

Pensacola Pass Inlet Management Plan

Office of Resilience and Coastal Protection

Florida Department of Environmental Protection

August 2024



Final Order Adopting Pensacola Pass Inlet Management Plan

WHEREAS, pursuant to Section 161.161, Florida Statutes, the Florida Department of Environmental Protection (department or FDEP) shall “evaluate each improved, modified or altered inlet and determine whether the inlet is a significant cause of beach erosion. With respect to each inlet determined to be a significant cause of beach erosion, the plan shall include the extent to which such inlet causes beach erosion and recommendations to mitigate the erosive impact of the inlet, including, but not limited to, inlet sediment bypassing; improvement of infrastructure to facilitate sand bypassing; modifications to channel dredging, jetty design and disposal of spoil material; establishment of feeder beaches; and beach restoration and beach nourishment.”

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 adopted the *Strategic Beach Management Plan*, which contained the current corrective measures to mitigate the identified impacts of Pensacola Pass; and

WHEREAS in 2022 and 2023, Escambia County sponsored an inlet management study of Pensacola Pass, which compiled new survey data and information regarding its coastal processes and inlet and shoreline dynamics and updated its sediment budget; and

WHEREAS, in August 2024, the department finalized the development of an inlet management plan that contains corrective measures to mitigate the identified inlet erosion impacts to adjacent beaches; and

WHEREAS, the City of Pensacola and the United States Army Corps of Engineers, Mobile District (USACE) is responsible for dredging and sand bypassing at Pensacola Pass and, therefore, responsible for implementation of the inlet management plan; and

WHEREAS, this inlet management plan (attached) 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 **Pensacola Pass Inlet Management Plan**. Future inlet management activities conducted by the City of Pensacola, Escambia County and/or the USACE 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. Beach and nearshore surveys between FDEP Reference Monuments R31 to R97 shall be conducted. Following major storms that inundate the barrier islands, topographic surveys shall be obtained landward of the beach to evaluate overwash volumes and scour effects, plus any barrier breaches that may occur. Periodic inlet hydrographic surveys to include the inlet channel and the ebb shoal shall also be conducted. Along with topographic and hydrographic surveys of the inlet system and adjoining beaches, dredge records shall be maintained for all sand bypassing activities.

- 2) Sand bypassing shall be performed from the inlet system to the adjacent Gulf-fronting beaches to the west of the inlet, principally between FDEP Reference Monuments R41 and R56.** The quantity of material to be bypassed shall be based on available quantities documented through the monitoring protocol of Strategy #1 above and the target bypassing identified in Strategy #3 below.

- 3) On an average annual basis, the initial target inlet sand bypassing quantity shall be 150,000 cubic yards per year to the west.** This target quantity may be modified or updated based on a minimum of five years of additional monitoring data indicating a change in the sediment budget. However, the sediment budget should cover a time period of at least 10 years.

- 4) The source of sediment for meeting the target sand bypassing quantities in Strategy #3 shall be the Pensacola Pass civil navigation channel, which is 500 feet wide by 35 feet deep, the Navy channel along the same alignment, which is 800 feet wide by 44 feet deep, or as otherwise authorized by permit.**

Inlet management actions conducted by the City of Pensacola, Escambia County and the USACE 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 other than the federal navigation project that implement these adopted strategies shall be eligible for state financial participation pursuant to Section 161.143, Florida Statutes, subject to department approval of a funding request 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. Activities ineligible for cost sharing include, but are not limited to navigational construction, operation, and maintenance activities, except those elements whose purpose is to place or keep sand on adjacent beaches. Nothing in this plan precludes the

evaluation and potential adoption of other strategies for the effective management of Pensacola Pass and the adjacent beaches.

The remainder of this page was intentionally left blank.

