ST. JOHNS COUNTY, FLORIDA

South Ponte Vedra Beach, Vilano Beach, and Summer Haven Reaches

COASTAL STORM RISK MANAGEMENT PROJECT

DRAFT INTEGRATED FEASIBILITY STUDY AND ENVIRONMENTAL ASSESSMENT

February 2016

DRAFT INTEGRATED FEASIBLITY REPORT February 2016

& DRAFT ENVIRONMENTAL ASSESSMENT

ST. JOHNS COUNTY, FLORIDA
South Ponte Vedra Beach, Vilano Beach, and Summer Haven Reaches
Coastal Storm Risk Management Project

RESPONSIBLE AGENCIES: U.S. Army Corps of Engineers, Jacksonville District

February 2016

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TABLE OF CONTENTS

* Items required for an Environmental Assessment by the National Environmental Policy Act

Appendices

EXECUTIVE SUMMARY

NOTE: This draft document is not yet complete. The current report describes existing conditions in the study area as well as future conditions if a project is not constructed, problems that a project would address and opportunities available to manage coastal risk. The current report also describes plan formulation, including environmental considerations, to reach a Tentatively Selected Plan (TSP). The document will be revised per comments received during concurrent review, and the TSP could be modified. There will be additional review prior to the report being made "final," and information will be added to the report as the TSP is developed into a Recommended Plan.

Purpose and Need

This report is an interim response to the study authority. This single purpose CSRM study will focus on the erosion problems and potential storm damage susceptibility of structures along three reaches of the Atlantic Ocean shoreline in St. Johns County, Florida as follows: South Ponte Vedra Beach, Vilano Beach and Summer Haven. The non-federal sponsor is St. Johns County, Florida, represented by the Board of County Commissioners.

There is Federal interest in a Tentatively Selected Plan (TSP) with a Benefit-to-Cost Ratio (BCR) of 1.65 as outlined in this Executive Summary.

Study Scope

Infrastructure along the St. Johns County shoreline is subject to damage from waves, erosion and innundation caused by coastal storms. Developed areas, as well as portions of State Road A1A (SR A1A), the major evacuation route for the region, are vulnerable. This study investigates alternatives for a unified plan that addresses coastal storm risk management, as well as incidental opportunities for maintenance of environmental resources and recreation for three reaches along the Atlantic shoreline of St. Johns County, Florida.

Study Area

All 42 miles of the St. Johns County shoreline are authorized for study in the interest of hurricane protection, storm damage reduction, beach erosion control, and other related purposes. Reaches within the study area currently experiencing coastal storm damages were selected as project reaches. The three reaches in this study include, from north to south:

- South Ponte Vedra: R84 – R104 (3.8 miles)
- Vilano Beach: R104 to R117 (2.6 miles) and R117 to St. Augustine Inlet North Sand-trap Groin (1.1 miles)
- Summer Haven: R197 – R209 (2.3 miles)

*R-monuments refer to Florida Department of Environmental Protection (FDEP) survey monuments used for geographic reference.

The boundaries of all of the subject reaches and the Florida Department of Environmental Protection (FDEP) R monuments are illustrated in Figure 1-1. The existing Federal HSDR project constructed in St. Augustine Beach is also shown in Figure 1-1 for reference.

Problems and Opportunities

Existing problems in the study area include:

- Storm damages due to erosion, inundation, and waves threatening infrastructure
- Loss of natural habitat
- Shoreline erosion threatening recreational opportunities
- Shoreline erosion threatening hurricane evacuation route (SR A1A)
- Beach/dune interaction limited or eliminated

Opportunities are positive conditions in the study area that may result from implementation of a Federal project such as:

- Reduce storm damage to infrastructure
- Protect/enhance habitat/environmental resources
- Retain recreation
- Protect hurricane evacuation route (Highway A1A)
- Protect/enhance beach/dune interaction
- Implement recommendations in the Florida Department of Environmental Protection (FDEP) St. Augustine Inlet Management Plan to use the St. Augustine Inlet as a sand source for beaches to the north of the inlet

A number of structural and non-structural management measures were considered to address problems and realize opportunities listed above. A TSP has been developed to manage coastal risk in an environmentally acceptable and engineeringly feasible manner.

PERTINENT PROJECT INFORMATION FOR THE TENTATIVELY SELECTED PLAN (TSP)

Table ES-1-1. Pertinent Project Information.

Tentatively Selected Plan (TSP) Description	The TSP includes beach and dune nourishment within the Vilano Beach reach and a small portion of the South Ponte Vedra Beach reach. The design includes construction of a 60 foot equilibrated berm extension from the +8.0 foot 1988 North Atlantic Vertical Datum (NAVD88) contour between the reference monuments R103.5 and R116.5 along 2.6 miles of shoreline. The project template will include a dune feature that reflects the average 2015 dune position. One thousand foot tapers will extend from the northern and southern ends of the berm extension, connecting the extension to the existing shoreline. The addition of tapers results in sand placement from R102.5 to R117.5 along 3 miles of shoreline. A hydraulic dredge will be used to fill the template with sand from the St. Augustine Inlet system.
Average # Nourishment Events	1 initial construction event, 4 periodic nourishment events
Average Volume of Initial Construction	1,310,000 cubic yards
Average Volume of Each Periodic Nourishment	866,000 cubic yards
Average Periodic Nourishment Interval	12 years
Initial Construction Duration	approximately 3.3 months
TSP total project cost (including contingency)	$65,814,000 (FY16 price levels)
Cost sharing	Initial construction: 22.0% Federal / 78.0% non-federal Periodic nourishments: 17.7% Federal / 82.3% non-federal
Benefit-to-Cost Ratio (BCR)	1.65

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CHAPTER 1
INTRODUCTION

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1 INTRODUCTION*

1.1 FEDERAL PROJECT PURPOSE*

Coastal Storm Risk Management (CSRM) projects have been authorized for a variety of purposes: beach erosion control, shore/shoreline protection, hurricane/hurricane wave protection, and storm protection. The Water Resources Development Act (WRDA) of 1986 assigns costs of Federal projects to appropriate project purposes. Project reaches that provide hurricane and storm damage reduction are assigned a 65% Federal share for initial construction. Specifically for beach renourishment projects, WRDA 1999 assigned a 50% Federal share for future renourishments. Project reaches that provide for separable recreation are not federally cost shared. The Federal government does not participate in work realizing separable recreation benefits such as constructing a beach only for recreational purposes (and not hurricane and storm damage reduction purposes) or constructing recreation facilities. Recreation is not considered to be a high priority output or primary project output under current Department of Army policy, as described in ER 1105-2-100. This policy precludes Federal funds to support construction of CSRM projects which depend on separable recreation benefits for economic justification, or for which incidental recreation benefits are greater than 50% needed for justification (ER 1105-2-100 section 3-4.b(4)(a)).

1.2 STUDY BACKGROUND AND LOCATION*

Infrastructure along the St. Johns County shoreline is subject to damages from waves, erosion, and storm surge caused by coastal storms. Developed areas, as well as portions of Florida State Road (SR) A1A, a major evacuation route for the region and designated national scenic and historic coastal byway, are vulnerable. All 42 miles of the St. Johns County shoreline are authorized for study in the interest of hurricane protection, storm damage reduction, beach erosion control, and other related purposes.

This St. Johns County Coastal Storm Risk Management Feasibility Study and Environmental Assessment investigates alternatives for a unified plan that addresses coastal storm risk management, as well as incidental opportunities for environmental restoration for three reaches along the Atlantic shoreline of St. Johns County, Florida. The non-federal sponsor is St. Johns County, Florida.

The three reaches in this study comprise 9.8 miles and include, from north to south:

- South Ponte Vedra: R84 – R104 (3.8 miles)
- Vilano Beach: R104 to R117 (2.6 miles) and R117 to St. Augustine Inlet North Sand-trap Groin (1.1 miles)
- Summer Haven: R197 – R209 (2.3 miles)

*R-monuments refer to Florida Department of Environmental Protection (FDEP) survey monuments used for geographic reference.

The St. Augustine Beach reach, separate from the above reaches and not included in this study, has previously been studied and authorized for Federal participation in a coastal storm risk management project for a period of 50 years of Federal participation. The St. Augustine Beach reach spans 2.5 miles of St. Johns County Atlantic Ocean shoreline between Florida Department of Environmental Protection monuments R137 through R150, including the southern portion of Anastasia State Park and the northern portion of the City of St. Augustine Beach.

The boundaries of all of the subject reaches and the Florida Department of Environmental Protection (FDEP) R monuments are illustrated in Figure 1-1 located on the following page and also on the back cover of this report). Figure 1-1 has also been included as a fold-out on the last page of the report to aid periodic reference of study area boundaries and other key reference points while reading this document.

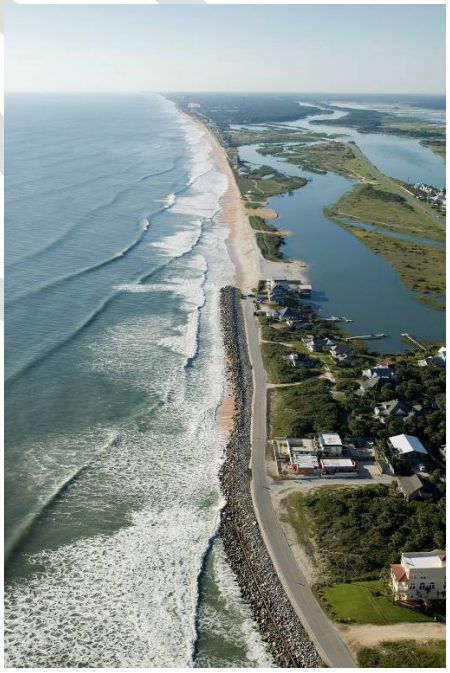
Figure 1-1. Project map with key boundaries and reference points.

In recent years, both South Ponte Vedra Beach and Vilano Beach have experienced erosion and infrastructure damage prompting state assistance. Impacts to homes and infrastructure since 2004 have resulted in the construction of temporary structures, such as seawalls, by property owners. Summer Haven has experienced significant erosion and threats to infrastructure since the mid-1900's resulting in the construction of a protective rock revetment and landward relocation of SR A1A.

South Ponte Vedra Beach reach

Vilano Beach reach

St. Augustine Beach – constructed



Summer Haven reach

Figure 1-2: South Ponte Vedra Beach, Vilano Beach, and Summer Haven reaches of the project area. The constructed St. Augustine Beach project, located south of St. Augustine Inlet, is also shown.

St. Johns County is located in the northeast Atlantic coast of Florida, midway between the Florida/Georgia state line and Cape Canaveral. The county is bounded to the north by Duval County and to the south by Flagler County. The county has approximately 42 miles of Atlantic coastal shoreline composed of three barrier islands separated by St. Augustine Inlet and Matanzas Inlet. The South Ponte Vedra Beach and Vilano Beach reaches are located north of the St. Augustine Inlet, and the Summer Haven reach is located south of the Matanzas Inlet as shown in Figure 1-1 and Figure 1-2.

Combined, the three reaches total 9.8 miles of shoreline. On average, the study area extends approximately 500 feet inland from the Mean High Water (MHW) line. The St. Johns County, Florida General Reevaluation Report (GRR) (USACE 1998), which recommended beach nourishment along St. Augustine Beach, determined 300 feet to be the approximate extent of shoreline recession from a 100-year storm. The extent of shoreline recession in the current study area is expected to be similar since geographic characteristics and wave climate closely resemble those of the 1998 GRR. To ensure adequate data collection an additional 200 feet was added to the 100-year storm recession. This data collection "buffer" ensures that sufficient data is collected for input into the economic model, Beach-fx, being applied to this study. Beach-fx measures damages to infrastructure from waves, erosion, and inundation.

Development along the Atlantic coast of St. Johns County began in the early 1900s. Of the three reaches included in the study area, Summer Haven was the first to be developed. Its early beach cottages eventually washed away, and between 1960 and today, additional homes were built resulting in 27 homes that remain along the landward side of Old SR A1A[1]. Substantial development in South Ponte Vedra Beach and Vilano Beach began around 1950. Shore protection efforts were initiated in these two areas soon after development, when damages from hurricanes and coastal storms began to threaten infrastructure.

Frequent northeast storms (nor'easters) impact this coast in the fall and winter, while tropical storms and hurricanes impact the area from June through November. While hurricanes generate damaging waves and storm surge, these storms are typically short-lived. On the other hand, nor'easters are generally more damaging due to their longer duration. The county has a history of damaging storms. Between 1830 and the present an average of one tropical storm system has passed within 50 miles of the study area every year.

Various types of hard structures such as seawalls and revetments have been constructed along the coast since 1892. In response to the Ash Wednesday storm of 1962, the Federal Office of Emergency Planning authorized 1,800 feet of granite revetment and 1,130 feet of road pavement at Summer Haven. Two

[1]Old SR A1A refers to approximately 2,700 and 3,600 feet the original SR A1A, which has been relocated landward following frequent storm damage.

years later, after Hurricane Dora (1964), Federal emergency funds were provided for more stabilization at Summer Haven.

Protection of SR A1A is of major importance since it is the only hurricane evacuation route leading to roads off the islands. Dependence on this one artery for evacuation makes safe escape from coastal storms difficult for residents in the project area. Maintenance of SR A1A in Summer Haven became so problematic that the road was relocated landward in 1979. In areas of Vilano Beach, erosion of the protective dunes reached within five feet of SR A1A in 2008.

The project area was defined, and expanded upon as necessary, by the Florida Department of Environmental Protection's (FDEP) designation of critically eroded beaches in the area. The FDEP defines a "critically eroded area" as "…a segment of the shoreline where natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost," (FDEP 2015). Gaps between critically eroded areas may also be deemed critical if their inclusion is needed to maintain design integrity of beach management projects. South Ponte Vedra Beach was designated as a critically eroded area in 2007, Vilano Beach in 2006 and Summer Haven in 1989.

1.3 STUDY SPONSOR

The non-federal sponsor is St. Johns County, Florida.

1.4 STUDY PURPOSE AND NEED*

The purpose of this study is to determine whether there is economic justification for Federal participation in coastal storm risk management in additional reaches of St. Johns County. If it is found that there is a Federal interest, the further purpose of the study is to analyze alternatives and formulate a recommended plan for coastal storm risk management to include incidental opportunities for environmental restoration within the South Ponte Vedra Beach, Vilano Beach, and Summer Haven reaches of the St. Johns County coastline.

Problems and opportunities within the study area are described in detail in Chapter 3, and are presented here for the reader's consideration. Specific problems in the study area include:

- Storm damages due to erosion, inundation, and waves threatening infrastructure
- Loss of natural habitat
- Shoreline erosion threatening recreational opportunities
- Shoreline erosion threatening hurricane evacuation route (SR A1A)
- Beach/dune interaction limited or eliminated

Opportunities exist to:

- Reduce storm damages to infrastructure within the study area
- Protect/enhance habitat/environmental resources
- Retain recreation
- Protect hurricane evacuation route (SR A1A)
- Protect/enhance beach/dune interaction
- Implement recommendations in the Florida Department of Environmental Protection (FDEP) St. Augustine Inlet Management Plan to use the St. Augustine Inlet as a sand source for beaches to the north

An array of alternatives will be analyzed in order to arrive at a recommended plan that addresses the above problems and maximizes opportunities while being technically sound, environmentally acceptable, and economically justified. Examples of management measures considered and combined into alternatives include: no action (doing nothing), retreat, changes to zoning and building codes, shore protection using hard structures (seawalls, revetments, groins, etc.), shore protection using soft structures (beach nourishment, etc.), combinations of the above, as well as other considerations.

1.5 STUDY AUTHORITIES*

The Rivers and Harbors Act of 1962 gave the Secretary of the Army broad authorization to survey coastal areas of the United States and its possessions in the interest of beach erosion control, hurricane protection and related purposes, provided that surveys of particular areas would be authorized by appropriate resolutions (Public Law 87-874, Section 110).

As a result, portions of the St. Johns County shoreline experiencing severe erosion were studied extensively. The St. Johns County, Florida General Reevaluation Report (GRR) (USACE 1998) recommended beach nourishment along St. Augustine Beach, and initial construction was completed in January, 2003.

Relative to this feasibility study, on June 21, 2000, House Resolution 2646 granted authority for a survey of the St. Johns County study area, which reads as follows:

> *"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army, acting through the Chief of Engineers, is requested to survey the shores of St. Johns County, Florida, with particular reference to the advisability of providing beach erosion control works in the area north of St. Augustine Inlet, the shoreline in the vicinity of Matanzas Inlet, and adjacent shorelines, as may be necessary in the interest of hurricane protection, storm damage reduction, beach erosion control, and other related purposes."*

This resolution authorized a reconnaissance report which was completed in 2004 and concluded that there was a Federal interest in conducting a feasibility study for the beaches of St. Johns County. The

study area for the reconnaissance report included the entire St. Johns coastline, but focused on the Vilano Beach and Summer Haven reaches since those were designated as critically eroded areas by the FDEP at that time. The South Ponte Vedra Beach reach was added to the study area after the reconnaissance report was completed in 2004. Its addition was requested by the sponsor due to increased erosion occurring around R90 in 2007. Significant and rapid loss of beach width and dunes protecting several structures led to the FDEP designating R84 to R94 (2 miles) a critically eroded area due to threats to private development as well as SR A1A. South Ponte Vedra Beach's geographic proximity to the Vilano Beach reach as well as its similar development and storm damage issues made its inclusion in this feasibility study reasonable. The southern boundary of the South Ponte Vedra Beach reach was extended to R104 to abut the Vilano Beach reach and to investigate the feasibility of providing uninterrupted shore protection along the coast.

1.6 RELATED DOCUMENTS*

1.6.1 RELATED USACE STUDIES

Summaries of prior Federal studies relevant to this project are as follows:

a. 1965 – Beach Erosion Control Study, St. Johns County, Florida (USACE 1965). The report was completed in response to a resolution of the Committee on Public Works of the U.S. Senate, adopted January 7, 1963, and a resolution of the Committee on Public Works of the House of Representatives, adopted June 19, 1963. The report recommended protective and recreational beaches with periodic nourishment (60 feet wide at 11 feet above mean sea level) for 2.2 miles of shore at South Ponte Vedra Beach, 1.4 miles at Anastasia State Park and St. Augustine Beach, and 1.4 miles at Crescent Beach. The Benefit-to-Cost Ratio (BCR) ratio was 1.2. The Board of County Commissioners of St. Johns County advised that the local share of the cost of the considered improvements was entirely prohibitive, therefore the District and Division Engineers recommended that no improvements for beach erosion control be undertaken by the U.S. Army Corps of Engineers (USACE) at that time (negative report – no sponsor support).

b. 1977 (Revised 1979) – St. Johns County Beach Erosion Control Project Feasibility Report (USACE 1979). The study area included the entire St. Johns County coastline. Study efforts, after preliminary investigation of the county's Atlantic coastline, were concentrated primarily on the problem area along the ocean shore of St. Augustine Beach and Anastasia State Recreation Area. The report recommended construction of a sand beach width of 60 feet at elevation 12 feet above mean low water from "A" Street north to include the south 4,000 feet of the recreation area. Total length of the coastline to be protected, including transitions, would be 2.5 miles. The B/C ration equaled 1.25. A significant portion of the project benefits were associated with predicted increases in recreational output. Sec. 501 (Title V) of WRDA'86 authorized the project as

recommended by the Chief of Engineers Report, dated February 26, 1980 at a total cost of $18,200,000.

c. 1982 – Section 14 Study Summer Haven, St. Johns County, Florida (USACE 1982). The study was completed in response to a request from St. Johns County for Federal assistance in the construction of shore protection measures for the county road, old SR A1A, along the coastline in Summer Haven.

d. 1990 – Special Report for the St. Johns Co. BEC Project (USACE 1990). The report was prepared in accordance with WRDA'86 which limited Federal participation in recreation projects. Maximization of net primary benefits identified the National Economic Development (NED) plan as an 80-foot berm extension along 2.5 miles of St. Johns shoreline (St. Augustine Beach) with three groins required to reduce future nourishment costs. The B/C ratio for this project was 0.61 (less than 1) resulting in an unfavorable recommendation of no Federal participation at that time.

e. 1994 – Economic Update (EU) Report (USACE 1994). The report was conducted at the direction of the U.S. Congress utilizing General Investigation (GI) funds. The EU was conducted in accordance with special instructions provided with the fiscal year 1994 work allowance. The EU, dated November 1994, was approved in March 1995 and found that Federal participation in the authorized shore protection project on St. Augustine Beach was economically justified at that time. Subsequently, the U.S. Congress appropriated money to proceed with a GRR (General Reevaluation Report) for the project as part of the pre-construction, engineering, and design (PED) phase.

f. 1997 – St. Johns County, Florida Shore Protection Project: General Reevaluation Report – Technical Review Conference (USACE 1997). The report summarized the general reevaluation of the Federally authorized shore protection project (which became the 1998 GRR for St. Augustine Beach). Modifications to the project were investigated in the interest of reducing total project costs.

g. 1998 – St. Johns County, Florida Shore Protection Project: General Reevaluation Report with Final Environmental Assessment (USACE 1998). The report recommended the construction of a 60-foot berm extension from the mean high water line along St. Augustine Beach between monuments R-137 and R-150. The B/C ratio equaled 1.9.

h. 1998 – Post Authorization Change Report (USACE 1998). The recommended plan in the 1998 GRR for St. Augustine Beach exceeded the cost authorized by Section 501 of WRDA'86 beyond the maximum cost increase provisions in Section 902 of WRDA'86 (PL 99-662). The 902 limit was $39,649,000, whereas the total project cost of the selected plan was $190,500,000. The report justified the cost increase.

i. 2004 – Reconnaissance Report (905(b) Analysis) St. Johns County, Florida, Shore Protection Project (USACE 2004). Authorized by 2000 HR 2646, the report recommends that the St. Johns County, Florida, Shore Protection study proceed into the feasibility stage. Authority for the report authorized a survey of the shores of St. Johns County with particular reference to the advisability of providing beach erosion control works in the areas north of St. Augustine Inlet, the shoreline in the vicinity of Matanzas Inlet, and adjacent shorelines. The report focused on Vilano Beach and Summer Haven.

j. 2005 – Project Information Report - Rehabilitation Effort for the St. Johns County Erosion Control and Hurricane Protection Project, St. Johns County, Florida (USACE 2005). The report determined that the project area (St. Augustine Beach) was eligible for emergency renourishment due to impacts from the 2004 hurricane season.

k. 2006 – Project Information Report - Rehabilitation Effort for the St. Johns County, Erosion Control and Hurricane Protection Project, St. Johns County, Florida (USACE 2006). The report determined that the project area (St. Augustine Beach) did not meet key criteria related to a significant storm event and therefore was not eligible for emergency renourishment.

1.6.2 RELATED NEPA STUDIES

a. 1998 – General Reevaluation Report with Final Environmental Assessment and FONSI, St. Johns County, Florida, Shore Protection Project. The Environmental Assessment evaluated the construction of a 60-foot berm at a location approximately 2.7 miles south of St. Augustine Inlet, with placement extending to the south approximately 2.5 miles along the shoreline of St. Augustine Beach. The sand source for the project was the St. Augustine Inlet ebb tide shoal and navigation channel.

b. 2010 – Final Environmental Assessment and FONSI, Maintenance Dredging, St. Augustine Inlet and Adjacent Intracoastal Waterway, St. Johns County, Florida. This document evaluates maintenance dredging of the St. Augustine Inlet and the adjacent Intracoastal Waterway (IWW), including IWW Cuts SJ-28 to SJ-30, a portion of the inlet flood shoal, and a portion of the inlet entrance channel along Porpoise Point. The placement location for beach-quality material is the shoreline within Anastasia State Park and St. Augustine Beach between R132 and R152. The placement location for non-beach compatible material would be placed in a near-shore placement area between R141 and R146. There was a FONSI associated with this document signed on 19 January 2011.

c. 2015 – Final Supplemental Environmental Assessment and FONSI, Maintenance Dredging, St. Augustine Inlet and Adjacent Intracoastal Waterway, St. Johns County, Florida. The Supplemental Environmental Assessment evaluated maintenance dredging of the St. Augustine Inlet and the

adjacent Intracoastal Waterway. Beach compatible material was proposed to be placed along the shorelines of South Ponte Vedra Beach and Vilano Beach. Non-beach compatible material was proposed to be placed in the near shore area north of the inlet.

1.6.3 PRIOR NON-FEDERAL STUDIES

Summaries of prior non-federal studies relevant to the project are as follows:

a. 1975 – Independent study by the St. Johns County Board of Commissioners of possible solutions to the county's erosion problems – *St. Johns County Beach Erosion Control Study* by Florida Coastal Engineers, Inc., of Jacksonville, Florida.

b. 2009 – St. Johns County Shore Stabilization Feasibility Study for South Ponte Vedra and Vilano Beach Regions (PBS&J 2009). A private homeowners organization, South Ponte Vedra-Vilano Beach Restoration Association, Inc. (SPVV), partnered with St. Johns County and the State of Florida to gain an overall understanding of the coastal processes affecting the study area and to recommend a shore stabilization solution. Draft conclusions of the study stated that the recent significant shoreline recession and erosion are most likely attributable to increases in storm activity, and that adjacent infrastructure and habitable structures are vulnerable to future storm impacts. Furthermore, the study indicated that the condition was unlikely to adequately recover naturally within the foreseeable future, and that shoreline remediation is warranted to protect upland infrastructure. Specifically, the study recommended beach nourishment with 2,527,100 cubic yards of sand from R84 to R117 (6.5 miles) and renourishment every 5 to 6 years. The project would include a 100-foot wide berm at +10 feet NAVD88 and a dune feature with a 10-foot crest width. The dune feature was proposed to mitigate for historical dune losses and enhance protection of upland areas.

c. 2014 – St. Augustine Inlet Management Implementation Plan (FDEP 2014). This implementation plan was developed in coordination with the Corps' Jacksonville District to modify sand bypassing recommendations contained in the original, 1997, inlet management plan. Key to the study area, the plan states that a portion of sediment dredged from the inlet should be placed on beaches north of the inlet.

d. 2015 – Strategic Beach Management Plan for Northeast Atlantic Coast Region (Florida Department of Environmental Protection June, 2015). The report presents data, analysis, and recommendation for managing the northeast Florida coastline, specifically St. Johns, Flagler, and Volusia counties' beaches and inlets. Special attention is placed on determining strategies for inlets and critically eroded beaches.

e. 2015 – Critically Eroded Beaches In Florida (FDEP 2015). This report provides an inventory of Florida's erosion problem areas, including areas within this report's study area.

1.7 FEDERAL PROJECTS NEAR STUDY AREA

Projects near the study area include:

a. St. Johns County, Florida Shore Protection Project, St. Augustine Beach, Florida. The project area is comprised of the 2.5 miles of St. Johns County Atlantic Ocean shoreline located between FDEP monuments R-137 through R-150. The project area includes the southern portion of Anastasia State Park and the northern portion of St. Augustine Beach. The recommended plan consists of beach fill with 600-foot transition sections at the northern and southern limits of the project. The design template berm elevation is +12.0 feet (MLW) and would result in extension of the pre-project mean high water shoreline by 60 feet (USACE 1998). At the location of the seaward extent of the design berm, the design template slopes 1V:20H seaward to the location of the MLW line and 1V:30H out to the intersection with the existing profile. Initial construction of the project required placement of approximately 2,100,000 cubic yards of design fill and 1,600,000 cubic yards of advance material (3,700,000 cubic yards total). During initial construction, additional material was dredged and placed north of the project area within Anastasia State Park. This work was funded by the park. The primary borrow source for construction was the St. Augustine Inlet ebb shoal located approximately 4.5 miles from the center of the project area. Periodic nourishment would be provided every 5 years over the 50 year period of Federal participation using about 1,600,000 cubic yards of material per event. The project was completed in January 2003 and renourished in 2005 and 2012.

b. St. Augustine Harbor. This project includes a channel 16 feet deep by 200 feet wide along the best natural alignment across the inlet bar; a 12 feet deep channel to the Intracoastal Waterway; a sand-trap groin (about 1,880 feet long built in 1941) on the north side of the inlet extending seaward from the shore of Vilano Beach; a sand-tight jetty (about 3,695 feet long built in 1957) on the south side of the channel extending seaward from the shore of Conch Island parallel to and coextensive with the groin (future landward extension of the groin and jetty - deferred); and a channel 10 feet deep by 100 feet wide in the San Sebastian River from the Intracoastal Waterway to King Street Bridge, with a turning area near the upper end. The project sponsor is the St. Augustine Port, Waterway and Beach Commission. The inlet (St. Augustine Inlet) is an improved tidal inlet connecting the Tolomato and Matanzas Rivers (part of the Intracoastal Waterway) to the Atlantic Ocean. Originally a natural inlet called Salt Run, the natural inlet was originally located about 400 yards south of its current location and was relocated in 1940. Beach-quality maintenance material from inlet and channel dredging is placed on the beaches located south of the inlet and, as of 2015, in the near shore zone north of the inlet.

c. Intracoastal Waterway (IWW). The Intracoastal Waterway is part of the Atlantic Intracoastal Waterway system that provides an inland navigation channel from New York to Miami. By 1965 the United States had completed the project from Jacksonville to Fort Pierce, Florida, including St. Johns County, to the authorized depth of twelve feet and a width of one hundred twenty-five feet. The Florida Inland Navigation District (FIND) provides the items of local cooperation for the waterway and performs maintenance in the absence of Federal funding. The principal items of local cooperation are lands, easements, rights-of-way, and dredged material disposal areas. In view of recent limited Federal funding for annual waterway maintenance, FIND currently pays most of the maintenance dredging costs for the waterway. The IWW near Matanzas Inlet is subject to shoaling and must be regularly dredged to maintain navigation. Maintenance dredging of this area is between 150,000 to 200,000 cubic yards per year (cy/yr) (personal communication FIND, 2003). This material can be pumped into the dredged material management area, MSA SJ-1, until the 800,000 cubic yard capacity is reached. In 1999 approximately 765,000 cubic yards was pumped from MSA SJ-1 and the IWW onto the beach at Summer Haven. However, the dredged material has been pumped directly onto the beach at Summer Haven since 2007. This sand is fine grained with a low percentage of fine material (less than 5% passing a #200 sieve.) The fine sand placed on Summer Haven tends to migrate rapidly from the beach (FDEP 2000). Beach quality sand dredged from the IWW near St. Augustine Inlet is typically placed on the beaches south of the inlet.

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CHAPTER 2

EXISTING AND FUTURE WITHOUT PROJECT CONDITIONS

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2 EXISTING AND FUTURE WITHOUT PROJECT CONDITIONS

2.1 GENERAL SETTING*

This chapter describes conditions as they currently exist, and as they are projected to exist if a project is not implemented, within the South Ponte Vedra Beach, Vilano Beach, and Summer Haven reaches. Information gathered in this step helps to describe the problems and opportunities and forecast future conditions. The Future Without Project (FWOP) condition is the most likely condition of the study area without construction of a Federal project over the next 50 years.

It is projected that storm induced erosion, inundation and wave attack in the study area will continue damaging infrastructure, limiting habitat, and jeopardizing storm evacuation and relief efforts. Without a Federal project, it is likely that the sponsor and private homeowners would take steps to combat erosion and loss of property – running the risk that these efforts might not be coordinated in a holistic fashion incorporating regional concerns such as sediment movement and environmental/habitat considerations.

The St. Johns County coastline totals 42-miles, spanning 3 island segments that vary in width from 750-ft to 3 miles. The islands are separated from the mainland by the Matanzas River, Guana River, Salt Run and the Tolomato River. The AIWW follows the Matanzas and Tolomato Rivers. A dune system backs much of the shoreline varying in height from 14 to 20 feet relative to the North American Vertical Datum of 1988 (NAVD88). This is approximately equal to 14.5 and 20.5 feet above Mean Sea Level (MSL.)

Seawalls or other protective armor have been constructed along portions of the South Ponte Vedra Beach reach and the Vilano Beach reach, and it is anticipated that more will be constructed in the coming years. Such structures often protect one property while causing accelerated erosion to adjacent, unarmored properties, while cutting off the vital exchange of sand from dunes to the beach during storm events. By accelerating erosion and cutting off the dunes, the structures also negatively impact habitat of species such as nesting sea turtles. The South Ponte Vedra-Vilano Beach Restoration Association, Inc. (SPVV) has been created in order to evaluate shore protection opportunities available to the homeowners. The association in partnership with the county and state has completed the *St. Johns County Shore Stabilization Feasibility Study for South Ponte Vedra and Vilano Beach Regions* (PBS&J 2009) with results summarized in Chapter 1, under “Prior Non-federal Studies.”

Without a project certain portions of the study area, such as Summer Haven, may require abandonment and retreat in order to protect lives and property. Continued erosion, breaching, and overwash of Summer Haven may eventually impact the Intracoastal Waterway (IWW) which follows the Matanzas River to the east of Summer Haven (Figure 1-1).

Storm damages, especially erosion, throughout most of the project area could jeopardize Florida State Road A1A (SR A1A), which is designated as a National Scenic Highway and is the only evacuation route for the region and a major north-south thoroughfare for the area. After the 2008 hurricane season, areas of the dune line were eroded to within 5 feet of SR A1A in portions of the Vilano Beach reach. SR A1A has already been relocated westward within the Summer Haven reach due to erosion.

2.2 PHYSICAL ENVIRONMENT (CONDITIONS)*

The study area consists of an open sandy coast subject to frequent storm events. Adjacent properties to the shoreline can be categorized as urban and include residential, commercial, and recreational properties. Many factors influence the coastal processes characteristic to the St. Johns County, Florida shoreline. Natural factors include winds, tides, currents, waves, storm effects, and sea level rise. Human-related (anthropogenic) factors include other shore protection projects, navigation projects, and development. The role of each of these factors and their contribution to beach erosion in St. Johns County are briefly described in the following paragraphs.

2.2.1 STUDY REACHES

The 9.8 mile length of the project area is separated into 3 reaches referenced to FDEP R monuments:

- South Ponte Vedra: R84 – R104 (3.8 miles)
- Vilano Beach: R104 to R117 (2.6 miles) and R117 to St. Augustine Inlet North Sand-trap Groin (1.1 miles)
- Summer Haven: R197 – R209 (2.3 miles)

The U.S. Army Corps of Engineers' Beach-fx model is the economic model used to determine the extent of damages which could potentially occur in the project area over the next 50 years. Without a constructed coastal storm risk management project in place, it is assumed that homeowners will construct a limited level of shore protection to defend their property against further damages. This assumption is supported by current practices, where home owners in the South Ponte Vedra and Vilano Beach reaches have applied for and constructed temporary seawalls (typically plastic sheet-pile construction) when the FDEP has determined a significant threat to their structures.

2.2.1.1 SOUTH PONTE VEDRA

The South Ponte Vedra reach begins at R-84 (see Figure 1-1). This reach was added to the study area after the Reconnaissance Report was completed in 2004. Its addition was necessary due to increased erosion occurring around R-90 in 2007. A significant and rapid loss of beach and dune width protecting several structures caused the FDEP to designate R-84 to R-94 (2 miles) as a critically eroded area due to threats to infrastructure and SR A1A. The southern boundary of the reach was extended

to R-104 for this feasibility study to border the Vilano Beach reach and to investigate the feasibility of providing uninterrupted shore protection along the coast.

Figure 2-1: South Ponte Vedra Beach – May 11th, 2007

To date, a number of homeowners have constructed temporary seawalls to protect their properties (Figure 2-1). The reach has a fairly narrow beach with a 15 to 20-foot natural dune. A single row of private homes is constructed on top of, or just landward of, the dune. SR A1A is sited landward of this single row of homes. Further landward of SR A1A, multiple rows of private homes are constructed with a marsh bordering the western extent of construction. The northern end of the reach is

surrounded by the Guana-Tolomato-Matanzas National Estuary and Research Reserve (GTMNERR), which extends, west to east, from the marsh into the Atlantic Ocean (Figure 2-2).

Figure 2-2. Guana-Tolomato-Matanzas National Estuary and Research Reserve boundary (green hatching) bordering the northern portion of the South Ponte Vedra Beach reach.

2.2.1.2 VILANO BEACH

The Vilano Beach reach begins at R104, abutting the southern boundary of the South Ponte Vedra reach. The FDEP designated R109 – R117 (1.6 miles) as a critically eroded area in 2006 when rapid erosion began to threaten private development and SR A1A. Due to this erosion, several homes were condemned and five structures were granted permits to construct temporary shore protection structures around an erosional hotspot (an area of rapid and chronic erosion) in the vicinity of R114. Just south of this hotspot, the dune was eroded to within 5 feet of A1A after the passage of Tropical Storm Fay in 2008. As of 2015, the FDEP has designated R84 – R117 (6.5 miles) as critically eroded.

Figure 2-3. Vilano Beach – August 26th, 2008, including the erosional hotspot at R-114 following Tropical Storm Fay.

The shoreline from R-117 to the sand-trap groin at St. Augustine Inlet (approximately R-122) was included as part of this study's Vilano Beach reach at the request of the local sponsor, St. Johns County. In general, this area has not seen the erosion apparent in the R-104 – R-117 area, possibly due to its proximity to the north sand trap groin of the St. Augustine Inlet, which inhibits the southward transport of sand.

The northern extent is geographically similar to the South Ponte Vedra reach with a narrow beach, and a single row of private homes constructed on top of, or just landward of, a 20 foot high dune. The southern extent of the reach is typified by a 14 foot high dune (on average), multiple rows of development seaward of A1A, and a slightly wider beach north of St. Augustine Inlet. Throughout the reach, multiple rows of development are sited between SR A1A and the marsh.

2.2.1.3 SUMMER HAVEN

The Summer Haven reach begins at R-197, just south of the Matanzas Inlet. Development in this reach is sited on a narrow strip of land between a shallow marsh and the Atlantic Ocean. Shore protection of upland development has likely been necessary since original development occurred in the early 1900s. After severe nor'easters in 1962, the President declared St. Augustine Beach and Summer Haven disaster areas, and USACE constructed an 1,800-foot granite revetment along the northern portion of the reach between R197 and R200 (Figure 2-4). After Hurricane Dora in 1964, the USACE added 1,070 linear feet of granite revetment to the existing revetment. This revetment fronts the majority of the upland development in the reach. South of the revetment, development is limited to one row of single-family residences. When possible the non-federal sponsor, St. Johns County, has been purchasing structures and lands in this southern area and not allowing further development.

SR A1A was originally built along the eastern edge of the reach, between the Atlantic Ocean and private homes. Frequent storm damage to the road prompted its re-siting landward to its current location. Approximately 2,700 feet and 3,600 feet of the original paved road (now called Old Highway A1A) remain in the northern and southern extents of the reach, respectively (Figure 2-4 and Figure 2-5).

Figure 2-4. Summer Haven reach viewed from northern end. Granite revetment protects paved section of Old SR A1A.

Figure 2-5. Summer Haven reach viewed from southern end. The entire reach is visible, with Matanzas Inlet in the upper right and Old SR A1A located just landward of the beach/dune.

As seen in Figure 1-1, the Guana-Tolomato-Matanzas National Estuary and Research Reserve (GTMNERR) borders the western perimeter of the reach, but does not extend offshore of the reach as it does in South Ponte Vedra Beach. Figure 2-6 illustrates an example of the GTMNERR bordering a portion of the Summer Haven reach.

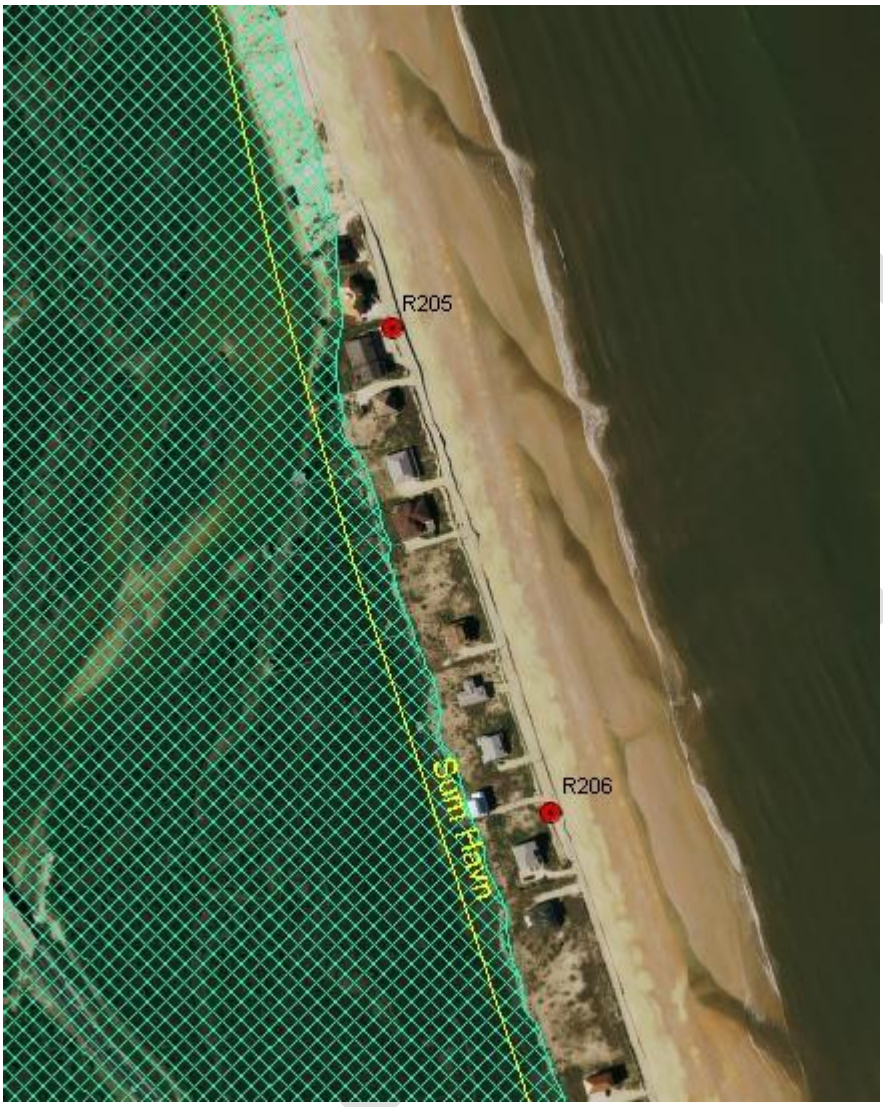


Figure 2-6. GTMNERR boundary (green hatching) bordering the Summer Haven reach.

