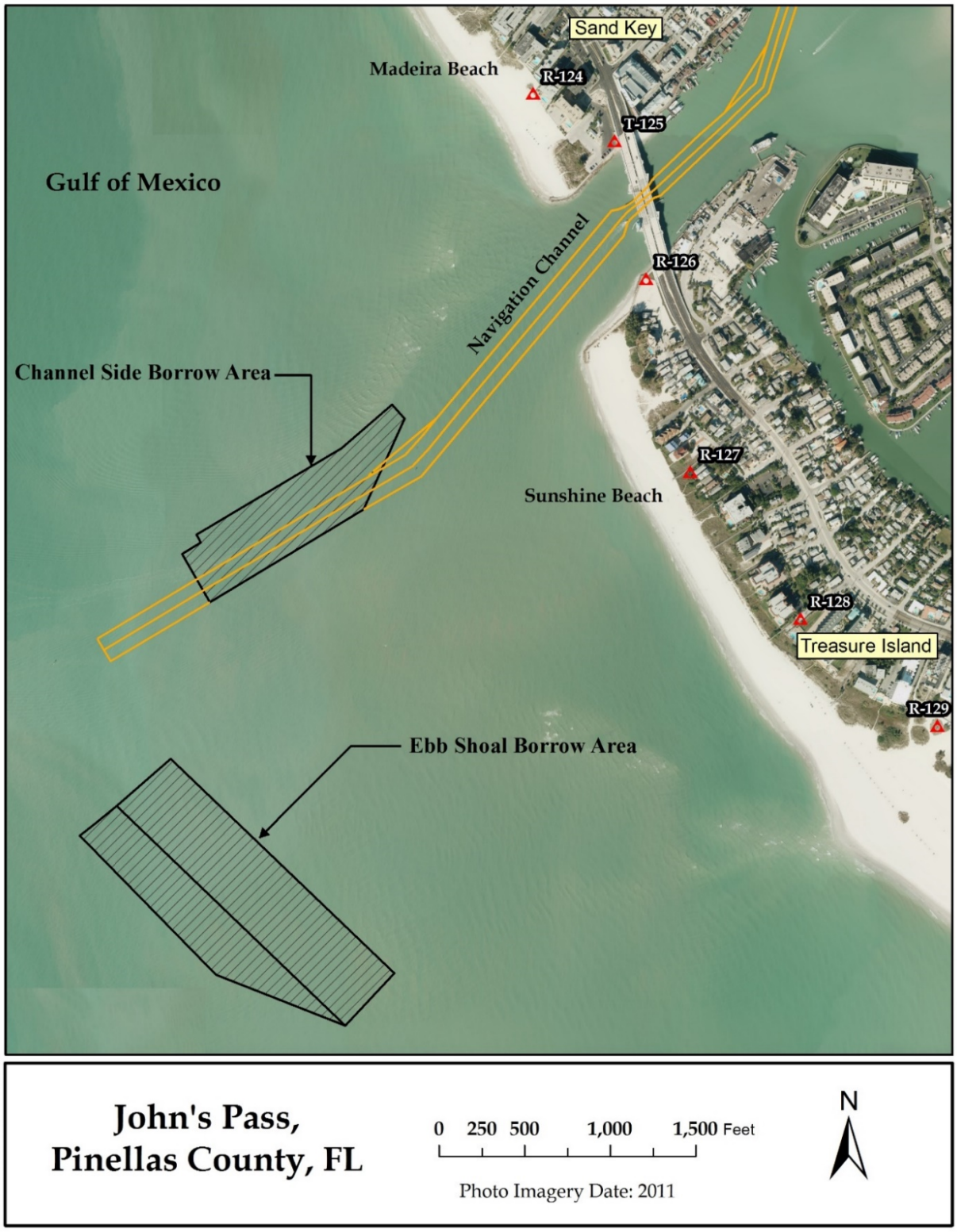

Figure 3. The authorized navigation channel, ebb shoal and channel side borrow areas for John's Pass. 2011 aerial photo courtesy of the SWFWMD.

Table 1 provides a list of the recent dredging projects at John's Pass, as well as other dredging projects with borrow areas located at the ebb shoals of John's Pass, Pass-a-Grille, and Egmont Channel, that had fill placements on Sunshine Beach.