Approval of Adoption

Alex Reed

Alex Reed

Director of the Office of Resilience and Coastal Protection

Florida Department of Environmental Protection

Filing and Acknowledgement

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

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

Lauren Jordan

Deputy Clerk

08/07/2027

Date

Electronic Copies Furnished to:

STATE OF FLORIDA - DEPARTMENT OF ENVIRONMENTAL PROTECTION
Lainie Edwards, Ph.D., Deputy Director, Office of Resilience and Coastal Protection
2600 Blair Stone Road Tallahassee, Florida 32399-2400
Crystal Anderson, Office of General Counsel
Greg Garis, Beaches, Inlets and Ports Program
Guy Weeks, Beaches, Inlets and Ports Program
Ralph Clark, Coastal Engineering and Geology Group
Michael Isaacson, Beaches Funding Program
DEP Agency Clerk

Escambia County – Tim Day
Olsen Associates – Al Browder and Krista Egan
City of Pensacola – Mark Jackson

U.S. Army Corps of Engineers, Mobile District – Elizabeth Godsey and Herb Bullock

Notice of Rights

This action is final and effective on the date filed with the clerk of the department unless a petition for an administrative hearing is timely filed under Sections 120.569 and 120.57, F.S., before the deadline for filing a petition. On the filing of a timely and sufficient petition, this action will not be final and effective until further order of the department. Because the administrative hearing process is designed to formulate final agency action, the hearing process may result in a modification of the agency action or even denial of the request for a variance or waiver.

Petition for Administrative Hearing

A person whose substantial interests are affected by the department's action may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, F.S. Pursuant to Rule 28-106.201, F.A.C., a petition for an administrative hearing 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, telephone number and any e-mail address of the petitioner; the name, address, telephone number and any email address 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 are or will be affected by the agency determination;
- (c) A statement of when and how 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 that the petitioner contends warrant reversal or modification of the agency's proposed action;

- (f) A statement of the specific rules or statutes that the petitioner contends require reversal or modification of the agency's proposed 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 the petitioner, stating precisely the action that the petitioner wishes the agency to take with respect to the agency's proposed action.

The petition must be filed (received by the clerk) in the Office of General Counsel of the department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000. Also, a copy of the petition shall be mailed to the applicant at the address indicated above at the time of filing.

Time Period for Filing a Petition

In accordance with Rule 62-110.106(3), F.A.C., petitions for an administrative hearing must be filed within 21 days of receipt of this written notice. The failure to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under [Sections 120.569](#) and 120.57, F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention (in a proceeding initiated by another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, F.A.C.

Extension of Time

Under Rule 62-110.106(4), F.A.C., a person whose substantial interests are affected by the department's action may also request an extension of time to file a petition for an administrative hearing. The department may, for good cause shown, grant the request for an extension of time. Requests for extension of time must be filed with the Office of General Counsel of the department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, FL 32399-3000, before the applicable deadline for filing a petition for an administrative hearing. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon.

Table of Contents

Introduction..... 1

Program Objectives and Statutory Responsibilities for Inlet Management..... 2

History of Pensacola Pass 3

Prior Inlet Management Studies..... 10

2023 Inlet Management Study and Updated Sediment Budget 12

Recommended Inlet Management Plan Strategies 17

References..... 19

Introduction

Pursuant to Subsection 161.101(2), Florida Statutes, the Florida Department of Environmental Protection (department or FDEP) 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 Pensacola Pass in Escambia County, Florida.

Pensacola Pass Inlet Management Plan updates strategies for Pensacola Pass that were adopted in the *Strategic Beach Management Plan* (FDEP, 2023) to be consistent with current statutes and observed erosion¹ conditions. The *Strategic Beach Management Plan* (FDEP, 2023) called for updating the sediment budget and adopting an inlet management plan.

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.

Program Objectives and Statutory Responsibilities for Inlet Management

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.”

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 of 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, Mobile District, and the City of Pensacola have been the entities responsible for dredging Pensacola Pass and consequently, mitigating the extent of beach erosion caused by the inlet, as specified in Subsection 161.142 (6), Florida Statutes.

History of Pensacola Pass

Pensacola Pass is a large tidal inlet located in Escambia County and is the western-most inlet on the northwest gulf coast of Florida located between FDEP range/reference monuments R67 and R68 (**Figure 1**). Pensacola Pass connects the Gulf of Mexico with Pensacola Bay and hosts a federally authorized deep-water navigation channel that provides safe passage from the Gulf of Mexico to the federal Gulf Intracoastal Waterway (GIWW), the U.S. Naval Air Station (NAS) Pensacola, Pensacola Harbor, and other points within the Pensacola Bay area.