A narrow beach is exposed at low- to mid-tide north of the revetment, however no significant beach exists seaward of the revetment. South of the revetment a narrow beach and low dune system fronting private homes is periodically overwashed and breached by storm surge and waves. The most recent breach occurred in September 2008 (Figure 2-7). The southern extent of the reach is fronted by a narrow beach exposed at low/mid tide and a constructed dune approximately 5 feet high.

Figure 2-7. Looking south along the Summer Haven reach (around R198). Granite revetment fronts paved remnant of Old SR A1A. The breach at R200 is shown in the middle of the picture, just beyond the "Road Closed" sign.

2.2.2 HURRICANE EVACUATION ROUTES AND ZONES

EXISTING CONDITIONS

Storm damages, especially erosion, throughout most of the project area could jeopardize National Scenic Highway, Florida State Road A1A (SR A1A), which is the only evacuation route for the region and a major north-south thoroughfare for the area. After the 2008 hurricane season, areas of the dune line around R115, in the Vilano Beach Reach, were eroded to within 5 feet of SR A1A. SR A1A has already been relocated westward within the Summer Haven reach due to erosion.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

Without a project in place, SR A1A will likely be damaged in portions of the study area. The most vulnerable portion is approximately 500 feet north and 1,500 feet south of R115 in the Vilano Beach Reach. The Florida Department of Transportation (FDOT) has preliminary designs, but no permit or

scheduled plans, to construct a seawall in this area for protection of the road. FWOP Beach-fx modeling for this study includes future construction of a seawall in this area. If the road were damaged, hurricane evacuation, emergency response, and storm recovery operations could be jeopardized. Compromising such operations could have life safety consequences.

2.2.3 GEOLOGY

The St. Johns County barrier islands have inlets at St. Augustine and at Fort Matanzas. There are low tidal marshes and lagoons between the barrier islands and the mainland. The barrier Islands are composed principally of quartz and carbonate sand, and are underlain by silty, clayey marsh deposits that formed at lower sea level stages. The sands are principally fine to medium-grained sand-sized quartz with variable amounts of shell and shell fragments.

Offshore of the beaches and modern barrier islands is the continental shelf. The continental shelf has a broad, shallow, low relief and extends approximately 80 miles offshore near St. Johns County. The shelf contains relic Pleistocene and Holocene terraces and submerged beach sand ridges. The wave climate and sediment transportation system creates a linear sandy coastline.

The northeast coast of Florida consists of a series of sandy barrier islands broken occasionally by inlets. The barrier islands are characterized by dunes and shore parallel beach ridges. Many of the islands display relic beach ridges formed during higher stands of sea level. The formations exposed at the surface are undifferentiated sediments and the Anastasia Formation of Pleistocene and Holocene age (Scott, et al., 2001). These deposits consist of fine to medium quartz sand and lenses of shell and clay of varying thickness. Thick shell beds and erosion of the outcropping Anastasia formation near the coast have been firmly cemented to form coquina rock (see Section 2.3.4 for additional information).

The quartz component of the modern barrier island sand was previously deposited over the entire region and was depositing when migrating southward along the Atlantic coast. However, a large portion of the coastal sediments in St. Johns County are carbonates, locally produced by calcite-producing plants and animals. Additional carbonate materials are reworked materials from outcropping Pleistocene formations offshore (Duane and Meisburger, 1969).

2.2.4 NATIVE BEACH

EXISTING CONDITIONS

The native sand on St. Johns County's beaches consists predominately of shelly, poorly sorted, fine to medium grained quartz and carbonate sand with silt content that averages less than two percent, and ranges in color from light gray and white to brownish gray. The amount of visual shell (carbonate content) varies from 3% to 84%, and generally is concentrated on the dry beach above Mean Low Water (MLW). The carbonate content originates from coquina rock outcrops of the Anastasia formation located in the

coastal zone. Due to the high content of shell, the sediments throughout the berm and mid-tide are significantly coarser than the rest of the beach profile. Some stretches of beach contain a high percentage of coquina shell fragments, which give the sand an orange hue.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The future without-project conditions of the native beach are similar to the existing conditions described above.

2.2.5 SAND SOURCES

The study includes three separate potential sand sources for any necessary beach or dune placement material: the St. Augustine Inlet shoal complex, including the ebb, flood, and Vilano Point shoals as well as the Federal navigation channel; the North Offshore Borrow Area (NOBA); and the South Offshore Borrow Area (SOBA).

2.2.5.1 ST AUGUSTINE INLET SYSTEM SAND SOURCES: EBB, FLOOD, AND VILANO POINT SHOALS, AND FEDERAL NAVIGATION CHANNEL

EXISTING CONDITIONS

In conjunction with this investigation, a Regional Sediment Management (RSM) analysis incorporating navigation projects near the study area (Intracoastal Waterway and St. Augustine Inlet) and the constructed Federal shore protection project at St. Augustine Beach has sought to integrate current and future project sand needs around the inlet vicinity. This work is published in the Engineer Research and Development Center (ERDC) draft technical report, *Regional Sediment Management Strategies for the Vicinity of St. Augustine Inlet, St. Johns County, Florida*.

The St. Augustine Inlet system has approximately 6.5 million cubic yards of beach quality sand per FDEP permitting standards. The FDEP permits any dredging that would be necessary to access this source. The FDEP's St. Augustine Inlet management plan states 278,000 cubic yards of sand can be dredged from the inlet system per year. The material obtained from the inlet system shall be distributed to the adjacent Atlantic Ocean fronting beaches with a placement ratio of approximately one-third of material placement to the north and two-thirds of material placement to the south. Further details on the inlet system sand sources are available in the Geotechnical Appendix.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

Without a project, the channel and shoals of the St. Augustine Inlet will continue to trap sand, and the water depths in the areas will decrease, compromising navigability of the Federal navigation project. The Federal navigation channel and IWW do receive Operation and Maintenance (O&M) funds for dredging, but infrequently due to their "shallow draft" status. Federal funding priority is instead given to "deep draft" channels serving ports handling the nation's majority of shipped freight. Consequently, the St.

Augustine Inlet and IWW have had dangerous shoals form in recent years causing hazards to navigation and negatively affecting the local economy. Such negative impacts would continue into the future without a project.

2.2.5.2 OFFSHORE SAND SOURCES

EXISTING CONDITIONS

The offshore sand sources are sand shoals on the Outer Continental Shelf. Additional details on the offshore sand sources are available in the Geotechnical Appendix. There are an estimated 400 million cubic yards of sand within the North Offshore Borrow Area (NOBA). Of this, 16 million cubic yards has been fully developed with core borings and related analysis. There are an estimated 130 million cubic yards of sand within the South Offshore Borrow Area (SOBA), of which 14 million cubic yards has been fully developed.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The Future Without-Project Conditions of the offshore borrow areas (NOBA and SOBA) are similar to the existing conditions described above.

2.2.6 SHORELINE CHANGE AND EROSION RATES

EXISTING CONDITIONS

Shoreline surveys dating back to 1952 indicate that the St. Johns County shoreline as a whole is experiencing an erosion at a rate of 1.0 ft/yr (FDEP 2000). Shoreline changes fluctuate over time along the study area. The shoreline of St. Johns County has fluctuated throughout history seeing areas undergo both advancement and recession of the mean high water (MHW) position. The analysis detailed in the Engineering Appendix showed that over the long term from 1972 to 2015 the study area on an average has been receding. In the time between 1972 and 2015, the MHW in South Ponte Vedra receded an average of 1.3 ft/yr. In the Vilano Beach 1 segment the MHW receded 1.7 ft/yr on average while the Vilano Beach 2 segment, directly north of the St. Augustine Inlet, the MHW advanced seaward an average of 0.3 ft/yr.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The shoreline should experience similar rates of erosion and accretion in the Future Without-Project Condition as described in the Existing Conditions section above.

2.2.7 WINDS

EXISTING CONDITIONS

Local winds are the primary means of generating the small-amplitude, short period waves that are an important mechanism of sand transport along the study area shoreline. Predominant winds from the east-southeast quadrant are generally mild in nature and occur in the spring and summer months. Elevated wind speeds from the north-northeast quadrant in fall and winter months occur during passage of nor'easters which can cause extensive beach erosion and shorefront damage. Occasionally the area is impacted by the passage of tropical storms that can generate devastating winds, waves, and storm surge, which can cause direct damage to coastal structures and infrastructure.

The Engineering Appendix provides additional detail on winds.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The Future Without-Project Conditions of winds are similar to the existing conditions described above.

2.2.8 WAVES

EXISTING CONDITIONS

The wave energy dissipation that occurs as waves enter the nearshore zone and break is the principal driver for sediment transport. Wave height, period, and direction, in combination with tides and storm surge, are the most important factors influencing the behavior of the beach and dune system. The study area is exposed to both short period wind-waves and longer period open-ocean swells originating predominantly from the northeast during spring, fall and winter months and from northeast to southeast during summer months.

Periodic erosion of the study area and associated damage to upland development is attributable to large storm waves produced primarily by northeasters during the late fall and winter months and by tropical disturbances, including hurricanes, during the summer months. Because the study area is fully exposed to the open ocean in all seaward directions, the coastline is vulnerable to wave attack from distant storms (causing long period swells) as well as local storms (causing short period steep waves). Tropical storm passage is relatively frequent for the study area and even without landfall of a tropical storm, a system passing within several hundred miles may cause extensive erosion damage to the area. The Engineering Appendix provides additional detail on waves.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The Future Without-Project Conditions of waves are similar to the existing conditions described above.

2.2.9 ASTRONOMICAL TIDES

EXISTING CONDITIONS

Astronomical tides are created by the gravitational pull of the moon and sun and are well understood and predictable in magnitude and timing. The National Oceanic and Atmospheric Administration (NOAA) regularly publishes tide tables for selected locations along the coastlines of the United States and selected locations around the world. These tables provide times of high and low tides, as well as predicted tidal amplitudes.

Tides in St. Johns County area are semidiurnal, meaning two high tides and two low tides occur per tidal day. Tidal datums for St. Augustine Beach (NOAA station 8720587) and Vilano Beach ICWW (NOAA station 8720554) are summarized in **Error! Not a valid bookmark self-reference.** and

Table 2-2, respectively. The St. Augustine Beach water level station is located on the St. Augustine Beach pier and represents open ocean water levels while the Vilano Beach water level station is located in the Intracoastal Waterway on the SR A1A bridge and represents tides affecting the marshside of the barrier islands. The difference between Mean High Water (MHW) and Mean Low Water (MLW), known as the mean tide range, equals 4.61 feet at St. Augustine Beach and 4.24 feet at Vilano Beach, Intracoastal Waterway gage.

Table 2-1: Tidal datums for St. Augustine Beach, FL on the Atlantic Ocean coast.

Tidal Datum	Elevation Relative to NAVD88 (feet)
Mean Higher High Water (MHHW)	2.01
Mean High Water (MHW)	1.64
North American Vertical Datum (NAVD88)	0.00
Mean Sea Level (MSL)	-0.70
Mean Low Water (MLW)	-2.97
Mean Lower Low Water (MLLW)	-3.13

Table 2-2: Tidal datums for Vilano Beach, FL on the marsh side of the island.

Tidal Datum	Elevation Relative to NAVD88 (feet)
Mean Higher High Water (MHHW)	1.86
Mean High Water (MHW)	1.53
North American Vertical Datum (NAVD88)	0.00
Mean Sea Level (MSL)	-0.56
Mean Low Water (MLW)	-2.71
Mean Lower Low Water (MLLW)	-2.89

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The Future Without-Project Conditions of tides are similar to the existing conditions described above.

2.2.10 CURRENTS

EXISTING CONDITIONS

Near-shore currents affect the supply and distribution of sediment on the sandy beaches of St. Johns County and are composed of alongshore and cross-shore components. Alongshore currents, induced by oblique wave energy, generally determine the long-term direction and magnitude of littoral transport. Cross-shore currents may have a more short term impact, but can result in both temporary and permanent erosion. The magnitude of these currents is determined by the wave characteristics, angle of waves from offshore, configuration of the beach, and the nearshore profile. For St. Johns County beaches, the net sediment transport is from north to south. This is due to the dominant wave activity from the northeast during the fall and winter months, particularly northeaster storms.

Adjacent to the St. Augustine Inlet, currents are affected by the ebb and flood tidal flow through the inlet. The terminal groin structure on the north side of St. Augustine Inlet also provides varying degree of influence on nearshore currents depending on its exposure level.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The Future Without-Project Conditions of currents are similar to the existing conditions described above.

2.2.11 STORM EFFECTS

EXISTING CONDITIONS

The beaches of St. Johns County are influenced by tropical systems during the summer and fall and by northeasters during the late fall, winter, and spring. Although hurricanes typically generate larger waves and storm surge, northeasters typically have a greater cumulative impact on the shoreline due to longer storm duration and greater frequency of event occurrence. Periodic and unpredictable hurricanes and coastal storms, with their energetic breaking waves and elevated water levels, can change the width and elevation of beaches and accelerate erosion as depicted in Figure 2-8.

The shoreline is expected to naturally modify its beach profile during storms. Storms erode and transport sediment from the subaerial beach into the active zone of storm waves. Once caught in the waves, this sediment is carried along the shore and re-deposited farther down the beach, or is carried offshore and stored temporarily in submerged sand bars.

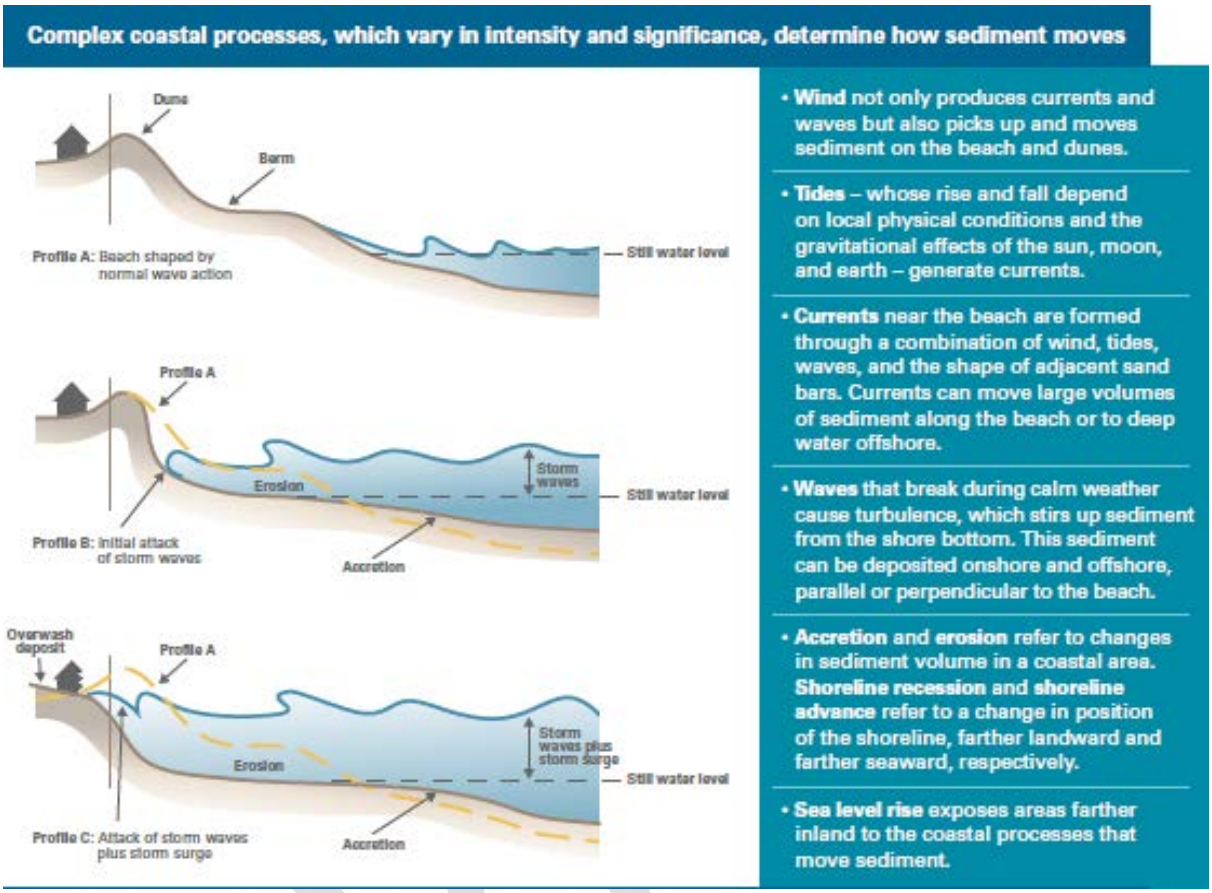


Figure 2-8. Typical coastal processes (from Shore Protection Assessment primer published by USACE-Engineer Research Development Center).

After storms pass, waves usually return sediment from the sand bars to the beach, which is restored gradually to its natural equilibrium profile. However, extreme storm events may cause sediment to leave the beach system entirely, sweeping it into inlets, into the back bay (over wash), or moving it far offshore into deep water where waves cannot return it to the beach. This causes the shoreline to recede, or move farther landward.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The Future Without-Project Conditions of storms are similar to the existing conditions described above.

2.2.12 STORM SURGE

EXISTING CONDITIONS

Storm surge is defined as the rise of the ocean surface above its astronomical tide level due to physical forces. Surges occur primarily as a result of atmospheric pressure gradients and surface stresses created

by wind blowing over a water surface. Strong onshore winds pile up water near the shoreline, resulting in elevated water levels along the coastal region and inland waterways. In addition, the lower atmospheric pressure which accompanies storms also contributes to a rise in water surface elevation. Extremely high wind velocities coupled with low barometric pressures (such as those experienced in tropical storms, hurricanes, and very strong northeasters) can produce very high, damaging water levels. Water level (with storm surge) time series are critical for input into shoreline response and coastal storm risk modeling applications. An increase in water depth may increase the potential for coastal flooding and allow larger storm waves to attack the shore.

The return period storm surge events can provide insight into the vulnerabilities of a given location through comparison with the existing topography. Table 2-3 provides peak storm surge heights by return period for St. Augustine Inlet, Florida. Storm surge levels versus frequency of occurrence presented in Table 2-3 were obtained from data compiled by the University of Florida for the Florida Department of Transportation (Sheppard and Miller, 2003).

Table 2-3: Peak storm tide elevations.

Storm Return Period	Peak Storm Surge Height		
(years)	ft-NGVD29	ft-NAVD88	ft-MSL
10	3.6	2.5	1.8
20	5.4	4.3	3.6
50	9.6	8.5	7.8
100	12.3	11.2	10.5
200	14.5	13.4	12.7
500	16.9	15.8	15.1

FUTURE without-project CONDITIONS (No Action Alternative)

The Future Without-Project Conditions of storm surge are similar to the existing conditions described above.

2.2.13 SEA LEVEL CHANGE

EXISTING CONDITIONS

It is anticipated that the global mean sea level will rise within the next 100 years. To incorporate the direct and indirect physical effects of projected future sea level change on design, construction, operation, and maintenance of coastal projects, the U.S. Army Corps of Engineers (USACE) has provided guidance in the form of Engineering Regulation, ER 1100-2-8162 and Engineering Technical Letter (ETL) 1100-2-1. Three estimates are required by the guidance, a Baseline (or "Low") estimate, which is based on historic sea level rise and represents the minimum expected sea level change, an Intermediate estimate, and a High estimate representing the maximum expected sea level change.

The study area is located between 30 and 45 miles from NOS gage #8720218 at Mayport, Florida. The historical sea level rise rate taken from this gage was determined to be 2.40 mm/year (0.0079 ft/year) (http://corpsclimate.us/ccaceslcurves.cfm). Given a project base year of 2020 a table of sea level change rates was produced for each of the three required scenarios through the 50 year planning horizon and up to the year 2120. Additional detail on sea level change is provided in the Engineering Appendix.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

Figure 2-9 provides a graphic representation of the three levels of projected future sea level change over a 100 year period. The project area can expect to see sea level rise 0.4 to 2.4 feet above its current position within the 50 year planning horizon as predicted by the low and high sea level change rates, respectively.

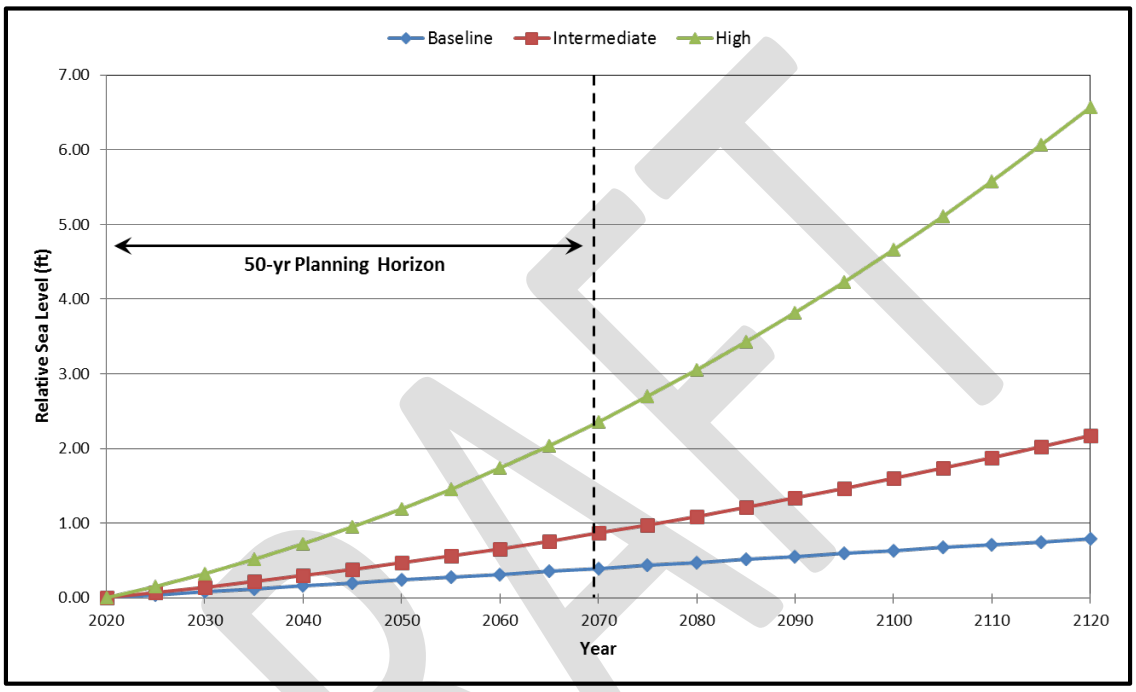


Figure 2-9: Relative sea level change, St. Johns Co., FL.

2.2.13.1 SHORELINE CHANGE RESULTING FROM SEA LEVEL RISE

An estimate of the rate of shoreline recession can be based on the local rate of sea level change in some cases. With a change in sea level, the beach profile will attempt to reestablish the same bottom depths relative to the surface of the sea that existed prior to sea level change. That is, the natural profile will be translated upward and shoreward to maintain equilibrium. If the longshore littoral transport in and out of a given shoreline is equal, then the quantity of material required to re-establish the nearshore slope must be derived from erosion of the shore.

The above estimation is applicable to long straight sandy beaches with an uninterrupted supply of sand and should only be used for estimating long-term changes. Additional detail is given in the Engineering Appendix. Figure 2-10 provides an estimate of the potential shoreline changes within the project area attributable to projected changes in sea level.

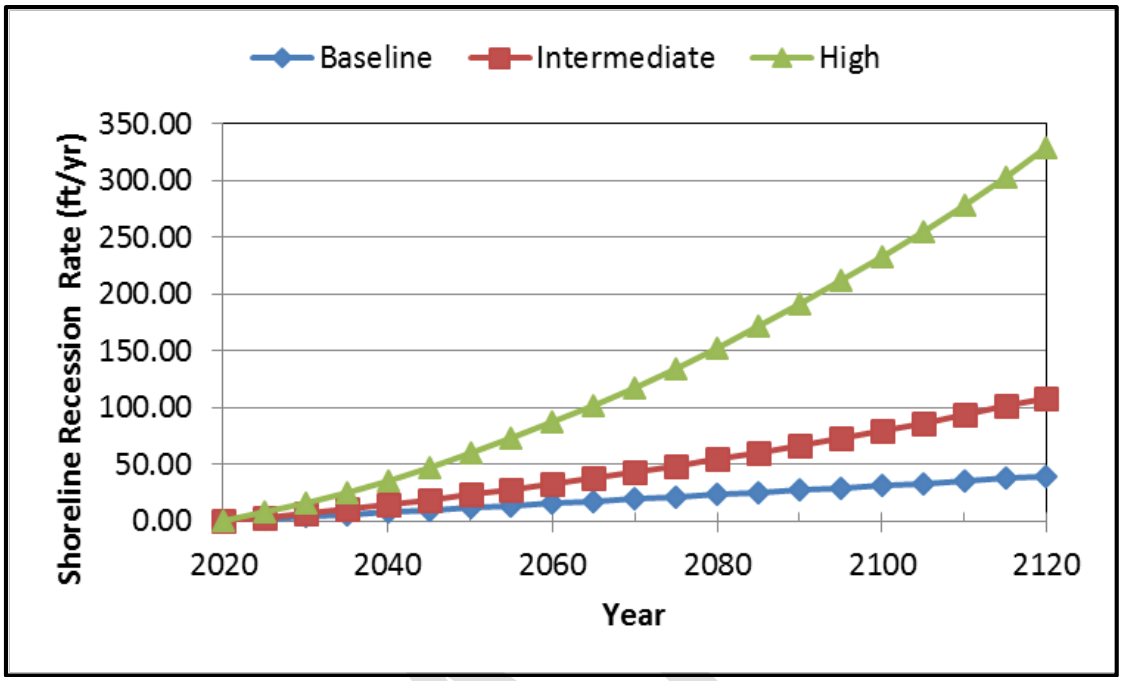


Figure 2-10: Estimated shoreline recession rate due to sea level rise.

2.2.13.2 VOLUMETRIC CHANGE RESULTING FROM SEA LEVEL RISE

Engineering Manual (EM) 1110-2-3301 (USACE, 1995) gives guidance on how to calculate beach volume based on berm height, depth of closure, and translation of the shoreline (in this case, shoreline recession). Figure 2-11 provides an estimate of the shoreline volume loss as a result of the three Sea Level Rise scenarios.

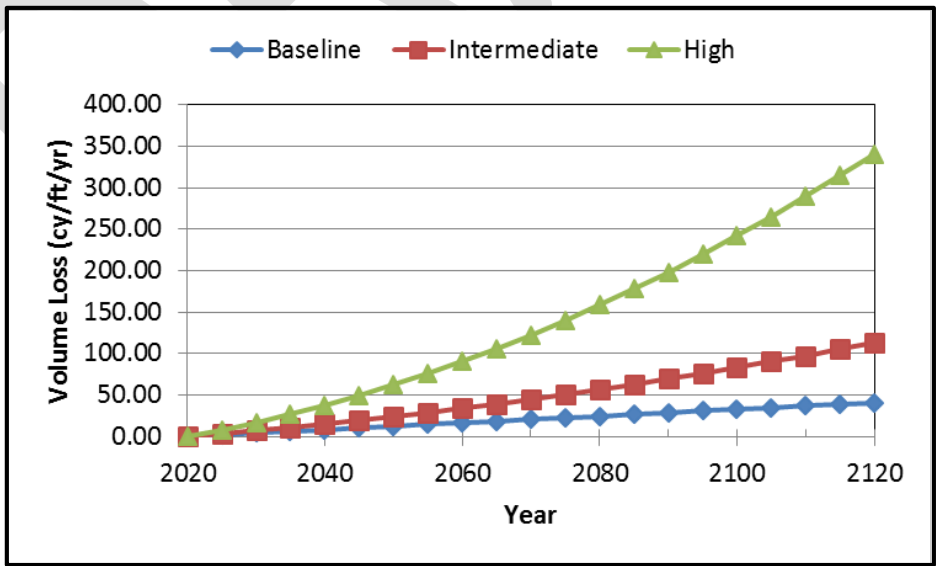


Figure 2-11: Estimated volume loss due to sea level rise.

2.2.13.3 INCORPORATION OF ER 1100-2-8162 AND ETL 1100-2-1: GUIDANCE FOR SEA LEVEL CHANGE

The Sea-Level Change (SLC) Engineering Technical Letter (ETL) 1100-2-1 supporting ER 1100-2-8162, suggests a tiered analysis to determine the risk of potential SLC and resulting incorporation into the plan formulation process. Incorporation of potential SLC into the USACE Planning process will require active focus on risk-based scoping to define pertinent needs, opportunities, and the appropriate level of detail for conducting investigations. In particular, close attention is needed at the beginning of each study in order to screen planning/scoping decisions. The tiered analysis for SLC is incorporated into the 6-step planning process used in this report. Mean Sea Level (MSL) is used as an elevation reference in this section of the report as it is generally more intuitive for readers when describing changes to existing water elevations.

In order to evaluate SLC impacts to infrastructure, critical resources, and the population residing in the study area, a qualitative matrix was developed in Table 2-4. Resources evaluated in the matrix were based on those identified by the USACE Coastal Systems Portfolio Initiative (CSPI). CSPI describes the resource risk in a project area relative to the density of the resource, the population density that the resource serves, or in the case of environment/habitat and recreation, the value placed on the resource. See http://navigation.usace.army.mil/CSPI for more information. The evaluation criteria shown in the table is from, *Technical Review of Coastal Projects: Storm Risk Management, Navigation and Ecosystem Restoration for Nation's Coastlines* (USACE, Spring 2012.)

The qualitative matrix shown in Table 2-4 evaluates the resources on which the study area depends. In addition to the CSPI evaluation criteria, Table 2-4 evaluates the vulnerability to resources from potential SLC, or Sea Level Rise (SLR) in the case of the study area. Averaging the "Vulnerability from SLR" to resources gives an average of 1.2, equating to a relatively low vulnerability of resources. This indicates that SLR is not a major contributor to overall resource vulnerability within the 50 year period of analysis.

Table 2-4: Qualitative Matrix describing vulnerability of resources from potential accelerations in SLC.

Resource	Risk Rating from CSPI - Value or density of resource or dependent population (3=high, 2=med., 1=low, X=none present)	Description	Vulnerability from SLR (3=high, 2=med., 1=low, X=none present)	Description
Residential/commercial structures	2	Mostly residential (single-family and multi-family homes.) Most ground floor elevations of structures vary between 10.5 and 20.5 feet above existing Mean Sea Level (MSL) throughout the study area. Most ground floor elevations within the Tentatively Selected Plan (TSP) area are approximately 15.5 feet above existing MSL.	1	Projected high scenario SLC would not place Mean Sea Level (MSL) near infrastructure within the 50 year planning horizon and would increase the flood frequency very minimally. Typical surge experienced in the project area from large coastal storms is between 2.5 to 4.3 feet (10 and 20 year return period, respectively.) This indicates that SLR is not a major contributor to future damages over the 50 year planning horizon.
Environment and Habitat	3	Beach/dune habitat. Fairly narrow, steep beach backed by average 15.5 feet high dunes. Where no dune exists, seawalls of varying quality have been constructed.	2	Beach berm and dune system is located between 10.5 and 20.5 feet above MSL throughout the study area. Sub aerial habitat is located throughout this system.
Infrastructure (roads, water/sewer lines, boardwalks, navigation structures)	2	Water/sewer lines, septic tanks, seawalls and dune walkovers exist. State Road A1A is located between 10.5 and 20.5 feet above MSL throughout the study area. The road is located approximately 15.5 feet above MSL within the TSP area. Most other infrastructure would not be impacted until water level, including storm surge, reached above this point. The 10-year return period storm tide level is equal to 1.8 feet above MSL, including tide and effects from waves wave setup.	1	By the end of the 50 year planning horizon, State Road A1A remains adequately elevated above MSL under any SLC scenario. Other infrastructure located at, or above, this elevation is also adequately elevated. Wooden boardwalks (typically built over the dunes to allow beach access) have portions lower than this elevation and are more subject to damage. However, they are not high value, or critical, infrastructure.
Critical Facilities (police, fire, schools, hospitals, and nursing homes)	1	low density of critical facilities	1	Elevation of most critical facilities remains above MSL under any SLC scenario by the end of the 50-year planning horizon.
Evacuation Routes	3	State Road A1A is the main north/south evacuation route, located approximately 15.5 feet above MSL within the TSP area.	1	By the end of the 50 year planning horizon, State Road A1A remains adequately elevated above MSL under any SLC scenario. Even under the high SLC scenario, a 13-foot difference would remain between MSL and A1A within the TSP area.
Recreation	3	significant recreational use of beaches	1	Beach berm is between 10.5 and 20.5 feet above current MSL throughout the study area. Recreational use of beach is high around public access points.
		average =	**1.2**	**Low Vulnerability**

Overall, the initial analysis above indicates that the project area vulnerability to SLC is relatively low. A relatively low risk from SLC to the project area combined with high uncertainty over potential accelerations in the rate of SLC lead to an adaptive management strategy as shown in Figure 2-12.

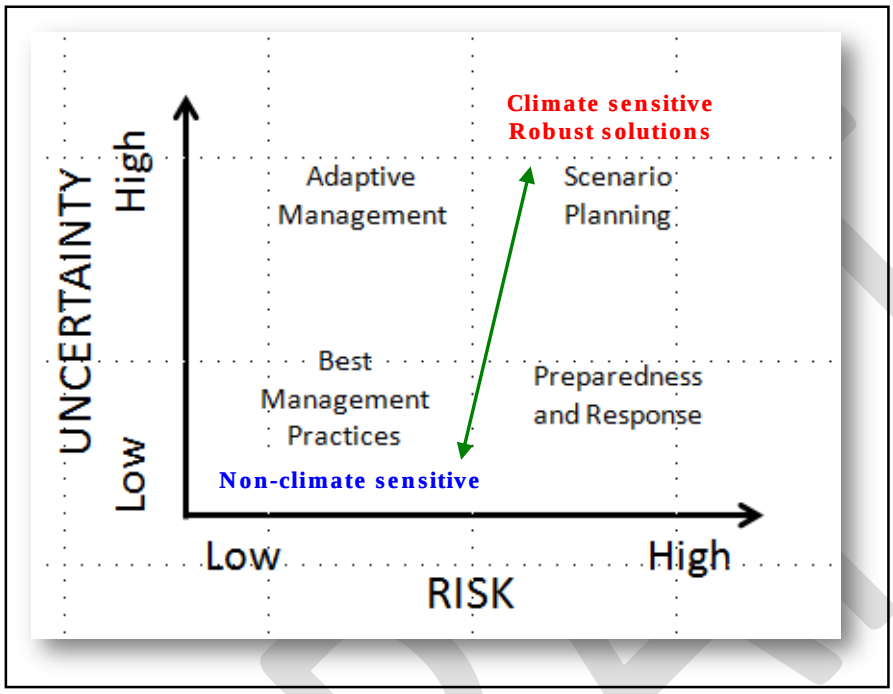


Figure 2-12: Consideration of risk and uncertainty in climate change related decision-making.

Elevations within the study area (Atlantic Ocean side of the island) are some of the highest on the barrier island, about 14.5 to 20.5 feet above Mean Sea Level (MSL). Elevations on the marsh side of the island are significantly lower. Although the marsh side of the island is not within the current study area, stakeholders should be aware of increased risk to infrastructure as sea level rises. Cross-island profiles were taken at three points throughout the study area, shown in Table 2-5. As reflected in the table, the profiles of the island slope downward from the dune (located on the Atlantic Ocean) to the marsh side of the island where structures are generally located around 5.5 to 6.5 feet above current MSL. There may be other locations with lower elevations. However, these cross-island profiles represent the general topography within, and adjacent to, the study area.

Table 2-5: Key elevations along cross-island profiles.

	Ground elevations in feet (MSL)*			
R-monument of Profile	**Dune**	**State Road A1A**	**Atlantic Ocean-side Structures**	**Marsh-side Structures**
R-97	18.5	18.5	18.5	6.5
R-110	24.5	20.5	20.5	6.5
R-119	14.5	10.5	12.5	5.5

*elevations are approximate, based on 2015 bare-earth LiDAR given in NAVD88. Difference between NAVD88 and MSL on ocean side is -0.7 ft. Difference between NAVD88 and MSL on marsh side is -0.6 ft.

The island profile taken at R-110 is shown in Figure 2-13. Marsh side areas of the island will likely be impacted by inundation more frequently than the ocean side as sea level rises, especially during extreme high tide events. In the study area, the majority of the oceanfront area is fronted by relatively high dunes as shown in Figure 2-13.

Figure 2-13: Cross-island profile taken at R-110. Elevations are relative to NAVD88.

A key question when assessing the vulnerability of the study area to SLC is when critical thresholds will be crossed, if at all, by potential SLC. Throughout the study area, the dune crest height represents a critical threshold. The average dune height from Table 2-5 is 19 feet (MSL). SR A1A and other infrastructure is located slightly lower, on average, at 17 feet (MSL). Since the dune lies between the ocean and infrastructure, the dune height (19 feet) will be used as the ocean side critical elevation.

The maximum 50-year storm tide elevation in the study area is given as 7.8 feet MSL in Table 2-3. Water elevations during such storm events could reach the top of the dunes (19 feet MSL) once sea level increases by about 11.2 feet (7.8 feet storm tide + 11.2 feet sea level increase = 19 feet). This estimate does not take erosion of the dune height into consideration which could occur over time. At the end of 50 years, sea level may increase by 2.4 feet under the high SLC scenario, significantly below the threshold off 11.2 feet.

ETL 1100-2-1 recommends that systems related to, but existing outside, the study area should also be evaluated for vulnerability to SLC. The marsh side of the island does not contain any critical infrastructure on which the study area depends, such as hospitals or emergency services. This analysis only brings attention to the vulnerability of the marsh side of the island for stakeholder knowledge.

Infrastructure on the marsh side is generally built at or above 6 feet MSL as seen in Table 2-5. This side of the island is mainly affected by tides, not storm surge. Tidal range on the marsh side of the island is smaller than the ocean side.

Table 2-2 shows that Mean Higher High Water (MHHW) is equal to 2.4 feet MSL. Infrastructure could be periodically impacted once sea level increases by about 3.6 feet (2.4 feet + 3.6 feet sea level increase = 6 feet). At the end of 50 years, sea level may increase by 2.4 feet under the high SLC scenario, which is below the threshold of 3.6 feet. The high scenario is predicted to surpass this threshold in approximately 85 years after the base year as seen in Figure 2-14. In such a case, infrastructure on the back side of the island could be impacted during higher high tide events, dependent on current and future construction to protect against elevated water levels such as seawalls and bulkheads.

