APPENDIX A

PERTINENT CORRESPONDENCE

COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT

Continued Operations and Maintenance Dredging Placement of Dredged Material
On Dade County Beach Erosion Control Project
(Intracoastal Waterway, Cut DA-9 at Bakers Haulover Inlet)
Draft Environmental Assessment (EA)/Finding of No Significant Impact (FONSI)
Jacksonville District, US Army Corps of Engineers (USACE)
Miami-Dade County, FL

US Environmental Protection Agency (EPA)
July 28, 2017

- In Table 1 (starting on page 8), the USACE outlines environmental factors evaluated in the various NEPA documents. The EPA thinks this is an appropriate approach to portraying information; however, there is no cross reference as to where this information is appropriate for the current EA. Recommendation: The EPA recommends the USACE provide a cross reference in Table 1 to the appropriate section within the Final EA.
- In Table 2 (page 16), the USACE discusses cultural resources and the proposed alternative and states, "A letter conveying a continuing no adverse effect to cultural resources was sent to the SHPO [State Historic Preservation Office] at the end of June 2017 to update the consultation." Recommendation: The EPA recommends the USACE briefly discuss the outcome of the SHPO correspondence and provide a copy of the SHPO's correspondence in the Final EA.
- On page 40, the USACE discusses a study conducted by the Regulatory Division regarding effects of operations and maintenance dredging on seagrasses, but does not provide a citation. Recommendation: The EPA recommends the USACE provide a citation for this study in the Final EA.
- On page 40, the USACE quotes a Miami-Dade County (Department of Environmental Resources Management, DERM)) study that states, "Differences in the relative abundance of seagrasses were noted between the pre and post construction surveys." However, the USACE does not provide any quantitative data that correspond with the "pre" and "post" construction surveys. Also, on page 41, the USACE further quotes the DERM study that states, "Therefore, the differences between the pre and post construction seagrass assessments are consistent with documented seasonal variations of shoot density and biomass (canopy)." Again, there is no quantitative data that backs up the narrative. Recommendation: For disclosure purposes, the EPA recommends the USACE provide specific quantitative data (i.e., percentage or raw number of either the delta between "pre" and "post" or the actual numbers) in the Final EA.
- On page 42, discusses the US Fish and Wildlife Service's Biological Opinion (BO) and states, "Those BOs include Terms and Conditions (T&Cs) to minimize adverse effects to listed species and provide incidental take authorizations where adverse effects cannot be avoided." Recommendation: The EPA recommends the USACE discuss the T&Cs in the Final EA and commit to these T&Cs in the FONSI.

From:	Stahl, Chris
To:	SELLERS, Tracey Jordan (Terri) CIV USARMY CESAJ (US)
Subject:	[Non-DoD Source] State_Clearance_Letter_For_FL201707038044 - Draft Supplemental Environmental Assessment for the Continued Periodic Operations and Maintenance Dredging of Cut DA-9 of the Intracoastal Waterway at Bakers Haulover Inlet in Miami-Dade Coun...
Date:	Tuesday, August 01, 2017 3:45:22 PM

July 31, 2017

Terri Jordan-Sellers
U.S. Army Corps of Engineers
Jacksonville District, Planning Division
P. O. Box 4970
Jacksonville, Florida 32232-0019

RE: Department of the Army - District Corps of Engineers - Draft Supplemental Environmental Assessment for the Continued Periodic Operations and Maintenance Dredging of Cut DA-9 of the Intracoastal Waterway at Bakers Haulover Inlet in Miami-Dade County, Florida.
SAI # FL201707038044

Dear Terri:

Florida State Clearinghouse staff has reviewed the proposal under the following authorities: Presidential Executive Order 12372; § 403.061(42), Florida Statutes; the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. §§ 4321-4347, as amended.

Based on the information submitted and minimal project impacts, the state has no comments or objections to the subject project. Thank you for the opportunity to review the proposed plan. If you have any questions or need further assistance, please don't hesitate to contact me at (850) 717-9076.