Table 1. Sand Placement on Sand Key and Treasure Island
(Wang et al., 2016; data from USACE)

Year	Volume (cubic yards)	Sand Source	Placement Location (by R-monument and Beach)
1969	790,000	Blind Pass and Offshore	R132-R141 Sunset Beach, Treasure Island
1971	75,000	Offshore	R131-R132 Mid Beach, Treasure Island
1976	380,000	Offshore	R135-R142 Sunset Beach
1981	53,500	John's Pass	R127-R130 Sunshine Beach
1986	550,000*	Pass-A-Grille's ebb shoal	R129-R141 Treasure Island
1988	300,000	John's Pass Channel and Ebb Shoal	R99-R107 North Redington Beach, Sand Key
1991	56,000	John's Pass	R127-R129 Sunshine Beach
1996	51,300	West Egmont Shoal	R138-R144 Sunset Beach
2000	348,722	Blind Pass and John's Pass	R136-R144 Sunset Beach
2000	40,000	Blind Pass and John's Pass	R126-R129 Sunshine Beach
2006	77,970	West Egmont Shoals	R126-R128 Sunshine Beach
2006	106,302	West Egmont Shoals	R136-R141 Sunset Beach
2010	127,260	John's Pass Channel and Ebb Shoal	R126-R128 Sunshine Beach

Year	Volume (cubic yards)	Sand Source	Placement Location (by R-monument and Beach)
2010	125,423	John's Pass Channel and Ebb Shoal	R136-R141 Sunset Beach
2014	66,892	East Egmont Shoals	R126-R128 Sunshine Beach
2014	232,407	East Egmont Shoals	R136-R141 Sunset Beach

*Emergency beach nourishment event in 1986 due to Hurricane Elena (1985). Source: U.S. Army Corps of Engineers

In 1985, Labor Day's Hurricane Elena and Halloween's Tropical Storm Juan each lingered in the Gulf for multiple days causing storm erosion of area beaches. In 1986, the U.S. Congress responded with post-storm emergency funding resulting in the USACE excavating sand from the Pass-a-Grille ebb shoal and placing the material along Treasure Island between reference monuments R129 and R141. The north jetty at John's Pass was reconstructed in 1987. A south jetty was constructed for John's Pass at the north end of Treasure Island in 2000 to mitigate the chronic erosion occurring at Sunshine Beach.

Inlet Management Study

In 2014, the Department contracted with the University of South Florida, Coastal Research Laboratory (USF-CRL), to conduct an inlet management study of John's Pass and Blind Pass. Both inlets were jointly investigated because the tidal prism of each inlet overlaps within Boca Ciega Bay to create a multi-inlet hydrodynamic system between the gulf and the bay. The goals of this study were to provide an updated sediment budget for John's Pass and Blind Pass, and to identify and quantify the sediment pathways to update the respective inlet management plans pursuant to Section 161.142, Florida Statutes. The study, which was completed in 2016, also provided an evaluation of alternative inlet management implementation strategies. A Technical Advisory Committee (TAC) was created to provide technical guidance to USF-CRL during the course of the study. The TAC was composed of representatives of the Department, the USACE, Pinellas County and the County's consultant.

In this study, the USF-CRL built, calibrated and verified a Coastal Modeling System (CMS) model of John's Pass and Blind Pass and the surrounding aquatic systems. The CMS model, developed by the USACE, is a widely used numerical model for evaluating inlets. As recommended by the TAC for the

study, seven alternative inlet management strategies were evaluated using the CMS model, as reported by Wang et al. (2016).

All seven alternatives evaluated in this study apply to John's Pass and are discussed below. The following factors were considered in the evaluation of the seven inlet management alternatives for John's Pass: (1) potential influence on the wave field in the vicinity of the inlet; (2) potential influence on tidal flow patterns; (3) potential influence on erosion or accretion trends along the adjacent beaches; (4) potential influences on erosion and deposition patterns in the channel; (5) potential influences on erosion and deposition patterns over the ebb shoal, and therefore, sand bypassing; and (6) for alternatives, including dredging, the in-filling rate, and resulting dredging interval.

Alternative 1: Maintain present bathymetry.

Alternative 1 provides baseline conditions for comparison with the various management alternatives, as shown in ***Figure 4***. Alternative 1 is the baseline simulation based on the detailed bathymetry surveyed in 2014, which includes the partially filled dredge pits at both John's Pass excavated in 2010, as well as the newly constructed beach fill (in 2014) at Sunshine Beach and Sunset Beach at the two ends of Treasure Island. Based on time-series bathymetry surveys, the channel excavation pit from the 2010 dredging project at John's Pass received roughly 28,800 cubic yards per year of sand. The offshore dredge pit received about 3,500 cubic yards per year of sand over the budget period from October 2010 to June 2014. However, the infilling rate in the John's Pass channel pit was 50,200 cubic yards per year during the first year and was about 21,600 cubic yards per year during the following years. Considering the time-varying infilling rate, the 152,000-cubic-yard dredge pit would take 5.7 years to fill. This suggests a dredging cycle of six years.