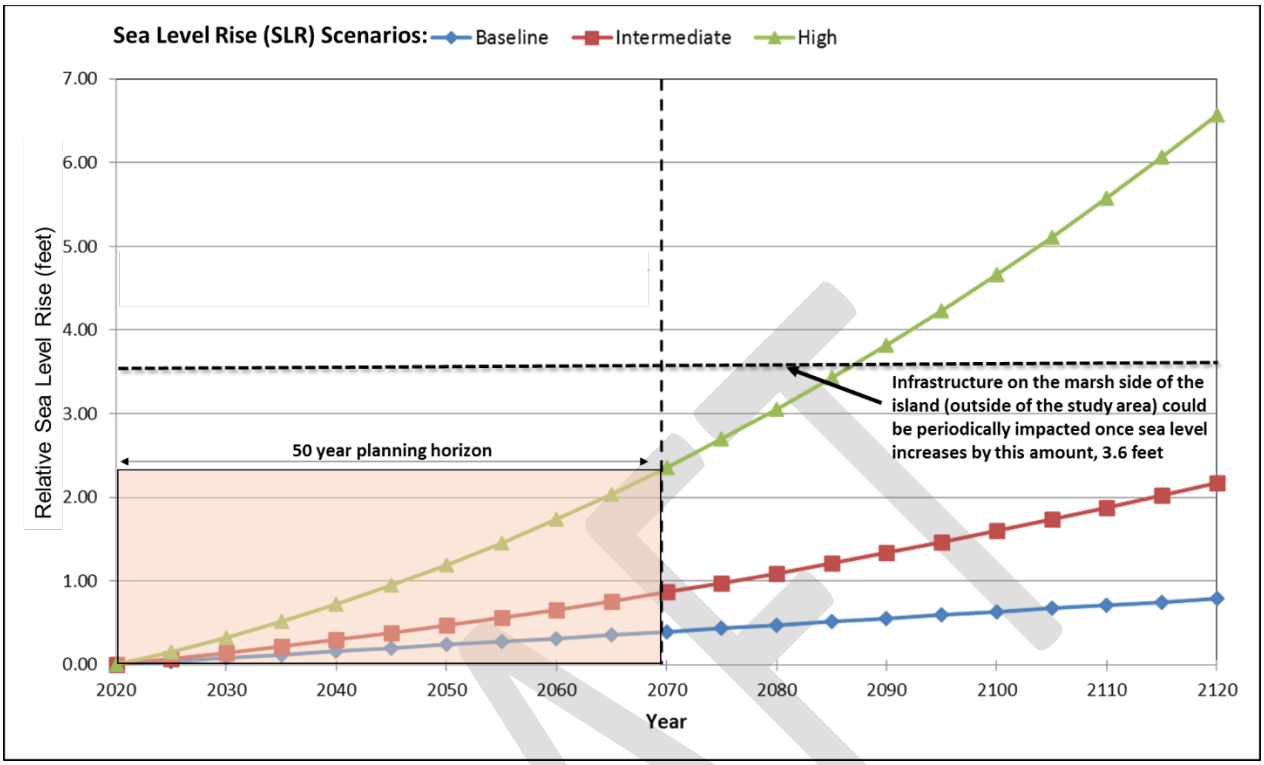
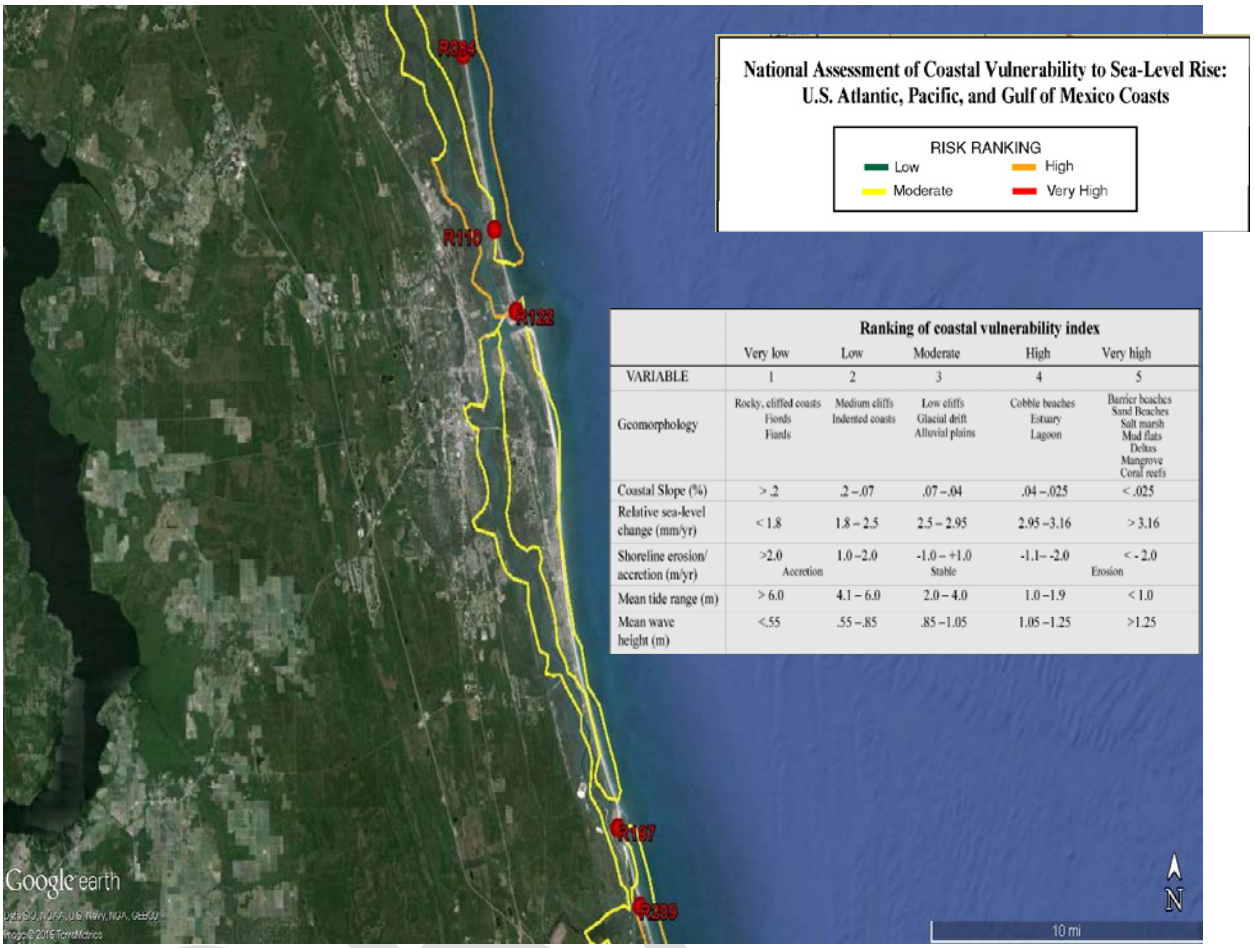


Figure 2-14: Threshold vulnerability on the marsh side of the island to relative sea level rise,

The existing Coastal Vulnerability Index (CVI) developed by the United States Geological Survey (USGS) is a useful indicator of a project area's natural vulnerability to SLC. Population and infrastructure type, or density, are not parameters used in the assessment. The USGS used six input parameters to assess the CVI for geographic areas along the nation's shoreline. Parameters used include geomorphology, coastal slope, relative SLC, shoreline erosion/accretion, mean tide range, and mean wave height (USGS 2000). Figure 2-15 shows the CVI for the study area is rated as moderate to high based on the area being part of an erosional barrier island surrounded by sandy beaches and salt marsh.



	Ranking of coastal vulnerability index				
	Very low	Low	Moderate	High	Very high
VARIABLE	1	2	3	4	5
Geomorphology	Rocky, cliffed coasts Fiords Fiards	Medium cliffs Indented coasts	Low cliffs Glacial drift Alluvial plains	Cobble beaches Estuary Lagoon	Barrier beaches Sand Beaches Salt marsh Mud flats Deltas Mangrove Coral reefs
Coastal Slope (%)	> .2	.2 – .07	.07 – .04	.04 – .025	< .025
Relative sea-level change (mm/yr)	< 1.8	1.8 – 2.5	2.5 – 2.95	2.95 – 3.16	> 3.16
Shoreline erosion/ accretion (m/yr)	>2.0 Accretion	1.0 – 2.0	-1.0 – +1.0 Stable	-1.1 – -2.0	< - 2.0 Erosion
Mean tide range (m)	> 6.0	4.1 – 6.0	2.0 – 4.0	1.0 – 1.9	< 1.0
Mean wave height (m)	<.55	.55 – .85	.85 – 1.05	1.05 – 1.25	>1.25

Figure 2-15: USGS Coastal Vulnerability Index.

2.2.14 EFFECTS OF OTHER COASTAL STORM RISK MANAGEMENT (CSRM) AND NAVIGATION PROJECTS

EXISTING CONDITIONS

St. Augustine Harbor Federal Navigation Project is located adjacent to the southern end of the Vilano Beach reach. The harbor inlet is stabilized by a northern sand-trap groin and southern jetty. Both of the structures act to impound material. Sediment transport around the tip of the north sand-trap groin is visible in the form of nearshore shoaling in an area referred to as Vilano Shoal or Porpoise Point. The inlet itself acts as an effective sediment sink, experiencing accretion in the channel as well as the developing ebb and flood shoals. Throughout this report all of these accretional areas, including the shoals and inlet channel are referred to as the, “shoal complex.”

St. Augustine Inlet has historically been dredged to maintain a navigable depth. The ebb tide shoal of St. Augustine Inlet was used as a sand source for the initial beach nourishment the St. Johns Co. Shore Protection Project (SPP) at St. Augustine Beach in 2001, as well as for subsequent nourishments in 2005. In 2012, portions of the shoal complex, including the entrance channel, ebb shoal and Vilano Shoal, were dredged as a sand source for renourishment of the project. The Engineering Appendix offers additional information on the effects of adjacent projects

Matanzas Inlet is not maintained for navigation. The inlet has a history of migrating to the south, but is now held in place by the south abutment of the SR A1A bridge over the inlet.

The Intracoastal Waterway (IWW) near Matanzas Inlet is subject to shoaling and must be regularly dredged to maintain navigation. Maintenance dredging of the channel is between 150,000 to 200,000 cubic yards per year (cy/yr) (personal communication, FIND 2003). This material can be pumped into the dredged material management area, MSA SJ-1, until the 800,000 cubic yard capacity is reached. In 1999, approximately 765,000 cubic yards of material was pumped from MSA SJ-1 and the IWW onto the beach at Summer Haven. SJ-1 was last used in 2004, however in 2007 and 2011 the dredged material was pumped directly onto the beach at Summer Haven. This sand is fine grained with a low percentage of fine material (less than 5% passing a #200 sieve). A 2016 maintenance event is planned with approximately 400,000 cubic yards expected to the dredged and placed onto the beach at Summer Haven.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The Future Without-Project Conditions of other CSRM and navigation projects are similar to the existing conditions described above. However, it should be stated that infrequent dredging of the Federal navigation channel has led to hazardous navigation conditions within the inlet. Without a project in place, these conditions are expected to continue.

2.2.15 PUBLIC ACCESS AND PARKING

EXISTING CONDITIONS

Federal participation in coastal storm risk management projects involving placement of sand is limited to shorelines open to public use. Guidance is provided in Engineering Regulation (ER) 1105-2-100 and ER 1165-2-130. Cost sharing for any recommended plan is based on shoreline ownership, use, and the availability of public access.

The South Ponte Vedra reach (R84-R104) contains only two signed public access points with parking which significantly limits any Federal participation in a potential project. At the time of this writing, the non-federal sponsor does not intend to add public access or parking in the near future. The Vilano Beach reach (R104-R122) has signed public access at least every ½ mile with a number of the accesses having adequate public parking. The Summer Haven reach (R197-R209) contains no maintained public access or signed

public parking, severely limiting any Federal participation in a potential project. In the northern extent of the reach, unofficial public parking is available on the shoulder of Old SR A1A between the revetment and the road between R198 and R199. However, no signs indicate "public parking."

Figure 2-16 depicts signed public access and parking within the South Ponte Vedra Beach and Vilano Beach Reaches. The green points are existing public access locations with free public parking recorded by the Florida Department of Environmental Protection (FDEP) and verified by the Jacksonville District. Red points indicate public accesses without parking.

Figure 2-16: Public access and parking within the South Ponte Vedra Beach and Vilano Beach Reaches.

FUTURE without-project CONDITIONS (No Action Alternative*)

Public access and parking are not expected to change between the existing and future without-project conditions.

2.3 NATURAL (GENERAL) ENVIRONMENT*

2.3.1 VEGETATION

EXISTING CONDITIONS

Coastal development has limited the dune system to relatively small portions of the three reaches. The intact dunes are dominated by a mixture of sea oats, beach pennywort, gaillardia, saltwort, sea rocket, railroad vine, prickly-pear cactus, and beach tea. In addition, a colony of the invasive exotic suckering Australian pine (*Casuarina glauca*) was located on Summerhaven beach at the southern terminus of the September 2008 breach. The majority of the three reaches are heavily developed, and the dune environment is degraded or non-existent. This is due to the construction of homes, hotels, restaurants and condominiums, and to the continuing erosion of the beach and foredune. In these areas, there are landscape plantings that include native and exotic ornamental species. Finally, extensive expanses of salt marsh, dominated by cordgrass (*Spartina alterniflora*) and needle rush (*Juncus roemerianus*), occur inland of the three reaches.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE*)

Without the proposed project, the dune will continue to erode and eventually be eliminated (along with the associated dune vegetation) in the developed portions of the shoreline. Salt marsh vegetation will remain unchanged in the Future Without Project Condition.

2.3.2 FISH AND WILDLIFE RESOURCES (OTHER THAN THREATENED AND ENDANGERED SPECIES)

EXISTING CONDITIONS

The biological communities found in the project area are well adapted to highly dynamic intertidal zones, and must cope with being aerially exposed during normal tidal cycles as well as being subjected to the high energy of the ocean waves. These habitats can have low species diversity due to the harshness of the environmental conditions. However, animals that are able to successfully adapt to these dynamic conditions are faced with very little competition from other organisms. Receding waves tend to wash amphipods (shrimp-like crustaceans) and isopods (small crustaceans such as woodlice) out of their burrows and suspend these organisms in the water column where they serve as an important food source for a variety of nearshore fish. A variety of polychaete worms that are also adapted to this highly dynamic and stressful environment can be found within the intertidal zone of the St. Johns County beaches. These intertidal organisms provide an important food source for foraging shore and wading birds. The dominant

invertebrate found along the shoreline of St. Johns County is the Atlantic coquina clam, *Donax variabilis*. Highly visible decapod crustaceans of the St. Johns County swash zone also include the ghost crab (*Ocypode quadrata*), mole crab (*Emerita talpoida*), and Atlantic fiddler crab (*Uca pugilator*). These organisms are highly motile, and burrow into the moist sand for refuge and to retard water evaporation from their bodies during aerial exposure.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

Species that utilize the beach environment may decrease in number due to continued erosion of the beach and dune system in the Future Without-Project Condition. No changes to fish and wildlife resources that reside below the swash zone would occur in the Future Without-Project Condition.

2.3.3 THREATENED AND ENDANGERED SPECIES

Threatened and endangered species that may occur in the project area and be affected by the proposed work are found in Table 2-6.

Table 2-6. Species protected under the Endangered Species Act that are located in the project area and that may be affected by the proposed project.

Common Name	Scientific Name	Federal Listing Status under ESA
Green Turtle	*Chelonia mydas*	Endangered
Loggerhead Turtle	*Caretta caretta*	Threatened
Leatherback Turtle	*Dermochelys coriacea*	Endangered
Kemp's Ridley Turtle	*Lepidochelys kempii*	Endangered
Hawksbill Turtle	*Eretmochelys imbricata*	Endangered
West Indian Manatee	*Trichechus manatus*	Endangered
Smalltooth Sawfish	*Pristis pectinata*	Endangered
Piping Plover	*Charadrius melodus*	Threatened
Red Knot	*Calidris canutus*	Threatened
Anastasia Island Beach Mouse	*Peromyscus polionotus phasma*	Endangered
North Atlantic Right Whale	*Eubalaena glacialis*	Endangered

2.3.3.1 SEA TURTLES

EXISTING CONDITIONS

The loggerhead (*Caretta caretta*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), Kemp's ridley (*Lepidochelys kempii*), and hawksbill (*Eretmochelys imbricata*) sea turtles can occur within the project area. All of these species are federally endangered except the loggerhead, which is designated as threatened. Loggerheads, greens, and leatherbacks regularly nest within the project area. The Florida Fish and Wildlife Conservation Commission manages the Statewide Nesting Beach Survey, which is a

statewide program of sea turtle nesting surveys. The program reaches located in the study area are shown on **Figure 2-17**. Loggerhead nesting typically exceeds nesting by green and leatherback turtles. The study area has experienced an increase in loggerhead nesting since 2009, which has been observed statewide. Nesting data for the study area is provided in Table 2-7, Table 2-8, and Table 2-9.

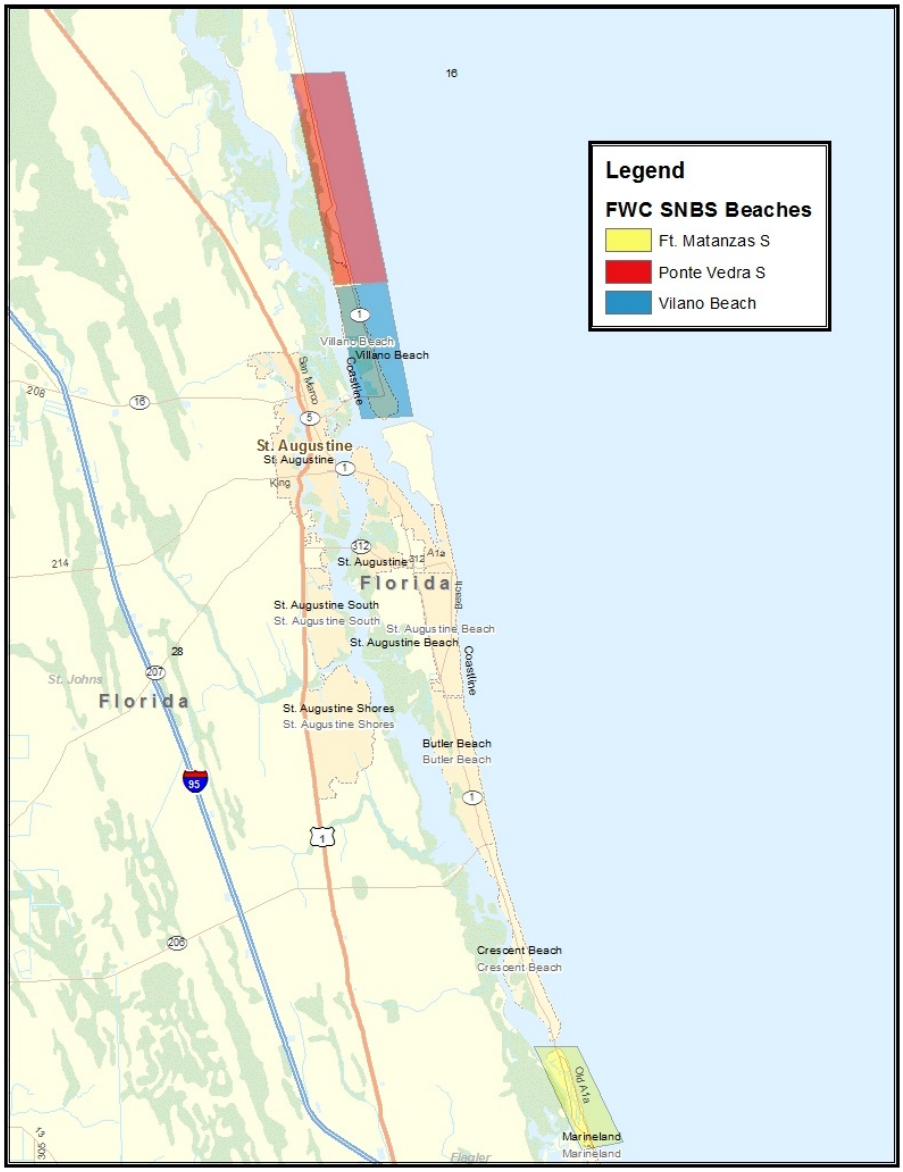


Figure 2-17. Map showing the location of the three Statewide Nesting Beach Survey (SNBS) reaches in the study area.

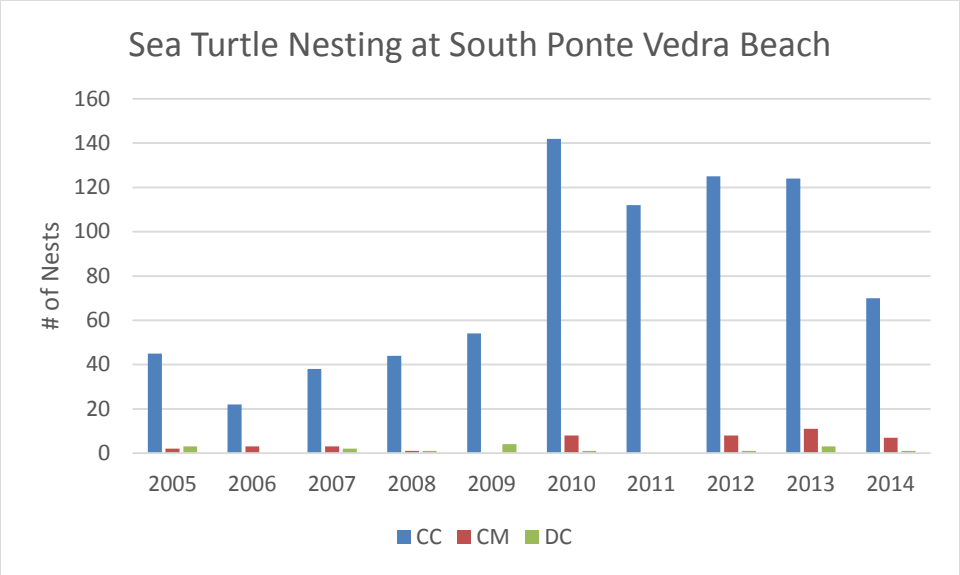


Table 2-7. Sea turtle nesting data for South Ponte Vedra Beach (identified as Ponte Vedra S according to the Statewide Nesting Beach Survey program) for loggerheads (CC), greens (CM), and leatherbacks (DC) from 2005 to 2014. Data obtained from the Florida Fish and Wildlife Conservation Commission.

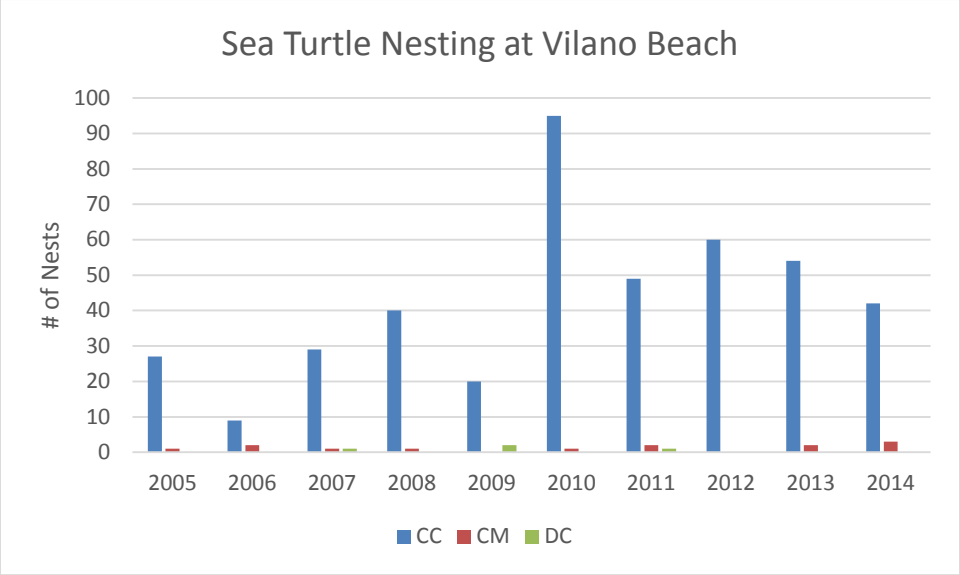


Table 2-8. Sea turtle nesting data for Vilano Beach for loggerheads (CC), greens (CM), and leatherbacks (DC) from 2005 to 2014. Data obtained from the Florida Fish and Wildlife Conservation Commission.

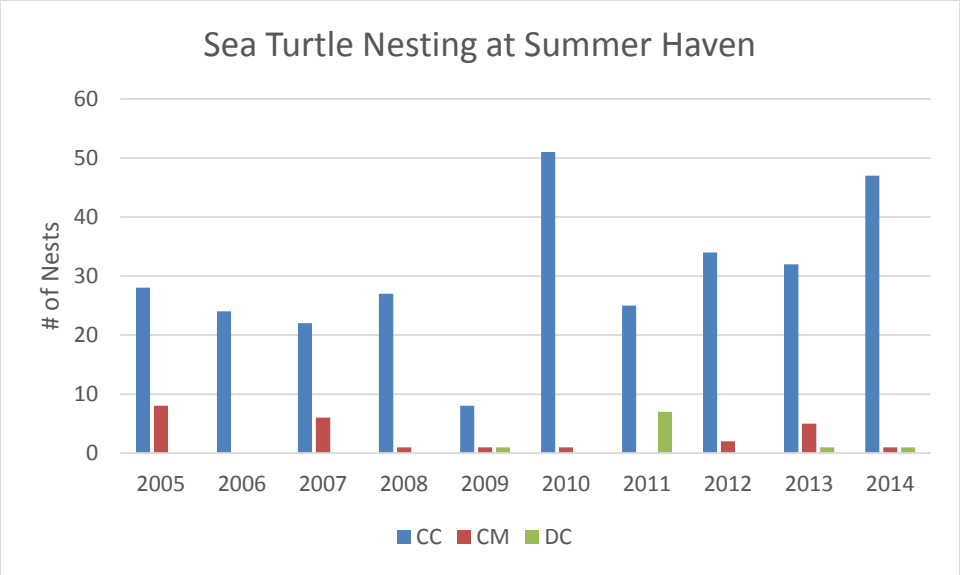


Table 2-9. Sea turtle nesting data for Summer Haven (identified as Ft. Matanzas South by the Statewide Nesting Beach Survey program) for loggerheads (CC), greens (CM), and leatherbacks (DC) from 2005 to 2014. Data obtained from the Florida Fish and Wildlife Conservation Commission.

The only sea turtle species for which U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) have designated critical habitat is the loggerhead. The project is located in designated loggerhead nearshore reproductive critical habitat (see Figure 2-18).

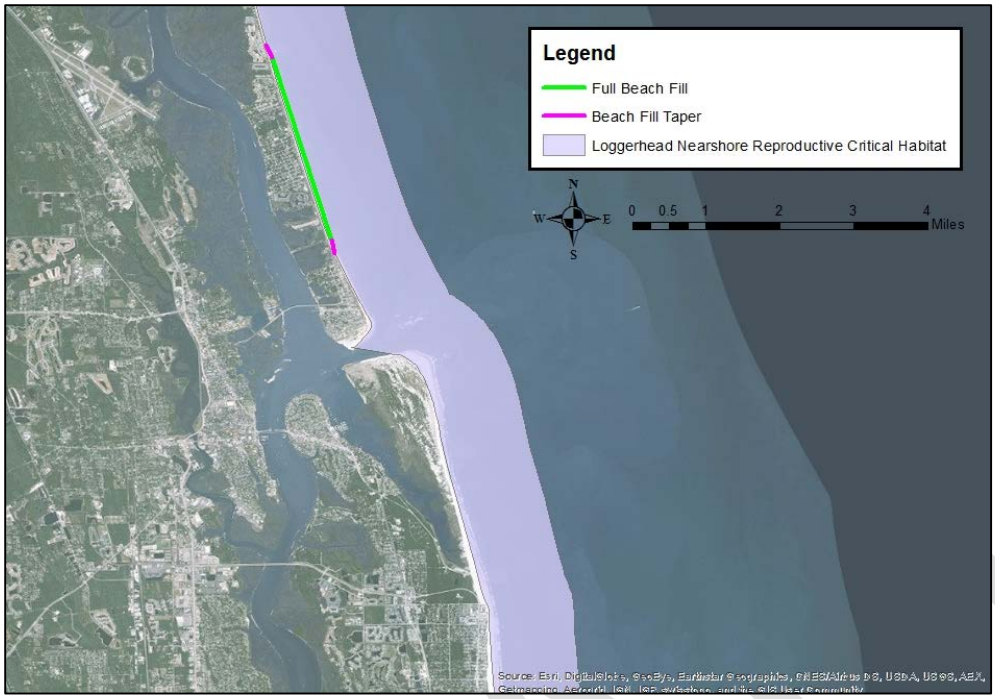


Figure 2-18. Location of loggerhead nearshore reproductive critical habitat in the project area.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

In the Future Without-Project Condition, it is projected that the beach will continue to erode. This will reduce the shoreline area available for nesting sea turtles. It will also increase turtle nest vulnerability to storm washout, as nests would be located closer to the mean high water line. As adjacent shorelines are currently available for nesting, it is unknown whether the overall nesting would be affected. In addition to increased erosion, it is likely that the length of shoreline hardened by structures would increase. This could further decrease the area available for nesting sea turtles due to the fact that the hard structures constructed would likely be seawalls and revetments (where permittable) that could negatively impact the width of beach available for nesting if not constructed in conjunction with beach nourishment.

2.3.3.2 WEST INDIAN MANATEE

EXISTING CONDITIONS

Manatees are found throughout St. Johns County, including St. Augustine Harbor. They primarily use the IWW and the estuary to migrate and forage for food. The closest designated manatee critical habitat is located in the St. Johns River, approximately 30 miles north of the study area.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The Future Without-Project Conditions for the West Indian manatee are not expected to be different from the Existing Conditions described above.

2.3.3.3 PIPING PLOVER AND RED KNOT

EXISTING CONDITIONS

The *rufa* red knot (*Calidris canutus rufa*) is a medium-sized shorebird about 9 to 11 inches in length. The piping plover (*Charadrius melodus*) is a small shorebird about 6 to 7 inches in length. Both species are designated as threatened species under the Endangered Species Act, and they overwinter in Florida between November and April. Both the piping plover and the red knot prefer to forage in coastal habitats that include sand flats adjacent to inlets or passes, sandy mud flats along prograding spits (areas where the land rises with respect to the water level), ephemeral pools, and overwash areas. These substrate types have a richer infauna than the foreshore of high energy beaches and often attract large numbers of shorebirds.

While piping plover and red knot are known to occur in the North Florida area, they are more likely to be found either north of the study area in the GTMNERR or south of the study area at Matanzas Pass. The closest designated piping plover critical habitat is located north of the mouth of the St. Johns River, approximately 30 miles north of the study area. The USFWS has not yet designated critical habitat for the *rufa* red knot.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The continued erosion of the shoreline in the proposed placement area may reduce some habitat currently utilized by piping plover and red knot; however, the infrequent usage of these areas by these species suggests that the Future Without-Project Conditions would be similar to the Existing Conditions with respect to these species.

Allowing sediment to overtop the dune and create overwash fans in the Summerhaven reach would have a beneficial effect by enhancing habitat for piping plover and red knot.

2.3.3.4 ANASTASIA ISLAND BEACH MOUSE

The endangered Anastasia Island beach mouse (*Peromyscus polionotus phasma*) inhabits the primary and secondary dune systems within a 14.5 mile length of Anastasia Island and sections of the GTMNERR (Figure 2-19).

EXISTING CONDITIONS

The Anastasia Island beach mouse may have ranged from Florida's St. John's River in Duval County, south to Anastasia Island in St. Johns County. This beach mouse currently occurs on Anastasia Island, primarily on the north (Anastasia Island State Park) and south (Fort Matanzas National Monument) ends of the island. In 1992, mice from these two populations were reintroduced into suitable historical habitat between Ponte Vedra Beach and South Ponte Vedra Beach in north St. John's County at the Guana-Tolomato-Matanzas National Estuarine Research Reserve (formerly Guana River State Park). The

reintroduced population is surviving, although in low numbers (USFWS, 2015). There is no evidence of beach mice utilizing the study reaches.

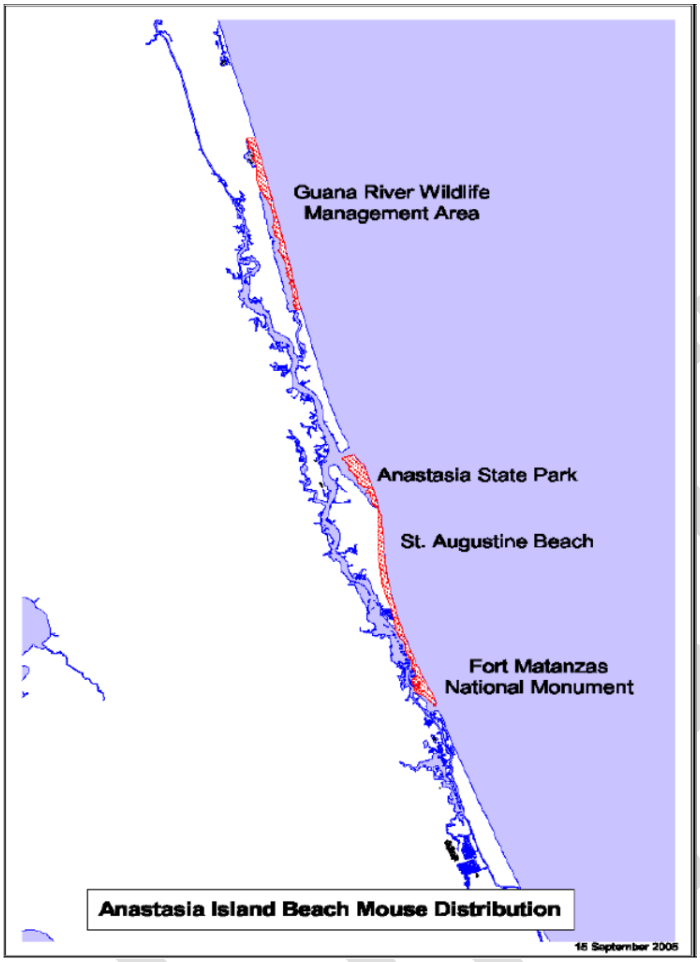


Figure 2-19. Location of Anastasia Island Beach Mouse habitat in the study area.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

Beach mouse habitat is decreasing due to erosion in the study area. However, the proposed placement location is outside of the area currently inhabited by beach mice. Therefore, the beach mouse will not be significantly affected by the Future Without-Project Condition.

2.3.3.5 WHALES

EXISTING CONDITIONS

Five whale species listed as federally endangered occur in the Atlantic Ocean along the county's coastline during certain times of the year. These species include the 1) North Atlantic right whale (*Eubalaena glacialis*), 2) Sei Whale (*Balaenoptera borealis*), 3) Fin Whale (*Balaenoptera physalus*), 4) Humpback Whale

(*Megaptera novaeangliae*), and 5) Sperm Whale (*Physeter catadon macrocephalus*). Portions of the offshore sand source boundaries are located in North Atlantic right whale critical habitat.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The presence of whales in the study area is not likely to be altered from the existing conditions if the project were not constructed.

2.3.4 ESSENTIAL FISH HABITAT (EFH)

Waters and substrate within the project area have been identified as Essential Fish Habitat (EFH) by the South Atlantic Fishery Management Council (1998). EFH is defined as those waters and substrate necessary for fish to spawn, breed, feed, or grow to maturity. Pursuant to the 1999 Finding between USACE and NMFS, USACE's Notice of Availability of this draft EA will initiate USACE's consultation under the Magnuson-Stevens Fishery Conservation and Management Act of 1976. This Section describes the Existing Conditions of the EFH in the project area, as well as the individual and cumulative impacts of the No Action Alternative. Section 4.2.5 describes the individual and cumulative impacts of the Tentatively Selected Plan and other reasonable alternatives. This NEPA document will satisfy the coordination requirement for EFH under the Magnuson-Stevens Fisheries Act (see also Section 6.13).

EXISTING CONDITIONS

Fish Utilization

The South Atlantic Fishery Management Council (SAFMC) has designated areas of vegetated and non-vegetated bottoms, live bottoms, and water columns within the study area as Essential Fish Habitat (EFH) in compliance with the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996. They also designated areas as Habitats Areas of Particular Concern, or HAPCs, for coral species. EFH for Coastal Migratory Pelagics, which includes King mackerel (*Scomberomorus cavalla*), Atlantic Spanish mackerel (*Scomberomorus maculatus*), and cobia (*Rachycentron canadum*), is located at coastal inlets along the Atlantic coast and in portions of the IWW. Coastal inlets are also EFH for shrimp and red drum.

The South Atlantic in this region also provides essential forage, cover, and nursery habitats for other species that are commercially and recreationally important. Some species managed either by the SAFMC or by state agencies are shown in Table 2-10.

Table 2-10. Managed species commonly found in the study area.

Common Name	***Scientific Name***	***Managing Agency(s)***
Almaco Jack	*Seriola rivoliana*	SAFMC
Atlantic Spadefish	*Chaetodipterus faber*	SAFMC
Banded Rudderfish	*Seriola zonata*	SAFMC

Common Name	*Scientific Name*	*Managing Agency(s)*
Bank Sea Bass	*Centropristis ocyurus*	SAFMC
Bar Jack	*Carangoides ruber*	SAFMC
Blackfin Snappper	*Lutjanus buccanella*	SAFMC
Black Grouper	*Mycteroperca bonaci*	SAFMC
Black Margate	*Anisotremus surinamensis*	FFWCC
Black Sea Bass	*Centropristis striata*	SAFMC
Black Snapper	*Apsilus dentatus*	SAFMC
Blue Runner	*Caranx crysos*	SAFMC
Blueline Tilefish	*Caulolatilus microps*	SAFMC
Blue Stripe Grunt	*Haemulon sciurus*	FFWCC
Cero	*Scomberomorus regalis*	SAFMC , GMFMC
Cobia	*Rachycentron canadum*	SAFMC , GMFMC
Coney	*Epinephelus fulvus*	SAFMC
Cottonwick	*Haemulon melanurum*	SAFMC
Cubera Snapper	*Lutjanus cyanopterus*	SAFMC
Dog Snapper	*Lutjanus jocu*	SAFMC
Dolphin Fish	*Coryphaena hippurus*	SAFMC , GMFMC
French Grunt	*Haemulon flavolineatum*	FFWCC
Gag Grouper	*Mycteroperca microlepis*	SAFMC
Golden Crab	*Chaceon fenneri*	SAFMC
Golden Tilefish	*Lopholatilus chamaeleonticeps*	SAFMC
Goliath Grouper	*Epinephelus itajara*	SAFMC
Graysby	*Epinephelus cruentatus*	SAFMC
Gray Snapper	*Lutjanus griseus*	SAFMC
Gray Triggerfish	*Balistes capriscus*	SAFMC
Greater Amberjack	*Seriola dumerili*	SAFMC
Hogfish	*Lachnolaimus maximus*	SAFMC
Jolthead Porgy	*Calamus bajonado*	SAFMC
King Mackerel	*Scomberomorus cavalla*	SAFMC, GMFMC
Knobbed Porgy	*Calamus nodosus*	SAFMC
Lane Snapper	*Lutjanus synagris*	SAFMC
Lesser Amberjack	*Seriola fasciata*	SAFMC
Little Tunny	*Euthynnus alletteratus*	SAFMC , GMFMC
Longspine Porgy	*Stenotomus caprinus*	SAFMC
Mahogany Snapper	*Lutjanus mahogoni*	SAFMC
Margate	*Haemulon album*	SAFMC
Misty Grouper	*Epinephelus mystacinus*	SAFMC
Mutton Snapper	*Lutjanus analis*	SAFMC
Nassau Grouper	*Epinephelus striatus*	SAFMC
Ocean Triggerfish	*Canthidermis sufflamen*	SAFMC

Common Name	*Scientific Name*	*Managing Agency(s)*
Penaeid Shrimp	*Litopenaeus setiferus, Farfantepenaeus duorarum, Farfantepenaeus aztecus*	SAFMC
Queen Snapper	*Etelis oculatus*	SAFMC
Queen Triggerfish	*Balistes vetula*	FFWCC
Red Grouper	*Epinephelus morio*	SAFMC
Red Hind	*Epinephelus guttatus*	SAFMC
Red Porgy	*Pagrus pagrus*	SAFMC
Red Snapper	*Lutjanus campechanus*	SAFMC
Rock Hind	*Epinephelus adscensionis*	SAFMC
Rock Sea Bass	*Centropristis philadelphica*	SAFMC
Rock Shrimp	*Sicyonia brevirostris*	SAFMC
Sailors Choice	*Haemulon parra*	SAFMC
Sand Tilefish	*Malacanthus plumieri*	SAFMC
Saucereye Porgy	*Calamus calamus*	SAFMC
Scamp	*Mycteroperca phenax*	SAFMC
Schoolmaster	*Lutjanus apodus*	SAFMC
Scup	*Stenotomus chrysops*	SAFMC
Sheepshead	*Archosargus probatocephalus*	FFWCC
Silk Snapper	*Lutjanus vivanus*	SAFMC
Snowy Grouper	*Epinephelus niveatus*	SAFMC
Spanish Mackerel	*Scomberomorus maculatus*	SAFMC
Speckled Hind	*Epinephelus drummondhayi*	SAFMC
Spiny Lobster	*Panulirus argus*	SAFMC, GMFMC
Tiger Grouper	*Mycteroperca tigris*	FFWCC
Tomtate	*Haemulon aurolineatum*	SAFMC
Vermilion Snapper	*Rhomboplites aurorubens*	SAFMC
Wahoo	*Acanthocybium solanderi*	SAFMC
Warsaw Grouper	*Epinephelus nigritus*	SAFMC
Whitebone Porgy	*Calamus leucosteus*	SAFMC
White Grunt	*Haemulon plumieri*	SAFMC
Wreckfish	*Polyprion americanus*	SAFMC
Yellowfin grouper	*Mycteroperca venenosa*	SAFMC
Yellowmouth Grouper	*Mycteroperca interstilitialis*	SAFMC
Yellowtail Snapper	*Ocyrus chrysurus*	SAFMC

Hardgrounds

Foster, Spurgeon, and Cheng (2000) note that "a long and relatively significant headland feature" extends from about R-15 to R-75. This feature is associated with submerged coquina and/or beachrock outcrops in the nearshore zone, which may contribute to the shell hash observed in the beach sediments in the

South Ponte Vedra reach. Shell components in the sediments may possibly derive from active shellfish populations associated with the outcrop habitat. The study area (R84 to R209) is located south of the headland feature that may have associated hardground features. While the shoreline adjacent to the headland feature has been relatively stable, the zone between the headland feature and St. Augustine Inlet has been progressively erosive from south to north.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The presence of EFH in the study area is not likely to be altered from the existing conditions if the project were not constructed.