Pensacola Pass separates two barrier islands, Perdido Key to the west and Santa Rosa Island to the east. Perdido Key is 15 miles in length and terminates at Perdido Pass in Alabama, and Santa Rosa Island extends 48 miles eastward to East Pass at the City of Destin. The lands adjacent to Pensacola Pass are owned by the National Park Service and are part of the Gulf Islands National Seashore (GUIS). The adjacent beaches are primarily undeveloped, though they host several old military forts and batteries. The GUIS administrative boundaries extend into the bay and one mile offshore into the Gulf of Mexico. The waters in the vicinity of Pensacola Pass are part of the Fort Pickens Aquatic Preserve.

It is important to understand the history of Pensacola Pass and prior inlet management activities as well as beach erosion control activities along the adjacent beaches, to gain a perspective on the inlet's dynamics and the need to change inlet management strategies over time. Historical records indicate that Pensacola Pass was of importance to early Spanish explorers. The 1559 De Luna expedition used the pass in establishing a Spanish colony at Pensacola. However, a hurricane destroyed the fleet of ships and all provisions resulting in abandonment of the colony within a year.



Figure 1. Pensacola Pass (Google Earth aerial imagery, January 2018).

After the War of 1812, the United States decided to fortify its major ports, including Pensacola Pass. Fort Pickens was constructed between 1829-1834 at the west end of Santa Rosa Island on the east shore of Pensacola Pass. Fort Pickens was the largest of a group of fortifications designed to protect Pensacola harbor and was occupied by federal forces during the Civil War seeing conflict in 1861. On the west shoreline of Pensacola Pass at the east end of Perdido Key, Fort McRee was constructed between 1834-1839. Fort McRee sustained major damage during the Civil War conflict in 1861 and subsequently by fire as the Confederate occupation ended in May 1862. Although the fort was not restored during the next 30 years, two groins were constructed to control shoreline erosion at the pass (**Figure 2**). Groins were also constructed along the east shoreline of the pass to protect Fort Pickens from erosion.



Figure 2. Historic 19th century Ft. McCree site with groins on Perdido Key (Source: National Park Service).

Historic records indicate that a navigation channel has received maintenance excavation since 1881. The U.S. Rivers & Harbors Act of 1962 established the current federally authorized channel width of 500 feet and depth of 35 feet (MLLW datum, from the Gulf of Mexico to Pensacola Bay). The USACE currently maintains the channel at those authorized dimensions through periodic dredging of roughly 200,000 cubic yards every two to three years. Material

dredged from the federally authorized Pensacola Pass channel is placed on the adjacent beach. The USACE must comply with the Federal Standard, which requires actions to be the least cost, engineeringly feasible and environmentally acceptable. Use of the adjacent beach as a placement site for material dredged from the federal channel complies with the Federal Standard.

In 1990 through 1991 at the request of the Navy, the channel was widened to 800 feet and deepened to 48 feet. These Navy channel dimensions are no longer maintained. **Table 1** lists the historical dimensions of the Pensacola Pass entrance channel. **Table 2** lists the dredged volumes and disposal areas from 1881 to present. Since dredging began, a total of 47.7 million cubic yards of material have been removed from the Pensacola Pass entrance channel.

Currently, the Pensacola Pass entrance channel includes the federal **Lower Pensacola Harbor Maintenance Dredging Project** (Joint Coastal Permit #0295379-001-JC, expiration December 2025), and the federal **Pensacola Naval Air Station Channel Maintenance Dredging Project** (Joint Coastal Permit #0247518-001-JC, expiration November 2023).

Table 1. Pensacola Pass entrance channel dimensions (adapted from Browder & Dean, 1999).

Date	Width (feet)	Depth (feet, MLLW)	Authorized / Actual
1881	80	24	Authorized
1885	80	22.5	Actual
1890	120	24	Actual
1894	300	30	Authorized
1902	500	30	Authorized
1928	500	30	Actual
1945	500	32	Actual
1959	800	37	Actual
1962	500	35	Authorized
1991	800	48	Actual (Navy)
2021	500	35	Actual

Table 2. Pensacola Pass entrance channel dredging and placement history (adapted from Hine et al. (1986), Work et al. (1991), Browder & Dean (1999), and OAI (2023)).