Figure 4. Initial bathymetry illustrating the present conditions at John's Pass (Wang et al., 2016).

<u>Alternative 2</u>: Dredging the northern portion of John's Pass ebb shoal and filling the old dredge pit offshore of Sunset Beach.

The nearshore area of the northern half of the John's Pass ebb shoal has a large quantity of beach quality sand. Alternative 2 analyzed the potential for filling the old dredge pit offshore (B-B') of Sunset Beach to mitigate the local erosion problem in that vicinity. Overall, the CMS model predicted that the Alternative 2 proposed excavation (A-A' in *Figure 5*) would have a significant negative influence on the beach processes directly north of the inlet. The influence along Sunshine Beach to the south was not considered significant. The excavation would also have a significant influence on tidal flow patterns through the main channel between the barrier islands, as well as the northern portion of the ebb shoal. Filling the old dredge pit offshore of Sunset Beach did not significantly affect beach processes at either Sunset Beach or Upham Beach, north and south of Blind Pass, and therefore the hypothesized beneficial effects were not observed in the model. Because Alternative 2 was shown to cause negative effects to the beach and coastal processes north of John's Pass, and was not shown to benefit the beach conditions at Sunset Beach, Alternative 2 is not recommended as a management strategy.

Figure 5. Bathymetry for the Alternative 2 model run. A dredge pit (A-A') is excavated at the channel margin linear bar just north of the John's Pass navigation channel. The sand is placed in an old dredge pit (B-B') seaward of Sunset Beach (Wang et al., 2016).

<u>Alternative 3</u>: Dredging John's Pass south bypass bars with berm nourishment offshore of Sunshine Beach.

The seaward fringe of the John's Pass ebb shoal has relatively finer sediment. A potential application of the sediment for nearshore nourishment is investigated in Alternative 3, and involves dredging a borrow pit along the south lobe of the ebb shoal immediately landward of the 2010 borrow area (A-A') and placing a submerged nearshore berm (B-B') along Sunshine Beach (*Figure 6)*. The CMS model predicted slow filling of the dredge area and landward migration of the nearshore berm that would eventually attach to and widen the beach. Alternative 3 had considerable localized effects on wave

conditions. Westerly approaching waves were shown to be reduced over the dredge pit and over the distal portion of the main channel, while the nearshore berm functioned as a submerged breakwater and significantly reduced the wave heights landward of the nearshore berm. The Alternative 3 ebb shoal dredge area showed potential for direct beach placement or nearshore placement, as an additional sediment source beyond dredging the channel. However, the ebb shoal dredge pit was shown to take 10 to 20 years to re-fill, and therefore, its use would be limited.

Figure 6. Alternative 3 showing the dredge pit (A-A') and the berm nourishment (B-B') (Wang et al., 2016).

<u>Alternative 4</u>: Re-dredge 198,000 cubic yards of sand from the John's Pass 2010 navigation channel and the channel side borrow area dredge footprint down to -16.7 ft., NAVD 88, and re-dredge 179,000 cubic yards of sand from the Blind Pass 2010 entrance channel borrow area to -16.7 ft. NAVD 88.

Alternative 4 involves the continuation of periodic dredging of 198,000 cubic yards of sand every five to ten years from the 2010 John's Pass dredging template, in conjunction with a continuation of periodic dredging of 179,000 cubic yards of sand every four to five years from the 2010 Blind Pass dredging template. The model evaluates re-dredging the John's Pass channel side borrow area that was dredged in 2010, as shown in *Figure 7*. The dredging would effectively widen and deepen the navigational channel at the channel side borrow area. The CMS

model predicted modest influence on the tidal flow patterns through the navigational channel. The study results determined that the dredge area would re-fill in 5.7 years and therefore would have a six-year maintenance dredging requirement. The dredging also had a minor influence on the nearshore wave field along the adjacent beaches. Therefore, Alternative 4 does not have a significant influence on the processes along the adjacent beaches. Alternative 4 would effectively widen and deepen the John's Pass navigational channel at the channel side borrow area. The Department's Joint Coastal Permit #0270453-001-JC states that the John's Pass channel is authorized to be dredged to a maximum depth of -14.9 ft. NAVD 88. Given the lack of negative effects on adjacent beaches and the continuous re-filling of the dredge area on an interval of six years, Alternative 4 is recommended as the dredging management option for John's Pass.