2.3.5 COASTAL BARRIER RESOURCES

In the 1970s and 1980s, Congress recognized that certain Federal actions and programs historically subsidized and encouraged development in coastal areas. To remove any Federal incentives to develop in these areas, Congress passed the Coastal Barrier Resources Act of 1982 (Public Law 97-348; CBRA). CBRA designated relatively undeveloped coastal areas along the Atlantic and Gulf of Mexico coasts of the United States as part of the John H. Chafee Coastal Barrier Resources System (CBRS), and made these areas ineligible for most new Federal expenditures and financial assistance. CBRA encourages the conservation of hurricane prone, biologically rich coastal resources by restricting Federal expenditures that encourage development, such as Federal flood insurance. The CBRA includes both CBRS Units and "Otherwise Protected Areas," which includes lands already protected by a conservation easement or that are in public ownership. CBRS Units can be developed, provided that private developers or other non-Federal parties bear the full cost. The USFWS administers the CBRS program, and makes the final determination of a project's consistency with the CBRA.

EXISTING CONDITIONS

The project area includes two CBRS Units and two Otherwise Protected Areas (Figure 2-20):

- Guana River Unit, FL-03P (Otherwise Protected Area)
- Usinas Beach Unit, P04A (CBRS Unit)
- Conch Island Unit, P05 (CBRS Unit)
- Conch Island Unit, P05P (Otherwise Protected Area)

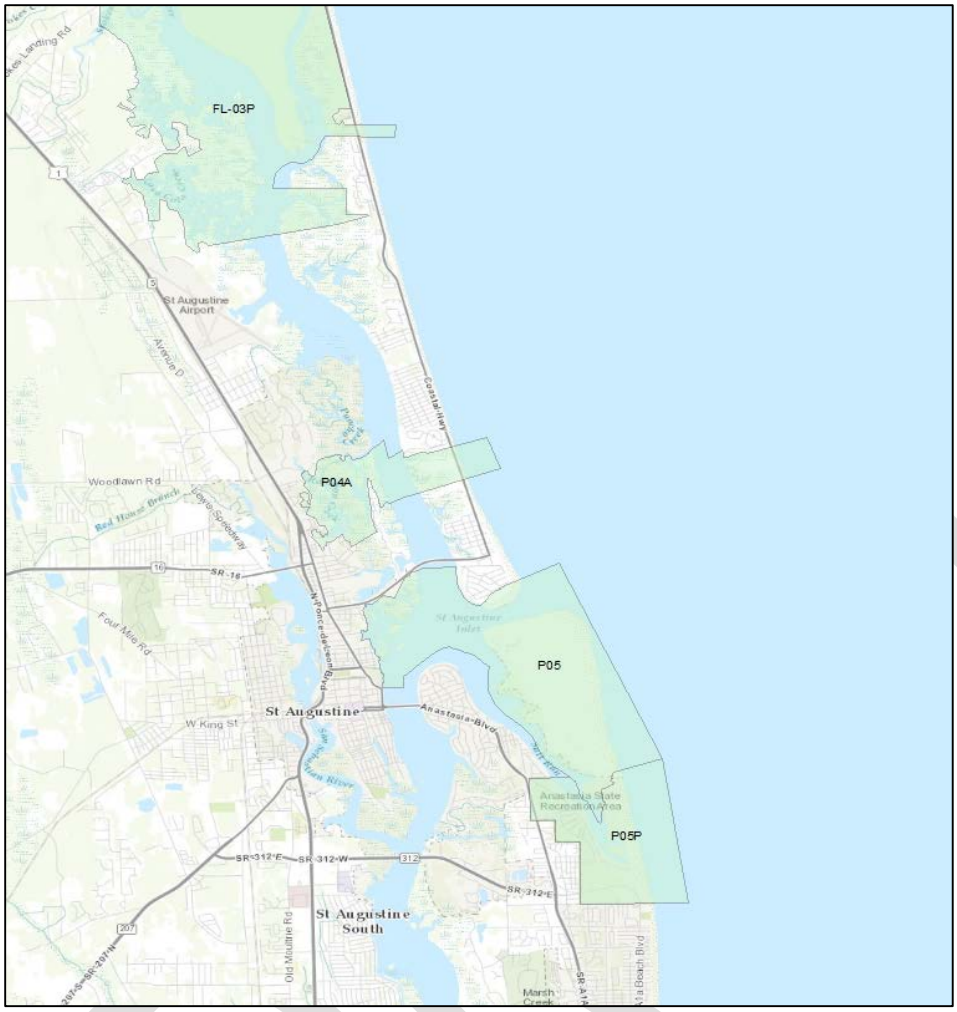


Figure 2-20. Location of Coastal Barrier Resource System (CBRS) units in the study area.

Portions of the Vilano Beach segment of the study area are within CBRS unit P04A, Usinas Beach, while the southern portion of the Summer Haven reach lies within CBRA unit P05A, Matanzas River (see **Error! Reference source not found.** and **Error! Reference source not found.**). The presence of CBRS units may limit Federally-implementable alternatives, but not alternatives which could be carried out by the state or local sponsor. The effects of CBRA on plan formulation are discussed later in this report.

Portions of the South Ponte Vedra Beach reach lie within Otherwise Protected Area (OPA) FL-03P. The only Federal funding prohibition within OPAs is related to Federal flood insurance. The presence of this OPA will not constrain plan formulation.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The Future Without-Project Condition related to Coastal Barrier Resources in the study area are the same as described in the Existing Conditions section.

2.3.6 WATER QUALITY

The nearshore waters adjacent to the South Ponte Vedra Beach reach, the IWW, and the Guana River are classified as an aquatic preserve and an Outstanding Florida Water. In addition, the area south of the St. Augustine Inlet, the Anastasia State Recreation Area, is classified as an Outstanding Florida Water (see Figure 2-21).

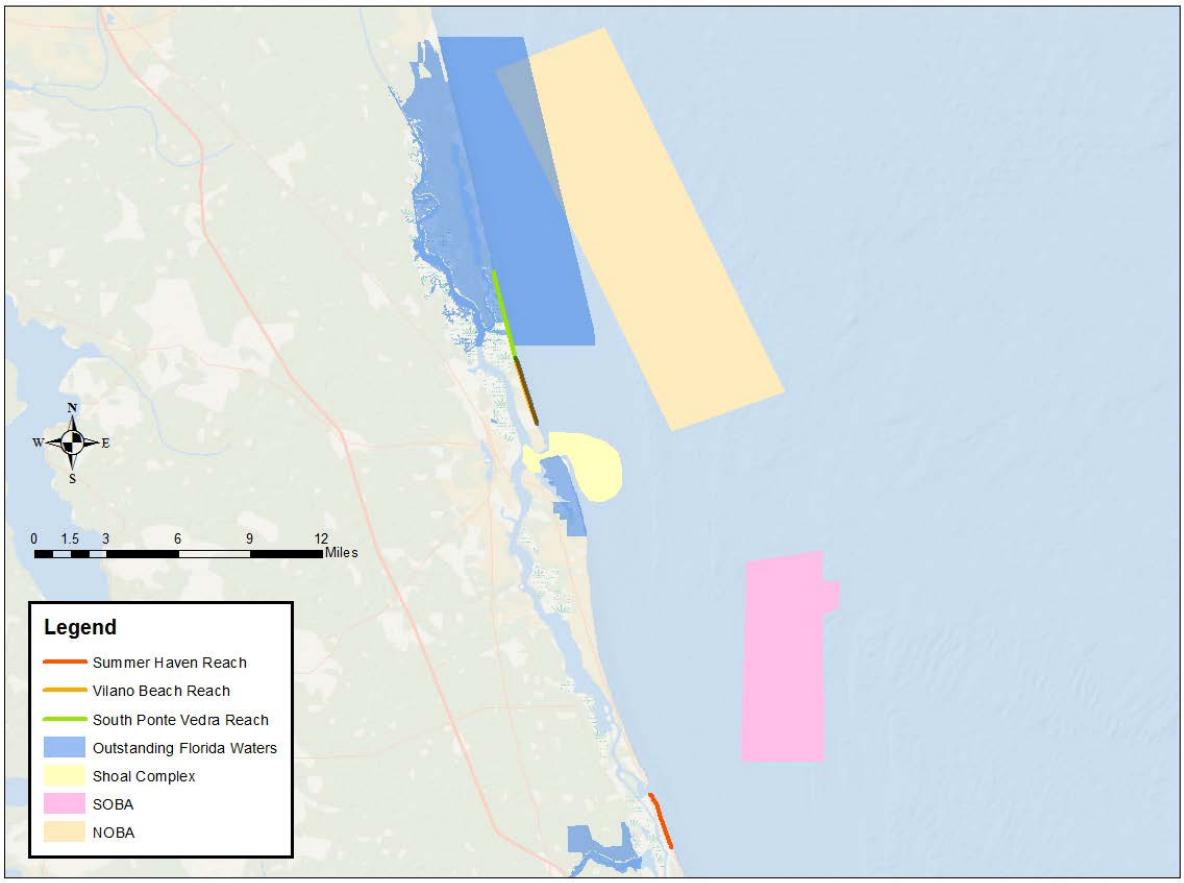


Figure 2-21. Location of OFWs in the study area.

EXISTING CONDITIONS

The project area is a sandy, high energy coastline. The beach is predominantly fine sand size quartz with little shell fragments. Due to the high energy conditions found along the St. Johns County coastline, sand is continuously re-suspended in the water column with each breaking wave. This re-suspension of sediment results in generally highly turbid conditions in the nearshore region of the project area. The coastal waters in the area of the authorized work are designated by the State of Florida as Class III, which are classified as being suitable for recreation and for the propagation of fish and wildlife. Immediately adjacent to the South Ponte Vedra Reach is the Guana River Marsh Aquatic Preserve Outstanding Florida

Water (OFW). The Florida Department of Environmental Protection (FDEP) regulates water quality in the Florida, and requires stringent water quality monitoring during dredging and beach fill operations.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The water quality in the study area is not likely to change from the Existing Conditions in the Future Without-Project Conditions.

2.3.7 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

EXISTING CONDITIONS

The coastline in the project area is located adjacent to predominantly residential and recreational areas. There are no known industrial activities in the immediate area. There are no known sources of hazardous or toxic wastes in the project area, and USACE is not aware of any records indicating these activities occurred in the project area in the past.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The presence/absence of hazardous or toxic wastes in the study area is not likely to change from the Existing Conditions in the Future Without-Project Conditions.

2.3.8 AIR QUALITY

EXISTING CONDITIONS

The urbanization of the City of St. Augustine and the popularity of the beaches contribute to a large number of motorized vehicles in the vicinity of the project area. Because of the sea breezes that are usually present along the St. Johns County shore, air quality is generally good. Airborne pollutants are readily dispersed by the ocean-generated winds.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The air quality in the study area is not likely to change from the Existing Conditions in the Future Without-Project Conditions.

2.3.9 NOISE

EXISTING CONDITIONS

The project area is a favorite recreational spot for residents who reside in the area, as well as for the numerous tourists who visit the region. Additionally, St. Johns County beaches are a favorite spot for many residents who reside in northeastern Florida. Because of the urbanization in the vicinity of the beaches, and the popularity of the beaches, noise levels are usually slightly elevated during the tourist season and on most weekends.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

While the area may experience a slight decrease in tourist activity, noise levels in the study area are not likely to change significantly from the Existing Conditions in the Future Without-Project Conditions.

2.3.10 AESTHETIC RESOURCES

EXISTING CONDITIONS

Aesthetics found along most of the project area are typical of low-density, residential beach communities. The beach ecosystem includes a narrow beach berm and minimal intertidal area due to the extreme erosion experienced there since the early 1970s. Small portions of aesthetically valuable natural conditions remain, but even these areas experience overwash and erosion that has eliminated dune and saltmarsh vegetation. Most of the project area also includes some backdune naturalized areas with dune grasses, morning glory, and other native flowering groundcovers. There are few commercial areas, but these generally lack dune features and native vegetation is absent. Previous efforts to restore dune habitats along St. Johns County beaches have been somewhat successful, and past maintenance efforts have greatly improved the aesthetics of the St. Johns County beaches.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The aesthetics of the study area are anticipated to decline in the Future Without-Project Condition due to increased erosion and the continued narrowing of the beach.

2.3.11 RECREATION RESOURCES

EXISTING CONDITIONS

The project area is a local favorite for county residents to spend much of their leisure time sunbathing, sailing, walking, and riding bicycles, in addition to a variety of other active and passive activities. The spring, summer, and fall months of the year are the most active times for recreational activities, with the summer months comprising the peak use period. During the winter months, the St. Johns County beaches have low recreational usage due to relatively low air and water temperatures (45-65°F and 56-61°F, respectively; NOAA 2015) and the frequency of northeast winds that produce strong waves and high tides.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The recreational usage of the study area are anticipated to decline in the Future Without-Project Condition due to increased erosion and the continued narrowing of the beach, which will make it less suitable for recreating.

2.3.12 NAVIGATION

EXISTING CONDITIONS

The St. Augustine Inlet is an improved tidal inlet connecting the San Sebastian River and the IWW Federal navigation channel to the Atlantic Ocean. Originally a natural inlet located south of its current location, the inlet was relocated in 1940 as part of the St. Augustine Harbor Navigation Project in response to public interests. Efforts to stabilize the inlet and improve navigation between 1941 and 1957 resulted in the construction of a north sand trap groin approximately 1,880 feet in length and a 3,695 foot south jetty. The authorized 16-foot inlet entrance channel is maintained at the best natural alignment, while the geographically fixed IWW channel is maintained at 12 feet deep.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

The St. Augustine Inlet is currently maintained with the IWW Federal navigation channels, and may continue to be maintained regardless of whether this project moves forward. Navigation conditions should not change from the Existing Conditions in the Future Without-Project Condition.

2.3.13 CULTURAL RESOURCES AND HISTORIC PROPERTIES

EXISTING CONDITIONS

In 1565, Pedro Menendez de Aviles was en route to the providence of Florida, which was then a Spanish territory. His orders were to create a Spanish presence in the area to prevent any further French advancement into Spanish lands. The intrusion into Spanish lands by Jean Ribualt in Port Royal had forced Philip II to act to preserve his lands. The creation of Fort Caroline on the St. Johns River by Laudoniere pushed the French intrusion further south. Menendez was to gather a group of colonists and soldiers to create a garrison/colony in La Florida. He was to accomplish this before the French had time to re-supply and fortify their position at Fort Caroline. In September of 1565, Menendez claimed the land for the city of St. Augustine as a defensive position, having failed to reach Fort Caroline before the French reinforcements arrived.

With five ships and 600 people, the Spanish territory of Florida was colonized. The city of St. Augustine was created as a garrison for defense from a French attack. Located on a harbor with a sand bar across the entrance, this port became the location of the longest continuous Spanish presence in Florida. The city grew out of the garrison over the next two hundred years, while continuing to maintain its military role.

Key in the development of the city and garrison was its limited access at the St. Augustine Inlet. The inlet was historically a series of shifting sand bars that only permitted shallower draft vessels to cross. This shallow access prevented large foreign ships of war from entering the channel and sailing directly up to the city. Today, the historic inlet has closed in and only portions of it remain in the form of Salt Run, which

is now a small bay adjacent to Anastasia Island. The current inlet was created by the Corps in 1940, when a land cut was made across the southern tip of Vilano Point.

Cultural resource surveys have been conducted along the St. Johns County shoreline, portions of the Intracoastal Water Way (IWW), and the ebb shoal as part of this current project and other Corps-related projects. Previous project areas have included portions of the St. Augustine Inlet, a section of the IWW within the Tolomato River, the beach placement area, and the nearshore placement areas along Anastasia Island. Within the IWW portion of the project, the USACE has conducted numerous surveys that have included IWW Cuts SJ-25 south to SJ-30A. This includes expansion areas and the St. Augustine Inlet. These surveys have resulted in the identification of known archeological and potential resources being identified within or adjacent to the project area. Site 8SJ4889, the Dixie Crystal, has been identified as a historic ship wreck and may be potentially eligible for inclusion in the National Register of Historic Places. Currently, insufficient information exists to make a formal determination of the wreck's eligibility. A 150-foot buffer was recommended for navigation projects working near it to protect the resource. In addition to the Dixie Crystal, four targets were identified as potential resources within the St. Augustine entrance channel (Hall 2000). No diver evaluations were performed on the targets, and a buffer of 200 feet was recommended. Within the St. Augustine Inlet, previous consultation and surveys indicated that there were four known targets in the project area: SA-T-5, SA-OS-2, SA-OS-3, SA-OS-4 (DHR File No 2010-04838-A and 04838-B). All four targets have a requirement for a 200-foot buffer around them for all maintenance activities. Within the ebb shoal area lies the North Shoals Vessel, which is a historic shrimp boat that sank trying to navigate the St. Augustine entrance channel. This vessel is situated within the ebb shoal, and there is currently insufficient information to determine its eligibility for inclusion in the National Register.

Along the coast are various known wrecks. Three known resources exist south of the entrance channel. The three sites are 8SAJ69NR (Spanish Coquina Quarries), SJ3318 (St. Augustine Beach Site), and SJ4873 (13th Street Wreck). The Spanish Quarries located along Salt Run served as the historic stone quarries for the City of St. Augustine and the Castillo de San Marcos. This site is listed on the National Register of Historic Places. The St. Augustine Beach Site is the location of a vessel fragment that was recovered from the beach. At the time of its identification, it was removed from the beach. The 13th Street Wreck is a deeply buried vessel that was exposed in the 1980s. Subsequent attempts to locate the vessel have failed. Located to the north of the Anastasia placement area are two sites: the Anastasia Recreation Area site (SJ3317) and the 1 Blowhole Shipwreck site (SJ 4853).

To the north of the entrance channel along the beach is the Chainplate site (SJ5442). This site is located along the shoreline and is situated west of the nearshore placement area. Identified materials were removed for conservation by the Lighthouse Archaeological Maritime Program (LAMP), but it is likely that more materials may be just offshore in the surf. However, no materials were identified during the Corps' shoreline survey of the area. Within the nearshore placement area. no resources are known to exist.

Further north along the beach has been subject to a shoreline survey by the Corps, and no resources were identified as a result of the survey. The only known resource occurs west of SR A1A. The Beachside Shell Midden (SJ3286) is a prehistoric site that dates from 300 BC to 750 A.D. No portion of this site has been reported to exist along the beach. Within the nearshore, a small portion of the northern area has been surveyed by LAMP and no resources were identified. While potential resources may exist, most surveys in the region have focused their search further to the south and nearer to the historic inlet at St. Augustine. However, a complete shoreline survey was conducted to the north from Florida DEP range monuments R84 to R122.

The only known wreck north of the inlet is the Compton's Wreck (8SJ3525). Currently, there is insufficient information on the significance of this site, but the resource is located sufficiently offshore as to avoided by potential impacts.

Extensive archival research and cultural resource surveys have been conducted along the St. Johns County shoreline, portions of Intracoastal Waterway (IWW), and the ebb shoal. Each potential reach and borrow area was examined for the presence of resources located either directly on the beach, east of the highway paralleling the beach, or contained within the borrow area. Significant portions of the project area have been surveyed for the presence of cultural resources, but additional areas remain surveyed as well.

Just west of the project is SR A1A, which is an historic scenic highway. Along the road on both the east and west side are also numerous historic structures. While outside the project area, their presence should also be noted as continued erosional forces have begun to encroach upon the shoreline. Continued erosion may have long term effects on such resources; therefore, they are considered as part of the existing conditions.

Because of the rich history of over 500 years of historic use and over thousands of years of prehistoric use, there continues to be high potential for the discovery of significant resources within the coastal environment. Prior to dredging and shoreline restorations, areas of proposed work will be subjected to additional evaluations. Resource investigations should be conducted to identify and evaluate resources where necessary. Consultation with the State of Florida Historic Preservation Officer (SHPO) and appropriate federally recognized tribes will also need to continue to be conducted.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

Continued erosion will eventually threaten cultural resources. As the shoreline recedes without a project, resources will either be destroyed or hard structures will need to be constructed for their protection. As noted above, increased hardening is detrimental to the environment as a whole. Thus, continued shoreline erosion will create a cumulative negative effect on the environment.

2.3.14 NATIVE AMERICANS

EXISTING CONDITIONS

There is no known tribal or reservation land within the project area. However, Native American groups lived throughout this region in the past, and their decedents continue to live within the State of Florida and throughout the U.S. Prior consultation under Section 106 of the National Historic Preservation Act on various aspects of the project has not indicated any historic use, although it certainly remains possible. Consultation will be updated with both tribes in regards to project impacts.

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

Selection of the No Action Alternative would have no adverse effect on Native American groups. As discussed above, portions of the project have been consulted upon with both federally recognized tribes living in the region.

2.4 ECONOMIC ENVIRONMENT

EXISTING CONDITIONS

Information on the existing economic conditions along the St. Johns County study area coastline was collected for economic modeling purposes using Beach-fx. The information on the coastal assets detailed in this section was collected from mapping resources, site visits, and contractors.

2.4.1 DAMAGE ELEMENTS - STRUCTURE & CONTENTS VALUE

Beach-fx is an event-driven life-cycle model that estimates damages and associated costs over a period of analysis based on storm probabilities, tidal cycle, tidal phase, beach morphology and many other factors. Damages to developed shorelines include damages to buildings, pools, patios, parking lots, roads, utilities, seawalls, revetments, bulkheads, replacement of lost backfill, etc., all classified as “damage elements.” Economists, real estate specialists, and engineers have collected and compiled detailed information on damage elements within the study area including:

- 397 single family residences
- 37 multi-family residences
- commercial structures
- 251 dune walks
- SR A1A (SR A1A)
- Several parking lots, gazebos, garages, pools, tennis courts, and bath houses

In total, attribute information for 817 separate damage elements was populated for economic modeling using Beach-fx. The proximity of these damage elements to the beach makes them potentially vulnerable to erosion, wave attack, and inundation.

Beach-fx handles economic considerations at the damage element level. These considerations include extent of damage, cost to rebuild, and time to rebuild. The construction and foundation type of each

damage element was gathered from the St. Johns County property appraiser information and visual observations by Jacksonville district (SAJ) staff. First floor elevations of all the damage elements in the study area were surveyed. Real Estate professionals from SAJ provided updated depreciated replacement costs for all of the damage elements in March 2015. An uncertainty of +/- 15% was assigned to these costs. The value of contents was assumed to be 50% of the structure value for all habitable structures per ER 1105-2-100. Non-habitable structures (dune walks, bathhouses, pools, etc...) had zero contents value.

2.4.2 STRUCTURE INVENTORY

The economic value of the existing structure inventory represents the depreciated replacement costs of damageable structures and their associated contents within the study area along the coastline. The damage element inventory includes 817 damageable structures with an overall estimated value of $268,000,000, with structure and content valuations of $188,000,000 and $80,000,000 respectively. **Error! Not a valid bookmark self-reference.** provides the distribution of structure and content values broken down by Beach-fx Reach.

Table 2-11: Distribution of Structures & Structure Value by Reach

Distribution of Structures & Structure Value by Reach					
Beach-Fx Reach	**DE Count**	**Structure Value**	**Content Value**	**Total Value**	**% of Total Value**
84	8	$ 1,108,437	$ 376,268	$ 1,484,705	**1%**
85	20	$ 3,175,145	$ 1,275,190	$ 4,450,335	**2%**
86	20	$ 3,627,217	$ 1,469,831	$ 5,097,048	**2%**
90	27	$ 3,928,659	$ 1,603,997	$ 5,532,656	**2%**
91	22	$ 3,149,707	$ 1,233,206	$ 4,382,913	**2%**
92	15	$ 2,085,649	$ 816,325	$ 2,901,974	**1%**
93	28	$ 4,067,044	$ 1,681,022	$ 5,748,066	**2%**
87	32	$ 6,612,213	$ 2,861,777	$ 9,473,990	**4%**
88	22	$ 3,851,535	$ 1,641,533	$ 5,493,068	**2%**
89	28	$ 6,237,679	$ 2,715,902	$ 8,953,581	**3%**
94	8	$ 844,758	$ 140,214	$ 984,972	**0%**
95	19	$ 2,015,648	$ 584,794	$ 2,600,442	**1%**
96	26	$ 4,281,210	$ 1,761,098	$ 6,042,308	**2%**
97	20	$ 3,430,500	$ 1,383,555	$ 4,814,055	**2%**
98	61	$ 16,869,267	$ 7,846,416	$ 24,715,683	**9%**
100	46	$ 11,714,035	$ 5,313,803	$ 17,027,838	**6%**
101	25	$ 4,181,708	$ 1,711,544	$ 5,893,252	**2%**
102	8	$ 10,049,865	$ 4,680,000	$ 14,729,865	**5%**
103	12	$ 13,796,355	$ 6,419,700	$ 20,216,055	**8%**
104	22	$ 5,035,899	$ 2,181,137	$ 7,217,036	**3%**
105	15	$ 3,488,390	$ 1,350,185	$ 4,838,575	**2%**
106	20	$ 3,880,670	$ 1,665,604	$ 5,546,274	**2%**
107	30	$ 4,970,238	$ 2,068,742	$ 7,038,980	**3%**
108	11	$ 2,723,804	$ 1,074,022	$ 3,797,826	**1%**
109	15	$ 3,003,386	$ 862,898	$ 3,866,284	**1%**
110	18	$ 2,510,368	$ 888,944	$ 3,399,312	**1%**
111	31	$ 5,272,445	$ 2,241,253	$ 7,513,698	**3%**
112	22	$ 5,522,167	$ 2,198,746	$ 7,720,913	**3%**
114	16	$ 5,263,067	$ 2,141,249	$ 7,404,316	**3%**
115	11	$ 3,216,410	$ 1,287,180	$ 4,503,590	**2%**
116	12	$ 2,077,290	$ 655,080	$ 2,732,370	**1%**
117	10	$ 1,285,292	$ 360,946	$ 1,646,238	**1%**
118	36	$ 5,326,818	$ 2,186,154	$ 7,512,972	**3%**
119	33	$ 4,767,243	$ 2,059,374	$ 6,826,617	**3%**
120	36	$ 16,351,882	$ 7,684,346	$ 24,036,228	**9%**
121	19	$ 5,315,967	$ 2,575,266	$ 7,891,233	**3%**
122	13	$ 2,588,949	$ 1,279,362	$ 3,868,311	**1%**
Total	**817**	**$ 187,626,916**	**$ 80,276,658**	**$ 267,903,574**	**100%**

FUTURE WITHOUT-PROJECT CONDITIONS (NO ACTION ALTERNATIVE)

2.4.3 BEACH-FX MODEL SET-UP

The Economic Appendix provides a complete description of the Beach-fx model set-up and use. Data on historic storms, beach survey profiles, and private, commercial & public structures within the project area is used as input to the Beach-fx model. The model is then used to estimate future damages resulting from hurricanes and coastal storms.

The future without-project damages are used as the base condition against which potential alternatives will be compared. The difference between with and without-project damages are used to determine project benefits.

2.4.4 BEACH-FX MODEL ASSUMPTIONS

- **Start Year:** The year in which the simulation begins is 2015
- **Base Year:** The year in which a federal project would be constructed and benefits would begin accruing is 2020
- **Period of Analysis:** 50 years (2020 to 2070)
- **Discount Rate:** 3.125% FY2016 Federal Water Resources Discount Rate
- **Damage Functions:** Damage functions developed by the Institute for Water Resources (IWR), Coastal Storm Damage Workshop (CSDW), Coastal Storm Damage Relationships Based on Expert Opinion Elicitation in 2002, were used.
- **Coastal Armor:**
    - Existing armor set at the lot level will protect the damage elements in that lot until failure is triggered. If the armor fails, structures will be subject to damages until the armor is rebuilt.
    - For lots without armor, state permit requirements for armor construction determine if a lot is able to be protected by armor, or not, once erosion reaches the seaward edge of the lot.
- **Number of Times Rebuilding Allowed:** The maximum number of structure rebuilds can be specified for damage elements. Based on the assumed likeliness that certain types of damage elements will eventually stop being rebuilt by property owners, the following are number of times that rebuilding is allowed for certain types of damage elements:
    - Dune Walks: 10x
    - All Other Damage Elements: 99x
- **Future value of structures:** The future structure inventory and values are the same as the existing condition. This conservative approach neglects any increase in value due to future development. Due to the uncertainty involved in projections of future development, using the existing inventory is considered conservative for Florida where coastal development has historically increased in density and value.

2.4.5 BEACH-FX FUTURE WITHOUT-PROJECT DAMAGE RESULTS

Future without-project damages across the study area range between $46.8 and $149.8 M present value dollars.

- Structure Damage: Economic losses resulting from the structures situated along the coastline being exposed to wave attack, inundation, and erosion damages. Structure damages account for approximately 53.7% of the total Future Without-Project (FWOP) damages.
- Contents Damage: The material items housed within the aforementioned structures (usually air conditioned and enclosed) that are potentially subject to damage. Content damages make up approximately 21.5% of the total FWOP damages.
- Coastal Armor Cost: Beach-fx provides the capability to estimate the costs incurred from measures likely to be taken to protect coastal assets and or prevent erosion in the study area. Based on the existence of coastal armor units throughout the study area, Beach-fx was used to estimate the costs of erecting such measures throughout the period of analysis. Armor costs account for approximately 24.8% of the total FWOP damages.

Table 2-12 provides greater detail on the composition of the average FWOP damages by category and damage element type based on the *Iteration.csv* and *ReachYearlyDamagesByType.csv* model output files.

Table 2-12: Distribution of FWOP Damages by Category and Type

DE Type	Average PV Structure Damage	Average PV Content Damage	Average PV Armor Costs	Total Average PV Damages & Costs	% of Total
COMM	$ 1,861,712	$ 930,865	$ -	**$ 2,792,576**	3%
GAZEBO	$ 608,711	$ -	$ -	**$ 608,711**	1%
MFR1	$ 2,250	$ 1,125	$ -	**$ 3,375**	0%
MFR2	$ 808,674	$ 404,337	$ -	**$ 1,213,010**	1%
MFR3	$ 135,699	$ 68,225	$ -	**$ 203,924**	0%
PARKINGLOT	$ 442,541	$ -	$ -	**$ 442,541**	0%
POOL	$ 88,565	$ -	$ -	**$ 88,565**	0%
ROAD2	$ 4,835,406	$ -	$ -	**$ 4,835,406**	5%
ROAD3	$ 1,687,213	$ -	$ -	**$ 1,687,213**	2%
SFR1	$ 13,295,051	$ 6,623,894	$ -	**$ 19,918,946**	21%
SFR2	$ 20,055,501	$ 10,009,045	$ -	**$ 30,064,546**	31%
SFR3	$ 5,793,992	$ 2,892,867	$ -	**$ 8,686,859**	9%
TENNIS	$ 734	$ -	$ -	**$ 734**	0%
WALK	$ 2,522,672	$ -	$ -	**$ 2,522,672**	3%
ARMOR COST	$ -	$ -	$ 24,063,881	**$ 24,063,881**	25%
Total	**$ 52,138,722**	**$ 20,930,358**	**$ 24,063,881**	**$ 97,132,960**	100%
% of Total	53.7%	21.5%	24.8%	100%	

2.4.5.1 SPATIAL DISTRIBUTION OF WITHOUT-PROJECT DAMAGES

There are several reaches within the area modeled where the FWOP damages and armor costs are the greatest. The segment that includes model reaches 96 – 100 accounts for about 22% of the overall FWOP damages, and the segment that includes model reaches 111 – 116 accounts for about 30% of the overall FWOP damages. **Figure 2-22** illustrates the spatial distribution of erosion rate, existing structure value, and FWOP damages and costs by reach.

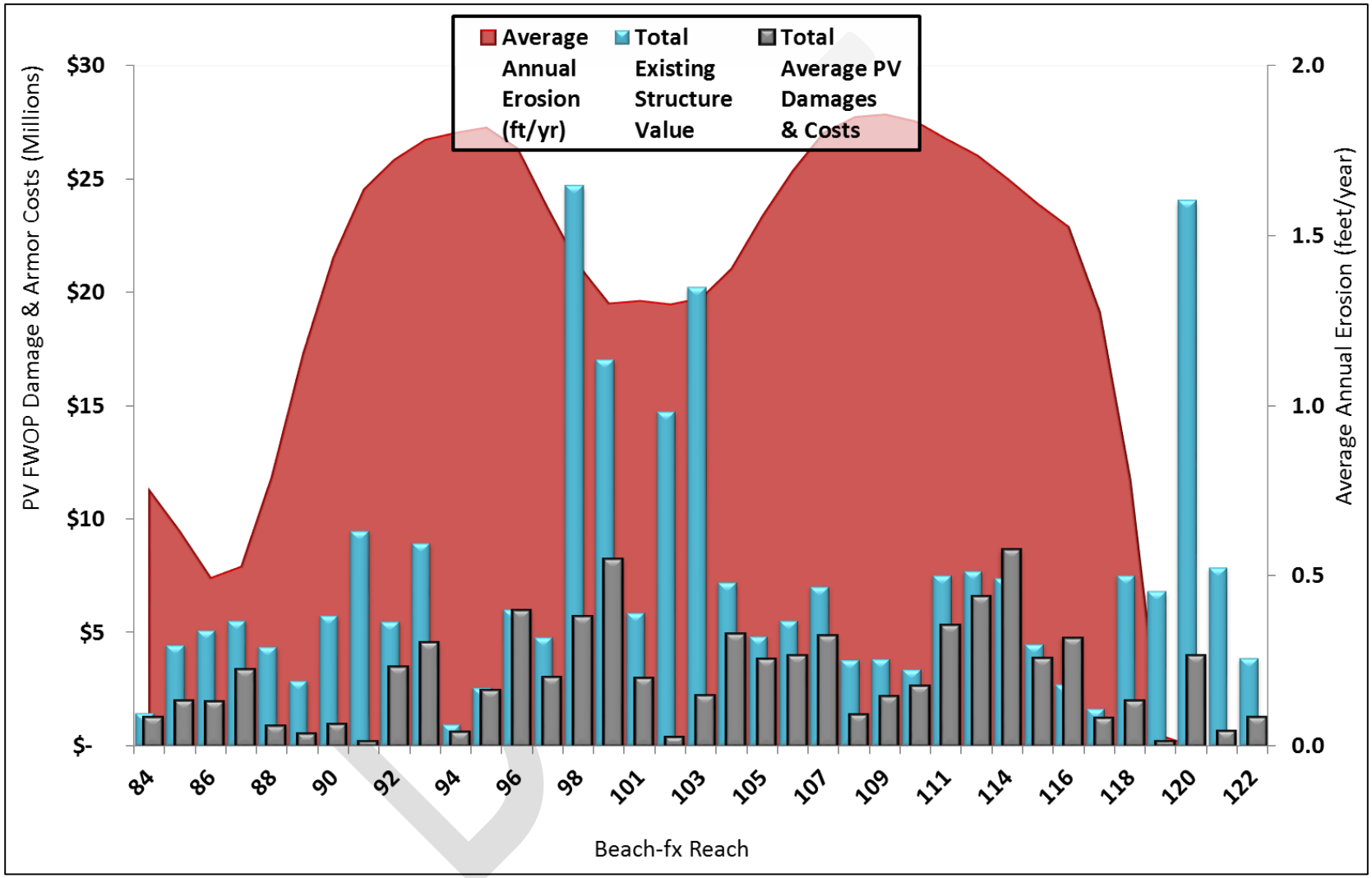


Figure 2-22: Spatial Distribution of Damages and Erosion Rates by Reach

2.4.5.2 DAMAGE DISTRIBUTION BY DAMAGE DRIVING PARAMETER

Most of the FWOP damages and costs are attributable to erosion. The distribution of damages by driving parameter is as follows:

- Erosion: 99.56%
- Inundation: 0.13%
- Wave Attack: 0.32%

2.4.5.3 TEMPORAL DISTRIBUTION OF DAMAGES

Figure 2-23 illustrates the non-present value damages over time by Beach-fx reach. The timing of FWOP damages and armor costs varies across the model reaches. There is a great deal of variability in the amount of damages among the Beach-fx reaches. This is explained by the large number of variables, all of which the Beach-fx model takes into account. Examples of variation between the reaches result from the following:

- Density and amount of development
- Typical size and value of structures
- Typical distance between structures and mean-high water
- Size, shape and location of the dunes and coastal morphology
- Rate of erosion for each reach
- Amount and type of coastal armoring present
- Timing that property owners construct coastal armoring in the future.

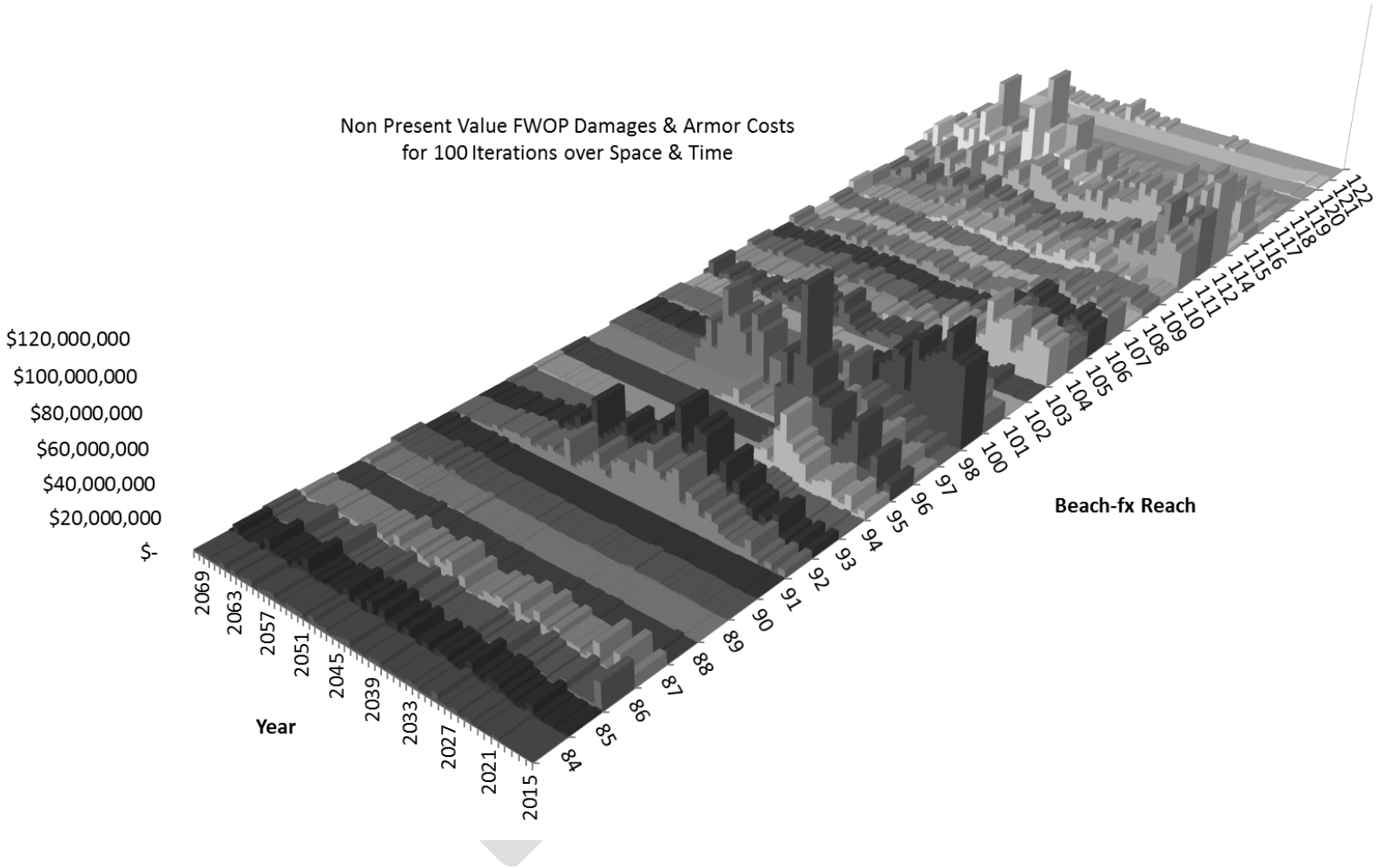


Figure 2-23: Non Present Value FWOP Damages & Armor Costs over Space and Time

2.4.5.4 FWOP DAMAGES IN ALTERNATIVE SEA LEVEL RISE (SLR) SCENARIOS

The FWOP condition was modeled for three Sea Level Rise (SLR) scenarios. ER 1110-2-8162 provides both a methodology and a procedure for determining a range of sea level rise estimates based on the local historic sea level rise rate, the construction (base) year of the project, and the design life of the project. The Beach-fx results presented above refer to the baseline scenario, which is based on the historic erosion rate. The results associated with the other two SLR scenarios are presented here.

Figure 2-24 provides an overall summary of FWOP average present value damage and armor costs in each SLR scenario. Combined structure and content damages increase by 22% from the base to intermediate scenarios, and 51% from the base to high scenarios. Armor costs increase by 57% from the base to intermediate scenarios, and 149% from the base to high scenarios. The total damage and armor costs increase by 31% from the base to intermediate scenarios, and 75% from the base to high scenarios. Erosion is the primary damage driver, accounting for about 99% of the FWOP damage and armor costs in the intermediate and high SLR scenarios. Additional detail on results from the SLR analysis is provided in the Economics Appendix.