Date	Disposal Site	Volume (cubic	Cumulative Volume
1883 - 1958	offshore	various	17,264,900
August 1959	Santa Rosa Pt.	971,800	18,311,300
August 1959	Santa Rosa Pt.	3,948,700	22,235,200
October 1959	Santa Rosa Pt.	2,011,600	24,197,100
November 1964	offshore	2,482,500	26,682,200
January 1967	offshore	1,225,500	27,990,100
January 1968	offshore	941,700	28,905,700
January 1969	offshore	218,400	29,167,300
January 1970	offshore	239,400	29,428,900
January 1971	offshore	171,300	29,559,700
October 1971	offshore	1,563,000	31,129,200
February 1975	offshore	1,098,700	32,175,600
February 1981	offshore	654,000	32,829,600
November 1983	offshore	113,800	32,960,400
January 1984	offshore	915,600	33,875,900
June 1985	Perdido Key	2,432,800	36,361,000
January 1987	offshore	196,200	36,491,800
January 1990	Perdido Key	5,362,600	41,854,400
January 1991	Perdido Key nearshore	3,923,900	45,778,300
April 2000	Perdido Key nearshore	142,521	45,920,821
October 2003	Perdido Key nearshore	235,976	46,156,797
October 2005	Perdido Key nearshore	274,528	46,431,325
November 2011	Perdido Key beach	513,500	46,944,825
November 2016	Perdido Key nearshore	238,700	47,183,525
May 2018	in-channel (deeper areas)	194,625	47,378,150
October 2020	in-channel (deeper areas)	186,073	47,564,223
April 2022	Perdido Key beach	140,000	47,704,223

Date	Disposal Site	Volume (cubic	Cumulative Volume
2023/2024	Perdido Key beach	915,666	48,619,889

Pensacola Pass has been subject to the impact of many hurricanes and tropical storms since the hurricane that destroyed the early Spanish colony in 1559. Spain even decreed no further settlement after that historic disaster. In recent history, the department has assessed damage and developed post-storm reports following hurricanes that impacted the Pensacola Pass area. The most notable storms were Hurricane Frederic (1979), Hurricanes Erin and Opal (1995), Hurricane Georges (1998), Tropical Storm Isidore (2002), Hurricane Ivan (2004), Hurricane Dennis (2005), Hurricane Katrina (2005) and Hurricane Sally (2020). Most recently, Hurricane Sally caused severe erosion and three breaches across Perdido Key just west of Pensacola Pass as seen in **Figure 3** (Clark and Weeks, 2020).



Figure 3. Hurricane Sally breaches through Perdido Key between R60 and R63 near Pensacola Pass (Source: NOAA aerial photography, September 2020).

Prior Inlet Management Studies

The first comprehensive study of Pensacola Pass was conducted by Browder & Dean (1999). The study was funded by the department for the purposes of developing a comprehensive plan addressing sediment management and shoreline impacts to the adjacent islands. The 1999 study recommended the following:

- 1) A monitoring program be instituted, consisting of hydrographic surveys of the bathymetry of Pensacola Pass and adjacent shoals at least once every five years and beach profile surveys of the adjacent shoreline in Escambia County every two years.
- 2) Beach quality material dredged from the entrance channel to Pensacola Pass be disposed of on the adjacent shorelines. If the material is to be disposed of on Santa Rosa Island, the material should be used to construct dunes, placing the material as high as possible on the profile to prevent its rapid return to the shoal system of the Pass. If the material is to be placed along the Perdido Key shoreline, it should be placed on the beach face or dunes. It is recommended that beach face placement of material along the Perdido Key shoreline occur in the area between 1.5 and 5.5 miles west of the Pass (roughly between FDEP monuments R58 and R37).
- 3) In the event of unacceptable shoaling in the channel between Battery 233 (this is a historic structure built at the eastern end of Perdido Key during World War II in 1943 associated with Ft. McRee near R67) and the sand disposal island, or in the event of further degradation of the two existing groins on the eastern side of Perdido Key, it is recommended that consideration be given to the construction of sand tightening structures immediately adjacent to the existing groins.

Since 1999, the shoreline has been monitored periodically, but not to the extent recommended by Browder and Dean (1999). No modifications have been made to the groins on Perdido Key.