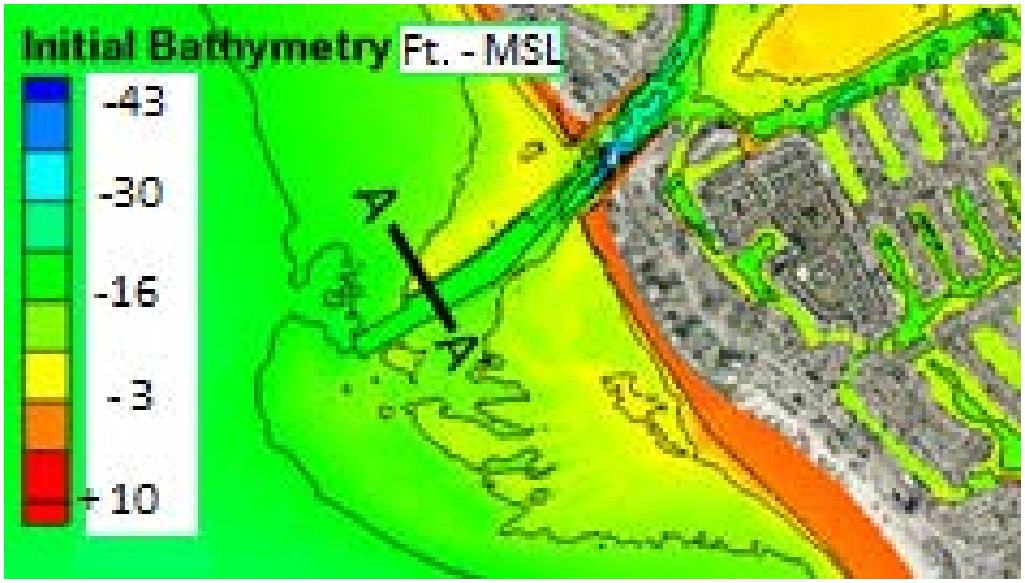

Figure 7. Alternative 4 showing the navigation entrance channel and channel side borrow area for John's Pass.

<u>Alternative 5</u>: Extend the south jetty at John's Pass.

Alternative 5 investigates the potential of extending the south jetty 230 feet, and does not involve any dredging or fill placement (*Figure 8*). Alternative 5 was determined to have minimal influence on the hydrodynamics and morphodynamics of the inlet and adjacent beaches. Because Alternative 5 was determined to have minimal influence in stabilizing Sunshine Beach, the south jetty extension is not recommended as an inlet management option. Its cost cannot be justified by its minimal benefits.

Figure 8. Alternative 5 illustrating an extension of the south jetty (Wang et al., 2016). The 2011 aerial photo is courtesy of the SWFWMD.

<u>Alternative 6</u>: Extend both jetties at John's Pass.

Alternative 6 investigates a structural option to include lengthening both the north and south jetties by 230 feet, and like Alternative 5, does not involve any dredging or fill placement (*Figure 9*). The model predicted modest accretion of the beaches immediately adjacent to John's Pass, due to the impoundment of sand by the extended jetties. The extended jetties had little influence on the wave field of John's Pass, but they had a significant influence on the flow field seaward of the jetties. The jetty extensions create a longer channel for ebb flow, which results in an ebb jet that extends farther seaward. The enhanced ebb flow jet may have a temporary influence on sand bypassing around the ebb shoal.

With the impoundment of sand at Sunshine Beach, there are potential negative impacts on beaches farther to the south of the inlet. Alternative 6 is not recommended because the benefits do not appear to justify the high cost of jetty construction, and because of the uncertainties associated with the beaches down-drift of the impoundment fillet.