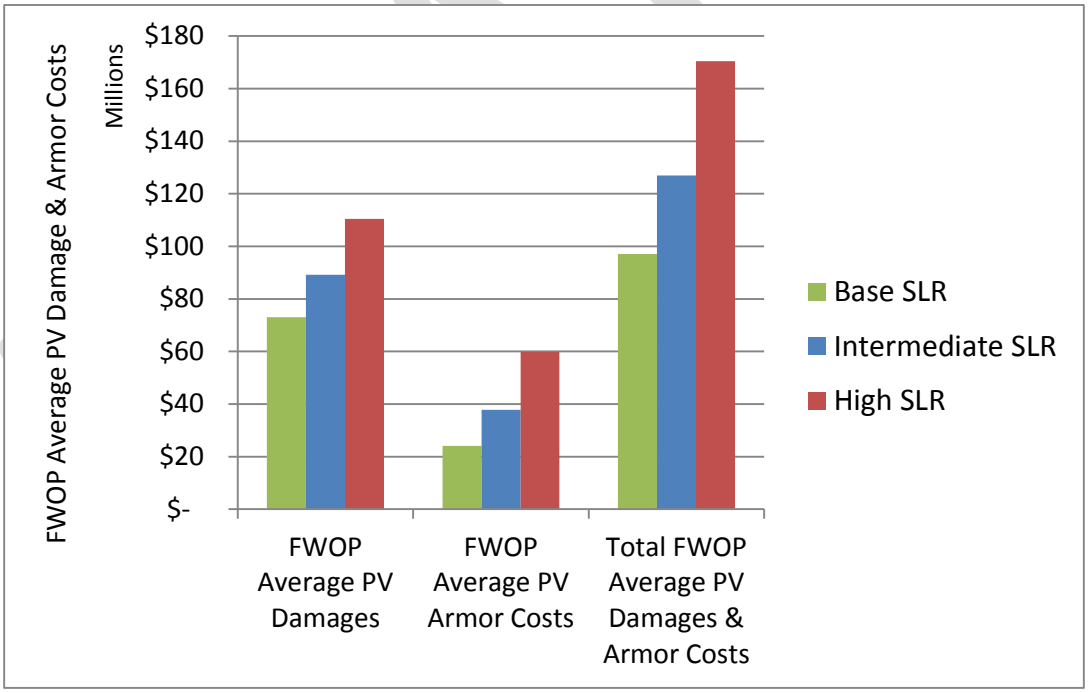


Figure 2-24: FWOP Average Present Value (PV) Damage and Armor Costs for SLR

2.4.5.5 FUTURE WITHOUT PROJECT CONDITION CONCLUSION

The following points summarize the Future Without Project (FWOP) conditions:

- Most of the FWOP damages are associated with single family residences located along the shoreline.
- The majority of the damage and armoring is caused by erosion.
- Damages in the future without project condition increase in the accelerated sea level rise scenarios.

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CHAPTER 3

PLAN FORMULATION

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3 PLAN FORMULATION

3.1 PLAN FORMULATION RATIONALE

Plan formulation is the process of developing alternative plans which meet the project-specific objectives while avoiding constraints.

The first step of plan formulation involves identifying all potential management measures for the given problems. A management measure is a structural or nonstructural action that can be implemented at a specific geographic site to address one or more planning objectives.

An alternative plan is a set of one or more management measures functioning to address one or more objectives. Sometimes a plan consists of only one measure, but more often it's a combination of measures. Different alternative plans consist of different measures, or they combine the same measures in different ways, such as different dimensions, quantities, materials, locations or implementation time frames. As the study evolves, favorable plans are reformulated to devise the most efficient, effective, complete, and acceptable plan.

Four accounts, making up the Federal objectives, are established in the *Principles and Guidelines* (P&G 1983) to facilitate the evaluation of management measures and display the effects of alternative plans. The national economic development (NED) account displays the plan with the greatest net economic benefit consistent with protecting the nation's environment; the environmental quality (EQ) account displays non-monetary effects on ecological, cultural, and aesthetic resources including the positive and adverse effects of alternative plans; the regional economic development (RED) account displays changes in the distribution of regional economic activity (e.g., income and employment); and the other social effects (OSE) account displays plan effects on social aspects such as community impacts, health and safety, displacement, energy conservation and others. The Federal *Principles and Guidelines* require that for Coastal Storm Risk Management (CSRM) projects the NED plan is to be the selected plan unless an exception is granted. The NED plan must also be evaluated in consideration of the Principles and Guidelines criteria of completeness, effectiveness, efficiency, and acceptability. Each alternative plan is formulated in consideration of these four criteria.

3.2 SCOPING*

A public scoping letter was sent on August 17, 2005 which outlined the USACE, Jacksonville District's intent to gather information to prepare an Environmental Impact Statement (EIS) for evaluation of the feasibility of providing hurricane and storm damage reduction, and related purposes, to the St. Johns County shoreline. The letter included the Summer Haven and Vilano Beach reaches as the study area. After that time, the Florida Department of Environmental Protection (FDEP) designated the South Ponte Vedra Beach Reach as critically eroding. A second scoping letter was sent out on September 16, 2008 to include the South Ponte Vedra Beach Reach in the study area. Finally, a notice of intent (NOI) to prepare a draft EIS was published in the Federal Register on April 5, 2010.

3.2.1 FEDERAL

3.2.2 AGENCY AND PUBLIC FEEDBACK

The most common concerns voiced in response to the scoping letters and NOI included:

- loss of land and property due to erosion
- lack of protection from hurricanes
- loss of recreational beach
- concern over impacts to sea turtles and shore birds from renourishment
- concern over impacts to benthic organisms from mining and fill
- concern over protecting surfing spots and the revenue they generate
- concern over wasting Federal tax dollars
- too much time since the first studies without positive results
- concern that revetments and seawalls harm sea turtle nesting

3.3 PROBLEMS AND OPPORTUNITIES*

A problem is an existing undesirable condition to be changed. An opportunity is a chance to create a future condition that is desirable. The difference between problems and opportunities is often indistinct, but in both cases a changed future condition is preferred. The purpose of this feasibility study is to develop an implementable and acceptable plan to improve the future condition and address specific problems and opportunities in the study area. Problems and opportunities to be addressed were identified in several ways. The study team reviewed previous studies by USACE

and other agencies and groups, as well as scoping letter comments received from local residents and stakeholders to identify current coastal risk related problems affecting the study area.

3.3.1 PROBLEMS

Problems within the study area include:

- Storm damages due to erosion, inundation, and waves threatening infrastructure
- Loss of natural habitat
- Shoreline erosion threatening recreational opportunities
- Shoreline erosion threatening hurricane evacuation route Florida State Road (SR) A1A
- Beach/dune interaction limited or eliminated

Erosion, both long-term and storm induced, is the greatest problem in the study area. Loss of protective beach and dunes due to shoreline erosion threatens infrastructure, including SR A1A which is a major hurricane evacuation route for most of the study area and a national scenic by-way. Erosion also threatens natural habitat and recreational opportunities. The study area has experienced long-term erosion. Some natural recovery occurs in the short-term, but the long-term trend is erosional.

Homeowners seeking to protect their property have constructed some erosion control measures, such as seawalls. These structures limit or eliminate the natural interaction where dunes feed sand to the eroded beach during storm events. Limiting this natural protective function makes infrastructure and the environment adjacent to protected properties more susceptible to storm damages. Multiple homes in the South Ponte Vedra Beach and Vilano Beach reaches received permits from the Florida Department of Environmental Protection (FDEP) to construct temporary seawalls. Sea level rise and coastal storms will continue to exacerbate the erosion pressures in the study area. Additional problems associated with the eroding shoreline include impacts to tourism, and loss of recreational resources and habitat.

3.3.2 OPPORTUNITIES

Opportunities exist to:

- Protect/enhance habitat/environmental resources
- Maintain recreation
- Protect hurricane evacuation route (SR A1A)
- Protect/enhance beach/dune interaction
- Implement recommendations in the State of Florida's St. Augustine Inlet Management Plan to use the inlet as a sand source for beaches to the north of the inlet.

There is an opportunity to reduce storm damage to infrastructure by implementing measures which control development in the project area and/or by engineering features which protect infrastructure. These are "management measures" and will be discussed in detail later in this chapter.

There is also the opportunity to preserve recreational opportunities that the current beach and dune systems provide in all reaches such as beach access, surfing, fishing, and wildlife viewing.

Coincident with some management measures like beach nourishment and dune creation are opportunities to protect and enhance natural habitat for sea turtles, etc., as well as protecting or enhancing the natural beach/dune interaction. While some natural functions, such as sea turtle nesting, may be disrupted around the time of construction activities, there is an opportunity for long-term benefit in preserving the beach habitat. Management measures requiring a source of sand for construction also provide an opportunity to implement part of the Florida Department of Environmental Protection (FDEP) St. Augustine Inlet management plan which states that a portion of beach-compatible sand dredged from the inlet should be placed on beaches to the north of the inlet. This also represents the opportunity to implement a Regional Sediment Management (RSM) strategy where maintenance of the Federal inlet can be combined with a Federal Coastal Storm Risk Management (CSRM) project, realizing significant cost savings to the Federal government and to the non-federal project sponsors.

3.4 CONSTRAINTS

3.4.1 PLANNING CONSTRAINTS

A constraint is a restriction that limits the extent of the planning process; it is a statement of effects the that alternative plans should avoid. Constraints are designed to avoid undesirable changes between without and with project future conditions. The planning constraint for this study area is to avoid conflict with Federal regulations, as stated in Federal law, USACE regulations, and executive orders.

3.4.2 LOCAL CONSTRAINTS

Local and state laws, such as Florida State statutes, are not a constraint to NED formulation. However, they may be considered in the selection of a Locally Preferred Plan (LPP).

3.5 OBJECTIVES

3.5.1 FEDERAL OBJECTIVES

The Federal objective is to maximize net benefits to the nation, and as such, it does not seek to identify specific targets within objectives. For example, targeting a pre-defined storm frequency (100-year storm) relative to the storm damage reduction objective would be inappropriate. Rather, the planning process includes formulation of alternative plans to maximize benefits relative to costs. The Federal objective to maximize net benefits would supersede any project-specific target output.

The Federal objective, as stated in The Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, established by the U.S. Water Resources Council on March 10, 1983 (P&G), is to contribute to national economic development (NED) consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Contributions to NED are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net economic benefits that accrue in the study area and the rest of the nation. The three basic criteria used in the planning process are: (1) the project must be economically justified and environmentally acceptable, (2) Federal participation is warranted, and (3) the project must meet current Administration budget priorities.

3.5.1.1 PLANNING OBJECTIVES

The planning objectives are statements of the study purpose. Planning objectives are more specific than the Federal and non-federal objectives and reflect the problems and opportunities in the study area. Federal and non-federal objectives are discussed later in this chapter. An objective is developed to address each of the identified problems and opportunities while being consistent with the study authority and the US Army Corps of Engineers (USACE) mission of coastal storm risk management. Planning objectives represent desired positive changes. The planning objectives for the study area would be attained within the 50-year period of analysis for the study, from 2020 through 2070. All of the objectives focus on activity within the three reaches of the study. The planning objectives are:

- Maximize storm damage reduction to infrastructure
- Maintain existing recreation (beach and nearshore)
- Maintain natural protection provided by beach/dune interaction

The goal of the feasibility study is to develop a range of alternative plans that balance the objectives and avoid conflicts or, where necessary, demonstrate the trade-offs between conflicting objectives, enabling decisions to be made.

3.5.1.2 FEDERAL ENVIRONMENTAL OBJECTIVES

The USACE strives to balance the environmental and development needs of the nation in full compliance with the National Environmental Policy Act (NEPA) and other authorities provided by Congress and the Executive Branch. Public participation is encouraged early in the planning process to define environmental problems and elicit public expression of needs and expectations. Significant environmental resources and values that would likely be impacted, favorably as well as adversely, by an alternative under consideration are identified early in the planning process. All plans are formulated to avoid to the fullest extent practicable any adverse impact on significant resources. Significant adverse impacts that cannot be avoided are mitigated as required by Section 906(d) of WRDA 1986. This feasibility study is an integrated document. Rather than having a separate NEPA document, it includes the Environmental Assessment which describes the environmental impacts of the recommended plan and summarizes compliance with Federal statutes and regulations.

3.5.1.3 ENVIRONMENTAL OPERATING PRINCIPLES

Consistent with the NEPA, the USACE has reaffirmed its commitment to the environment by formalizing a set of "Environmental Operating Principles" applicable to all its decision making and programs. These principles foster unity of purpose regarding environmental issues and ensure that conservation, environmental preservation, and restoration are considered in all USACE activities.

Sustainability can be achieved only by the combined efforts of Federal agencies, tribal, state and local governments, and the private sector each doing its part, backed by the citizens of the world. These principles help the USACE define its role in that endeavor. The USACE Environmental Operating Principles are:

1. Strive to achieve environmental sustainability. An environment maintained in a healthy, diverse and sustainable condition is necessary to support life.

2. Recognize the interdependence of life and the physical environment. Proactively consider environmental consequences of USACE programs and act accordingly in all appropriate circumstances.

3. Seek balance and synergy among human development activities and natural systems by designing economic and environmental solutions that support and reinforce one another.

4. Continue to accept corporate responsibility and accountability under the law for activities and decisions under our control that impact human health and welfare and the continued viability of natural systems.

5. Seek ways and means to assess and mitigate cumulative impacts to the environment; bring systems approaches to the full life cycle of our processes and work.

6. Build and share an integrated scientific, economic, and social knowledge base that supports a greater understanding of the environment and impacts of our work.

7. Respect the views of individuals and groups interested in USACE activities, listen to them actively, and learn from their perspective in the search to find innovative win-win solutions to the nation's problems that also protect and enhance the environment.

3.5.1.4 CAMPAIGN PLAN OF THE U.S. ARMY CORPS OF ENGINEERS (USACE)

The USACE Campaign Plan goals and objectives are derived, in part, from the Commander's intent, the Army Campaign Plan, and the Office of Management and Budget. The four goals and their associated objectives also build on prior strategic planning efforts. Each goal and objective is led by a USACE senior leader who manages and oversees actions to reach the goal and objectives.

The successful achievement of the goals and objectives contained in the Campaign Plan are dependent on actions implemented by the entire USACE team. The implementing actions supporting each goal and objective are contained in the headquarters staff and Major Subordinate Command (MSC) implementation guidance for the Campaign Plan. The four goals of the Campaign Plan are:

Goal 1: Deliver innovative, resilient, and sustainable solutions to the Department of Defense (DoD) and the nation.

Goal 2: Deliver enduring and essential water resource solutions, utilizing effective transformation strategies.

Goal 3: Deliver support that responds to, recovers from, and mitigates disaster impacts to the nation.

Goal 4: Build resilient People, Teams, Systems and Processes to sustain a diverse culture of collaboration, innovation and participation to shape and deliver strategic solutions.

These Campaign Plan goals and associated objectives will be addressed through the course of this feasibility study.

3.5.2 STATE AND LOCAL OBJECTIVES

The State of Florida is empowered by the Federal Coastal Zone Management Act (CZMA) and its implementing regulations at 15 CFR 930 to review Federal activities within or adjacent to its coastal zone to determine whether the activity is consistent with the requirements of the state's approved management program. The Federal CZMA requires Federal activities to be consistent with a state's coastal zone program to the maximum extent practicable; it does not require compliance with a state's program. Florida's Coastal Zone Management Program was established under the Coastal Management Act of 1978 (Chapter 380.20, Florida Statutes) and approved by the Federal Coastal Zone Management office in 1981. Florida does not regulate its coastal zone through one comprehensive law but rather through state statutes and administrative codes. Through Florida's comprehensive planning act, local governments are also given the opportunity to determine whether these activities are consistent with their goals and policies. The FDEP is the lead state agency for the implementation of the Federal coastal zone management act.

The Beach and Shore Preservation Act (Chapter 161, Florida Statutes) is Florida's primary statute for developing and implementing the state's strategic beach management plan, regulating coastal construction seaward of the mean high water line, and regulating activities seaward of the coastal construction control lines. The act, administered by the FDEP, was first passed in 1965 and has since been significantly amended. The objective of the Beach and Shore Preservation Act is to preserve and protect Florida's sandy beaches and adjacent beach and dune systems. The FDEP strives to accomplish this objective with the following programs: Coastal Construction Control Lines, Joint Coastal Permit Program, Erosion Setbacks, Coastal Building Zone, Erosion Control Program, Erosion Control Line, and Inlet Management.

3.5.2.1 LOCAL COMPREHENSIVE PLANNING

The state's Local Government Comprehensive Planning Act of 1985 (Chapter 163) requires that all local governments prepare, adopt, and implement comprehensive plans that address community growth and development needs. It requires that local, regional, and state comprehensive plans be consistent with each other and requires coastal counties and cities to include a "coastal management element" in their local plans. This section of the plan must be based on an inventory of the beach/dune system and existing coastal land uses and an analysis of the effects of future land uses on coastal resources. Local governments must also address disaster mitigation and redevelopment, designation of coastal high-hazard areas, beach protection, and shoreline use.

The St. Johns County Beach Management Plan states that the county's central vision for its beaches provides for an equitable balance between dune and wildlife protection and amenities development for beach use and enjoyment, similar to those developed in Federal and state parks.

3.6 SUMMARY OF MANAGEMENT MEASURES

Management measures are specific structural or nonstructural actions that would take place at geographical locations within the project areas. For this first iteration of evaluating measures, the entire project area was split into two geographical locations:

1) The South Ponte Vedra Beach and Vilano Beach reaches were grouped together due to their proximity and physical similarity.
2) The Summer Haven reach was evaluated separately due to its remote location relative to the rest of the study area and unique physical characteristics (e.g., number of houses).

3.6.1 IDENTIFICATION OF MANAGEMENT MEASURES

Management measures were selected to accomplish at least one planning objective. Both nonstructural (NS) and structural (S) measures are included. All possible measures are considered, including those beyond the authority of the US Army Corps of Engineers (USACE) to implement.

NS-1: No-Action. The no-action plan is the continuation of existing conditions. Although this measure does not address any specific problems, it will provide a comparison to other measures. Information to describe this measure was collected during the inventory of existing conditions. The rate of shoreline change and current adjacent beach fill and sand bypassing operations will be assumed to continue over the 50-year period of analysis. Present structures and replacement costs will be used into the future.

NS-2: Coastal Construction Control Line. A coastal construction control line (CCCL) that does not prohibit construction, but does provide stringent structural restrictions, has already been established by the State of Florida for all of the St. Johns County study area. This management measure provides for potential changes to the CCCL or building regulations that could be implemented by the State of Florida. Such changes could include moving the CCCL landward, increasing the setback for construction, or increasing the standards for construction to reduce storm damages. The erosion of the shoreline would continue at the present rate, unabated by this measure.

NS-3: Moratorium on Construction. This management measure would not permit new construction in the area vulnerable to storm damages within the study area. As properties are damaged, reconstruction would not be permitted. The erosion of the shoreline would continue at the present rate, unabated by this measure. Although, not a congressionally authorized activity, this measure could be implemented by state or local governments.

NS-4: Establish a No-Growth Program. This management measure would allow for existing structures and limited reconstruction following storm damage, but would not allow for an increased number of structures within the area vulnerable to storm damages adjacent to the study area. The erosion of the shoreline would continue at the present rate, unabated by this measure. Although, not a congressionally authorized activity, this measure could be implemented by state or local governments.

NS-5: Relocation of Structures. The relocation of the structures measure would allow the area to continue to erode and the land in this area would be lost. Structures vulnerable to storm damage in the study area would be identified, and where feasible, such structures would be moved further landward on their parcels to escape the vulnerable area.

NS-6: Flood Proofing of Structures. Flood proofing of existing structures and regulation of flood plain and shorefront development are management measures that state and local governments could implement. This measure would require changes to the building codes to further minimize flood damages associated with coastal storms. New construction and substantial reconstruction would be improved by new building code regulations. Existing structures could be improved through incentives and aid programs.

NS-7: Condemnation of Structures and Land Acquisition. This measure would allow the shoreline to erode in the study area with a loss of land. Structures within the study area vulnerable to storm damage would be identified for acquisition. These structures would be demolished and natural areas would be restored. Such parcels would become public property and would reduce the number of structures vulnerable to storm damages.

S-1: Seawalls. The construction of additional concrete seawalls, or improvements to, and maintenance of the existing bulkheads/seawalls would provide a significant degree of protection. The seawalls would be constructed at the seaward edge of the existing dune line. Existing seawalls may be demolished in favor of a new seawall to provide a seamless wall over the entire study area or select areas. This measure would stabilize the shoreline at the location of the bluff, allowing erosion to continue until the seawall becomes the water line. A concrete sheet pile wall is proposed due to its stability in the salt environment and its ability to withstand wave action. Construction would entail excavation into the bluff to install tie-back features. The seawall must be of sufficient depth underground to withstand projected scour by wave action and will require rock protection at the bottom (toe) of the structure.

S-2: Revetments. Revetments have been placed on similar beaches to protect critically damaged or eroding areas. This measure would involve placement of large rock designed to withstand the wave environment along the existing dune line. The engineered structure would start at the elevation of the bluff, to tie into existing elevations, and have a sloped profile. The structure

would be imbedded under the beach elevation to a depth below expected scour and future erosion. In-place materials from the excavation would be used for backfill behind the structure. Along the shoreline, the revetment should be continuous to avoid erosional features at gaps and should include tie back features at the ends. Existing armor can either be incorporated into the structure, or demolished to provide a seamless structure.

S-3: Sand Covered Soft Structure. This management measure includes construction of a dune composed of geotextile sand-filled forms (typically tubes or bags) and covered with sand. This forms a sand dune with a structured core. Sand depth over the geotextile core would be maintained to an adequate depth to allow the dune to function as habitat and not inhibit sea turtle nesting.

S-4: Beach Nourishment. This management measure includes initial construction of a beach fill and future renourishments at regular intervals. Renourishment of the beach would be undertaken periodically to maintain the recreational and erosion control features within design dimensions. Dimensions of the beach fill would be based on economic optimization of benefits provided with consideration to cost, as well as the potential environmental impacts. Beach nourishment material is anticipated to be available in adequate quantities from offshore and/or in combinations of other sources such as navigation dredging, upland disposal areas, etc.

S-5: Groins. A series of groins in the problem area would help hold a beach in front of existing development and prevent further losses of land. The construction of groins would have to be supplemented with nourishment so that adjacent beaches would not be starved of sand. For this reason, groins are considered a method to help hold the fill in place and to reduce periodic nourishment requirements. The groins would be constructed of large size rock, designed to interlock together and with a foundation such to avoid subsidence. The groins would be placed perpendicular to the shoreline and would extend from above the mean high water line out into shallow water. The length, orientation, and head of the structure (T-head or not) would be designed based on wave conditions, storms and sediment transport. The beach fill material would come from offshore and/or in combinations of other sources such as navigation dredging, upland disposal areas, etc.

S-6: Submerged Artificial Reefs. This management measure would use the "perched beach concept" to limit the amount of underwater beach fill and retain the dry beach for a longer period. Such construction would limit cross-shore losses of fill material. This would be accomplished by placement of a submerged artificial reef in shallow water with beach fill material placed "perched" behind the reef structure. This measure may reduce initial nourishment (fill) quantities, reduce renourishment requirements, and offer mitigation for potential nearshore environmental impacts. The submerged artificial reef would be constructed out of large size rock with a foundation material to avoid subsidence. Typically, a structure perpendicular to the shore is

constructed downdrift of the reef to stabilize fill. The beach fill material would come from offshore and/or in combinations of other sources such as navigation dredging, upland disposal areas, etc.

S-7: Submerged Artificial Multi-purpose Reefs. This measure was chosen to fully account for the "maintain existing recreation (beach and nearshore)" objective. Multi-purpose reefs are intended to reduce wave energy by causing waves to break offshore over an artificial reef. The reef is designed to cause wave breaking in a form favorable for surfing and is constructed of material suitable for nearshore habitat. It is advisable to construct the reefs in combination with beach nourishment. A point of sand (or salient) typically forms in the wave shadow of the reef extending that portion of beach seaward. Sand that forms the salient would come from adjacent beaches. Pre-filling the project area with sand prior to, or with reef construction, would reduce adverse impacts to adjacent shorelines. Typically, these reefs are constructed of large, sand filled geotextile bags (or geotubes). Sand would come from offshore and/or in combinations of other sources such as navigation dredging, upland disposal areas, etc.

S-8: Nearshore Placement. Dredged material would be placed in the nearshore to dissipate wave energy, nourish the active profile, or placed as a combination of both. This method allows placement in water depths 15 feet and deeper. This management measure assumes that a portion of the sand placed in shallow water will move towards the beach under normal wave conditions. Over time, following construction, the sand bar will migrate towards the beach, attach to the beach and shape into the normal equilibrium profile of the beach (thus adding material and enlarging the beach). The dredged material would come from offshore.

S-9: Breakwaters. The construction of breakwaters offshore along the St. Johns County study area is considered as a management measure to stabilize the existing beach. Such structures reduce the amount of wave energy reaching the shoreline behind them. As a result, the rate of annual erosion could decrease. The breakwaters would be constructed of large size rock with foundation materials to prevent subsidence. The breakwaters would be trapezoidal in profile and would be placed parallel to the shoreline in shallow water. The breakwaters would be constructed in segments separated from each other to prevent infilling between the existing beach and the breakwaters. The elevation and length of each breakwater segment and the distance between segments would be designed using the wave and sediment transport characteristics of the reach.

S-10: Dunes and Vegetation. The presence of dunes is essential if a beach is to remain stable and able to accommodate the stress from unpredictable storms and extreme conditions of wind, wave, and elevated sea surfaces. Dunes maintain a sand repository that, during storms, provides sacrificial sand before structures would be damaged. The dune system provides a measure of public safety and property protection. Proper vegetation on dunes increases sand erosion resistance by binding the sand together via extensive root masses penetrating deep into the sand.

Further, such vegetation promotes dune growth through its sand trapping action when significant wind action transports substantial quantities of sand. This measure would include placement of beach compatible material, from either upland or offshore sources, in a dune feature adjacent to any existing dune. The top elevation of the constructed dune would tie into the existing dune. The front slope of the dune would be a function of the material grain size and construction equipment. Vegetation would be planted after placement of the dune material.

3.7 SCREENING OF MANAGEMENT MEASURES

3.7.1 PRELIMINARY SCREENING

In Table 3-1 management measures are evaluated by how they will individually meet planning objectives given planning constraints during a 50-year planning horizon within each geographic location, not necessarily across entire reaches. Seawalls, for example, would not necessarily be constructed down the entire length of the South Ponte Vedra Beach and Vilano Beach reaches. Rather the measure is evaluated to identify how constructing seawalls singularly in select portions of the reaches would meet planning objectives and constraints. Also, the overall effects of implementation are evaluated, not the shorter-term effects during construction of structural measures. This is especially relevant for beach nourishment which typically includes periodic renourishment (or reconstruction) of the beach over 50 years.

In addition to planning objectives and constraints, measures were also rated on their potential to meet the Federal Objectives (Four Accounts): National Economic Development (NED) includes damages prevented, emergency costs avoided, and other project costs; Environmental Quality (EQ) includes ecosystem value, water circulation, noise level changes, public facilities and services, aesthetic values, natural resources, air and water quality, cultural and historical preservation and other factors covered by the National Environmental Policy Act (NEPA); Other Social Effects (OSE) includes security and preservation of life, health, and safety, community cohesion and growth, tax and property values, displacement of businesses, and public facilities; and Regional Economic Development (RED) includes impact on local economy including local employment, income, and sales volume.

For the NED account, costs and benefits were not yet developed at this stage of plan formulation. The implementation of some measures, such as “Moratorium on Construction,” would impact damage to future construction but not damage to the existing inventory which the NED calculation is based on for this study. These statements were entered in the matrix under the NED account and all measures given a “1” rating which effectively negates the weight of this account. Rough costs versus Beach-fx damages were later used to screen measures carried forward from this stage.

The OSE account considers how measures impact life safety risk, especially as related to hurricanes and other significant storm events. The sponsor and state have an effective hurricane education, preparedness, and evacuation program. This results in most measures not having a significant difference between the with-project and without-project condition as it is assumed most residents are prepared and would evacuate when necessary. As reflected in Table 3-1, structural measures could minimally improve life safety risk as a result of protecting hurricane evacuation route SR A1A. However, this analysis assumes that the majority of the population evacuates damage prone areas in adequate time to effectively reduce life safety risk.

The management measures were evaluated and rated in Table 3-1 for their potential to accomplish planning objectives given project constraints: 0 = does not meet criteria, 1 = partially meets criteria, and 2 = fully meets criteria. If the total rating equals a number greater than 8, the measure partially meets, at least, over half of the objectives and constraints and is carried forward for further analysis. If the total rating is equal to or less than 8, the measure is not considered further. The final total rating should not be inferred to be a ranking of measures against one another. A measure's rating is only an indication of how likely it is to meet objectives given constraints and therefore carried forward or not.

Management measures for the South Ponte Vedra Beach and Vilano Beach reaches were jointly screened due to their similarities and proximity to one another. The only significant difference between the reaches is the presence of the Coastal Barrier Resources Act (CBRA) zone in the Vilano Beach reach. Federal law constrains Federal participation in a CBRA zone. Total ratings in Table 3-1 were significantly high or low enough that separate evaluation of the reaches was not required. The only exception was evaluation of S-8 (Nearshore Placement). Presence of the CBRA zone caused this measure to not be carried forward for the Vilano Beach reach. However, the measure was carried forward for the South Ponte Vedra reach where no CBRA zone exists.

Table 3-1: Preliminary screening matrix.

South Ponte Vedra Beach and Vilano Beach Non-Structural Measures

	MEASURES	PROJECT OBJECTIVES			PROJECT CONSTRAINTS	FEDERAL OBJECTIVES					
	SOUTH PONTE VEDRA AND VILANO	Maximize Storm Damage Reduction to Infrastructure	Maintain Existing Recreation (Beach and Nearshore)	Maintain Beach/Dune Interaction	Consistent with Federal Laws	National Economic Development (NED)	Environmental Quality	Other Social Effects	Regional Economic Development (RED)	Total	Measure Carried Forward (Yes/No)
	Nonstructural Measures (NS)										
NS-1	No-Action	No improvement	No impact to nearshore recreation. Loss of beach recreation.	Natural and artificial loss due to private shore protection measures.	Consistent with Federal law.	No project cost. No damages prevented.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width and private shore protection measures. Minimal change to other factors.	Small life safety risk due to hurricane evacuation route damage. Moderate risk to loss of public facilities (parking, beach access, bathrooms). Negative effect on community cohesion due to perceived inequality.	Loss of property value and tax value. Loss of other revenue related to existing beach as long -term erosion continues.		
		0	1	0	2	1	1	0	0	5	Yes
NS-2	Coastal Construction Control Line	Increasing construction standards could decrease damage to future construction	No impact to nearshore recreation. Loss of beach recreation.	Natural and artificial loss due to private shore protection measures.	Implemented by state/local government and is consistent with Federal law.	Would impact future construction but not impact damages to existing inventory which NED calculation is based on for this study.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width and private shore protection measures. Minimal change to other factors.	Small life safety risk due to hurricane evacuation route damage. Increased requirements/ restrictions on future construction are typically unfavorable.	Loss of property value and tax value. Loss of other revenue related to existing beach as long -term erosion continues.		
		1	1	0	2	1	1	0	0	6	No
NS-3	Moratorium on Construction	No improvement to damage of current construction but elimination of damage to future construction	No impact to nearshore recreation. Loss of beach recreation.	Natural and artificial loss due to private shore protection measures.	Implemented by state/local government and is consistent with Federal law.	Would impact future construction but not impact damages to existing inventory which NED calculation is based on for this study.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width and private shore protection measures. Minimal change to other factors.	Small life safety risk due to hurricane evacuation route damage. Moderate risk to loss of public facilities (parking, beach access, bathrooms). Negative effect on community cohesion due to perceived inequality.	Loss of property value and tax value. Loss of other revenue related to existing beach as long term erosion continues.		
		1	1	0	2	1	1	0	0	6	No

Carried Forward | Eliminated | 2 Fully Meets Obj/Constraint | 1 Partially Meets Obj/Constraint | 0 Does Not Meet Obj/Constraint

South Ponte Vedra Beach and Vilano Beach Non-Structural Measures

	MEASURES	PROJECT OBJECTIVES			PROJECT CONSTRAINTS	FEDERAL OBJECTIVES					
	SOUTH PONTE VEDRA AND VILANO	Maximize Storm Damage Reduction to Infrastructure	Maintain Existing Recreation (Beach and Nearshore)	Maintain Beach/Dune Interaction	Consistent with Federal Laws	National Economic Development (NED)	Environmental Quality	Other Social Effects	Regional Economic Development (RED)	Total	Measure Carried Forward (Yes/No)
	Nonstructural Measures (NS)										
NS-1	No-Action	No improvement	No impact to nearshore recreation. Loss of beach recreation.	Natural and artificial loss due to private shore protection measures.	Consistent with Federal law.	No project cost. No damages prevented.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width and private shore protection measures. Minimal change to other factors.	Small life safety risk due to hurricane evacuation route damage. Moderate risk to loss of public facilities (parking, beach access, bathrooms). Negative effect on community cohesion due to perceived inequality.	Loss of property value and tax value. Loss of other revenue related to existing beach as long -term erosion continues.		
		0	1	0	2	1	1	0	0	5	Yes
NS-2	Coastal Construction Control Line	Increasing construction standards could decrease damage to future construction	No impact to nearshore recreation. Loss of beach recreation.	Natural and artificial loss due to private shore protection measures.	Implemented by state/local government and is consistent with Federal law.	Would impact future construction but not impact damages to existing inventory which NED calculation is based on for this study.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width and private shore protection measures. Minimal change to other factors.	Small life safety risk due to hurricane evacuation route damage. Increased requirements/ restrictions on future construction are typically unfavorable.	Loss of property value and tax value. Loss of other revenue related to existing beach as long -term erosion continues.		
		1	1	0	2	1	1	0	0	6	No
NS-3	Moratorium on Construction	No improvement to damage of current construction but elimination of damage to future construction	No impact to nearshore recreation. Loss of beach recreation.	Natural and artificial loss due to private shore protection measures.	Implemented by state/local government and is consistent with Federal law.	Would impact future construction but not impact damages to existing inventory which NED calculation is based on for this study.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width and private shore protection measures. Minimal change to other factors.	Small life safety risk due to hurricane evacuation route damage. Moderate risk to loss of public facilities (parking, beach access, bathrooms). Negative effect on community cohesion due to perceived inequality.	Loss of property value and tax value. Loss of other revenue related to existing beach as long term erosion continues.		
		1	1	0	2	1	1	0	0	6	No

Carried Forward Eliminated 2 Fully Meets Obj/Constraint 1 Partially Meets Obj/Constraint 0 Does Not Meet Obj/Constraint

South Ponte Vedra Beach and Vilano Beach Non-Structural Measures

	MEASURES	PROJECT OBJECTIVES			PROJECT CONSTRAINTS	FEDERAL OBJECTIVES					
	SOUTH PONTE VEDRA AND VILANO	Maximize Storm Damage Reduction to Infrastructure	Maintain Existing Recreation (Beach and Nearshore)	Maintain Beach/Dune Interaction	Consistent with Federal Laws	National Economic Development (NED)	Environmental Quality	Other Social Effects	Regional Economic Development (RED)	Total	Measure Carried Forward (Yes/No)
	Nonstructural Measures (NS)										
NS-4	Establish a No-Growth Program	No improvement to damage of current construction but elimination of damage to future construction.	No impact to nearshore recreation. Loss of beach recreation.	Natural and artificial loss due to private shore protection measures.	Implemented by state/local government and is consistent with Federal law.	Would impact future construction but not impact damages to existing inventory which NED calculation is based on for this study.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width and private shore protection measures. Minimal change to other factors.	Small life safety risk due to hurricane evacuation route damage. Loss of property value and tax value. Moderate risk to loss of public facilities (parking, beach access, bathrooms). Negative effect on community cohesion due to perceived inequality.	Loss of property value and tax value. Loss of other revenue related to existing beach as long-term erosion continues.		
		1	1	0	2	1	1	0	0	6	No
NS-5	Relocation of Structures	Relocating damageable elements would reduce damages.	No impact to nearshore recreation. Eventual narrowing of beach could cause loss of beach recreation.	Relocation could reduce private shore protection measures and maintain beach/dune interaction. Eventual narrowing of beach/dune system between ocean and A1A would limit or eliminate interaction	Consistent with Federal law.	Costs undetermined at this stage.	Eventual narrowing of beach/dune system between ocean and A1A would limit or eliminate habitat. No impact to nearshore habitat. Minimal change to other factors.	Small life safety risk due to hurricane evacuation route damage. Moderate risk to loss of public facilities (parking, beach access, bathrooms). Negative effect on community cohesion due to perceived inequality.	Loss of property value and tax value. Loss of other revenue related to existing beach as long -term erosion continues.		
		1	1	1	2	1	1	0	0	7	No
NS-6	Flood Proofing of Structures	Increasing construction standards could decrease damage to future construction	No impact to nearshore recreation. Loss of beach recreation.	Natural and artificial loss due to private shore protection measures.	Implemented by state/local government and is consistent with Federal law.	Costs undetermined at this stage.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width and private shore protection measures. Minimal change to other factors.	Small life safety risk due to hurricane evacuation route damage. Increased requirements/ restrictions on future construction are typically unfavorable.	Loss of property value and tax value. Loss of other revenue related to existing beach as long -term erosion continues.		
		1	1	0	2	1	1	0	0	6	No
NS-7	Condemnation of Structures and Land Acquisition	Removing damageable elements and conversion of property to natural area would maximize storm damage reduction.	No impact to nearshore recreation. Loss of beach recreation as beach/dune system narrows between A1A and ocean.	Eventual narrowing of beach/dune system between ocean and A1A would limit or eliminate interaction	Consistent with Federal law.	Costs undetermined at this stage.	Creation of natural area/habitat would improve environment. Loss of habitat as beach/dune system narrows between ocean and A1A.	Small life safety risk due to hurricane evacuation route damage. Moderate risk to loss of public facilities if parkland were created. Negative effect on community cohesion due to perceived inequality.	Minimal increase with creation of parkland and eco-tourism benefits.		
		2	1	1	2	1	1	0	1	9	No

Carried Forward | Eliminated | 2 Fully Meets Obj/Constraint | 1 Partially Meets Obj/Constraint | 0 Does Not Meet Obj/Constraint

South Ponte Vedra Beach and Vilano Beach Structural Measures

	MEASURES	PROJECT OBJECTIVES			PROJECT CONSTRAINTS	FEDERAL OBJECTIVES					
	SOUTH PONTE VEDRA AND VILANO	Maximize Storm Damage Reduction to Infrastructure	Maintain Existing Recreation (Beach and Nearshore)	Maintain Beach/Dune Interaction	Consistent with Federal Laws	National Economic Development (NED)	Environmental Quality	Other Social Effects	Regional Economic Development (RED)	Total	Measure Carried Forward (Yes/No)
	Structural Measures (S)										
S-1	Seawalls	Would maximize storm damage reduction where constructed. However, adjacent properties could be made more vulnerable due to erosive effects of structures.	Potential loss of beach recreation fronting structures. Steepening of profile and/or wave reflection may effect nearshore recreation such as surfing.	Construction would eliminate beach/dune interaction. Interaction on properties adjacent to construction could be negatively affected.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Negative effects to sea turtle nesting habitat and wildlife habitat.	Likely supported by homeowners but little support from others.	No change.		
		1	1	0	1	1	0	1	0	5	No
S-2	Revetments	Would maximize storm damage reduction where constructed. However, adjacent properties could be made more vulnerable due to erosive effects of structures.	Sloped construction causes revetments to take up more beach width than seawalls. Potential loss of beach recreation fronting structures. Steepening of profile and/or wave reflection may effect nearshore recreation such as surfing.	Construction would eliminate beach/dune interaction. Interaction on properties adjacent to construction could be negatively affected.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Negative effects to sea turtle nesting habitat and wildlife habitat.	Likely supported by homeowners but little support from others.	No change.		
		1	1	0	1	1	0	1	0	5	No
S-3	Sand Covered Soft Structure	Would improve storm damage reduction.	Existing narrow beach may be maintained.	Beach/dune interaction would be maintained.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Environmental quality is highly dependent on maintaining sand coverage of structure. Without adequate coverage dune habitat and sea turtle nesting could be negatively impacted. No impact to nearshore habitat.	Improved life safety risk due to hurricane evacuation route protection. Protection of public facilities (parking, beach access, bathrooms).	Minimal increase to RED through improvement of tourism/beach economy. Protection of property value and tax value.		
		1	1	2	1	1	1	2	1	10	Yes

Carried Forward Eliminated 2 Fully Meets Obj/Constraint 1 Partially Meets Obj/Constraint 0 Does Not Meet Obj/Constraint