In 2006, to support the permit application for potential dredging of the Pensacola Pass Navigation Channel by the U.S. Navy, Olsen Associates, Inc. prepared a report providing recommendations for placement areas, volumes, and priorities (OAI, 2006). The U.S. Navy was issued a permit (JCP #0247518-001-JC) for a second project to widen and deepen the

entrance channel to 800 feet by 48 feet. Permitted placement areas included: Perdido Key beach (R32 to R58), Perdido Key nearshore (R32 to R64), Santa Rosa Island beach (R84.5 to R107), and the Ocean Dredged Material Disposal Site (ODMDS).

In 2008, the department and Escambia County contracted Olsen Associates, Inc. to provide coastal engineering assessments and detailed disposal plan options for the planned large-scale U.S. Navy dredging. The report provided an updated assessment of the shoreline and beach volume changes adjacent to Pensacola Pass and the estimated volume available in the Navy channel. Olsen Associates, Inc. (2008) noted the following regarding future dredged material disposal:

- The easternmost two miles of Perdido Key, between R56 and R64, are extremely erosional. Future sand disposal will be needed to address chronic erosion in this area.
- Impacts of federal navigation channel maintenance and construction continue to warrant the strategic placement of all beach quality maintenance material into the littoral zones of the two adjacent barrier islands.

The second U.S. Navy widening and deepening project proposed in the mid-2000s was never constructed. The entrance channel at Pensacola Pass is currently maintained at the federally authorized dimensions of 500 feet wide by 35 feet deep. In recent dredging efforts, some of the dredged material has been disposed within the entrance channel itself. The remaining volume of the dredged material is placed within the littoral zone of Perdido Key.

2023 Inlet Management Study and Updated Sediment Budget

Olsen Associates, Inc. (2023) performed an inlet management study, which included the development of a contemporary sediment budget for the early 2000's through 2021. By the early 2000's, Pensacola Pass had achieved a quasi-equilibrium state following the major Navy homeport dredging and sand placement activity in 1990-1991. OAI (2023) conducted the following analyses: evaluation of beach volume and shoreline changes on the adjacent islands of Perdido Key and Santa Rosa Island; computation of shoal volume changes; documentation of maintenance dredging and disposal operations; and numerical simulation of littoral transport.

Table 3 summarizes the sediment budget input values, including the background volume change rates in the shoal and along the inlet-adjacent shorelines.

Table 3. Input transport or change rates for the contemporary sediment budget of Pensacola Pass between the early 2000's and 2021 (OAI, 2023).

Description	Rate (cy/yr)
Riverine input	0
Natural inlet bypassing	0
Effective mechanical inlet bypassing	20,000
Net longshore transport (east end)	70,000
Net longshore transport (west end)	40,000
Shoal system	+210,000
Santa Rosa Island beach (R-100 to R-87)	-50,000
Santa Rosa Island beach (R-87 to R-68)	0
Perdido Key beach (R-67 to R-56)	-110,000
Perdido Key beach (R-56 to R-49); nodal zone	-40,000
Perdido Key beach (R-49 to R-41)	-20,000
Perdido Key beach (R-41 to R-32)	-10,000

*Beach volume change rates include the effects of overwash.

Figure 4 presents the contemporary sediment budget for Pensacola Pass between the 2000's and 2021 (OAI, 2023). The area surrounding the pass has been divided into various sediment budget cells based upon the analyses described above. The ambient transport at the eastern boundary (R100) is 70,000 cubic yards per year to the west. The Gulf of Mexico shoreline from R100 to R87 erodes by an average of -50,000 cubic yards per year. Beach erosion along this segment of Santa Rosa Island is attributed to a combination of overwash and increasing westward sediment transport potential.

To the west, the Santa Rosa Island shoreline from R87 to R68 exhibits negligible change in cumulative volume. From the east, roughly 110,000 cubic yards per year enter the beach cell. This shoreline loses approximately 10,000 cubic yards per year from overwash. Roughly 50,000 cubic yards per year of sand moves westward off the tip of Santa Rosa Island and another 50,000 cubic yards per year enters the ebb shoal. In total, roughly 100,000 cubic yards per year of sand enters Pensacola Pass from the east.