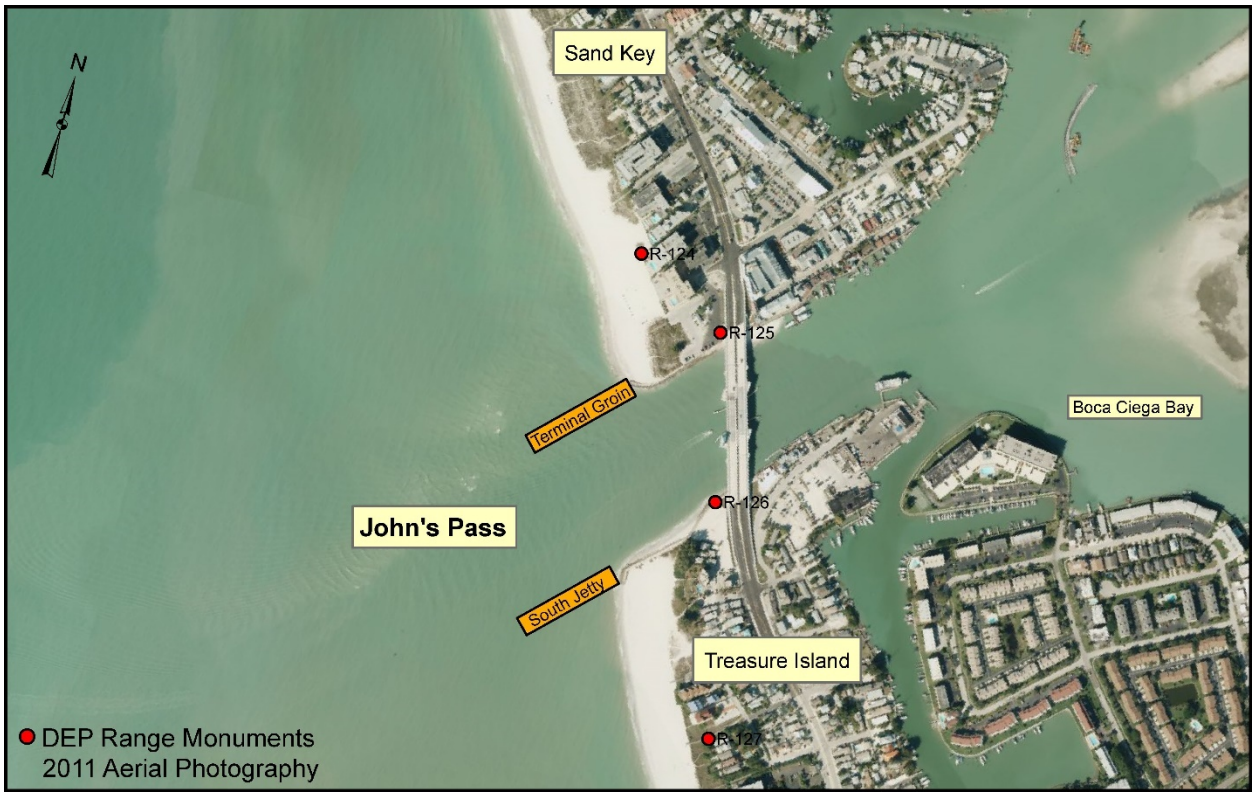

Figure 9. Extension of both jetties in Alternative 6 (Wang et al., 2016). The 2011 aerial photo is courtesy of the SWFWMD.

<u>Alternative 7</u>: Dredging John's Pass main channel and placing the sand as berm nourishment offshore of Sunshine Beach.

Alternative 7 investigates the option of dredging the John's Pass main channel and placing the sand as a nearshore berm at Sunshine Beach instead of typical on-shore beach placement (*Figure 10*). Alternative 7 had the same dredge area and response as modelled in Alternative 4. The model predicted the onshore migration of the nearshore berm at Sunshine Beach. The shape of the nearshore berm evolved from a straight shape to a curved shape with the ends migrating further shoreward, similar to the evolution of O'Brien's Lagoon in the 1970s. Significant wave-height reduction was predicted at and landward of the nearshore berm, and Sunshine Beach was protected from excessive erosion.

Alternative 7 resulted in the benefits shown in Alternatives 3 and 4, and is recommended as an option when the John's Pass channel is in need of a maintenance dredging, but beach nourishments are not needed at the adjacent beaches.