Sincerely,

Chris Stahl

Chris Stahl, Coordinator
Florida State Clearinghouse
Florida Department of Environmental Protection
2600 Blair Stone Road, M.S. 47
Tallahassee, FL 32399-2400
ph. (850) 717-9076
State.Clearinghouse@dep.state.fl.us

From:	Youmans, Kellie
To:	SELLERS, Tracey Jordan (Terri) CIV USARMY CESAJ (US)
Subject:	[Non-DoD Source] RE: Draft Environmental Assessment - Intracoastal Waterway Cut DA-9 at Bakers Haulover Inlet
Date:	Friday, July 28, 2017 11:48:05 AM
Attachments:	IWW DA-9 Bakers draft EA and FONSI NOA signed .pdf IWW DA-9 at Bakers Haulover draft FONSI.pdf

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Hi Terri,

Thanks for checking in with us about the deadline. No FWC comments for this draft EA.

Hope you are doing well!

Kellie Youmans
Fisheries and Wildlife Biological Scientist
Florida Fish and Wildlife Conservation Commission
Imperiled Species Management Section
620 South Meridian Street - 6A
Tallahassee, Florida 32399-1600
Kellie.Youmans@myfwc.com
(850) 922-4330

-----Original Message-----
From: Chabre, Jane
Sent: Friday, July 28, 2017 11:30 AM
To: Youmans, Kellie <Kellie.Youmans@MyFWC.com>
Subject: FW: Draft Environmental Assessment - Intracoastal Waterway Cut DA-9 at Bakers Haulover Inlet

Hi Kellie,

Just fyi. Thanks.

Jane Chabre
Office of Conservation Planning Services Coordinator Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, FL 32399
850.410.5367
Jane.Chabre@myfwc.com

-----Original Message-----
From: SELLERS, Tracey Jordan (Terri) CIV USARMY CESAJ (US) [mailto:Terri.Jordan-Sellers@usace.army.mil]
Sent: Friday, July 28, 2017 11:01 AM
Subject: FW: Draft Environmental Assessment - Intracoastal Waterway Cut DA-9 at Bakers Haulover Inlet

ALCON - reminder that comments on the Draft EA for the continued O&M dredging of the IWW DA-9 in the vicinity of Bakers Haulover are due today, June 28. Our original notification was sent Friday, June 30, 2017, but the letter was signed on the 28th of June. We will accept comments through Monday, July 31 due to the lag between the signature of the letter on the 28th and the email of the 30th. I am teleworking, and can be reached at 904-910-8705 if you have any questions.

I've attached the original notice that was sent to each of you on June 30.

Thank you.

-----Original Message-----
From: SELLERS, Tracey Jordan (Terri) CIV USARMY CESAJ (US)
Sent: Friday, June 30, 2017 2:12 PM
Subject: Draft Environmental Assessment - Intracoastal Waterway Cut DA-9 at Bakers Haulover Inlet

ALCON - The Army Corps of Engineers, Jacksonville District has completed a draft Supplemental Environmental Assessment for the continued periodic operations and maintenance dredging of Cut DA-9 of the Intracoastal Waterway at Bakers Haulover Inlet in Miami-Dade County. The EA is open for a 30-day comment period. Attached is the Notice of Availability of the Draft Supplemental EA and FONSI.

The Draft EA, FONSI and appendices are available for download at the link below

Blockedhttp://www.saj.usace.army.mil/About/Divisions-Offices/Planning/Environmental-Branch/Environmental-Documents/

Click on the + sign next to Dade County and scroll to the bottom of the table. The last row is "Intracoastal Waterway, Cut DA-9 at Bakers Haulover Inlet."

If you have any questions, please feel free to contact me.

Sincerely,

Terri Jordan-Sellers
Biologist/Regional Technical Specialist
Coastal Section
Environmental Branch-Planning Division
Jacksonville District-US Army Corps of Engineers

Direct: 904-232-1817
Cell: 904-910-8705
Fax: 904-232-3442

Mailing Address:
PO Box 4970
Jacksonville, FL 32232

Physical Address:
701 San Marco Blvd
Jacksonville, FL 32207-8175

ADVANCE MAINTENANCE DREDGING REQUESTS AND AUTHORIZATIONS

CESAD-ET-CO-M (CESAJ-CO/21 Jun 97) (11-2-240a) 1st End Mr. DeVeaux/ dsm/(404) 331-6742
SUBJECT: Advanced Maintenance Dredging of the Atlantic Intracoastal Waterway (IWW) Jacksonville to Miami, in the Vicinity of Bakers Haulover Inlet, Dade County, Florida