West of Pensacola Pass, observations in shoreline behavior and numerical modeling indicate a zone of diverging net littoral transport extending from R56 westward to R49, roughly 2.0 to 3.5 miles west of the channel. In this erosional zone, the net transport changes from the typical westward regional direction to an eastward direction back towards the pass. The reversal zone itself loses approximately -40,000 cubic yards per year. From this longshore drift divide or nodal zone eastward, approximately 20,000 cubic yards per year is predicted to be transported into the easternmost beach cell on Perdido Key. In the net, the easternmost beach segment of Perdido Key exhibits -110,000 cubic yards per year of background erosion. This cell loses roughly 20,000 cubic yards per year of sand from the gulf-fronting beaches through storm overwash events. Concurrently, the easternmost Perdido Key beach cell loses a total of 110,000 cubic yards per year to the Pensacola Pass shoal system. Roughly 40,000 cubic yards per year travel eastward into the inlet channel and 70,000 cubic yards per year is transported into the inlet's ebb shoal.

West of the Perdido Key nodal zone, 20,000 cubic yards per year is transported westward at R49. The Perdido Key beach cell from R41 to R49 experiences erosion due to an increase in westerly-directed transport, as the refractive effect of the ebb shoal dissipates with distance. This cell loses 20,000 cubic yards per year, due to the gradient in transport, thus roughly 40,000 cubic

yards per year are transported westward at R41. To the west, the longshore transport input at R41 is equivalent to the output at R32. As a result, the mild erosion measured in this shoreline segment is principally attributed to overwash.

Re-deposition of Dredged Sediment

As noted in **Figure 4**, OAI (2023) estimated that 60 percent of the sand dredged from the entrance channel ultimately re-enters the channel. The USACE records indicate that roughly 50,000 cubic yards per year is dredged from the navigation channel and placed along eastern Perdido Key. Contemporary practice involves placement of sand along a highly erosional shoreline, where transport is predominantly directed eastward, back toward the pass. Consequently, a portion of the sand is re-deposited in the channel and must be dredged again to maintain navigation. As a result, the effective sand bypassing to the downdrift Perdido Key shoreline is 20,000 cubic yards per year.

Length of Inlet Influence

Olsen Associates Inc. (2023) determined the length of inlet influence from inspection of the shoreline and volume changes, the bathymetry, and the predicted transport curves. The primary inlet influence spans approximately 3.5 miles updrift along Santa Rosa Island and 5.0 miles downdrift along Perdido Key. Outside these boundaries, the effects of the inlet on the adjacent shorelines decrease significantly.

Updrift Impact

From **Figure 1**, the updrift shoreline from R68 to R87 exhibits a background erosion rate of 0 cubic yards per year. To isolate the volumetric impact of the inlet, the effects of overwash must be discounted. It was estimated that 10,000 cubic yards per year are transferred from the gulf-fronting shoreline into the upland. In the net, the contemporary updrift inlet impact is +10,000 cubic yards per year. The presence of the pass causes slight background accretion along the adjacent 3.5 miles of Santa Rosa Island shoreline.

Downdrift Impact

The downdrift impact was similarly determined from the sediment budget. From the pass to R41, the Perdido Key shoreline exhibits a background erosion rate of -170,000 cubic yards per year. However, this rate is exaggerated by overwash. Discounting the background erosion rate for 20,000 cubic yards per year of overwash results in a downdrift impact of -150,000 cubic

yards per year. The erosional effects of the pass are manifested along the adjacent 5.0 miles of Perdido Key shoreline.

Bypassing Objective

To mitigate the downdrift impact of the inlet, an average of 150,000 cubic yards per year should be transferred to the Perdido Key shoreline. In the late 19th century, the United States military constructed groins to mitigate shoreline erosion that threatened Fort McCree. The severe erosion and shoreline recession of the magnitude currently observed on the eastern end of Perdido Key typically necessitate engineered structural elements to maintain a stable beach. Structural stabilization would be effective at reducing the erosion rate along eastern Perdido Key and limiting sand re-entry into the shoal and navigation channel. Without stabilization, the need for sand placement east of R56 will continue. However, it is recognized that the National Park Service manages the Perdido Key shoreline and while preferring to limit any anthropogenic influences, does not currently approve the use of shoreline stabilization structures.