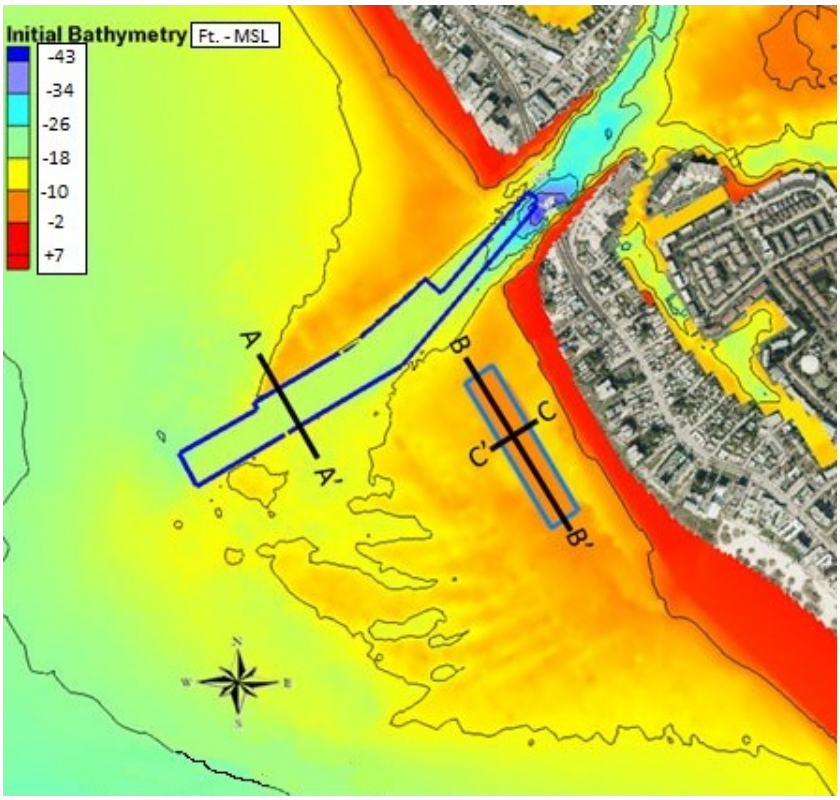

Figure 10. Input bathymetry for the Alternative 7 case with channel dredging at John's Pass and berm placement at Sunshine Beach (Wang et al., 2016).

Updated Sediment Budget through 2015 (Wang et al, 2016)

Pursuant to Section 161.142, Florida Statutes, dredging within an inlet system, including its shoals, should result in the placement of all beach quality sand on adjacent eroding beaches to balance the sediment budget between the inlet and adjacent beaches. A sediment budget is a balance of the volumes (or volume rate of change) for sediments entering and leaving a tidal inlet system and its adjacent beaches. A sediment budget quantifies the natural longshore sediment transport by waves and tides to and from the inlet, the entrapment of longshore sediment by the inlet channel and the ebb and flood shoals, and the mechanical "bypassing" of sediment, typically by a hydraulic dredge, from the inlet to the adjacent beaches or nearshore. Sediment transport volumes and pathways are unique to each inlet as influenced by regional geology, morphological characteristics, wave and tide conditions, and sediment characteristics and supply. A sediment budget is determined by comparing two or more surveys of an inlet system, including its channel, ebb and flood shoals, and the adjacent beaches. The inlet

management study for John's Pass conducted an updated hydrographic survey in 2014 of the inlet system (*Figure 11*) to compare with a prior survey from 2010, and developed a sediment budget using the methodology described by Rosati (2005).

Inlet sediment management requires implementation of sediment bypassing protocols that are based on the latest available data and analysis in developing a balanced sediment budget. An updated sediment budget for John's Pass was developed for the period between 2010 and 2014, after the last dredging at both John's Pass and Blind Pass in 2010 and associated beach nourishment on Treasure Island and Long Key, and before the beach nourishments on Treasure Island and Long Key in 2014 (Wang et al., 2016). In addition, Sand Key beach to the north of John's Pass and Blind Pass were nourished in 2012 using sand from an offshore borrow area.