Commander, South Atlantic Division, U.S. Army Corps of Engineers, 77 Forsyth Street, S.W., Room 322, Atlanta, Georgia 30303-3490
10 July 1997

FOR THE COMMANDER, JACKSONVILLE DISTRICT, ATTN: CESAJ-CO

1. Your request to perform advanced maintenance in subject channel is approved subject to completing all appropriate environmental documentation, coordination, and clearance. Approval of the Memorandum of Agreement with the Florida Inland Navigation District is also required.

2. You should continue to monitor the cost of maintenance to assure that the proposed advanced maintenance dredging results in the least costly method of maintaining the channel.

FOR THE DIRECTOR OF ENGINEERING AND TECHNICAL SERVICES:

GEORGE R. PRINCE, JR., PE, CPE
Chief, Construction-Operations Division
Directorate of Engineering and Technical Services

Rcvd: 7 Jul 97

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

CESAJ-CO (11-2-240a) 21 June 1997

MEMORANDUM FOR CDR, USAED (CESAD-ET-CO-M), ATLANTA, GA 30335

SUBJECT: Advanced Maintenance Dredging of the Atlantic Intracoastal Waterway (IWW) Jacksonville to Miami, in the Vicinity of Bakers Haulover Inlet, Dade County, Florida

1. Reference ER 1130-2-520.

2. Advanced maintenance dredging is proposed for the IWW in the vicinity of Bakers Haulover Inlet to reduce the frequency of dredging required for this reach of the IWW. The advanced maintenance will provide the most efficient and cost effective solution for maintaining the channel at project depths. The authorized project is 125 feet wide with a depth of 10 feet mean low water. Overdepth dredging is not an option because existing project depth was attained by excavating through rock. Recent dredging contracts in this portion of the IWW provided a safe navigation channel for less than a year. Within a year after dredging, complaints from the Coast Guard and users of this reach of the IWW have been received. The channel is presently reported to be 50 feet wide and 6 feet deep, and is able to serve only navigation interests with very shallow drafts.

3. Enclosure 1 is an Area Map which shows the location of the project. Bakers Haulover Inlet is a man-made inlet, with a relatively high top of rock elevation throughout its flood tide shoal. Enclosure 2 provides a hydrographic survey overlayed onto the Federal inlet channel and IWW channel. Please note the area for which we are requesting advanced maintenance coincides with the flood tide shoal. Enclosure 3 shows the top of rock elevations in the area. We intend to dredge the flood tide

shoal down to two feet above rock, which will create a settling basin. In the past when the IWW channel was dredged, the dredging effectively just cut off the western edge of this flood tide shoal, and as the inlet processes continued, the flood tide shoal simply extended back into the IWW channel. A Water Quality Certificate for doing this work has been submitted to the Florida Department of Environmental Protection. All dredged material will be placed on Bal Harbour Beach.

4. According to the project cost estimate, the total cost to dredge the 22,000 cubic yards of material in the IWW would be $661,900. Alternatively, the total cost to dredge the 142,000 cubic yards in the flood tide shoal (including the IWW portion) would be $1,359,525. Since all the material to be dredged is beach quality, it would be placed on Bal Harbour Beach, located immediately south of Bakers Haulover Inlet. Enclosure 4 compares the dredging costs for the with and without advanced maintenance alternative. We anticipate that the frequency of dredging is a non-linear function proportional to the quantities dredged. We predict that by dredging this settling basin, the dredging frequency would be reduced from the annual requirement to a four-year period. This would result in a project savings of over $1,288,000 every four years, and at the same time producing a channel that would be truly navigable for four years or possibly more.

5. ER 1130-2-520 allows the District to perform advanced maintenance dredging with your permission. Without your approval, the District will have to dredge the channel every year to every other year. Consequently, the district will fail to maintain the project at authorized dimensions during portions of the interval and maintenance of the channel will cost more. Prior to future advanced maintenance for this location of the IWW, the District will evaluate and affirm the effectiveness of advanced maintenance.