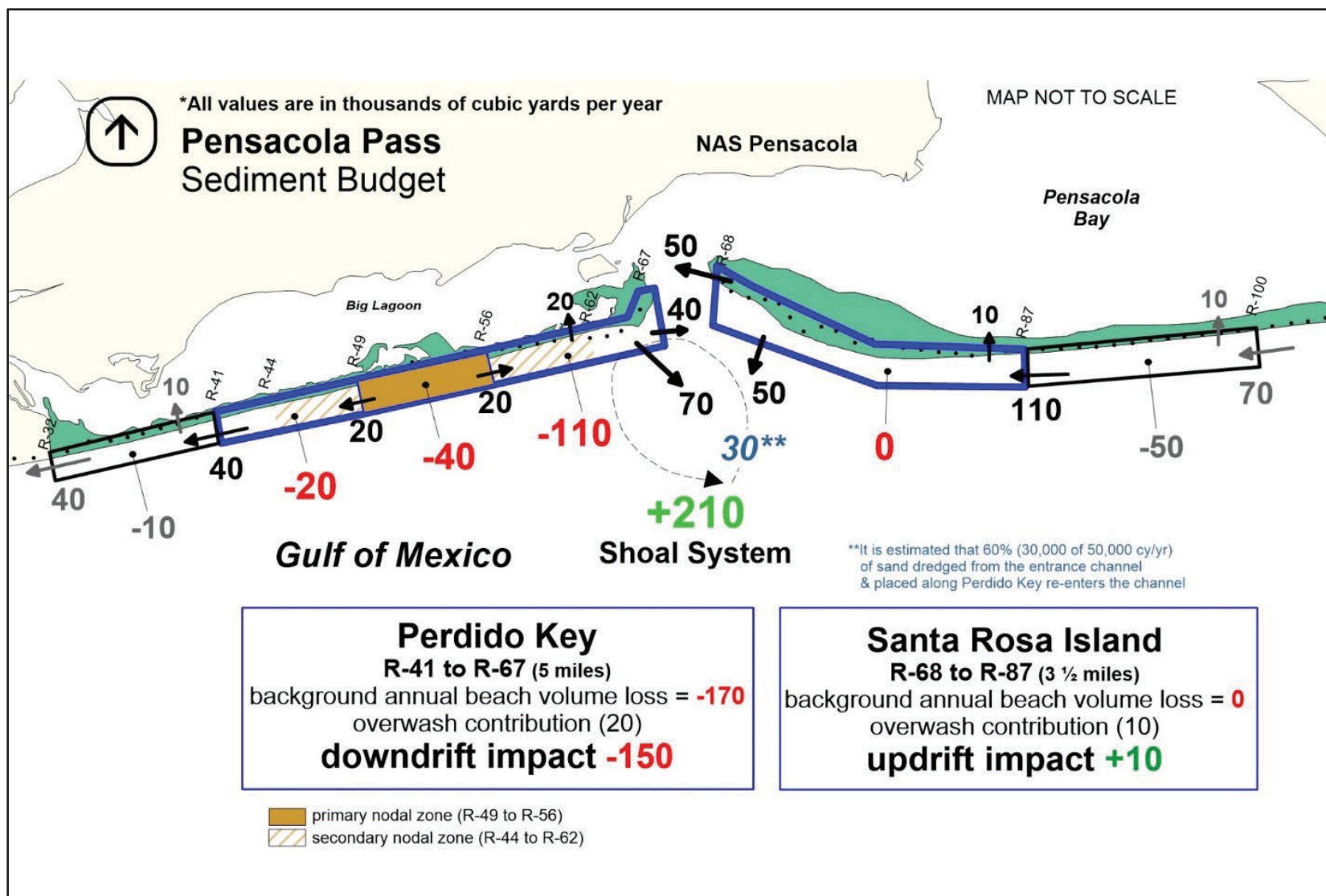


Figure 4. Pensacola Pass sediment budget from the early 2000's through 2021 (Olsen Associates, Inc., 2023).

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.

- 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. Beach and nearshore surveys between FDEP Reference Monuments R31 to R97 shall be conducted. Following major storms that inundate the barrier islands, topographic surveys shall be obtained landward of the beach to evaluate overwash volumes and scour effects, plus any barrier breaches that may occur. Periodic inlet hydrographic surveys to include the inlet channel and the ebb shoal shall also be conducted. Along with topographic and hydrographic surveys of the inlet system and adjoining beaches, dredge records shall be maintained for all sand bypassing activities.