South Ponte Vedra Beach and Vilano Beach Structural Measures

	MEASURES	PROJECT OBJECTIVES			PROJECT CONSTRAINTS	FEDERAL OBJECTIVES					
	SOUTH PONTE VEDRA AND VILANO	Maximize Storm Damage Reduction to Infrastructure	Maintain Existing Recreation (Beach and Nearshore)	Maintain Beach/Dune Interaction	Consistent with Federal Laws	National Economic Development (NED)	Environmental Quality	Other Social Effects	Regional Economic Development (RED)	Total	Measure Carried Forward (Yes/No)
	Structural Measures (S)										
S-4	Beach Nourishment	Continuous nourishment along constructible lengths of shoreline would maximize storm damage reduction.	Beach recreation would be maintained or improved. Nearshore recreation such as surfing and fishing could be impacted (negatively or positively) for a period of time after initial nourishment and periodic renourishments.	Beach/dune interaction would be maintained.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Empirical evidence indicates potential negative effects to benthic invertebrates and nearshore habitat are for short periods of time, with habitat recovering within one year. Positive impact to sea turtle nesting habitat.	Improved life safety risk due to hurricane evacuation route protection. Protection of public facilities (parking, beach access, bathrooms). Supported by majority of community.	Moderate increase to RED through improvement of tourism/ beach economy. Protection of property value and tax value.		
		2	1	2	1	1	1	2	2	12	Yes
S-5	Groins	In combination with beach nourishment, groins could be used at hotspots to stabilize fill and maximize storm damage reduction.	In combination with beach nourishment, beach recreation would be maintained. Nearshore recreation such as surfing and fishing could be impacted (negatively or positively) for a period of time after initial nourishment and periodic renourishments. Periodic renourishments should be reduced due to stabilization effects of groins.	Beach/dune interaction would be maintained.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Periodic renourishments could be reduced due to stabilizing effect of groins. Empirical evidence indicates potential negative effects to benthic invertebrates and nearshore habitat from beach nourishment are for short periods of time, with habitat recovering within one year. Positive impact to sea turtle nesting habitat. Possible entrapment hazard for hatchling sea turtles.	Improved life safety risk due to hurricane evacuation route protection. Protection of public facilities (parking, beach access, bathrooms). Supported by majority of community.	Moderate increase to RED through improvement of tourism/ beach economy. Protection of and tax value.		
		2	1	2	1	1	1	1	2	11	Yes
S-6	Submerged Artificial Reefs	Constructed in select locations, in combination with beach nourishment and a shore perpendicular structure, could maximize storm damage reduction.	In combination with beach nourishment and a shore perpendicular structure, beach recreation would be maintained. Nearshore recreation such as surfing and fishing could be impacted (negatively or positively) for a period of time after initial nourishment and periodic renourishments.	Beach/dune interaction would be maintained.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Reef has potential as nearshore habitat. Empirical evidence indicates potential negative effects to benthic invertebrates and nearshore habitat from beach nourishment are for short periods of time, with habitat recovering within one year. Positive impact to sea turtle nesting habitat.	Improved life safety risk due to hurricane evacuation route protection. Protection of public facilities (parking, beach access, bathrooms).	Moderate increase to RED through improvement of tourism/ beach economy. Protection of property value and tax value.		
		2	1	2	1	1	2	1	2	12	Yes

Carried Forward | Eliminated | 2 Fully Meets Obj/Constraint | 1 Partially Meets Obj/Constraint | 0 Does Not Meet Obj/Constraint

South Ponte Vedra Beach and Vilano Beach Structural Measures

	MEASURES	PROJECT OBJECTIVES			CONSTRAINTS	FEDERAL OBJECTIVES					
	SOUTH PONTE VEDRA AND VILANO	Maximize Storm Damage Reduction to Infrastructure	Maintain Existing Recreation (Beach and Nearshore)	Maintain Beach/Dune Interaction	Consistent with Federal Laws	National Economic Development (NED)	Environmental Quality	Other Social Effects	Regional Economic Development (RED)	Total	Measure Carried Forward (Yes/No)
	Structural Measures (S)										
S-7	Submerged Artificial Multi-Purpose Reefs	Constructed in select locations in combination with beach nourishment, could maximize storm damage reduction.	In combination with beach nourishment, beach recreation would be maintained. Reef construction could maintain or improve nearshore recreation such as surfing, fishing, and diving. Reef could serve as mitigation for periodic beach nourishment impacts to nearshore recreation in other portions of the study area.	Beach/dune interaction would be maintained.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Reef has potential as nearshore habitat. Empirical evidence indicate potential negative effects to benthic invertebrates and nearshore habitat from beach nourishment are for short periods of time, with habitat recovering within one year. Positive impact to sea turtle nesting habitat.	Improved life safety risk due to hurricane evacuation route protection. Protection of public facilities (parking, beach access, bathrooms). May receive more support from environmental agencies.	Moderate increase to RED through improvement of tourism/beach economy. Protection of property value and tax value.		
		2	2	2	1	1	2	1	2	13	Yes
S-8 South Ponte Vedra	Nearshore Placement	Could provide moderate storm damage reduction dependent on migration of fill.	Beach recreation could be maintained or improved dependent on fill migration. Nearshore recreation such as surfing and fishing could be impacted (negatively or positively) for a period of time after initial placement and future periodic placements.	Beach/dune interaction would be maintained.	Consistent with Federal law.	Costs undetermined at this stage.	Empirical evidence indicates potential negative effects to benthic invertebrates and nearshore habitat are for short periods of time, with habitat recovering within one year. Volume of sand needed to provide significant benefits could have negative impact to sea turtle nesting habitat dependent on migration of fill.	Minimal improvement to life safety risk due to hurricane evacuation route protection. Minimal protection of public facilities (parking, beach access, bathrooms).	Minimal protection of property value and tax value.		
		1	1	2	2	1	0	1	1	9	Yes
S-8 Vilano	Nearshore Placement	Could provide moderate storm damage reduction dependent on migration of fill	Beach recreation could be maintained or improved dependent on fill migration. Nearshore recreation such as surfing and fishing could be impacted (negatively or positively) for a period of time after initial placement and future periodic placements.	Beach/dune interaction would be maintained	Supported by federal law except in CBRA zone.	Costs undetermined at this stage.	Empirical evidence indicates potential negative effects to benthic invertebrates and nearshore habitat are for short periods of time, with habitat recovering within one year. Volume of sand needed to provide significant benefits could have negative impact to sea turtle nesting habitat dependent on migration of fill.	Minimal improvement to life safety risk due to hurricane evacuation route protection. Minimal protection of public facilities (parking, beach access, bathrooms).	Minimal protection of property value and tax value.		
		1	1	2	1	1	0	1	1	8	No
S-9	Emergent Breakwaters	As a stand-alone measure, emergent breakwaters could improve storm damage reduction.	Beach recreation could be maintained. Nearshore recreation such as surfing could be negatively impacted.	Beach/dune interaction would be maintained.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Potential negative impacts to sea turtle nesting activities and hatchling entrapment.	Minimal improvement to life safety risk due to hurricane evacuation route protection. Minimal protection of public facilities (parking, beach access, bathrooms).	Minimal protection of property value and tax value.		
		1	1	2	1	1	1	1	1	9	No
S-10	Dunes and Vegetation	Could improve storm damage reduction as a stand-alone measure.	Beach recreation could be maintained. No impact to nearshore recreation.	Beach/dune interaction would be maintained or improved.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Dune creation improves dune habitat and potentially beach habitat for sea turtle nesting. No impact to nearshore habitat.	Minimal improvement to life safety risk due to hurricane evacuation route protection. Minimal protection of public facilities (parking, beach access, bathrooms).	Moderate increase to RED through improvement of tourism/beach economy. Moderate protection of property value and tax value.		
		1	1	2	1	1	2	1	2	11	Yes

Carried Forward Eliminated 2 Fully Meets Obj/Constraint 1 Partially Meets Obj/Constraint 0 Does Not Meet Obj/Constraint

Summer Haven Non-Structural Measures

	MEASURES	PROJECT OBJECTIVES			PROJECT CONSTRAINTS	FEDERAL OBJECTIVES					
	Summer Haven	Maximize Storm Damage Reduction to Infrastructure	Maintain Existing Recreation (Beach and Nearshore)	Maintain Beach/Dune Interaction	Consistent with Federal Laws	National Economic Development (NED)	Environmental Quality	Other Social Effects	Regional Economic Development (RED)	Total	Measure Carried Forward (Yes/No)
	Nonstructural Measures (NS)										
NS-1	No-Action	No improvement	No impact to nearshore recreation. Loss of beach recreation.	No dune exists in northern, revetted portion. Minimal impact to beach/ dunes system in southern portion	Consistent with Federal law.	No project cost. No damages prevented.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width and private shore protection measures. Minimal change to other factors.	Negative effect on community cohesion due to perceived inequality	Loss of property value and tax value. Loss of other revenue related to existing beach as long -term erosion continues.		
		0	1	0	2	1	1	0	0	5	Yes
NS-2	Coastal Construction Control Line	Increasing construction standards could decrease damage to future construction	No impact to nearshore recreation. Loss of beach recreation.	Natural and artificial loss due to private shore protection measures.	Implemented by state/local government and is consistent with Federal law.	Would impact future construction but not impact damages to existing inventory which NED calculation is based on for this study.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width and private shore protection measures. Minimal change to other factors.	Increased requirements/restrictions on future construction are typically unfavorable.	Loss of property value tax value. Loss of other revenue related to existing beach as long term erosion continues.		
		1	1	0	2	1	1	0	0	6	No
NS-3	Moratorium on Construction	No improvement to damage of current construction but elimination of damage to future construction	No impact to nearshore recreation. Loss of beach recreation.	Some natural loss likely due to erosion. No artificial loss due to no anticipated shore protection measures in southern reach..	Implemented by state/local government and is consistent with Federal law.	Would impact future construction but not impact damages to existing inventory which NED calculation is based on for this study.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width. Minimal change to other factors.	Loss of property value and tax value. Negative effect on community cohesion due to perceived inequality .	Loss of property value and tax value. Loss of other revenue related to existing beach as long -term erosion continues.		
		1	1	1	2	1	1	0	0	7	No
NS-4	Establish a No-Growth Program	No improvement to damage of current construction but elimination of damage to future construction	No impact to nearshore recreation. Loss of beach recreation.	Some natural loss likely due to erosion. No artificial loss due to no anticipated shore protection measures in southern reach.	Implemented by state/local government and is consistent with Federal law.	Would impact future construction but not damage to existing inventory which NED calculation is based on for this study.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width. Minimal change to other factors.	Loss of property value and tax value. Negative effect on community cohesion due to perceived inequality .	Loss of property value and tax value. Loss of other revenue related to existing beach as long -term erosion continues.		
		1	1	1	2	1	1	0	0	7	No

Carried Forward Eliminated 2 Fully Meets Obj/Constraint 1 Partially Meets Obj/Constraint 0 Does Not Meet Obj/Constraint

Summer Haven Non-Structural Measures

	MEASURES	PROJECT OBJECTIVES			PROJECT CONSTRAINTS	FEDERAL OBJECTIVES					
	Summer Haven	Maximize Storm Damage Reduction to Infrastructure	Maintain Existing Recreation (Beach and Nearshore)	Maintain Beach/Dune Interaction	Consistent with Federal Laws	National Economic Development (NED)	Environmental Quality	Other Social Effects	Regional Economic Development (RED)	Total	Measure Carried Forward (Yes/No)
	Nonstructural Measures (NS)										
NS-5	Relocation of Structures	Relocating damageable elements would reduce damages.	No impact to nearshore recreation. Eventual narrowing of beach could cause loss of beach recreation.	Relocation could reduce private shore protection measures in the southern reach and maintain beach/dune interaction. Eventual narrowing of beach/dune system between ocean and Old A1A would limit or eliminate interaction	Consistent with Federal law.	Costs undetermined at this stage.	Eventual narrowing of beach/dune system between ocean and Old A1A would limit or eliminate habitat. No impact to nearshore habitat. Minimal change to other factors.	Small life safety risk due to hurricane evacuation route damage. Moderate risk to loss of public facilities (parking, beach access, bathrooms). Negative effect on community cohesion due to perceived inequality.	Loss of property value and tax value. Loss of other revenue related to existing beach as long- term erosion continues.		
		1	1	1	2	1	1	0	0	7	No
NS-6	Flood Proofing of Structures	Increasing construction standards could decrease damage to future construction	No impact to nearshore recreation. Loss of beach recreation.	Natural and artificial loss due to private shore protection measures.	Implemented by state/local government and is consistent with Federal law.	Costs undetermined at this stage.	Possible loss of dune habitat. Loss of turtle nesting habitat due to decreased beach/dune width and private shore protection measures. Minimal change to other factors.	Increased requirements/restrictions on future construction are typically unfavorable.	Loss of property value and tax value. Loss of other revenue related to existing beach as long- term erosion continues.		
		1	1	0	2	1	1	0	0	6	No
NS-7	Condemnation of Structures and Land Acquisition	Removing damageable elements and conversion of property to natural area would maximize storm damage reduction.	Creation of natural area/park would not impact beach or nearshore recreation. This assumes removal of Old A1A in southern reach.	Creation of natural area and removal of Old A1A would maintain beach/dune interaction.	Consistent with Federal law.	Costs undetermined at this stage.	Creation of natural area/habitat would improve environment.	Overall, public may view measure as beneficial to local interests.	Minimal increase with creation of parkland and eco-tourism benefits.		
		2	2	2	2	1	2	1	1	13	Yes

Carried Forward | Eliminated | 2 Fully Meets Obj/Constraint | 1 Partially Meets Obj/Constraint | 0 Does Not Meet Obj/Constraint

Summer Haven Structural Measures

	MEASURES	PROJECT OBJECTIVES			PROJECT CONSTRAINTS	FEDERAL OBJECTIVES					
	Summer Haven	Maximize Storm Damage Reduction to Infrastructure	Maintain Existing Recreation (Beach and Nearshore)	Maintain Beach/Dune Interaction	Consistent with Federal Laws	National Economic Development (NED)	Environmental Quality	Other Social Effects	Regional Economic Development (RED)	Total	Measure Carried Forward (Yes/No)
	Structural Measures (S)										
S-1	Seawalls	Would maximize storm damage reduction where constructed. Structures exist to the north and south, therefore minimal effects to adjacent properties .	Potential loss of beach recreation fronting structures. Steepening of profile and/or wave reflection may effect nearshore recreation such as surfing.	Construction would eliminate beach/dune interaction. Beach/dune interaction on properties adjacent to construction could be negatively affected.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Negative effects to sea turtle nesting habitat in southern reach.	Likely supported by homeowners but little support from others.	No change.		
		2	1	0	1	1	0	1	0	6	No
S-2	Revetments	Would maximize storm damage reduction where constructed. Structures exist to the north and south, therefore minimal effects to adjacent properties .	Sloped construction causes revetments to take up more beach width than seawalls. Potential loss of beach recreation fronting structures. Steepening of profile and/or wave reflection may effect nearshore recreation such as surfing.	Construction would eliminate beach/dune interaction. Beach/dune interaction on properties adjacent to construction could be negatively affected.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Negative effects to sea turtle nesting habitat in southern reach.	Likely supported by homeowners but little support from others.	No change.		
		2	1	0	1	1	0	1	0	6	No
S-3	Sand Covered Soft Structure	Would improve storm damage reduction.	Existing narrow beach may be maintained.	Beach/dune interaction would be maintained.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Environmental quality is highly dependent on maintaining sand coverage of structure. Without adequate coverage dune habitat and sea turtle nesting could be negatively impacted. No impact to nearshore habitat.	Improved life safety risk due to hurricane evacuation route protection. Protection of public facilities (parking, beach access, bathrooms).	Minimal increase to RED through improvement of tourism/beach economy. Protection of property value and tax value.		
		1	1	2	1	1	1	2	1	10	Yes

Carried Forward | Eliminated | 2 Fully Meets Obj/Constraint | 1 Partially Meets Obj/Constraint | 0 Does Not Meet Obj/Constraint

Summer Haven Structural Measures

	MEASURES	PROJECT OBJECTIVES			PROJECT CONSTRAINTS	FEDERAL OBJECTIVES					
	Summer Haven	Maximize Storm Damage Reduction to Infrastructure	Maintain Existing Recreation (Beach and Nearshore)	Maintain Beach/Dune Interaction	Consistent with Federal Laws	National Economic Development (NED)	Environmental Quality	Other Social Effects	Regional Economic Development (RED)	Total	Measure Carried Forward (Yes/No)
	Structural Measures (S)										
S-4	Beach Nourishment	Continuous nourishment along constructible lengths of shoreline would maximize storm damage reduction.	Beach recreation would be maintained or improved. Nearshore recreation such as surfing and fishing could be impacted (negatively or positively) for a period of time after initial nourishment and periodic renourishments.	Beach/dune interaction would be maintained in southern reach.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Empirical evidence indicate potential negative effects to benthic invertebrates and nearshore habitat are for short periods of time, with habitat recovering within one year. Positive impact to sea turtle nesting habitat.	Supported by homeowners.	Moderate increase to RED through improvement of tourism/beach economy. Minimal protection of property value and tax value in northern reach due to existing protection provided by revetment. Increased protection likely in southern reach.	11	Yes
		2	1	2	1	1	1	1	2		
S-5	Groins	In combination with beach nourishment, groins could be used at hotspots to stabilize fill and maximize storm damage reduction.	In combination with beach nourishment, beach recreation would be maintained. Nearshore recreation such as surfing and fishing could be impacted (negatively or positively) for a period of time after initial nourishment and periodic renourishments. Periodic renourishments should be reduced due to stabilization effects of groins.	Beach/dune interaction would be maintained in southern reach.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Periodic renourishments could be reduced due to stabilizing effect of groins. Empirical evidence indicate potential negative effects to benthic invertebrates and nearshore habitat from beach nourishment are for short periods of time, with habitat recovering within one year. Positive impact to sea turtle nesting habitat.	Supported by homeowners.	Moderate increase to RED through improvement of tourism/beach economy. Minimal protection of property value and tax value in northern reach due to existing protection provided by revetment. Increased protection likely in southern reach.	11	Yes
		2	1	2	1	1	1	1	2		

Carried Forward | Eliminated | 2 Fully Meets Obj/Constraint | 1 Partially Meets Obj/Constraint | 0 Does Not Meet Obj/Constraint

Summer Haven Structural Measures

	MEASURES	PROJECT OBJECTIVES			PROJECT CONSTRAINTS	FEDERAL OBJECTIVES					
	Summer Haven	Maximize Storm Damage Reduction to Infrastructure	Maintain Existing Recreation (Beach and Nearshore)	Maintain Beach/Dune Interaction	Consistent with Federal Laws	National Economic Development (NED)	Environmental Quality	Other Social Effects	Regional Economic Development (RED)	Total	Measure Carried Forward (Yes/No)
	Structural Measures (S)										
S-6	Submerged Artificial Reefs	Constructed in select locations in combination with beach nourishment, could maximize storm damage reduction.	In combination with beach nourishment, beach recreation would be maintained. Nearshore recreation such as surfing and fishing could be impacted (negatively or positively) for a period of time after initial nourishment and periodic renourishments.	Beach/dune interaction would be maintained in southern reach.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Reef has potential as nearshore habitat. Empirical evidence indicate potential negative effects to benthic invertebrates and nearshore habitat from beach nourishment are for short periods of time, with habitat recovering within one year. Positive impact to sea turtle nesting habitat.	Supported by homeowners.	Moderate increase to RED through improvement of tourism/beach economy. Minimal protection of property value and tax value in northern reach due to existing protection provided by revetment. Increased protection likely in southern reach.		
		2	1	2	1	1	2	1	2	12	Yes
S-7	Submerged Artificial Multi-Purpose Reefs	Constructed in select locations in combination with beach nourishment, could maximize storm damage reduction.	In combination with beach nourishment, beach recreation would be maintained. Reef construction could maintain or improve nearshore recreation such as surfing, fishing, and diving. Reef could serve as mitigation for periodic beach nourishment impacts to nearshore recreation in other portions of the study area.	Beach/dune interaction would be maintained in southern reach.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Reef has potential as nearshore habitat. Empirical evidence indicate potential negative effects to benthic invertebrates and nearshore habitat from beach nourishment are periodic, with habitat recovering within one year. Positive impact to sea turtle nesting habitat.	Supported by homeowners.	Moderate increase to RED through improvement of tourism/beach economy.		
		2	2	2	1	1	2	1	2	13	Yes
S-8	Nearshore Placement	Could provide moderate storm damage reduction dependent on migration of fill.	Beach recreation could be maintained or improved dependent on fill migration. Nearshore recreation such as surfing and fishing could be impacted (negatively or positively) for a period of time after initial placement and future periodic placements.	Beach/dune interaction would be maintained in the southern reach.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Empirical evidence indicates potential negative effects to benthic invertebrates and nearshore habitat are for short periods of time, with habitat recovering within one year. Volume of sand needed to provide significant benefits could have negative impact to sea turtle nesting habitat dependent on migration of fill.	Supported by homeowners.	Dependent on fill migration to the dry beach, there could be a moderate increase to RED through improvement of tourism/beach economy. Minimal protection of property value and tax value in northern reach due to existing protection provided by revetment. Increased protection likely in southern reach.		
		1	1	2	1	1	0	1	1	8	No

Carried Forward Eliminated 2 Fully Meets Obj/Constraint 1 Partially Meets Obj/Constraint 0 Does Not Meet Obj/Constraint

Summer Haven Structural Measures

	MEASURES	PROJECT OBJECTIVES			PROJECT CONSTRAINTS	FEDERAL OBJECTIVES					
	Summer Haven	Maximize Storm Damage Reduction to Infrastructure	Maintain Existing Recreation (Beach and Nearshore)	Maintain Beach/Dune Interaction	Consistent with Federal Laws	National Economic Development (NED)	Environmental Quality	Other Social Effects	Regional Economic Development (RED)	Total	Measure Carried Forward (Yes/No)
	Structural Measures (S)										
S-9	Emergent Breakwaters	As a stand-alone measure, emergent breakwaters could improve storm damage reduction.	Beach recreation could be maintained. Nearshore recreation such as surfing could be negatively impacted.	Beach/dune interaction would be maintained.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Potential negative impacts to sea turtle nesting activities and hatchling entrapment.	Minimal improvement to life safety risk due to hurricane evacuation route protection. Minimal protection of property value and tax value. Minimal protection of public facilities (parking, beach access, bathrooms).	No change.		
		1	1	2	1	1	1	1	0	8	No
S-10	Dunes and Vegetation	Could improve storm damage reduction as a stand-alone measure.	Beach recreation could be maintained. No impact to nearshore recreation.	Beach/dune interaction would be maintained or improved.	Supported by Federal law except in CBRA zone.	Costs undetermined at this stage.	Dune creation improves dune habitat and potentially beach habitat for sea turtle nesting. No impact to nearshore habitat.	Minimal improvement to life safety risk due to hurricane evacuation route protection. Minimal protection of property value and tax value. Minimal protection of public facilities (parking, beach access, bathrooms).	Moderate increase to RED through improvement of tourism/beach economy.		
		1	1	2	1	1	2	1	2	11	Yes

Carried Forward | Eliminated | 2 Fully Meets Obj/Constraint | 1 Partially Meets Obj/Constraint | 0 Does Not Meet Obj/Constraint

Management measures that were carried forward from this screening include:

Measures carried forward for South Ponte Vedra Beach and Vilano Beach reaches
NS-1: No Action
NS-7: Condemnation of Structures and Land Acquisition
S-3: Sand Covered Soft Structure
S-4: Beach Nourishment
S-5: Groins
S-6: Submerged Artificial Reef
S-7: Submerged Artificial Multi-Purpose Reef
S-8: Nearshore Placement (for South Ponte Vedra Beach reach only)
S-9: Emergent Breakwaters
S-10: Dunes and Vegetation

Measures carried forward for Summer Haven reach
NS-1: No Action
NS-7: Condemnation of Structures and Land Acquisition
S-3: Sand Covered Soft Structure
S-4: Beach Nourishment
S-5: Groins
S-6: Submerged Artificial Reef
S-7: Submerged Artificial Multi-Purpose Reef
S-10: Dunes and Vegetation

The measures carried forward were further discussed with the Project Development Team, the sponsor, and other stakeholders. In some cases, further analysis of a measure was not recommended, and the measure was eliminated. The following paragraphs discuss measures carried forward and their potential for development into alternatives. Rough Order Magnitude (ROM) costs for measures carried forward were developed and compared to future without project damages from Beach-fx, as described later in this chapter. This comparison provides insight into where specific measures may be justified and merit more in-depth analysis.

NS-7: Condemnation of Structures and Land Acquisition. In the South Ponte Vedra Beach and Vilano Beach reaches, this measure will include buyout and demolition of the existing structures most susceptible to damage. For the Summer Haven reach this measure would include buyout and demolition of existing structures in the southern portion of the reach south of the existing revetment.

S-3: Sand Covered Soft Structure. Such structures could be constructed in select areas of all three reaches, especially where infrastructure is particularly vulnerable during periods of beach narrowing. The vicinity of R114 in Vilano Beach is such an area where the beach and dune have eroded close to homes and SR A1A during storm events. In their review of the screening matrix, the FDEP stated that five similar structures constructed in Brevard County, Florida have been problematic, mainly due to the difficulty in maintaining appropriate sand cover over the structure. Sand covered soft structures are likely to operate best in combination with beach nourishment.

S-4: Beach Nourishment. This is the most common type of structural measure constructed for large storm damage reduction projects in Florida. The Florida coastline is typically composed of straight sand beaches

periodically interrupted by inlets and other man-made structures, but with few natural obstructions. This creates an environment where sediment transport patterns span large areas which the construction structures can easily interrupt. Because of this, constructing a beach system with natural storm damage reduction and habitat functions typically serves as the most effective and environmentally sound solution.

S-5: Groins: Groins are typically constructed to stabilize a sandy beach in isolated sections of shoreline with high erosion rates (hot spots). Constructing groins on long, straight sections of sandy beach, such as South Ponte Vedra and Vilano Beaches, can cause erosion to adjacent beaches downdrift of the sand transport flow. Although the R114 vicinity in Vilano Beach is considered a hotspot, other measures such as beach nourishment would be more likely to meet project objectives without causing downdrift impacts. Groins will not be evaluated in the South Ponte Vedra Beach or Vilano Beach reaches. However the Summer Haven reach could benefit from groins, especially if constructed near the southern end of the existing revetment where breaches have occurred. Previous beneficial use placements of sand dredged from navigation projects have eroded at very high rates from this area and could be stabilized with groins.

S-6: Submerged Artificial Reefs. Such a structure is typically constructed to protect isolated areas experiencing erosion and to prevent sand from eroding in the cross shore direction. Construction on a long, straight beach such as South Ponte Vedra or Vilano Beaches may cause negative impacts on adjacent beaches. The cost to construct structures the length of the study area would likely be excessive. There are also significant difficulties in construction and maintenance since the structure would be located in the surf zone. Construction of these structures in Summer Haven could be evaluated further, however material costs for construction would likely exceed those for other structures (such as groins) that could provide similar benefits. Due to these points, submerged artificial reefs are eliminated from further analysis.

S-7: Submerged Artificial Multi-Purpose Reefs. These structures are typically constructed along isolated areas of high erosion and particularly to mitigate for impacts to recreation (such as surfing) and/or habitat. Negative impacts as described for S-6 may not be such a factor with these reefs since they are constructed in deeper water. The technology is relatively new compared to other structural measures. However, construction techniques are improving which could lower costs and improve performance. Construction of such a measure would be best offshore of an erosional hotspot such as in the R114 vicinity of Vilano Beach or offshore of the Summer Haven breach, just south of the constructed revetment.

S-8: Nearshore Placement (South Ponte Vedra Beach reach only). Typically, nearshore placement is conducted when a sand source's characteristics do not match the native beach and direct placement on the beach (beach nourishment) is not possible for permitting reasons. For nearshore placement, material is placed in the nearshore where processes such as waves and currents can naturally sort finer material out and transport material suitable for the beach toward the shore. Preliminary investigations indicate that beach quality material is available for any potential project. Material of this quality would likely be more effective for storm damage reduction if placed as a typical beach nourishment and not in the nearshore. Due to these considerations nearshore placement is eliminated from further analysis.

S-9: Emergent Breakwaters. Emergent breakwaters would be constructed to minimize erosive forces, particularly waves, on the shoreline behind them. As a stand-alone measure, they can be effective at slowing erosion in isolated sections of shoreline with high erosion rates (hot spots). However, they may cause impacts to adjacent shorelines if constructed without beach nourishment, especially if constructed on long, straight sections of sandy beach such as the South Ponte Vedra Beach and Vilano Beach reaches.

In combination with beach nourishment this measure could be effective in select areas such as the hotspot around R114 in Vilano Beach.

S-10: Dunes and Vegetation. Dunes are an integral component of the existing beach/dune system throughout the majority of the study area. Dunes protect against elevated water levels resulting from storm surge and are also a "reservoir" of sand, feeding the beach during erosive events. This measure would include nourishing the existing dune or creating a dune where one does not currently exist. The nourished dune would be vegetated in order to stabilize the sand

3.7.2 FORMULATION STRATEGY

Measures, used singularly or in combination with others, create alternatives; and varying scales of each create additional alternatives. For example, an alternative may be implementable for a portion of a reach but not for an entire reach. Several alternatives of merit have resulted from combinations of management measures. These alternatives will undergo further analysis.

The purposes of the Coastal Barrier Resources Act (CBRA) include minimizing the loss of human life, wasteful expenditure of Federal revenues, damage to fish, wildlife, and other natural resources associated with CBRA units. There are limits to Federal expenditures related to actions that could affect a unit. Section 6 of the CBRA provides an exception to this limitation if the Federal expenditure is for "soft structures" such as beach nourishment. Soft structures are defined as shoreline stabilization projects that are designed to mimic, enhance, or restore a natural stabilization system. Furthermore, Federal participation may be warranted for protection of the hurricane evacuation route Highway A1A in order to reduce risk to loss of lives. Coordination with the U.S. Fish and Wildlife Service (USFWS) will be required to determine if a selected alternative meets the exception defined under Section 6 or another exception to the CBRA.

Due to the presence of a CBRA unit in the southern portion of the Summer Haven reach and the revetment providing significant storm damage reduction to infrastructure in the northern portion, the USACE will be limited in which alternatives it can implement. Due to the fact that a significant amount of shoreline within the CBRA unit is composed of undeveloped privately owned parcels, Federal expenditures for any alternative implementation would be prohibited by the CBRA due to the fact that such action could encourage development. A Section 6 CBRA exemption would only apply if every parcel were covered under a perpetual conservation easement which is not the case.

The USACE will analyze structural alternatives only for the northern half of the Summer Haven reach, north of the CBRA unit. The only alternative analyzed in the southern half will be NS-7: Condemnation of Structures and Land Acquisition. The sponsor or state would not be as limited and may choose to implement other alternatives without Federal assistance.

The only other CBRA unit located in the study area is in the Vilano Beach reach. The CBRA unit extends from just south of R114 to just south of R116, a distance of approximately 2,000 feet. The unit may prevent Federal expenditures for alternative implementation within its boundaries. However, some

alternatives may be implementable for the remainder of the reach. Coordination with USFWS would be required to determine which alternatives may be implementable. The location of the unit, at the southern extreme of the Vilano 1 portion of the Vilano Beach reach would allow for certain alternatives, such as beach nourishment, to be continuously implemented for justifiable lengths of the South Ponte Vedra Beach reach and Vilano 1, ending at the northern border of the CBRA unit. In a letter regarding a similar Hurricane and Storm Damage Reduction feasibility study, USFWS stated that beach nourishment next to a CBRA unit could be acceptable as long as natural sediment transport through the CBRA unit was not impeded.

Beach-fx modeling of the without project condition indicates very limited damages to the Vilano 2 portion of the Vilano Beach reach (R117 to St. Augustine Inlet sand-trap groin). This indicates that it is highly unlikely any alternatives would provide a benefit justifying their cost to implement. Due to this, the Vilano 2 portion of the Vilano Beach reach is eliminated from further analysis. Only the portion from R110 – R117 will be considered further, and will be referred to as the Vilano Beach reach.

<u>Alternatives for South Ponte Vedra Beach and Vilano Beach reaches</u>

- Condemnation of Structures and Land Acquisition (NS-7)
- Beach nourishment (S-4)
- Dunes and vegetation (S-10)
- Beach nourishment (S-4) and sand covered soft structure (S-3)
- Beach nourishment (S-4) with emergent breakwaters (S-8)
- Beach nourishment (S-4) and multi-purpose artificial reef (S-7)

<u>Alternatives for Summer Haven reach</u>

In northern reach only, north of CBRA unit

- Beach nourishment (S-4)
- Beach nourishment (S-4) with multi-purpose artificial reef (S-7)
- Beach nourishment (S-4) with groin construction (S-5)

In southern reach only, within CBRA unit

- Condemnation of Structures and Land Acquisition (NS-7)

As alternatives are developed, the alternative evaluation criteria of completeness, effectiveness, efficiency and acceptability will be considered. Completeness is satisfied by ensuring that the alternatives include all activities to implement the plan. Effectiveness is determined by how the alternatives address the project problems. Efficiency is indicated by the cost effectiveness of a plan, which will be determined through the cost and benefit analysis. Acceptability is determined by evaluating the plan against local, state or Federal law and policy, environmental constraints, and public willingness to support the plan.

Alternatives not meeting the criteria will be eliminated. Alternatives which meet the criteria will be carried forward as alternative plans.

3.8 ALTERNATIVES MILESTONE

The preliminary plan formulation and initial screening discussed in the sections above was accomplished prior to 2011 when study progress was put on hold due to funding constraints. With the advent of SMART Planning (Water Resources Reform and Development Act (WRRDA) 2014), the study received funding and was realigned in 2014 to meet the SMART Planning milestones, the first of which is the Alternatives Milestone which was held in March 2015. As stated at the milestone meeting, the alternatives outlined above continue to be feasible for the South Ponte Vedra Beach and Vilano Beach Reaches. Between 2011 and 2014, the non-federal sponsor continued efforts in the Summer Haven reach to buy-out threatened properties within the CBRA unit and not allow future development, thus furthering the NS-7 alternative discussed above without Federal assistance. Implementation of one of the structural measures discussed above is highly likely to have significant cost without providing much additional benefit. **With non-federal sponsor concurrence, the decision was made at the Alternatives Milestone to drop the Summer Haven Reach from further analysis based on the following:**

- Summer Haven is a geographically separate reach from the other two reaches and has extremely limited public access/parking.
- Major infrastructure such as SR A1A has already been relocated landward.
- There are a minimal number of structures in the southern portion of the reach.
- Rebuilding of damaged structures is questionable given limited road access and damage susceptibility.
- The sponsor is purchasing properties when able and not allowing future development of the acquired properties.
- With the existing structural inventory growing smaller, it is highly likely that damages would not justify a 50 year CSRM project anywhere in the reach.
- Alternatives are also limited by the presence of a CBRA unit in three-quarters of the reach.

Although the Summer Haven Reach was screened out of further analysis in this Feasibility Study and Environmental Assessment (EA), additional coordination efforts were made to determine if other Federal agencies, such as the Federal Emergency Management Agency (FEMA), could provide assistance to the local sponsor in their ongoing efforts acquire vulnerable structures and property and limit future construction within the reach. FEMA has provided past assistance by funding construction of small berm construction (beach nourishment) following severe storms warranting Federal assistance, and dredging of the IWW in the vicinity of Matanzas Inlet typically results in the beneficial placement of dredged sand within the Summer Haven reach.

3.9 SECONDARY SCREENING: SCREENING WITH ROM COSTS PRIOR TO BEACH-FX

Elimination of the Summer Haven Reach resulted in further development of the following alternatives for the South Ponte Vedra Beach and Vilano Beach reaches:

1. Buyout of Structures and Land Acquisition (NS-7)
2. Beach nourishment (S-4)
3. Dunes and vegetation (S-10)
4. Beach nourishment (S-4) with sand covered soft structure (S-3)
5. Beach nourishment (S-4) with emergent breakwaters (S-8)
6. Beach nourishment (S-4) with submerged multi-purpose artificial reef (S-7)

In order to screen these alternatives prior to Beach-fx modeling, rough order of magnitude (ROM) cost estimates were developed for each of the alternatives. The ROM cost estimates were developed using information from similar historical projects. The estimates were based on implementing a measure along one mile of shoreline. It was assumed that it would not be feasible or practical to implement any alternatives along a stretch of shoreline less than one mile. These ROM costs were brought to present value (PV) based on maintenance assumptions over 50 years and broken down to a cost per linear foot (LF) of shoreline, shown in Table 3-2.

Table 3-2: Alternative descriptions and Rough Order of Magnitude (ROM) costs.

Alternative	Description	Assumptions		Present Value (PV) of accumulated total cost	Present Value (PV) of accumulated cost per linear foot ($/LF)
1	Buy-out of Structures and Land Acquisition	Estimates were made for reaches that had the greatest Future Without Project damages. Buying out sturctures and parcels in these reaches would equate to "managed retreat" of the most vulnerable reaches.	In addition to buy-out of structures, a $50,000 relocation allowance and $15,000 demolition cost per structure was assumed. Vacant parcels would also be bought out to prevent future development. Cost of vacant land is estimated at $3,600/linear foot of oceanfront footage plus $12,000 legal fees per vacant parcel.	This cost differs per reach due to differing estimated structure value, number of structues and number of vacant parcels per reach.	This cost differs per reach due to differing estimated structure value, number of structues and number of vacant parcels per reach.
2	Beach nourishment	Includes the cost of nourishment with 120 cubic yards per linear foot using an offshore sand source, approximately ten miles offshore.	The renourishment interval is seven years.	$34,945,011	$6,618
3	Dunes and vegetation	15 cubic yards per linear foot using an offshore sand source, approximately ten miles offshore.	Renourishment would be required every seven years.	$13,969,117	$2,646
4	Beach nourishment with sand covered soft structure (Geotube)	Includes the cost of geotube core filled with sand plus an additional 9 cubic yards of sand per linear foot covering the filled geotube.	Also includes the cost of a full beach nourishment to keep geotube covered with sand. This is necessary to prevent exposure of the tube, which threatens turtle nexting and exposes the core to degredation from sunlight and vandalism. Renourishment interval is assumed to be seven years.	$39,933,581	$7,563
5	Beach nourishment with emergent breakwater	Assumes that eight breakwaters would be required, per mile.	Assumes that periodic (seven year) renourishment would be necessary every seven years. Renourishment costs are estimated at 75% cost of full beach nourishment alternative.	$75,419,880	$14,284
6	Beach nourishment with submerged artificial multi-purpose reef	Assumes that two reefs per mile would be required, per mile.	Periodic renourishment would be necessary along with reef construction. Renourishment interval is seven years. Renourishment costs are estimated at 75% cost of full beach nourishment alternative. Also, it is assumed that the artificial reef would need to be rebuilt at year 15 and again in year 30.	$38,848,967	$7,358

A project's benefit-to-cost ratio (BCR) must be greater than 1.0 in order for an alternative to be justified and implementable (i.e., the benefits must be greater than the costs). Benefits equal damages prevented, or the difference between without project damages and damages resulting after implementation of an alternative (with project damages). At this point in the study damages are used as a proxy for benefits. Using the value of without-project damages as a substitute for the benefits will overestimate the benefit provided by any measure since this assumes that 100 percent of damages have been averted. Therefore if the ROM cost of an alternative is equal to, or less than, the without-project damages, the Benefit-to-Cost Ratio (BCR) can be assumed to approximate 1 and the measure may be justified. Figure 3-1 displays the ROM costs per linear foot of alternatives in addition to the Future Without Project (FWOP) Beach-fx damages along the shoreline for each of the three SLC scenarios. Wherever damages were far below an alternatives ROM cost, it was assumed that the measure would not be justified along that shoreline length and the alternative was screened out. Where damages are near or above ROM costs along a stretch of shoreline of sufficient length for an alternative to be realistically implemented, it was assumed that the alternative could be justified and was carried forward. This comparison not only helps in screening, but it also serves to scale alternatives that are carried forward, illustrating the shoreline lengths that may have enough FWOP damages to justify implementation of a project.

The cost of an alternative's implementation may vary depending on the SLC scenario used for design. Because of this it is important to note that there is uncertainty around future costs, and alternatives with costs just above projected damages should not be screened out prematurely. Beach nourishment, for example, will have a higher cost for higher SLC scenarios because more sand or shorter renourishment intervals would be required. Other alternatives may have the same implementation cost for any scenario.

In Figure 3-1, FWOP damages are shown for each Beach-fx reaches throughout the South Ponte Vedra Beach and Vilano Beach reaches. On the horizontal axis R-84 is the northernmost reach and R-122 furthest south reach, adjacent to St. Augustine Inlet. The damages include both damages to infrastructure (roads and houses), as well as costs for replacing and constructing armor as it is damaged or triggered in the Beach-fx model. Straight horizontal lines are the ROM costs for alternatives listed in Table 3-2.

Figure 3-1 also shows where Federal cost sharing in an alternative requiring placement of sand on the dune or beach would be limited due to limited public access and parking and the presence of a CBRA zone.