CESAJ-CO
SUBJECT: Advanced Maintenance of the Atlantic Intracoastal Waterway (IWW) Jacksonville to Miami, in the Vicinity of Bakers Haulover Inlet, Dade County, Florida

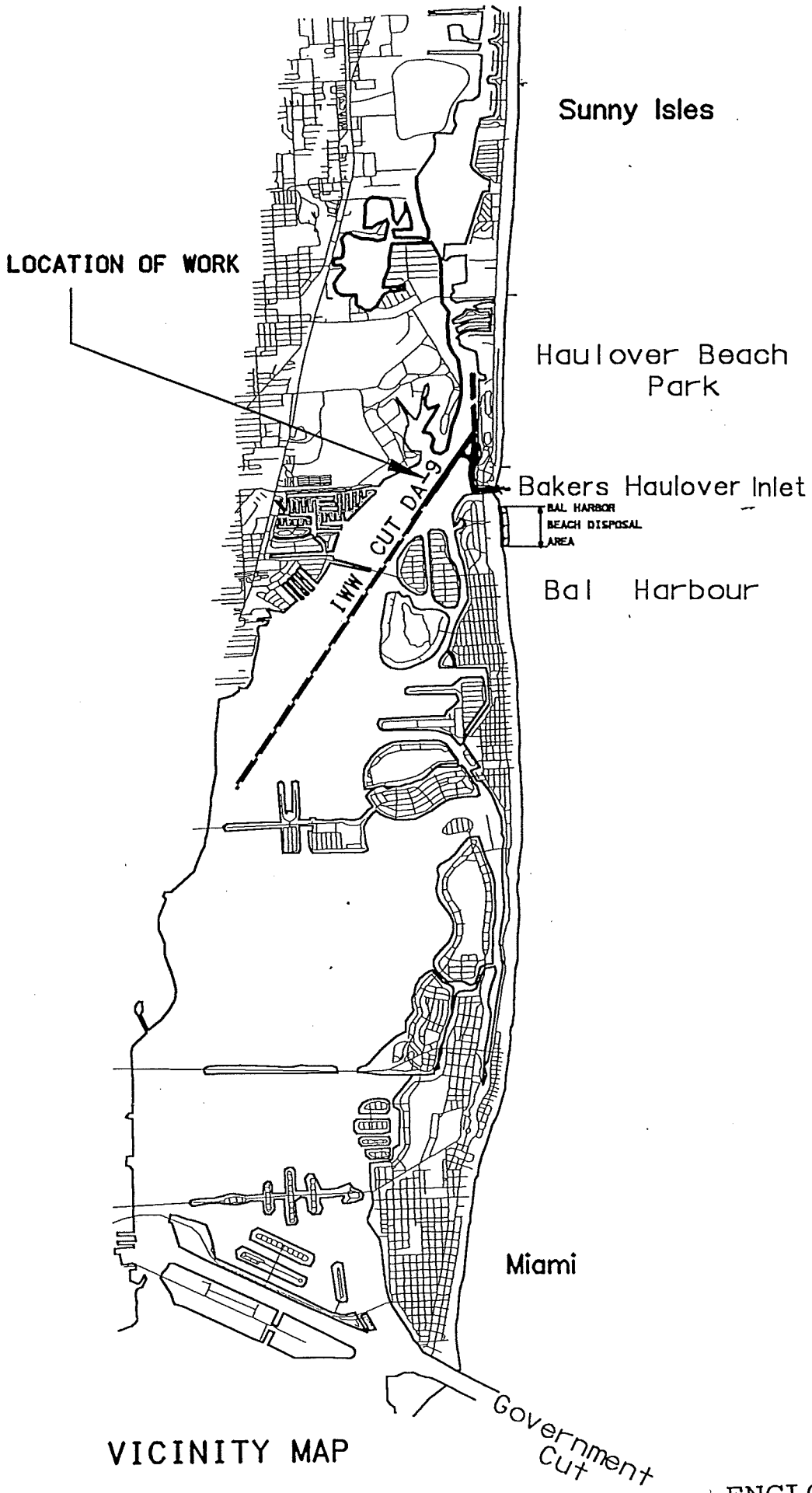
6. Request approval of subject advanced maintenance for the area shown at Enclosure 2. The Florida Inland Navigation District (as local sponsor), is willing to pay for the additional cost of the first advanced maintenance activity. A Memorandum of Agreement to accept their funds is being processed.