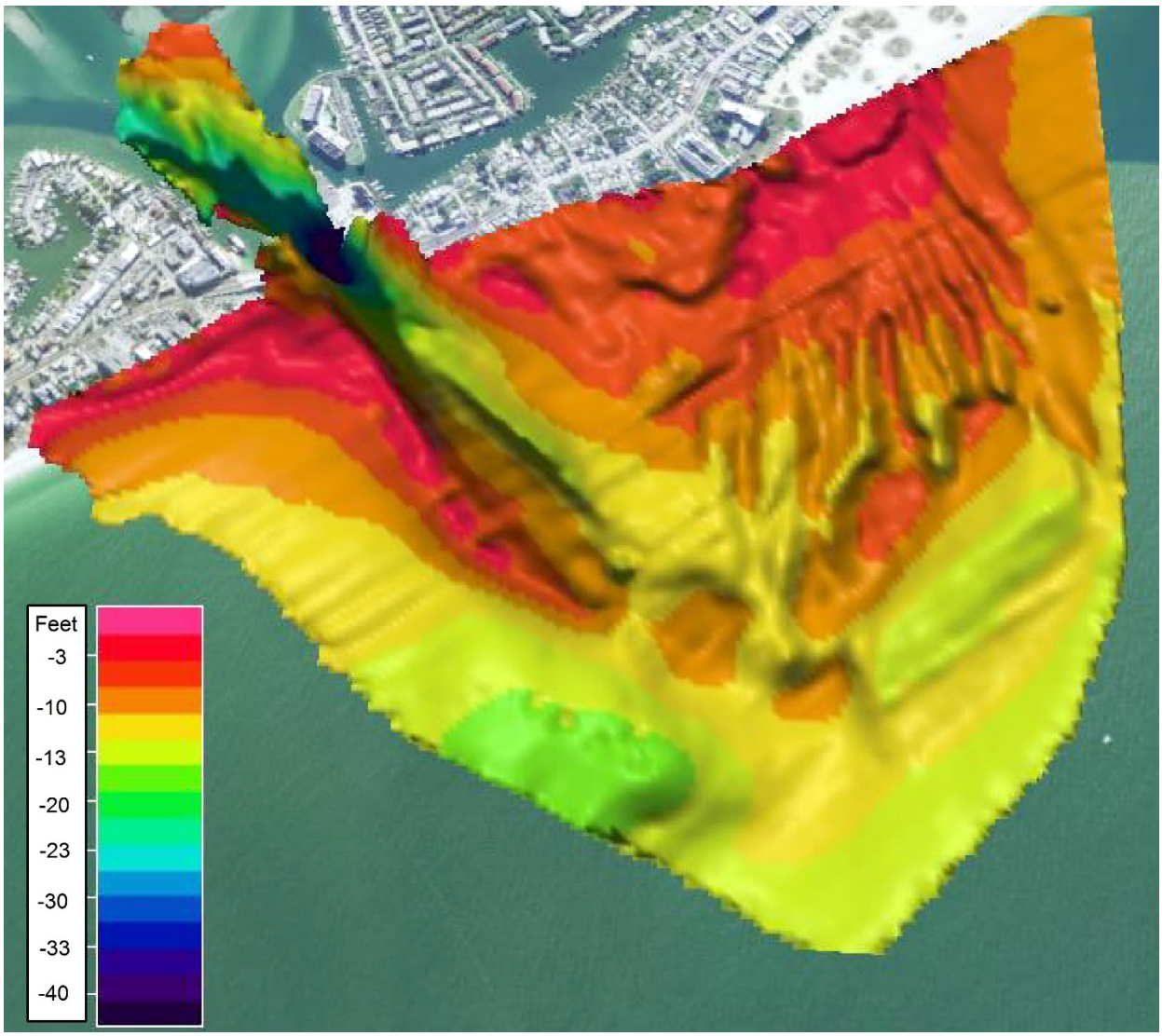

Figure 11. John's Pass channel and ebb shoal surveyed in 2014 using a multi-beam hydrographic surveying system (Wang et al., 2016).

Therefore, this updated sediment budget is influenced by the artificial sand supply from the 2010 Treasure Island and Long Key beach nourishments and the 2012 Sand Key nourishment. Since the beaches in the study area are nourished regularly and the budget period incorporates a large portion of a beach nourishment cycle, this updated sediment budget should represent a typical situation inclusive of artificial sand supplies from beach nourishments. For this sediment budget, the coast directly affected by John's Pass has been divided into the beach and inlet cells as shown in *Figure 12*.

Figure 12. Annualized sediment budget at John's Pass determined based on field data collected from October 2010 to June 2014 (Wang et al., 2016). The 2011 aerial photo is courtesy of the SWFWMD.

Beach erosion and accretion have been measured by comparing the surveys of October 2010 and June 2014, which has yielded the volume losses and gains for each of the beach and inlet cells. North of these cells, the input longshore transport quantity was based on the sum of the erosion along Sand Key south of R60. R60 has been determined to be a point of divergence in longshore transport, causing a drift divide where to the north of R60, sediment moves northward toward Clearwater Pass, and to the south of R60, sediment moves southward toward John's Pass. Over the period of measurement, Sand Key experienced a loss of 159,600 cubic yards per year, which would be the longshore transport to the north cell for the John's Pass sediment budget.