Discussion – A comprehensive beach and inlet hydrographic monitoring program is the most important element to manage the sediment at Pensacola Pass. Topographic and bathymetric surveys provide 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.

- 2. Sand bypassing shall be performed from the inlet system to the adjacent gulf-fronting beaches to the west of the inlet, principally between FDEP Reference Monument R41 and R56.** The quantity of material to be bypassed shall be based on available quantities documented through the monitoring protocol of Strategy #1 above and the target bypassing identified in Strategy #3 below.

Discussion – The 5 miles of beach immediately west of Pensacola Pass is the adjacent eroded beach directly impacted by the inlet system. Sand should be placed west of R56 to limit re-entry into the channel. Sand placement between R56 and R63 may be necessary to prevent or repair barrier island breaches. The volume of direct sand placement east of R56 should be limited and should be placed up to the authorized +10-foot elevation. Nonfederal funding may

be necessary to cover the additional cost for sand placement west of R56 due to the Federal Standard that requires the least cost for sediment disposal.

- 3. On an average annual basis, the initial target inlet sand bypassing quantity shall be 150,000 cubic yards per year to the west.** This target quantity may be modified or updated based on a minimum of five years of additional monitoring data indicating a change in the sediment budget. However, the sediment budget should cover a time period of at least 10 years.

Discussion – The recent sediment budget indicates a need to place an annual quantity of approximately 150,000 cubic yards of sand on the eroded beaches west of the inlet to account for the inlet’s impact.

- 4. The source of sediment for meeting the target sand bypassing quantities in Strategy #3 shall be the Pensacola Pass civil navigation channel, which is 500 feet wide by 35 feet deep, the Navy channel along the same alignment, which is 800 feet wide by 44 feet deep, or as otherwise authorized by permit.**

Discussion – Maintenance dredging of the civil channel currently accounts for 20,000 cubic yards per year bypassed to the beaches west of the inlet. Analysis of channel surveys indicates that a sufficient quantity of material is available within the civil channel template to meet the bypassing objective. Should a secondary source be needed, the permitted Navy channel template may be used to supplement sand volume and meet the bypassing objective.

References

- Browder, A.E., and Dean, R.G., 1999. *Pensacola Pass, FL, Inlet Management Study*, (Report submitted to the Florida Department of Environmental Protection) University of Florida, Civil and Coastal Engineering Department, Report UFL/COEL-99-002, Gainesville, FL.
- Browder, A.E., Reilly, W.I., and Olsen, E.J., 2006. *Recommendations for Dredged Material Disposal for the Proposed U.S. Navy Channel Dredging*, (Report prepared for the Florida Department of Environmental Protection) Olsen Associates, Inc., Jacksonville, FL, 41 p.
- Clark, R., and Weeks G., 2020. Hurricane Sally Post-Storm Beach Conditions and Coastal Impact Report, Florida Department of Environmental Protection, Office of Resilience and Coastal Protection, 57 p.
- Florida Department of Environmental Protection, 2023. *Strategic Beach Management Plan*, Office of Resilience and Coastal Protection, 420 p.
- Hine, A.C., Mearns, D.L., Davis, R.A., and Bland, M., 1986. *Impacts of Florida's Gulf Coast Inlets on the Coastal Sand Budget*, (Report prepared for the Florida Department of Natural Resources) University of South Florida, St. Petersburg, FL.
- Olsen Associates, Inc., 2008. *Update of General Littoral Processes at Pensacola Pass, FL, JCP File No. 0247518-001-JC*, (Report prepared for the Florida Department of Environmental Protection) Olsen Associates, Inc., Jacksonville, FL.
- Olsen Associates, Inc., 2023. [*Inlet Management Study, Pensacola Pass, Escambia County, FL*](#), (Report prepared for the Florida Department of Environmental Protection and Escambia County) Olsen Associates, Inc., Jacksonville, FL.
- Work, P.A., Charles, L., and Dean, R.G., 1991. *Perdido Key Historical Summary and Interpretation of Monitoring Programs*. University of Florida, Coastal and Oceanographic Engineering Department, Report UFL/COEL-91/009, Gainesville, FL.