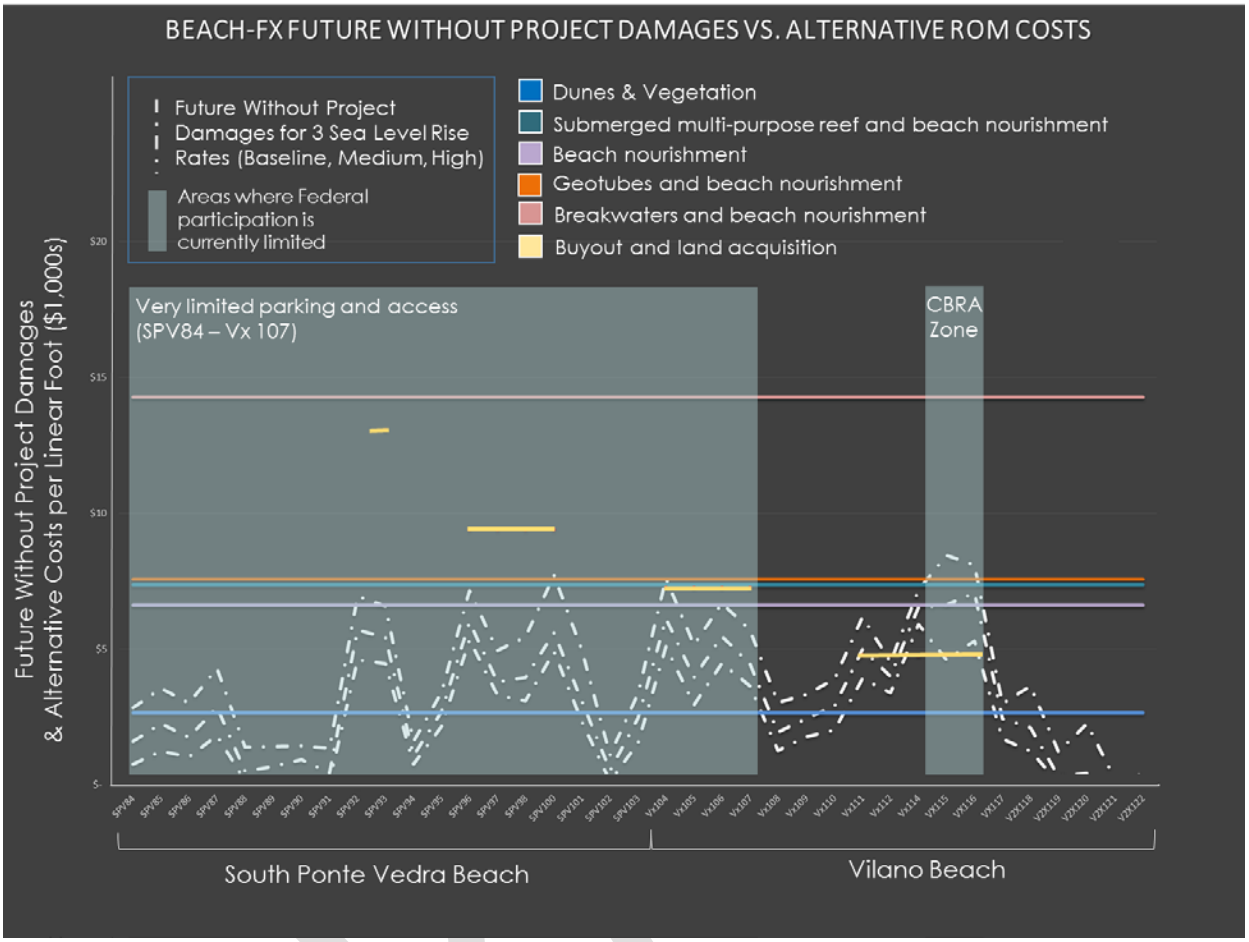

Figure 3-1: Beach-fx Future Without Project Damages vs. Alternative ROM Costs

This step resulted in the following alternatives being carried forward for modeling in Beach-fx:

- buyout and land acquisition in Beach-fx reaches 111 to 116 (Vilano Beach)
- Dunes and vegetation in Beach-fx reaches 92-101 (South Ponte Vedra) and 104-116 (Vilano Beach)
- Beach nourishment in Beach-fx reaches 92-101 (South Ponte Vedra) and 104-116 (Vilano Beach)

For Beach-fx modeling and evaluation of alternatives, the buyout and land acquisition alternative already had an adequate cost estimate. The two other alternatives were developed further for specific application in the designated reaches and more detailed cost estimates were prepared. Descriptions of the alternatives are as follows:

Buyout and Land Acquisition: This alternative would allow the shoreline to erode in the study area with a loss of land. Parcels, both developed and undeveloped, vulnerable to storm damage would be bought and structures would be demolished. Parcels would be managed by the non-federal sponsor, remaining undeveloped into the future and reducing future storm damages.

Dunes and Vegetation: This alternative would include placement of beach compatible material in a dune feature adjacent to the existing bluff. The top elevation of the dune would be such to tie into the bluff. The front slope of the dune would be a function of the material grain size and construction equipment. Vegetation would be planted after initial placement of the dune material where needed. Preliminary engineering design work concluded that the most feasible plan for dunes and vegetation would have the following characteristics:

- Extension from the existing seaward face of the dune or existing armor (revetment/seawall).
- Construction such that the dune and beach profile out to the depth of closure will extend approximately 10 to 20 feet seaward from its existing location and the dune elevation will as closely as possible match the elevation of the existing dune elevation.
- Construction such that a berm feature will extend seaward from its existing location above the water line to account for the volume of material needed to fill the submerged portion of the beach profile extension.
- Periodic re-construction of the dune and beach profile extension.
- Construction using a hydraulic dredge to transport material from a sand source.

Beach Nourishment: This measure includes initial construction of a beach fill and future re-nourishments at regular intervals. Preliminary engineering design work and economic analysis suggested that the plan for beach nourishment would have the following characteristics:

- Maintaining the existing dune feature and extension of the berm feature from the existing seaward toe of the dune or existing armor (revetment/seawall).
- Construction such that the berm will extend approximately 20 to 100 feet seaward from its existing location and the berm elevation will as closely as possible match the elevation of the existing berm elevation.
- Periodic re-construction of the berm extension and occasional re-construction of the dune feature.
- Construction using a hydraulic dredge to transport material from a sand source.

Figure 3-2 shows profile views of the beach nourishment, dunes and vegetation, and a combination of both, alternatives.

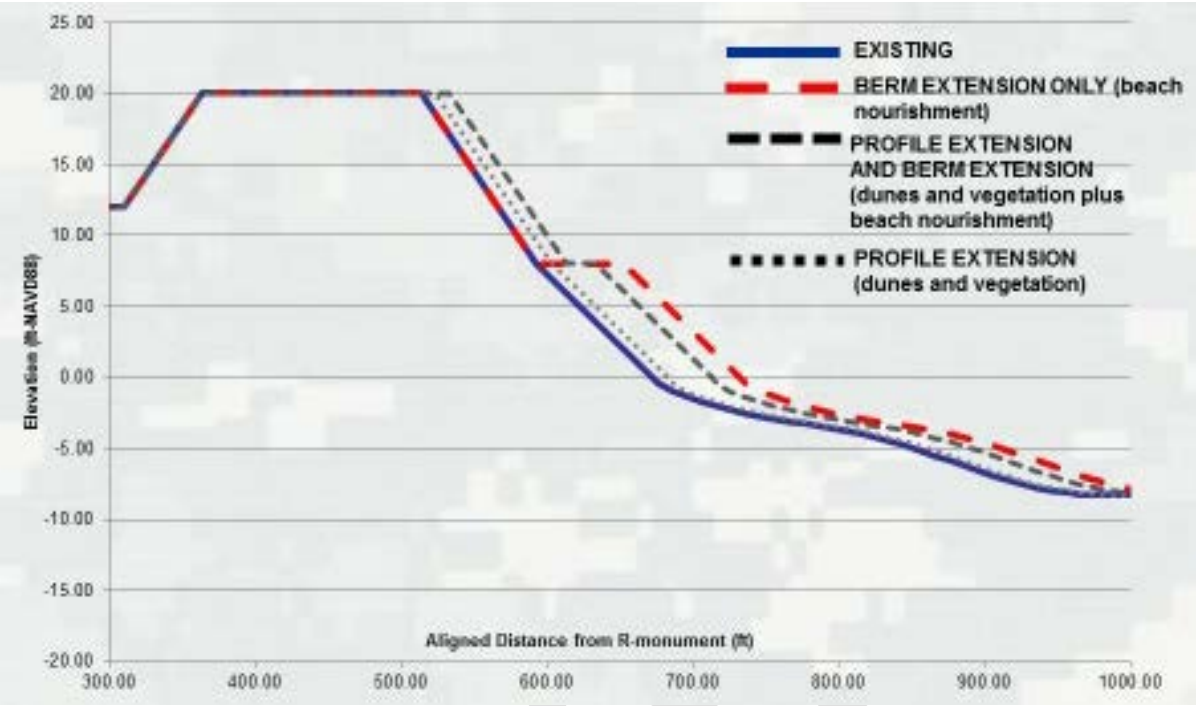

Figure 3-2: Profile view of dunes and vegetation and beach nourishment combinations.

The non-structural alternative of Buyout and Land Acquisition (BLA) in Beach-fx Reaches 111 to 116 was modeled in Beach-fx by starting with a copy of the FWOP model setup, then deactivating all of the damage elements that were to be bought out and setting all of the lots to be bought out as unable to be armored. The FWP damages were compared to the FWOP damages to determine the benefits of this alternative over 50 years. This alternative only prevents 28% of the FWOP damages in reaches 111 to 116. Most of the FWOP damages in this area are associated with SR A1A and future armoring costs to protect the road. The BLA alternative does nothing to prevent these damages. SAJ Real Estate estimated the cost of this alternative to be $30,226,584. The results showed that this alternative would not be economically justified, with a BCR of 0.45.

Additionally, the alternative did not adequately meet the Principles and Guidelines (P&G) screening criteria:

- Completeness: The alternative partial meets this criteria. Buyout of land potentially using eminent domain would be necessary which could make the alternative difficult to fully implement.
- Effectiveness: The alternative partial meets this criteria. Buyout does not alleviate damages to SR A1A, only to structures being bought out.
- Efficiency: The alternative is not efficient as reflected in the BCR being less than one.

- Acceptability: The alternative would likely not be acceptable to a majority of home/property owners, and possibly require eminent domain to carry out.

3.9.1 FINAL SCREENING: FUTURE WITH PROJECT MODELING IN BEACH-FX

The dune and beach nourishment alternatives were set up to be modeled in Beach-fx for any combination of 0, 10, or 20 foot dune and profile extensions (dunes and vegetation) along with 0, 20, 40, 60, 80, or 100 foot berm extensions (beach nourishment). For instance, an alternative named "10P60B" in Table 3-3 would equate to a 10 foot dune and profile extension, with an additional 60 foot berm constructed seaward of the dune and profile extension. Initial results indicated that no alternative with only a dune and profile extension resulted in a Benefit to Cost ratio (BCR) greater than one. Furthermore, the original plan was to use an offshore sand source located within the Northern Offshore Borrow Area (NOBA). This source is located approximately 10 miles from the study area. Using this distant source resulted in low BCRs. The FDEP's Inlet Management Plan for St. Augustine Inlet directs that a portion of sand dredged from the inlet should be place on beaches north of the inlet. Formulation of further alternatives then focused on use of the inlet's shoal complex as a sand source. Since the inlet is approximately four miles from the study area, nourishment costs are less and the BCR improved. Table 3-3 shows all alternative combinations resulting in a BCR of one or greater using the inlet shoal complex as the sand source. More information Beach-fx inputs and results for alternative formulation is provided in the Economic Appendix.

Table 3-3: Results Summary for Beach-fx Future With Project Modeling

Alternative Number	Dune and Profile Extension* (ft)	Berm Extension** (ft)	Shoreline Extent (Beach-fx reaches)	Project Length (miles)	Average Periodic Nourishment Interval (years)	Average Present Value (PV) Total Project Cost	Average Present Value (PV) Total Project Benefits	Benefit to Cost Ratio	Average Present Value (PV) Project Net Benefits
1	0	100	104 to 116	2.6	16	$ 41,457,000	$ 45,821,000	1.11	$ 4,364,000
2	10	80	104 to 116	2.6	16	$ 39,809,000	$ 44,198,000	1.11	$ 4,389,000
3	0	80	104 to 116	2.6	15	$ 37,993,000	$ 44,647,000	1.18	$ 6,654,000
4	10	60	104 to 116	2.6	13	$ 37,903,000	$ 46,487,000	1.23	$ 8,584,000
5	0	60	92 to 116	4.8	16	$ 61,192,000	$ 70,300,000	1.15	$ 9,108,000
6	**0**	**60**	**104 to 116**	**2.6**	**12**	**$ 36,058,000**	**$ 46,361,000**	**1.29**	**$ 10,303,000**
7	10	40	104 to 116	2.6	12	$ 35,372,000	$ 42,443,000	1.20	$ 7,071,000
8	0	40	92 to 116	4.8	11	$ 57,196,000	$ 67,317,000	1.18	$ 10,121,000
9	0	40	104 to 116	2.6	10	$ 34,667,000	$ 41,385,000	1.19	$ 6,718,000
10	20	20	92 to 116	4.8	12	$ 59,714,000	$ 63,472,000	1.06	$ 3,758,000
11	20	20	104 to 116	2.6	10	$ 35,303,000	$ 38,039,000	1.08	$ 2,736,000
12	10	20	92 to 116	4.8	9	$ 58,365,000	$ 58,539,000	1.00	$ 174,000
13	10	20	104 to 116	2.6	9	$ 34,669,000	$ 35,617,000	1.03	$ 948,000

Table is sorted by volume of sand needed by the alternative, from greatest to least.
*Value indicates the norizontal seaward extension of the dune and entire profile (feet). At a minimum, the 2015 dune profile is maintained.
**Value indicates the horizontal seaward extension of the berm (feet) in addition to the dune and profile extension.

Values based on 30 iteration runs, preliminary cost estimates, and only include structure, content, & armor damage.

Alternative 6 results in the greatest net benefits. This alternative includes a 60 foot berm extension and no extension of the dune and profile.

Table 3-3 includes alternatives that cover portions of both the South Ponte Vedra Beach and Vilano Beach reaches. As noted elsewhere in this report, the South Ponte Vedra Beach reach contains very limited public access and parking. Continued coordination with the sponsor on this issue resulted in the determination that no additional public access would be added to the reach prior to initial construction of any potential project. Additionally, the reach is separable from the Vilano Beach reach, meaning that construction, or no construction, of a project in either of the two reaches would not have an impact on project performance in the adjacent reach. **These factors resulted in screening out of the South Ponte Vedra Beach reach from further formulation.**

Screening out of the South Ponte Vedra Beach reach resulted in consideration of alternatives from Beach-fx reaches 104 through 116 in the final array. The top two alternatives covering these reaches were run in Beach-fx using 100 iteration simulations. The results of these simulations were used to determine the National Economic Development (NED) Plan. The results of the alternative comparison are presented in Table 3-4. The National Economic Development (NED) Plan is the plan with a BCR greater than one which maximizes net benefits. The NED Plan is Alternative #6 from Beach-fx reaches 104 - 116. As shown in Table 3-3, Alternative 6 is bracketed by a larger alternative, #3, and a smaller alternative, #8, demonstrating that a larger or smaller project would not result in greater net benefits and that the NED Plan is the optimal size alternative. Additional detail on NED selection is provided in the Economics Appendix.

Table 3-4: Final Array of Alternatives and Selection of the NED Plan.

NATIONAL ECONOMIC DEVELOPMENT PLAN (NED)

Alternative Number	Dune and Profile Extension* (ft)	Berm Extension** (ft)	Shoreline Extent (Beach-fx reaches)	Project Length (miles)	Average Periodic Nourishment Interval (years)	Average Present Value (PV) Total Project Cost	Average Present Value (PV) Total Project Benefits	Benefit to Cost Ratio	Average Present Value (PV) Project Net Benefits
4	10	60	104 to 116	2.6	13	$ 36,838,000	$ 44,311,000	1.20	$ 7,473,000
6	**0**	**60**	**104 to 116**	**2.6**	**12**	**$ 34,975,000**	**$ 43,548,000**	**1.25**	**$ 8,573,000**

*Value indicates the norizontal seaward extension of the dune and entire profile (feet). At a minimum, the 2015 dune profile is maintained.
**Value indicates the horizontal seaward extension of the berm (feet) in addition to the dune and profile extension.

Values based on 100 iteration runs, preliminary cost estimates, and only include structure, content, & armor damage.

3.10 THE TENTATIVELY SELECTED PLAN

Typically, the NED plan becomes the Tentatively Selected Plan (TSP) unless the non-federal sponsor opts to pursue a Locally Preferred Plan (LPP) which differs from the NED plan. An LPP is subject to requirements described in ER 1105-2-100. The option of selecting an LPP was coordinated with the local sponsor, who opted not to pursue an LPP. The NED plan therefore becomes the Tentatively Selected Plan (TSP).

The Alternative 6 is the Tentatively Selected Plan (TSP). The economic results presented in this section reflect the costs in the Total Project Cost Summary (TPCS) found in Appendix B – Cost Engineering and Risk Analysis. Therefore the results presented here will differ slightly from the values presented in previous sections.

The Beach-fx model results describing the physical performance of the TSP will not change from the simulation run for the final array of alternatives. These results are independent of the project costs. The physical performance results most relevant to the economic analysis are the nourishment volumes and the timing of nourishment events.

The average initial construction volume over 100 iterations is 1,310,000 cubic yards (cy). The average volume of all re-nourishments over 100 iterations is 866,000 cubic yards (cy).

The average time interval between nourishment events over 100 iterations is 12 years. Assuming that re-nourishment events occurred at this average interval, the nourishment years would be 2020, 2032, 2044, 2056, & 2068.

Traditionally, in CSRM studies, a fixed re-nourishment interval is defined and optimized for 50 year period of Federal participation. In Beach-fx, rather than having a fixed renourishment interval, renourishment events are triggered when specific criteria are met. The triggers were set up to simulate a point at which the berm extension erodes to at least half its equilibrated width in at least one reach, and a minimum volume of 750,000 cubic yards has eroded from the entire project template. Based on these parameters, the average time interval between nourishment events over all 100 iterations is 12 years. In reality, this interval could vary significantly depending on erosion and storm events. More information about the re-nourishment triggers is provided in the Engineering Appendix. Ultimately, planning based on life-cycle

modeling results in plans that are more resilient and adaptable. Life-cycle modeling allows planners to design projects while recognizing the inherent uncertainty that exists when future events are simulated.

Beach-fx reaches correspond, approximately, with FDEP range monuments (R-monuments). The shoreline extent of the TSP, Alternative 6 from Beach-fx reaches 104 to 116 corresponds to a shoreline length spanning from R-monument R-103.5 to R116.5. A description of the TSP is as follows:

- **Name (Description):** Alternative 6 includes construction of 60 foot equilibrated berm extension from R103.5 to R116.5 along 2.6 miles of shoreline. The project template will include a dune feature that reflects the average 2015 dune position. One thousand foot tapers will extend from the northern and southern ends of the berm extension, connecting the extension to the existing shoreline. The addition of tapers results in sand placement from R102.5 to R117.5 along 3 miles of shoreline. A hydraulic dredge will be used to fill the template with sand from the St. Augustine Inlet system, including the ebb, flood, Vilano Point shoals, the Federal navigation channel and any associated shoals.
- **Average # Nourishment Events:** 1 initial construction event, 4 periodic nourishment events
- **Average Volume of Initial Construction**: 1,310,000 cubic yards
- **Average Volume of Each Periodic Nourishment**: 866,000 cubic yards
- **Average Periodic Nourishment Interval**: 12 years
- **Initial Construction Duration**: approximately 3.3 months

3.10.1 TSP SAND SOURCE

As plan formulation proceeded, it was determined that the available offshore sand sources were too far from the Tentatively Selected Plan project area to be cost effective. Use of navigation channels and inlet material had been discussed, and these sources are closer to the project area than offshore sand sources and therefore more cost effective. During a Value Engineering (VE) analysis, discussion of sand sources focused on the St. Augustine Inlet system, including the ebb, flood, and Vilano Point shoals as well as the Federal navigation channel. These sources are projected to be cost effective and able to provide the needed volume of sediment to both the TSP and the ongoing Federal shore protection project at St. Augustine Beach without negatively impacting the inlet system.

The TSP will require approximately 5,640,000 cubic yards of sand over a 50 year period. The FDEP "Final Order Adopting St. Augustine Inlet Management Implementation Plan," directs that strategies should be implemented to:

1. Continue to transfer sediment from the inlet system to the adjacent beaches meeting a bypassing objective of 278,000 cubic yards per year as determined by the Inlet Sink Analysis provided in the document, *Regional Sediment Budget for St. Augustine Inlet and St. Johns County, FL, 1998/1999-2010* (USACE, 2012). The material obtained from the inlet system shall be distributed to the adjacent Atlantic Ocean fronting beaches with a placement ratio of approximately one-third of material placement to the north and two-thirds of material placement to the south.

2. Inlet sand transfer material shall be placed in designated critically eroded areas to the north or south of the inlet between R84 and R152, St. Johns County, in accordance with Implementation Strategy #1.
3. Inlet dredge material may be obtained from the federal navigation channel, the intracoastal waterway channel, and encroaching flood shoals adjacent to the federal channel, including the Porpoise [Vilano] Point borrow area for placement in accordance with Implementation Strategies #1 and #2.

The TSP area is to the north of St. Augustine Inlet, between R102.5 and R117.5. As detailed in the Geotechnical Appendix, there is adequate beach quality sand (meeting FDEP permitting requirements for beach placement) to meet the estimated sand needs of the TSP. Currently, there is approximately 6.5 million cubic yards of compatible sand available within the shoal complex. This volume is more than adequate to meet the initial construction volume. The periodic nourishment volume is 866,000 cubic yards every 12 years. The inlet management plan states that the bypassing objective is 278,000 cubic yards per year of which one third should go to beaches to the north. One third of the bypassing objective is 92,666 cubic yards per year. Over 12 years, 1.1 million cubic yards would be available to meet the 866,000 cubic yard need for a periodic nourishment event.

Use of the inlet system would implement a Regional Sediment Management (RSM) strategy where maintenance of Federal navigation features can be combined with a Federal CSRM project, realizing significant cost savings. It would be ideal if construction of the TSP could be coordinated with future construction of the already authorized and constructed Federal Shore Protection Project at St. Augustine Beach, south of the inlet. Such a strategy would realize significant cost savings and minimize potential environmental impacts from multiple dredge mobilizations as outlined in the Engineer Research and Development Center (ERDC) draft technical report, *Regional Sediment Management Strategies for the Vicinity of St. Augustine Inlet, St. Johns County, Florida*.

3.10.2 SEA LEVEL RISE CONSIDERATIONS

An important question about the TSP is its performance under different Sea Level Change scenarios. As discussed earlier in this report, the study area is experiencing Sea Level Rise (SLR). Each of the SLR scenarios described earlier are considered equally likely to occur. Therefore, if the project does not perform, then it cannot be considered a completely effective plan. Table 3-5 shows the average BCRs and net benefits of the TSP under the three SLR scenarios.

Table 3-5: Average PV Benefits and Costs for the TSP in different SLR scenarios.

SLR Scenario	PV Benefits	PV Costs	BCR	Net Benefits
Baseline	$42,252,000	$37,166,000	1.13	$ 5,086,000
Intermediate	$54,026,000	$43,770,000	1.23	$10,256,000
High	$65,161,000	$55,916,000	1.17	$ 9,245,000

Values based on 100 iteration runs, final cost estimates, and only include structure, content, & armor damage.

As shown in Table 3-5, though the average benefits of the project increase in the SLR scenarios, the average costs also increase. The costs increase because re-nourishment is triggered more frequently. Thus, the project performance (in terms of the benefit-cost ratio) is relatively constant throughout the SLR scenarios. Overall, these results suggest that the TSP is effective in all three simulated SLR scenarios.

3.10.3LAND LOSS AND RECREATION BENEFITS

In outlining the process and procedures to be used in the evaluation of coastal storm risk managment projects, ER-1105-2-100 mentions the inclusion of land loss due to erosion, stating that such damages should be computed as the market value of the average annual area expected to be lost. Prevention of land loss is a component of primary storm damage reduction benefits but is not computed within the Beach-fx model. Thus, calculation of land loss benefits must be completed outside of the model and added to the structure and contents damage and armor costs benefits to obtain the total storm damage reduction benefits of the project.

Following the guidance provided, two key pieces of information are needed to calculate land loss benefits of a storm damage reduction project: (1) the square footage of the land lost each year and (2) the market value of land in the project footprint. The Economics Appendix provides detail on how the square footage of land loss each year was calculated. As the second component of the land loss benefits calculation, ER 1105-2-100 instructs that nearshore land values be used to estimate the value of land lost. The Jacksonville District Real Estate Department estimated a nearshore land value of $10.00 per square foot for the St Johns study area.

Using the analysis technique described, the total present value of land loss benefits over the 50 year project life is estimated at $6,051,000, or $241,000 in average annual terms.

According to ER-1105-2-100, incidental recreation benefits can be calculated for Coastal Storm Risk Management (CSRM) projects. Recreation benefits are not to be used in plan formulation, but they can constitute up to 50% of total project benefits.

Additionally, ER-1105-2-100 specifies that benefits arising from recreation opportunities created by a project be measured in terms of willingness to pay. As described in the Economics Appendix, the unit day value (UVD) method was used to calculate the incidental recreation benefit provided by the TSP resulting

in an estimated total present value of recreation benefits of $15,624,000, or $622,000 in average annual terms. Table 3-6 provides a summary of the NED Plan with land loss and recreation benefits added expressed in average annual equivalent terms.

Table 3-6: Economic Summary.

Economic Summary	Primary Storm Damage Reduction Benefits	Primary Storm Damage Reduction + Incidental Recreation Benefits
Price Level	FY16	FY16
FY16 Water Resources Discount Rate	3.125%	3.125%
Average Annual Structure & Contents Damage & Armor Costs Benefits	$ 1,709,000	$ 1,709,000
Average Annual Land Loss Benefits	$ 241,000	$ 241,000
Average Annual Incidental Recreation Benefits	$ -	$ 622,000
Average Annual Total Benefits	$ 1,950,000	$ 2,572,000
Average Annual Costs	$ 1,562,000	$ 1,562,000
Average Annual Net Benefits	**$ 388,000**	**$ 1,010,000**
Benefit Cost Ratio	**1.25**	**1.65**

The total Benefit-to-Cost Ratio (BCR) including CSRM, land loss, and incidental recreation benefits for the TSP is equal to 1.65.

3.10.4TSP COST SHARING

The current cost share estimates are based on policy guidance provided by ER 1105-2-100 Appendix E and ER 1165-2-130. The Water Resources Development Act (WRDA) of 1999 changed the cost sharing policy previously provided by WRDA 1986 by setting a maximum federal share of periodic nourishment carried out after 1 January 2003 to 50% for projects authorized for construction after 31 December 1999. Table 3-7 shows the Federal and non-federal cost sharing for the TSP. Changes to shoreline ownership and use prior to construction could change the stated cost sharing percentages. Cost sharing for initial

construction is 22.0% Federal / 78.0% non-federal. Cost sharing for periodic nourishments is 17.7% Federal / 82.3% non-federal.

Table 3-7: TSP cost sharing.

	INITIAL CONSTRUCTION				PERIODIC NOURISHMENT*		
Shore Ownership and Project Purpose (as defined in ER 1105-2-100)	Maximum Level of Federal Participation in Construction Costs	Shoreline Length (feet)	Length of Federal Participation (feet)	Length of non-Federal Participation (feet)	% of Federal Participation for Periodic Nourishment	Length of Federal Participation (feet)	Length of non-Federal Participation (feet)
I. Federally Owned	100%	0	0	0	100%	0	0
II. Publicly and Privately Owned, Protection Results in Public Benefits							
A. Coastal Storm Risk Management (CSRM) on Developed Lands (Public/Private)	65%	3,835	2,493	1,342	50%	1,918	1,918
B. CSRM on Undeveloped Public Lands **	50%	948	474	474	50%	474	474
C. CSRM on Undeveloped Private Lands	0%	603	0	603	0%	0	603
III. Privately Owned, Use Limited to Private Interests (No public access within 1/4 mile)	0%	5,922	0	5,922	0%	0	5,922
IV. CBRA Zone	0%	2,190	0	2,190	0%	0	2,190
	Total Distance:	13,498	2,967	10,531	Total Distance:	2,392	11,107
		Cost Shares:	22.0%	78.0%	Cost Shares:	17.7%	82.3%

3.10.5 TSP COSTS

The TSP total project cost including contingency is $65,814,000 as shown in Table 3-8 (FY16 price levels). The Cost Appendix provides additional detail.

Table 3-8: TSP Total Project Costs (FY16 price levels.)

Total Project Cost Apportionment Summary (FY16 Price Levels)									
St. Johns County, FL CSRM Project									
R103.5 - R116.5									
INITIAL CONSTRUCTION					PERIODIC NOURISHMENT				
Item	Total Item Cost	Federal Share	Federal Cost	Non-federal Cost	Item	Total Item Cost	Federal Share	Federal Cost	Non-federal Cost
Mob/Demob	$2,691,000	22.0%	$592,000	$2,099,000	Mob/Demob	$10,763,000	17.7%	$1,905,000	$8,858,000
Beach Fill	$5,649,000	22.0%	$1,243,000	$4,407,000	Beach Fill	$14,944,000	17.7%	$2,645,000	$12,299,000
Associated General Items	$221,000	22.0%	$49,000	$172,000	Associated General Items	$681,000	17.7%	$120,000	$560,000
				0					0
Subtotal	$8,561,000	0	$1,884,000	$6,678,000	Subtotal	$26,388,000	0	$4,670,000	$21,717,000
				0					0
Lands and Damages	$0	0.0%	$0	$0	Lands and Damages	$0	0.0%	0	0
- lands and damages	$2,480,000	0%	$0	$2,480,000	- lands and damages	$0	0%	$0	$0
- administrative	$25,000	0%	$0	$25,000	- administrative	$80,000	0%	$0	$80,000
PED	$2,120,000	22.0%	$466,000	$1,654,000	PED	$4,899,000	17.7%	$867,000	$4,032,000
Construction Management	$717,000	22.0%	$158,000	$559,000	Construction Management	$2,278,000	17.7%	$403,000	$1,875,000
Dune vegetation	$996,000	22.0%	$219,000	$777,000	Dune Vegetation	$3,982,000	0%	$0	$3,982,000
Post-Project Monitoring	$110,000	22.0%	$24,000	$86,000	Post-Project Monitoring	$440,000	17.7%	$78,000	$362,000
				0					0
Subtotal	$6,448,000	0	$867,000	$5,581,000	Subtotal	$11,679,000	0	$1,348,000	$10,331,000
				0					0
Contingency (24%)	$3,602,000	22.0%	$792,000	$2,810,000	Contingency (24%)	$9,136,000	17.7%	$1,617,000	$7,519,000
				0					0
Total Project Cost (initial construction)	**$18,611,000**		**$3,543,000**	**$15,067,000**	**Total Project Cost (periodic nourishment)**	**$47,203,000**		**$7,636,000**	**$39,567,000**

3.10.6 DRAFT ITEMS OF LOCAL COOPERATION

Recommendations for provision of Federal participation in the Tentatively Selected Plan described in this report would require the project sponsor to enter into a written Project Partnership Agreement (PPA), as required by Section 221 of Public Law 91-611, as amended, to provide local cooperation satisfactory to the Secretary of the Army. Such local cooperation shall provide the following non-federal responsibilities:

a. Provide 35 percent of initial project costs assigned to hurricane and storm damage reduction, plus 50 percent of initial project costs assigned to protecting public park lands, plus 100 percent of initial project costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits; and 50 percent of periodic nourishment costs assigned to hurricane and storm damage reduction, plus 100 percent of periodic nourishment costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits and as further specified below:

    1) Enter into an agreement that provides, prior to construction, 35 percent of design costs;
    2) Provide all lands, easements, and rights-of-way, and perform or ensure the performance of any relocations determined by the Federal Government to be necessary for the initial construction, periodic nourishment, and operation and maintenance of the project;
    3) Provide, during construction, any additional amounts as are necessary to make their total contribution equal to 35 percent of initial project costs assigned to hurricane and storm damage reduction, plus 50 percent of initial project costs assigned to protecting public park lands, plus 100 percent of initial project costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits; and 50 percent of periodic nourishment costs assigned to hurricane and storm damage reduction, plus 100 percent of periodic nourishment costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits;

b. For so long as the project remains authorized, operate, maintain, and repair the completed project, or functional portion of the project, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and state laws and regulations, and any specific directions prescribed by the Federal Government;

c. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-federal sponsor, now or hereafter, owns or controls for access to the project for the purpose of inspecting, operating, maintaining, repairing, replacing, rehabilitating, or completing the project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Federal Government shall relieve the non-federal sponsor of responsibility to meet the non-federal sponsor's obligations, or to preclude the Federal Government from pursuing any other remedy at law or equity to ensure faithful performance;

d. Hold and save the United States free from all damages arising from the initial construction, periodic nourishment, mitigation, operation, maintenance, repair, replacement, and rehabilitation of the project and any project related betterments, except for damages due to the fault or negligence of the United States or its contractors;

e. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;

f. Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended, 42 U.S.C. 9601 9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for the initial construction, periodic nourishment, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-federal sponsor with prior specific written direction, in which case the non-federal sponsor shall perform such investigations in accordance with such written direction;

g. Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the initial construction, periodic nourishment, operation, or maintenance of the project;

h. Agree that the non-federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, and repair the project in a manner that will not cause liability to arise under CERCLA;

i. If applicable, comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100 17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for the initial construction, periodic nourishment, operation, and maintenance of the project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

j. Comply with all applicable Federal and state laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), Department of

Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600 7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army," and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141- 3148 and 40 U.S.C. 3701 – 3708 (revising, codifying and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq.*), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq.*), and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c *et seq.*);

k. Provide the non-federal share of that portion of the costs of data recovery activities associated with historic preservation, that are in excess of 1% of the total amount authorized to be appropriated for the project, in accordance with the cost sharing provisions of the agreement;

l. Participate in and comply with applicable Federal floodplain management and flood insurance programs;

m. Do not use Federal funds to meet the non-federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized;

n. Prescribe and enforce regulations to prevent obstruction of or encroachment on the project that would reduce the level of protection it affords or that would hinder future periodic nourishment and/or the operation and maintenance of the project;

o. Not less than once each year, inform affected interests of the extent of protection afforded by the project;

p. Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the floodplain, and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the project;

q. For so long as the project remains authorized, the non-federal sponsor shall ensure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based;

r. Provide and maintain necessary access roads, parking areas, and other public use facilities, open and available to all on equal terms;

s. Recognize and support the requirements of Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-federal sponsor has

entered into a written agreement to furnish its required cooperation for the project or separable element;

t. At least twice annually and after storm events, perform surveillance of the beach to determine losses of nourishment material from the project design section and provide the results of such surveillance to the Federal Government; and

u. Comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), which requires the non-federal sponsor to participate in and comply with applicable Federal floodplain management and flood insurance programs, prepare a floodplain management plan within one year after the date of signing the project partnership agreement (PPA), and implement the plan no later than one year after project construction is complete.

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CHAPTER 4

EFFECTS OF THE TENTATIVELY SELECTED PLAN

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4 EFFECTS OF THE TENTATIVELY SELECTED PLAN*

The effects of the Tentatively Selected Plan will include effects resulting from the use of the offshore sand sources identified in Section 2.2.5. This sand source is not included in the TSP; however, the effects of this mining are discussed in the event that offshore sand may be sought as a borrow source in the future if economically justified.

4.1 GENERAL ENVIRONMENTAL EFFECTS*

The environmental effects associated with the Tentatively Selected Plan are primarily temporary in nature, and most affected resources would return to pre-construction conditions either immediately after dredging (with respect to resources such as aesthetics and noise) or within one or two years (with respect to sea turtle nesting and benthic resources). However, dredging inlets and altering the shoreline has the potential to change how sediment transport occurs regionally. The use of the St. Augustine Inlet was extensively studied, and the FDEP's Inlet Management Plan supports the usage of the shoal complex as identified in the TSP.

4.2 NATURAL (GENERAL) ENVIRONMENT*

This section is the scientific and analytic basis for the comparisons of the alternatives. Section 0 includes the effects resulting from the "No Action Alternative," or the "Future Without-Project Conditions." The following section includes anticipated changes to the existing environment including direct, indirect, and cumulative effects as a result of the Recommended Plan, or the "Future With-Project Conditions."

4.2.1 GENERAL CONDITIONS

4.2.1.1 ST. AUGUSTINE INLET

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

Since the St. Augustine Inlet is currently maintained at a depth of 16 feet, the Future With-Project Condition will not change the inlet. USACE modeled the sediment transport patterns in the ebb shoal of the inlet, and dredging the ebb shoal in the quantities proposed in the Recommended Plan will not increase shoaling rates associated with the inlet. The material from the inlet and its shoal complex will be distributed to the beaches north and south of the inlet in accordance with the FDEP's Inlet Management Plan, which corresponds to the volumes outlined in the Recommended Plan.

If the offshore sand sources are used, there may be increased shoaling in the St. Augustine Inlet due to the increased volume of material in the sediment budget. However, the inlet will continue to be maintained as part of the Federal inlet and IWW projects. Therefore, no significant changes to the inlet are expected to occur.

4.2.1.2 SOUTH PONTE VEDRA AND VILANO BEACH

The Recommended Plan includes beach placement at the full template width from R103.5 to R116.5. There are 1000-foot tapers at each end, extending the area of beach placement to approximately R102.5

to R117.5. This placement area extends slightly into the South Ponte Vedra study reach; however, the majority of the South Ponte Vedra will not be affected by the Recommended Plan. Vilano Beach will be entirely affected by the Recommended Plan.

4.2.1.3 SUMMER HAVEN BEACH

The Recommended Plan does not affect Summer Haven Beach. Without beach placement, the beach and dune systems in the Summer Haven Beach study reach will continue to erode.

4.2.2 VEGETATION

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

Study reaches where sand is placed should see an increase in dune vegetation as the dune system is reestablished through the addition of material. This increase would be seen regardless of the sand source (shoal complex or offshore sand source).

4.2.3 FISH AND WILDLIFE RESOURCES (OTHER THAN THREATENED AND ENDANGERED SPECIES)

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

The dredging activity may attract some seabirds to the dredge area. Activities such as oil exploration have been shown to attract large numbers of seabirds, possibly because of an increase in food availability as bottom sediments are stirred up by drilling, potentially resulting in an algal bloom, and attracting species preyed on by seabirds (Tasker et al. 1986; Herron Baird 1990). Similar processes may occur during the initial stages of sand dredging. In addition, some species groups, notably gulls, are attracted by increases in shipping activity, especially at the low speeds associated with dredging (Garthe and Hüppop 1999; Skov and Durinck 2001; Christensen et al. 2003). Vision has been shown to be an important component in the foraging activity of a number of seabird species (Essink 1999; Garthe et al. 2000; Gaston 2004; Thaxter et al. 2010). As a result, water clarity may play an important role in the foraging success of these, and other, species. Changes to water clarity resulting from the re-suspension of sediments during dredging operations would negatively affect the foraging capabilities of some species. However, turbidity would only be located in the vicinity of the dredging and placement operations. In addition, the impact of increases in turbidity is likely to be dependent (both in scale and spatial extent) on initial background levels (Cook 2010). Water quality would quickly return to pre-dredging conditions upon completion of construction. Other than these effects, migratory birds would be minimally affected by dredging activities.

Although benthic organisms would be temporarily impacted at the beach placement site and at the sand source locations (including both the Shoal Complex and the offshore sand source locations), recovery of the benthic community is expected to occur with normal seasonal recruitment patterns documented for the project area. If construction occurs during the summer months, USACE would implement its migratory bird protection measures that include daily surveys for shorebird nesting activities. If nests were found,

a buffer zone of at least 200 feet would be established around each nest. No significant adverse impacts to migratory birds are anticipated with the migratory bird protection measures in effect. Some opportunistic foraging during placement is expected by both fish and bird species. Other wildlife utilizing the dredging and placement sites would be temporarily displaced during construction.

If the offshore sand source were used, the impacts fish and wildlife species other than those protected under the Endangered Species Act will be similar to those effects identified for the use of the shoal complex.

4.2.4 THREATENED AND ENDANGERED SPECIES

FUTURE WITH-PROJECT (TENTATIVELY SELECTED PLAN)

With the implementation of the protective measures listed in this section, USACE has determined that the Recommended Plan may affect, but is not likely to adversely affect sea turtles in the water, manatees, whales, or the smalltooth sawfish. The terms and conditions of the 1997 NMFS South Atlantic Division Regional Biological Opinion (SARBO) will be followed for these species. In addition, USACE has determined that the presence of a dredge in the nearshore waters and pipeline on the beach could temporarily impact the physical or biological features (PBF) and primary constituent elements (PCE) of loggerhead critical habitat unit LOGG-N-14 during construction. Hatchling egress from the water's edge to open water and nesting female transit back and forth between the open water and the nesting beach during nesting season could be hindered by the presence of the dredge and pipeline. However, the construction phase would typically last 3-5 months approximately every 10-12 years (erosion due to storms could require more frequent events) and the daily construction activity would occur within only a small area at a time. In addition, the SARBO includes conditions that minimize incidental take of turtles. Finally, the placement of sand may increase sea turtle nesting habitat if the placed sand is highly compatible (i.e., grain size, shape, color, etc.) with naturally occurring beach sediments in the area, and compaction and escarpment remediation measures are incorporated into the project (i.e. the project complies with the terms and conditions of the SPBO). Therefore, the Corps has determined that the project will not destroy or adversely modify loggerhead critical habitat. USACE has initiated consultation with USFWS and NMFS in accordance with Section 7 of the Endangered Species Act.