To the north of John's Pass, Madeira Beach between R121 and R125 gained an annualized 13,100 cubic yards per year of sediment between October 2010 and June 2014. During the same period, to the south of John's Pass, Sunshine Beach between R126 and R129 lost an annualized -20,900 cubic yards per year of sediment. These losses were offset by gains within the John's Pass system, including the channel and the ebb shoal. Specifically, the John's Pass channel from the entrance at the inlet jetties, extending into the inlet interior, saw an annualized gain during the same period of 1,300 cubic yards per year of sediment. Outside the entrance to John's Pass, i.e., the ebb shoal, there was an annualized gain for the same period of 95,500 cubic yards per year.

Combining the John's Pass channel and ebb shoal gains equals 96,800 cubic yards per year, which is over four times the 20,900 cubic yards per year needed to offset the losses to Sunshine Beach south of John's Pass. The southern half of Treasure Island between R135 and R143 is eroding. Between October 2010 and June 2014, this southern segment of Treasure Island lost an annualized -64,100 cubic yards. The John's Pass channel and ebb shoal annualized gain of 96,800 cubic yards per year exceeds the losses at both the north and south ends of Treasure Island, which is approximately -85,000 cubic yards per year. This suggests there is sufficient sand accumulating within the John's Pass system to balance the erosion losses at not only Sunshine Beach immediately south of John's Pass, but also along the southern half of Treasure Island between R135 and R143 and north of Blind Pass.

Recommended Inlet Management Plan Strategies

The Department staff recommends the following inlet management strategies be adopted to meet the requirements of Chapter 161, Florida Statutes. Future inlet management activities shall be consistent with the following four strategies.

1) **A comprehensive beach and inlet hydrographic monitoring program shall be conducted** to evaluate the performance and impact of existing sand bypassing and nourishment projects and to periodically update the inlet sediment budget.

Discussion – A comprehensive beach and inlet hydrographic monitoring program is the most important element to manage the sediment at John's Pass. Topographic and bathymetric surveys provide the most reliable data to estimate the volumetric impact of the inlet on adjacent beaches and to establish a sand placement protocol that complies with Section 161.142, Florida Statutes. The current approved inlet monitoring program conducted by Pinellas County provides sufficient monitoring data.

2) **Sand bypassing shall be performed from the John's Pass navigation channel, channel side borrow area, and ebb shoal borrow areas to the adjacent designated critically eroded gulf-fronting beaches to the south of the inlet, giving first priority to the eroding segment between DEP Range Survey Monuments R126 and R130, and second priority to the southern Treasure Island beaches between R135 and R143.** The quantity of fill to be placed shall be based on observed beach erosion patterns and quantities within the areas of inlet influence documented through the monitoring protocol of Strategy #1 above.

Discussion – Alternative 2 from the inlet study recommends the dredging of the ebb shoal, while Alternative 4 recommends the dredging of the navigational channel and the channel side borrow area in John's Pass. The Sunshine Beach segment (R126-R130) of the Treasure Island beach restoration project immediately south of John's Pass is the beach erosion area directly impacted by John's Pass. The southern Treasure Island beaches between R135 and R143 are also eroding, and are also part of the Treasure Island beach restoration project.

3) **The initial target inlet sand bypassing quantity shall be 21,000 cubic yards per year to Sunshine Beach south of the inlet (R126-R130).** This target quantity may be modified based on a minimum of four years of monitoring indicating a change in the sediment budget. In the interim, should the volume of sand accumulating in the John's Pass navigation channel, channel

side borrow area, or ebb shoal borrow area exceed these quantities, the additional sand may be dredged and placed on the southern Treasure Island beaches in order to extend the life of the Treasure Island beach restoration project.

Discussion – Treasure Island (R126-R143) to the south of John's Pass is currently designated critically eroded (DEP, 2016), and is a federally authorized beach restoration project.

4) **The source of sediment for meeting the target sand bypassing quantities in Strategy #3 above shall be the John's Pass navigation channel and the channel side borrow area.** Acceptable beach quality sand may also be obtained from the 2010 ebb shoal borrow area or the alternate ebb shoal borrow area immediately landward of the 2010 ebb shoal borrow area, as described in the inlet management study Alternative 3.

Discussion – The area typically dredged for sand bypassing is the John's Pass navigation channel and the channel side borrow area. In 2010, a borrow area was dredged in the ebb shoal, which has not yet recovered. The inlet management study investigated an alternate ebb shoal borrow area immediately landward of the 2010 ebb shoal borrow area, which showed promise as an additional source of sediment. A slow in-filling rate will limit its use.

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