4.2.4.1 SEA TURTLE NESTING HABITAT

Beach placement may occur year-round. The following conditions will be implemented as part of the project to protect sea turtle nesting habitat:

- Only beach compatible material containing no more than 5% fine material passing a #230 sieve would be placed on the beach.
- Daily sea turtle nest monitoring and relocation would be required. Only nests that would be affected by construction activities would be relocated to a nearby self-release beach site in a secure setting where artificial lighting would not interfere with hatchling orientation.
- Sand compaction and escarpment monitoring would occur post placement.

- Staging areas for construction equipment would be located off the beach to the maximum extent practicable.
- Direct lighting of the beach and near shore waters would be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the water's surface and nesting beach while meeting all U.S. Coast Guard, EM 385-1-1, and Occupational Safety and Health Administration (OSHA) requirements.

4.2.4.2 LOGGERHEAD CRITICAL NEARSHORE REPRODUCTIVE HABITAT

The proposed placement area is located in designated loggerhead Nearshore Reproductive Critical Habitat. The Primary Constituent Elements (PCEs) for Nearshore Reproductive Habitat include waters off the highest density nesting beaches, waters free from obstructions or artificial lighting to allow ingress/egress of turtles, and waters with minimal manmade structures to promote predators and to disrupt wave patterns.

In the designation of Critical Nearshore Reproductive Habitat, NMFS indicates that dredging and disposal activities may "affect habitat conditions for efficient passage of hatchlings or females by creating barriers or dramatically altering the slope of the beach approach." Dredging of the Shoal Complex sand source will be located far enough away from nesting beaches to avoid impacting nesting and hatching turtles, and will be at dredging depths shallow enough to avoid modifying wave energy reaching the shoreline. Dredging of the Shoal Complex sand sources or of the proposed offshore sand sources would not "dramatically" alter the slope of the "beach approach" or disrupt wave patterns that would impact nesting female or hatchling ingress or egress to/from the beach. Additionally, in the final ruling for critical habitat, NMFS responded to a commenter that, "neither beach nourishment nor the dredging of sand from offshore borrow sites are expected to be significantly impacted by the critical habitat designation as proposed."

Placement of sediment on the beach requires the use of a pipeline to convey the material from the dredge to the placement site. The pipeline typically includes floating and submerged components and approaches perpendicular to the beach. Though the pipeline will be located within the nearshore reproductive habitat, a pipeline floating at the surface or located along the sea floor would not be an obstruction to ingressing/egressing sea turtles and would not affect the PCE's that support nearshore reproductive habitat. Dredging and placement of beach-compatible sediment will not result in barriers or dramatic altering of the slope of the beach approach for nesting females because of the relatively fast equilibration of the constructed profile. The constructed profile immediately begins to equilibrate to the more natural design profile as the waves redistribute sediment along and cross-shore to the equilibration toe of fill. The beach profile will extend into the Nearshore Reproductive Habitat; however, the slope will quickly adjust and would not block or otherwise impede passage of hatchlings or females. Additionally, in the Final Rule for Nesting Beaches Critical Habitat, the U.S. Fish and Wildlife Service states that processes that "mimic these natural processes" (e.g., beach nourishment) are an important component of the physical and biological features of these high density nesting beaches. Since Critical Nearshore Reproductive Habitat is tied to the locations of these high nesting density beaches and beach nourishment

projects can be essential to maintaining the long term nesting densities on highly erosive beaches, beach nourishment is not likely to adversely modify Critical Nearshore Reproductive Habitat.

Lighting on-board dredges and associated ancillary equipment/vessels is required for safe and efficient operations at night. Lighting associated with beach nourishment dredging is a temporary occurrence. However, while dredging sand sources, all lighting aboard dredges, support vessels, etc. operating within three nautical miles of sea turtle nesting beaches are limited to the minimal lighting necessary to comply with U.S. Coast Guard and/or OSHA requirements. All nonessential lighting on the dredge and supporting equipment/vessels shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to minimize illumination of the water to reduce potential disorientation effects on female sea turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward from their natal beaches. Through the implementation of minimum lighting requirements on board dredges and associated ancillary equipment, the PCEs that support Nearshore Reproductive Habitat will not be affected.

4.2.4.2.1 Sea Turtle and Smalltooth Sawfish Protective Measures

To minimize potential adverse impacts to sea turtles and smalltooth sawfish, the following measures would be implemented:

- The contractor would instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel would be responsible for observing water-related activities for the presence of these species.
- The contractor would advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or small tooth sawfish, which are protected under the Endangered Species Act of 1973.
- Siltation barriers would be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment.
- All vessels associated with the construction project would operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels would preferentially follow deep-water routes (e.g., marked channels) whenever possible.
- If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/disposal operation or vessel movement, all appropriate precautions would be implemented to ensure its protection. These precautions would include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment would cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-foot radius of the equipment. Activities would not resume until the protected species has departed the project area of its own volition.

- Any collision with and/or injury to a sea turtle or smalltooth sawfish would be reported immediately to the NMFS Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

4.2.4.3 WEST INDIAN MANATEE AND NORTH ATLANTIC RIGHT WHALE

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

Standard protective measures would be taken during placement activities to ensure the safety of manatees and whales. To make the contractor and his personnel aware of the potential presence of these species in the project area, their endangered status, and the need for precautionary measures, the contract specifications would include the following standard manatee and right whale protection clauses:

- The contractor would instruct all personnel associated with construction activities about the potential presence of manatees and right whales in the area and the need to avoid collisions with them.
- If siltation barriers are used, they shall be made of material in which manatees and whales cannot become entangled, are properly secured, and are regularly monitored to avoid manatee entrapment. Barriers must not block entry to or exit from essential habitat.
- If a manatee were sighted within 100 yards of the project area, all appropriate precautions would be implemented by the contractor to ensure protection of the manatee. These precautions would include the operation of all moving equipment no closer than 50 feet of a manatee. If a manatee were closer than 50 feet to moving equipment or the project area, the equipment would be shut down and all placement activities would cease to ensure protection of the manatee. Placement activities would not resume until the manatee has departed the project area.
- The vessel operators shall maintain a 500-yard buffer between the vessel and any whale.
- All vessels associated with the project would operate at 'no wake' speeds at all times while in shallow waters or channels where the draft of the boat provides less than three feet clearance from the bottom. Boats used to transport personnel would be shallow draft vessels, preferably of the light-displacement category, where navigational safety permits. Vessels transporting personnel between the landing and any workboat would follow routes of deep water to the greatest possible extent. Shore crews would use upland road access if available.
- Mooring bumpers would be placed on all large vessels wherever and whenever there is a potential for manatees to be crushed between two moored vessels. The bumpers would provide a minimum stand-off distance of four feet.
- All personnel would be advised that there are civil and criminal penalties for harming, harassing, or killing manatees and right whales, which are protected under the Endangered Species Act and the Marine Mammal Protection Act.

4.2.4.4 PIPING PLOVER AND RED KNOT

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

Beach placement of material would temporarily impact wintering piping plover and red knot due to displacement from their foraging and roosting habitat. In addition, the benthic invertebrates on which these species feed will be affected by the placement of sand. Recovery of the benthic infauna should occur with normal seasonal recruitment patterns. During pump-out of the dredged material, there may be some opportunistic feeding at the placement area by shorebirds, including piping plover and red knot.

4.2.4.5 ANASTASIA ISLAND BEACH MOUSE (AIBM)

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

Although AIBM have not been trapped within the GTMNERR since 2006 and are not likely to be affected by the beach placement activities, the following conditions for the AIBM from the SPBO would be followed.

- Beach mouse habitat would be avoided when selecting sites for equipment, pipes, vehicle storage and staging to the maximum extent practicable.
- All construction activity would remain at least 5 to 10 feet seaward of the toe of the dune or 10% of the beach width seaward of the dune toe in areas of occupied beach mouse habitat.
- Existing beach access points shall be used for vehicle and equipment beach access to the maximum extent possible. These access points shall be delineated by post and rope or other suitable material to ensure vehicles and equipment transport stay within the access corridor. The topography at the access points shall be fully restored to preconstruction conditions following project completion. Parking areas for construction crews shall be located as close as possible to the work sites, but outside of vegetated dune areas to minimize impacts to existing habitat and transporting workers along the beachfront.
- If needed, personnel would trap any pipeline access corridor through beach mouse habitat for 5 days prior to pipeline placement and removal.

4.2.5 ESSENTIAL FISH HABITAT (EFH)

Pursuant to the 1999 Finding between USACE and NMFS, USACE's Notice of Availability of this draft EA will initiate USACE's consultation under the Magnuson-Stevens Fishery Conservation and Management Act of 1976. Section 2.3.4 describes the Existing Conditions of the EFH in the project area, as well as the individual and cumulative impacts of the No Action Alternative. This Section describes the individual and cumulative impacts of the Tentatively Selected Plan and other reasonable alternatives. This NEPA document will satisfy the coordination requirement for EFH under the Magnuson-Stevens Fisheries Act (see also Section 6.13).

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

Placement of dredged material on the beach could directly and indirectly impact approximately 15,500 feet of ocean high salinity surf zone. Long-term adverse impacts (i.e. suppression of re-colonization of the infaunal community) are not anticipated if nourishment events are spaced more than five years apart. In addition, material placed will be beach-quality sediment similar in composition to the existing beach

sediments. Beach placement is anticipated to take up to six months, and migrating larvae and/or juvenile fish could be subject to project-related elevated turbidity and suspended sediment levels during that time period. Timing construction for the fall and winter months could minimize impacts to migrating larvae and juvenile fish. USACE will consider this window as funding and scheduling allow.

The headland feature discussed in Section 2.3.4 is located over five miles north of the proposed location of sand placement in the Tentatively Selected Plan (R102.5 to R117.5). Since the direction of longshore sediment transport in this region is north to south, any potential rock outcrops located north of sand placement are unlikely to experience coverage by placed sand as it equilibrates.

4.2.6 COASTAL BARRIER RESOURCES

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

The Federal government cannot cost-share in the sand placement within Unit P04A (Usinas Beach). The proposed project does not include the construction of structures that would require Federal Flood Insurance. Therefore, the Tentatively Selected Plan will not affect the Units P04A or P05 (Conch Island) with respect to the goals of the Coastal Barrier Resources Act. Please see also Section 2.3.5 and Section 5.15.

4.2.7 WATER QUALITY

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

The primary anticipated change in water quality at the beach placement site would be a temporary increase in turbidity. According to the State of Florida's Class III water quality standards, turbidity levels during placement of dredged material are not to exceed 29 nephelometric turbidity units (NTUs) above background levels at the edge of normally a 150-meter mixing zone, which would be the standard for the dredge and beach placement areas. However, since South Ponte Vedra Beach is within an OFW, turbidity levels there are not to exceed 0 NTUs above background levels unless a variance is obtained from FDEP. In order to comply with these standards, turbidity will be monitored according to State protocols during the proposed nearshore placement work. If at any time the turbidity standards are exceeded, the activities causing the violation would temporarily cease.

4.2.8 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

As mentioned in Section 2.3.7, there are no known sources of hazardous or toxic wastes in the project area, and USACE is not aware of any records indicating these activities occurred in the project area in the past. Therefore, USACE does not anticipate that dredging in any of the proposed sand source locations would encounter hazardous, toxic, or radioactive wastes. USACE includes in all project specifications the procedures and protective measures to be taken should munitions be encountered during dredging operations.

4.2.9 AIR QUALITY

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

The proposed action may result in small, localized, temporary increases in concentrations of nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), volatile organic compounds (VOC), and particulate matter (PM). Projected emissions from the dredge plant and other associated construction activities would not adversely impact air quality given the anticipated relatively low level of emissions and the likelihood for prevailing offshore winds. With the proposed action, the criteria pollutant levels should be well within the national ambient air quality standards.

Since the placement area and the preferred sand source (the Shoal Complex Sand Sources) are located in an attainment area, there is no requirement to prepare a conformity determination pursuant to the General Conformity Regulations (58 FR 63214). The offshore sand sources are located in Federal Outer Continental Shelf waters where the attainment status is unclassified. There is no provision for any classification in the Clean Air Act for waters outside of the boundaries of state waters.

4.2.10 NOISE

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

Dredging noise can affect marine mammals, sea turtles, and fishes. Possible effects of dredging noise can vary depending on a variety of internal and external factors, and can be divided into masking (obscuring sounds of interest by the production of interfering sounds, generally at similar frequencies), response, discomfort, hearing loss, and injury (MALSF, 2009). Deeper water operations may propagate sound over greater distances than those in confined nearshore areas (Hildebrandt, 2004).

Dredging to extract sand produces broadband and continuous sound, mainly at lower frequencies. The little available data indicates that dredging is not as noisy as seismic surveys, pile driving, and sonar; however, it is louder than most shipping, operating, offshore wind turbines, and drilling (MALSF, 2009). Noise associated with dredging activities can be placed into five categories:

1. **Collection noise** – The noise generated from the collection of material from the sea-floor; for example, the scraping of the buckets on a bucket ladder dredge or the operation of the drag head. This noise is dependent on the structure of the sea floor and the type of dredge used.
2. **Pump noise** – The noise from the pump driving the suction through the pipe.
3. **Transport noise** – The noise of the material being lifted from the sea floor to the dredge and pumped through a pipeline to the beach. For trailing suction hopper and cutter suction dredges, this would be the noise of the material as it passes up the suction pipe. For clamshell dredges, it would be the sound of the crane dropping/lifting the bucket.
4. **Deposition noise** – This noise is associated with the placement of the material within the barge or hopper.

5. **Ship/machinery noise** – The noise associated with the dredging ship itself. For stationary dredges, the primary source will be the onboard machinery. Mobile dredges will also have propeller and thruster noise (MALSF, 2009).

Field investigations have been undertaken to characterize underwater sounds typical of bucket, hydraulic cutterhead, and hopper dredging operations (Dickerson et al., 2001). Preliminary findings indicate that cutterhead dredging operations are relatively quiet as compared to other dredging operations in aquatic environments. Bucket dredges create a more complex spectrum of sounds, very different than either cutterhead or hopper dredges. Hopper dredges produce somewhat more intense sounds similar to those generated by vessels of comparable size. Hopper dredge noises consist of a combination of sounds emitted from two relatively continuous sources: engine and propeller noise similar to that of large commercial vessels, and sounds of dragheads moving in contact with the substrate.

Reported source levels for dredging operations range from 160 to 180 dB re 1 uPa @ 1 m for 1/3 octave bands with peak intensity between 50 and 500 Hz (Greene and Moore, 1995). The intensity, periodicity, and spectra of emitted sounds differ greatly among dredge types. Components of underwater sounds produced by each type are influenced by a host of factors including substrate type, geomorphology of the waterway, site-specific hydrodynamic conditions, equipment maintenance status, and skill of the dredge plant operator (Dickerson et al., 2001).

Noise generated by the dredge may minimally impact those living on the beaches during project construction, but will likely not be too noticeable over ambient noise of wind and waves. Noise generated on the beaches by equipment placing the dredged material will be relatively low level and will be of a short duration. Construction equipment such as booster pumps will be properly maintained to minimize effects of noise. Once dredging and beach placement have concluded, noise levels will drop back to background levels for the beach area. Since the increases to the current level of noise as a result of this project will be localized and minor, there will only be a temporary reduction in aesthetics and no expectation of adverse effects to the environment as a result of construction-related noise.

4.2.11 AESTHETIC RESOURCES

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

The aesthetics of the beach placement area would be temporarily adversely impacted during construction due to the presence of construction equipment on the beach. In addition, the slope and appearance of the beach can take up to several months to equilibrate and to match the pre-existing conditions. In the longer term, the beach aesthetics will be improved over the previously eroded shoreline with the construction of a more natural beach.

Aesthetics of the sand source locations would also experience temporary adverse impacts due to the presence of dredge equipment during construction.

4.2.12 RECREATION RESOURCES

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

Recreational use of the beach, including sunbathing and surfing, would be temporarily disrupted for up to several months during construction due to the presence of construction equipment on the beach. In addition, recreational use of the Shoal Complex Sand Source and the offshore sand sources (e.g., boating, kayaking, and windsurfing) would be temporarily adversely affected by the dredging operations.

Recreational usage in the Future With-Project Condition would be improved over the long-term due to the availability of a wider beach face.

4.2.13 NAVIGATION

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

Temporary impacts to vessel traffic could occur due to the presence of dredge equipment in St. Augustine Inlet during construction. If the inlet system is used as a sand source, the shoaling rate is not anticipated to increase in the inlet. However, an offshore sand source may cause additional shoaling in the inlet shoal complex due to the material added to the sediment budget in the region.

4.2.14 CULTURAL RESOURCES AND HISTORIC PROPERTIES

As discussed in the Section 2: Existing Conditions and Future Without-Project Conditions portion of this document, substantial cultural resources work and investigations have been conducted throughout various portions of the project area. Consultation is ongoing with the Florida State Historic Preservation Officer (SHPO) and appropriate federally-recognized tribes. Prior to project implementation, consultation and any required resources surveys will be finalized in accordance with Section 106 of the National Historic Preservation Act for all proposed alternatives.

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

The Recommended Plan would see shoreline impacts occurring between FDEP Range Monuments R102.5 and R117.5. This area was previously surveyed in 2010. As discussed in Section 2, this area includes the Chainplate site (SJ5442). Identified materials were removed for conservation by Lighthouse Archaeological Maritime Program (LAMP), but it is likely that more materials may be just offshore in the surf. However, no materials were identified during the Corps' shoreline survey of the area. Within the nearshore placement area, no resources are known to exist. While identified as part of a LAMP's survey, no evidence was reported during a follow up survey of the shoreline in 2010 by the Corps. Considering the high energy environment, materials can often be exposed by storms only to be reburied. LAMP recommended that further monitoring of the area should be conducted if further portions of the potential site are exposed. The materials exposed in the portion of the site covered by LAMP's survey were removed for conservation, and no additional materials are known to exist.

The proposed borrow areas would involve the use of the shoal complex, and they could pose a threat to known resources as discussed in Section 2. The Corps would be required to maintain all buffers for the protection of identified resources. These resources would include Site 8SJ4889, the Dixie Crystal, which has been identified as a historic ship wreck and may be potentially eligible for inclusion in the National Register of Historic Places. A 150-foot buffer was recommended for navigation projects working near it to protect the resource. In addition to the Dixie Crystal, four targets were identified as potential resources within the St. Augustine entrance channel (Hall 2000). No diver evaluations were performed on the targets, and a buffer of 200 feet was recommended. Within the St. Augustine Inlet, previous consultation and surveys indicated that there were four known targets in the project area: SA-T-5, SA-OS-2, SA-OS-3, SA-OS-4 (DHR File No 2010-04838-A and 04838-B). All four targets have a requirement for a 200-foot buffer around them for all maintenance activities. Within the ebb shoal area lies the North Shoals Vessel, which is an historic shrimp boat that sank trying to navigate the St. Augustine entrance channel. This vessel is situated within the ebb shoal, and there is insufficient information to determine its eligibility for inclusion in the National Register. The Corps will protect the site through the use of buffers that will be determined through consultation with the appropriate parties. Currently, the Corps is conducting a cultural resource survey of portions of the shoal complex. When it is complete, 100 percent of the shoal complex will have been subject to cultural resource surveys. Consultation for this survey is ongoing with the Florida SHPO and appropriate federally-recognized tribes. The consultation will be updated prior to project implementation (see Appendix G).

Cultural resource surveys are still required for any additional offshore sand sources. It is the Corps' intent to protect all known resources within the identified project area through the use of project buffers and monitoring where appropriate.

4.2.15 NATIVE AMERICANS

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

As part of the development of this project, consultation is ongoing between USACE and the two federally recognized tribes within the immediate area of potential effect. As discussed in Chapter 3, there are no known Native American properties within the project area and the project should not have any effects to Native Americans. However, consultation with both federally recognized tribes within the region is ongoing and will be updated upon further consultation on this project. Archaeological sites near the project area are discussed in the Cultural Resources section of this report. Once consultation is complete, additional updates may be needed.

4.2.16 NATURAL OR DEPLETABLE RESOURCES

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

Sand is a natural and depletable resource. However, the use of the material from the navigation channel serves two purposes: shoreline protection and enhanced navigation. As discussed in Section 3.10.1, the

use of the shoal complex would implement a Regional Sediment Management strategy where the material from the navigation project is beneficially used to protect the adjacent beaches.

4.2.17 CUMULATIVE IMPACTS

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

Cumulative impacts are defined in 40 CFR 1508.7 as those effects that result from:

> *…the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*

Table 6 summarizes the impact of cumulative actions by identifying the past, present, and reasonably foreseeable future condition of the various resources which are directly or indirectly impacted by the proposed action and its alternatives. The table also illustrates the with-project and without-project condition (the difference being the incremental impact of the project). Also illustrated is the future condition with any reasonable alternatives (or range of alternatives).

	Past (baseline condition)	Present (existing condition)	Future without project	Future with Proposed Action
Sand Resources	Structures located along the shorelines to the north and south have experienced erosion since the early 1900s St. Augustine Inlet was created in the mid-1900s	offshore sand resources are not within an economic distance of the study site for use; shoal sediments at St. Augustine Inlet are abundant as sediment accumulates from alongshore transport	Material from navigational channels will continue to be periodically dredged, and the material will be placed on downdrift beaches; seawalls may be required to protect upland structures in the project area	Sediments eroding from north of St. Augustine Inlet will be deposited into the shoal complex; approximately 1/3 of the sediment in the shoal complex will be dredged and placed north of the Inlet
Protected Species	more abundant and widespread prior to development	individuals of some species becoming increasingly rare; erosion causing continued decline in habitat	Increased erosion in the future without project condition will cause beach habitat to continue to shrink	individuals may be affected by dredging and placement activities; coastal habitat is sustained for life of project
Water Quality	Pristine prior to development; increasing recreational usage, and the development of the City of St. Augustine may have caused some decline in water quality	some degradation due to anthropogenic actions	no change to present condition; no known projects in the vicinity that would cause a decline in water quality	temporary increases in local turbidity due to construction; no long-term change

4.2.18 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

4.2.18.1 IRREVERSIBLE

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. One example of an irreversible commitment might be the mining of a mineral resource. The use of sand from the proposed sand sources would temporarily deplete the suitable sand reserves in the short-term, but they are expected to reestablish following dredging as outlined in the FDEP "Final Order Adopting St. Augustine Inlet Management Implementation Plan."

4.2.18.2 IRRETRIEVABLE

An irretrievable commitment of resources is one in which, due to decisions to mandate the resource for another purpose, opportunities to use or enjoy the resources as they presently exist are lost for a period of time. An example of an irretrievable loss might be where a type of vegetation is lost due to road construction. As littoral drift restores the sand volumes in the shoal complex over time, the dredging alternatives would not result in an irretrievable commitment of resources.

4.2.19 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

FUTURE WITH-PROJECT (RECOMMENDED PLAN)

Species of relatively non-motile infaunal invertebrates that inhabit the dredge areas will unavoidably be lost during dredging. Species of motile epifaunal invertebrates inhabit the shoal complex. Motile organisms such as fish and crabs should be able to escape the area during construction. Many of those species that are not able to escape the construction area are expected to recolonize after project completion from adjacent similar habitat.

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CHAPTER 5

ENVIRONMENTAL COMPLIANCE

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5 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS*

This chapter discusses the status of coordination and compliance of the Recommended (NED) Plan with environmental requirements. Additionally, the Recommended Plan's applicability to the USACE environmental operating principles is addressed.

5.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA)

The report documents the effects of this project and serves as the Draft Environmental Assessment. It will be subject to public review and comment for a 45 day period. This public coordination and environmental impact assessment complies with the intent of NEPA. The project is in compliance with the National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321, *et seq*. P.L. 91-190.

5.1.1 SCOPING AND ISSUES

An initial scoping period for the project was conducted from August 17, 2005 through September 17, 2005. NOAA responded to the scoping letter with concerns about the essential fish habitat (EFH) in the nearshore waters of the study area and requested that an EFH assessment be prepared as part of the study. This assessment is included in Sections 2.3.4 and 4.2.5 of this report. The Florida Department of Environmental Protection (FDEP) coordinated a review of the scoping letter and proposed project with the appropriate state agencies. Their comments were incorporated into the drafting of this report. The scoping letter also drew a response from one concerned citizen who owned property in the area.

As the study progressed, USACE anticipated that an Environmental Impact Statement would be required. A second scoping period was held from September 16, 2008 to October 16, 2008. Responses were received from the Environmental Protection Agency (EPA), the Florida Department of State's Division of Historical Resources, the Seminole Nation of Oklahoma, and several landowners in the study area. A notice of intent to draft an EIS was published in the Federal Register on April 5, 2010.

Subsequently, it became evident that no significant impacts to the human or natural environments were anticipated. USACE decided to initially prepare an Environmental Assessment (EA), rather than continue with the previous plans to draft an EIS. This draft EA and the draft Finding of No Significant Impact (FONSI) will be made available to the public for a 60-day public comment period.

All correspondence associated with the NEPA scoping process is included in Appendix G-3, NEPA Correspondence.

5.1.2 AGENCY COORDINATION AND COOPERATING AGENCIES

This proposed project has been coordinated with the following agencies: U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Environmental Protection Agency, Florida State Clearinghouse, Florida State Historic Preservation Officer (SHPO), and the Florida Department of Environmental

Protection. The FDEP, Bureau of Beaches and Coastal Systems, National Marine Fisheries Service (NMFS) Habitat Conservation Division, and the Bureau of Ocean and Energy Management (BOEM) have all accepted USACE's invitations to participate as cooperating agencies in this study. Correspondence with all Federal and state agencies is included in Appendix G-3.

5.1.3 LIST OF RECIPIENTS

A Notice of the Availability of the Draft EA and Draft FONSI will be mailed to those listed in Appendix G-4, NEPA Mailing List. The document will also be available on USACE's website at http://www.saj.usace.army.mil/About/DivisionsOffices/Planning/EnvironmentalBranch/EnvironmentalDocuments.aspx#St_Johns.

5.1.4 COMMENTS RECEIVED AND RESPONSE

Comments received as a result of the public review of the draft EA will be addressed in the final NEPA document.

5.2 ENDANGERED SPECIES ACT OF 1973

This project falls under the scope of the November 25, 1991 South Atlantic Regional Biological Opinion (as amended) for federally listed marine species. No additional coordination is required with NOAA Fisheries for these species.

USACE has determined that the sand placement activities associated with this project fall within the scope of the USFWS SPBO (2011), as amended in 2015, and the P^3BO (2013). USACE will coordinate with USFWS for project effects to species under their jurisdiction. USFWS generally responds within 30 days to confirm that USACE can utilize these programmatic biological opinions. Coordination with USFWS will be finalized prior to completing the NEPA process.

This project is in compliance with the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531, *et seq*. P.L. 93-205.

5.3 FISH & WILDLIFE COORDINATION ACT OF 1958

Coordination with the USFWS will be conducted as part of their review under the Endangered Species Act. This project is in full compliance with the Act.

5.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966 (*INTER ALIA*)

The Proposed Action is in compliance with Section 106 of the National Historic Preservation Act, as amended (PL89-665). As part of the requirements and consultation process contained within the National Historic Preservation Act implementing regulations of 36 CFR 800, this project is also in compliance

through ongoing consultation with the Archaeological and Historic Preservation Act, as amended (PL93-29), Archeological Resources Protection Act (PL96-95), American Indian Religious Freedom Act (PL 95-341), Native American Graves Protection and Repatriation Act (NAGPRA), Executive Order 11593, 13007, and 13175, the Presidential Memo of 1994 on Government to Government Relations and appropriate Florida Statutes. Consultation with the Florida SHPO, appropriate federally recognized tribes, and other interested parties has been initiated and is ongoing. The Proposed Action will be in compliance with the goals of this Act upon completion of coordination as stated above.

5.5 CLEAN WATER ACT OF 1972

A Section 401 water quality certification application will be submitted to the FDEP, and USACE will obtain this certification prior to construction. All state water quality requirements would be met. A Section 404(b) evaluation is included in this report as Appendix G-1. The project is in compliance with this Act.

5.6 CLEAN AIR ACT OF 1972

The short-term impacts from construction equipment associated with the project would not significantly impact air quality. No air quality permits would be required for this project. St. Johns County is designated as an attainment area for federal air quality standards under the Clean Air Act. Because the project is located within an attainment area, USEPA's General Conformity Rule to implement Section 176(c) of the Clean Air Act does not apply and a conformity determination is not required.

5.7 COASTAL ZONE MANAGEMENT ACT OF 1972

The Florida State Clearinghouse coordinated a review of the project in response to USACE's scoping letter dated August 17, 2005. Based on the information contained in the scoping notice and comments provided by their reviewing agencies, the state had no objections to the proposed activities. However, the state provided several comments in their letter dated October 14, 2005. FDEP staff noted that the project would require state water quality certification in the form of a Joint Coastal Permit. They did not object to investigating the offshore borrow areas, but expressed concern about the use of the ebb shoal. They suggested that further investigation of the nearshore area adjacent to Vilano Beach be conducted for the presence of hardbottom communities. Finally, they discouraged the use of structural alternatives. Please see Appendix G-3 for the FDEP comments, which will be addressed primarily during the FDEP permit process.

A Federal consistency determination in accordance with 15 CFR 930 Subpart C is included in this report as Appendix G-2. The USACE has determined that the project is consistent with the Florida Coastal Management Plan (FCMP) concerning acquisition of Water Quality Certifications and other state authorizations. The Draft EA and Section 404 (b)(1) Evaluation have been submitted to the state in lieu of a summary of environmental impacts to show consistency with the FCMP.

The state's final concurrence of the project's consistency with the FCMP will be determined during the environmental permitting process, in accordance with the 2006 Interagency Coordination Agreement. At this time, this project is in compliance with this Act.

5.8 FARMLAND PROTECTION POLICY ACT OF 1981

No prime or unique farmland would be impacted by implementation of this project. This Act is not applicable to the project.

5.9 WILD AND SCENIC RIVER ACT OF 1968

No designated Wild and Scenic river reaches would be affected by project related activities. This project is in compliance with this Act.

5.10 MARINE MAMMAL PROTECTION ACT OF 1972

USACE does not anticipate the take of any marine mammal during any activities associated with the project. Should a hopper dredge be utilized, a trained, government-certified sea turtle and marine mammal observer will be stationed on the dredge during all water-related construction activities. Appropriate actions will be taken to avoid adverse effects to listed and protected marine mammal species during project construction. Therefore, this project is in compliance with this Act.

5.11 ESTUARY PROTECTION ACT OF 1968

In the Estuary Protection Act of 1968, Congress declared that "many estuaries in the United States are rich in a variety of natural, commercial, and other resources, including environmental natural beauty, and are of immediate and potential value to the present and future generations of Americans." This Act is intended to protect, conserve, and restore estuaries in balance with developing them to further the growth and development of the Nation. There are no estuaries of national significance located in the study area; therefore, this project is consistent with the purposes of this Act.

5.12 FEDERAL WATER PROJECT RECREATION ACT

The principles of the Federal Water Project Recreation Act, as amended, 16 U.S.C. 460-1 (12), *et seq*. P.L. 89-72, do not apply to this project.

5.13 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976

Pursuant to the 1999 Finding between USACE and NMFS, USACE's Notice of Availability of this draft EA will initiate USACE's consultation under the Magnuson-Stevens Fishery Conservation and Management Act. NMFS provided initial comments on September 13, 2005, in response to USACE's request for scoping comments (August 17, 2005). NMFS requested that any NEPA document associated with the project

include an EFH assessment, and noted the importance of the nearshore waters in the study area as foraging habitat for federally managed fishery resources. The project is being coordinated with NMFS, and is in compliance with the Act.

5.14 SUBMERGED LANDS ACT OF 1953

The project would occur on submerged lands of the State of Florida. The project is being coordinated with the State, and is in compliance with the Act.

5.15 COASTAL BARRIER RESOURCES ACT AND COASTAL BARRIER IMPROVEMENT ACT OF 1990

The Coastal Barrier Resources Act (CBRA) and the Coastal Barrier Improvement Act of 1990 (CBIA) limit Federally subsidized development within the CBRA Units to limit the loss of human life by discouraging development in high risk areas, to reduce wasteful expenditures of Federal resources, and to protect the natural resources associated with coastal barriers. CBIA provides development goals for undeveloped coastal property held in public ownership, including wildlife refuges, parks, and other lands set aside for conservation ("otherwise protected areas," or OPAs). These public lands are excluded from most of the CBRA restrictions, although they are prohibited from receiving Federal Flood Insurance for new structures.

Federal monies can be spent within the CBRA Units for certain activities, including (1) projects for the study, management, protection, and enhancement of fish and wildlife resources and habitats; (2) establishment of navigation aids; (3) projects funded under the Land and Water Conservation Fund Act of 1965; (4) scientific research; (5) assistance for emergency actions essential to saving lives and the protection of property and the public health and safety, if preferred pursuant to the Disaster Relief Emergency Assistance Act and the National Flood Insurance Act and are necessary to alleviate the emergency; (6) maintenance, repair, or reconstruction, but not expansion, of publically owned or publically operated roads, structures, or facilities; (7) nonstructural projects for shoreline stabilization that are designed to mimic, enhance, or restore a natural stabilization system; (8) any use or facility necessary for the exploration, extraction, or transportation of energy resources; (9) maintenance or construction of improvements of existing federal navigation channels, including the disposal of dredge materials related to such projects; and (10) military activities essential to national security.

The USACE will coordinate with the USFWS concerning the CBRS and CBIA units in the project area to confirm that the project is in compliance with the Act.

5.16 RIVERS AND HARBORS ACT OF 1899

The proposed work would temporarily obstruct navigable waters of the United States. The proposed action will be subject to the public notice, public hearing, and other evaluations normally conducted for activities subject to the Act. The project is in compliance with this Act.

5.17 ANADROMOUS FISH CONSERVATION ACT

This Act authorizes the Secretaries of the Interior and Commerce to enter into cooperative agreements with the States and other non-Federal interests for conservation, development, and enhancement of anadromous fish and to contribute up to 50 percent as the Federal share of the cost of carrying out such agreements. As this project is not receiving funding for these purposes, this Act does not apply.

5.18 MIGRATORY BIRD TREATY ACT AND MIGRATORY BIRD CONSERVATION ACT

Migratory birds would be minimally affected by dredging at the proposed sand source locations. The USACE will include our standard migratory bird protection requirements in the project plans and specifications and will require the Contractor to abide by those requirements. Renourishment activities at the beach placement site will be monitored at dawn or dusk daily during the nesting season to protect nesting migratory birds. If nesting activities occur within the construction area, appropriate buffers will be placed around nests to ensure their protection. The project is in compliance with these Acts.

5.19 MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT (OCEAN DUMPING ACT)

The term "dumping" as defined in the Act (3[33 U.S.C. 1402](f)) does not apply to the disposal of material for beach nourishment or to the placement of material for a purpose other than disposal (i.e. placement of rock material as an artificial reef or the construction of artificial reefs as mitigation). Therefore, the Marine Protection, Research, and Sanctuaries Act does not apply to this project. The disposal activities addressed in this EA have been evaluated under Section 404 of the Clean Water Act (see Appendix A).

5.20 UNIFORM RELOCATION ASSISTANCE AND REAL PROPERTY ACQUISITION POLICIES ACT OF 1970.

The purpose of PL 91-646 is to ensure that owners of real property to be acquired for Federal and Federally assisted projects are treated fairly and consistently and that persons displaced as a direct result of such acquisition will not suffer disproportionate injuries as a result of projects designed for the benefit of the public as a whole.

While one of the alternatives considered during plan formulation included the acquisition of real property, this is not part of the Recommended (NED) Plan. Therefore, this project does not involve any real property acquisition or displacement of property owners or tenants. Therefore, this Act is not relevant to this project.

5.21 EXECUTIVE ORDER (EO) 11990, PROTECTION OF WETLANDS

No wetlands would be affected by project activities. This project is in compliance with the goals of this Executive Order.

5.22 E.O 11988, FLOOD PLAIN MANAGEMENT

To comply with EO 11988, the policy of USACE is to formulate projects that, to the extent possible, avoid or minimize adverse effects associated with the use of the floodplain and avoid inducing development in the floodplain unless there is no practicable alternative. No activities associated with this project are located within a floodplain, which is defined by EO 11988 as an "area which has a one percent or greater chance of flooding in any given year." The project is located within the Coastal High Hazard Area (CHHA), as defined by EO 11988 as an "area subject to inundation by one-percent-annual chance of flood, extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms." The project shoreline is significantly developed, and further development is anticipated to be minimal.

CSRM projects are inherently located in coastal areas, and are often located in CHHAs based on the problems the project is seeking to alleviate. The primary objective of the St. Johns County Coastal Storm Damage Reduction Project is to reduce infrastructure damage. There is no practicable alternative that could be located outside of the CHHA that would achieve this objective.

For the reasons stated above, the project is in compliance with EO 11988, Floodplain Management.

5.23 E.O. 12898, ENVIRONMENTAL JUSTICE

On February 11, 1994, the President of the United States issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. The Executive Order mandates that each federal agency make environmental justice part of the agency mission and to address, as appropriate, disproportionately high and adverse human health or environmental effects of the programs and policies on minority and low-income populations.

Any potential adverse effects of the proposed action would be more likely to affect those of higher socioeconomic status, such as large watercraft owners or those living in the coastal area surrounding the project. The beneficial effect of a wider, more sustainable beach at South Ponte Vedra Beach and Vilano Beach would benefit all members of the public who are able to obtain transportation to access the beach. The storm damage reduction benefits are primarily benefitting the landowners in this area. There are no disproportionate adverse impacts to minority or low income populations resulting from the implementation of the project.

5.24 E.O. 13045, DISPARATE RISKS INVOLVING CHILDREN

On April 21, 1997, the President of the United States issued Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. The Executive Order mandates that each federal agency make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

As the proposed action does not affect children disproportionately from other members of the population, the proposed action would not increase any environmental health or safety risks to children.

5.25 E.O. 13112, INVASIVE SPECIES

The proposed action will require the mobilization of dredge equipment from other geographical regions. Dredge equipment has the potential to transport species from one region to another, introducing them to new habitats where they are able to out-compete native species. The benefits of the proposed project outweigh the risks associated with the very slight potential for introducing non-native species to this region. The action takes place primarily in Atlantic Ocean waters, minimizing risk to more sheltered coastal habitats.

5.26 ENVIRONMENTAL OPERATING PRINCIPLES

1. Foster sustainability as a way of life throughout the organization.

   The TSP prioritizes the use of material from the shoal complex that is already in the sediment system. This prevents the need from dredging offshore, previously undisturbed sediments.

2. Proactively consider environmental consequences of all USACE activities and act accordingly.

   The integration of the Draft EA into the feasibility study requires all members of the Project Delivery Team to acknowledge the impact that the proposed project will have on the environment. This helps to ensure the project is designed with the environment in mind.

3. Create mutually supporting economic and environmentally sustainable solutions.

   The use of the shoal complex in the TSP incorporates RSM strategies, which inherently incorporate outcomes that are economically and environmentally preferable.

4. Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments.

This document includes all information necessary to document how the project meets USACE's corporate responsibility and accountability requirements for actions that may impact human and natural environments.

5. Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.

The project biologist is involved throughout the study process to ensure that environmental considerations are taken into account for the life of the project.

6. Leverage scientific, economic and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.

The entire Project Delivery Team understands the need to consider the environment during its decision-making process.

7. Employ an open, transparent process that respects views of individuals and groups interested in Corps activites.

The actions taken to involve the public, resource agencies, and NGOs who may be interested in the project are outlined in Section 5.1.

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CHAPTER 6

Recommendation

6 RECOMMENDATION

NOTE: This draft document is not yet complete. The current report describes existing conditions in the study area as well as future conditions if a project is not constructed, problems that a project would address and opportunities available to manage coastal risk. The current report also describes plan formulation, including environmental considerations, to reach a Tentatively Selected Plan (TSP). The document will be revised per comments received during concurrent review, and the TSP could be modified. There will be additional review prior to the report being made "final," and information will be added to the report as the TSP is developed into a Recommended Plan.

The Recommended Plan has not yet been identified. This section will be completed for the final version of the report.]

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CHAPTER 7

List of Preparers

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7 LIST OF PREPARERS*

7.1 PREPARERS

This Feasibility Study with integrated Draft Environmental Assessment was prepared by the following U.S. Army Corps of Engineers personnel:

Matt Schrader, P.E.	Coastal Engineer
Aubree G. Hershorin, Ph.D.	Ecologist
Paul DeMarco	Biologist
Dan Hughes, Ph.D.	Archeologist

7.2 REVIEWERS

This report was reviewed by the following personnel:

Paul DeMarco	Biologist
Brandon Burch	Project Manager

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CHAPTER 8

References and Index

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8 REFERENCES AND INDEX*

8.1 REFERENCES

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8.2 INDEX

Back cover
fold-out