FOR THE COMMANDER:

Girlamo DiChiara

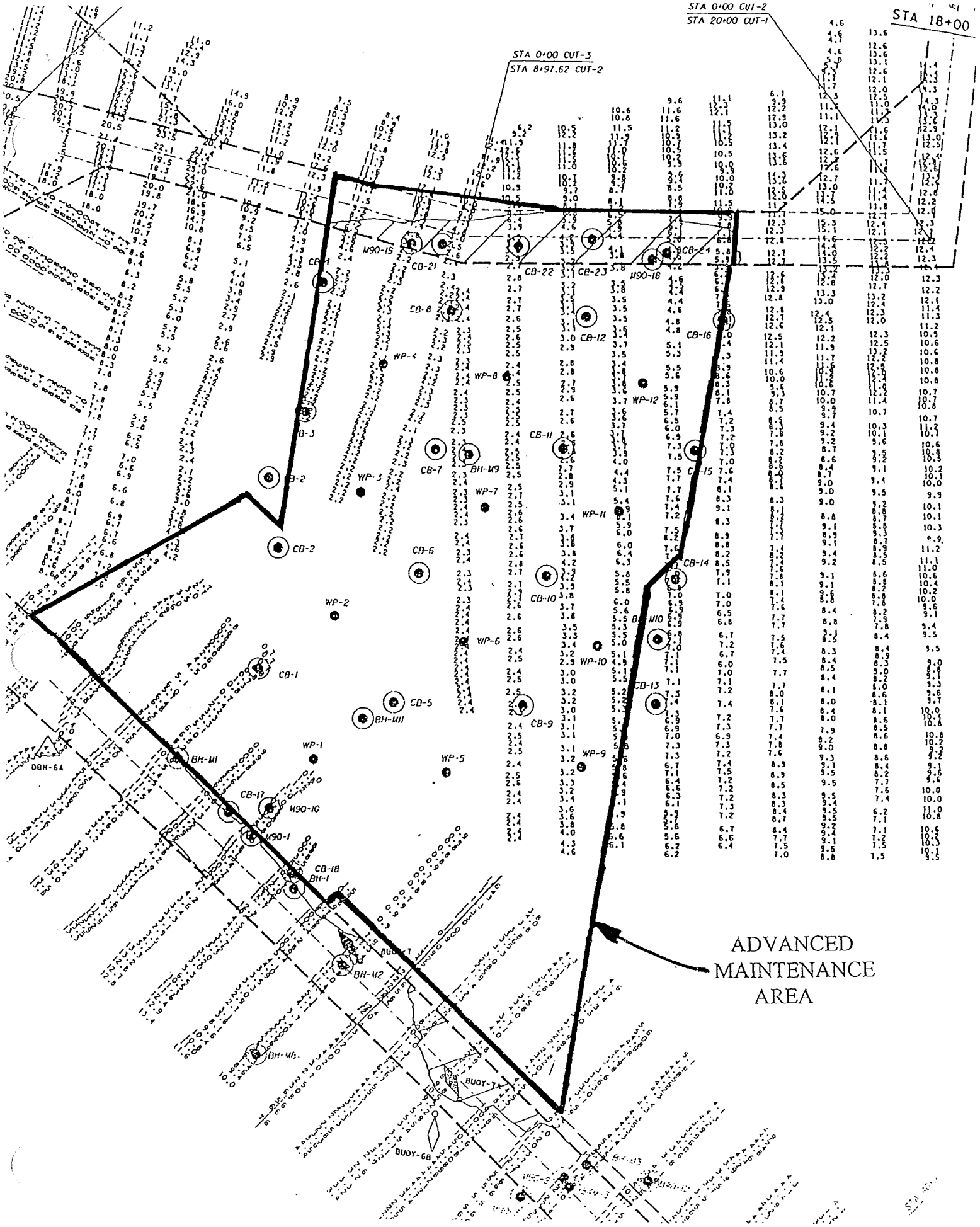
Encls

GIRLAMO DiCHIARA
Chief, Construction-Operations
Division

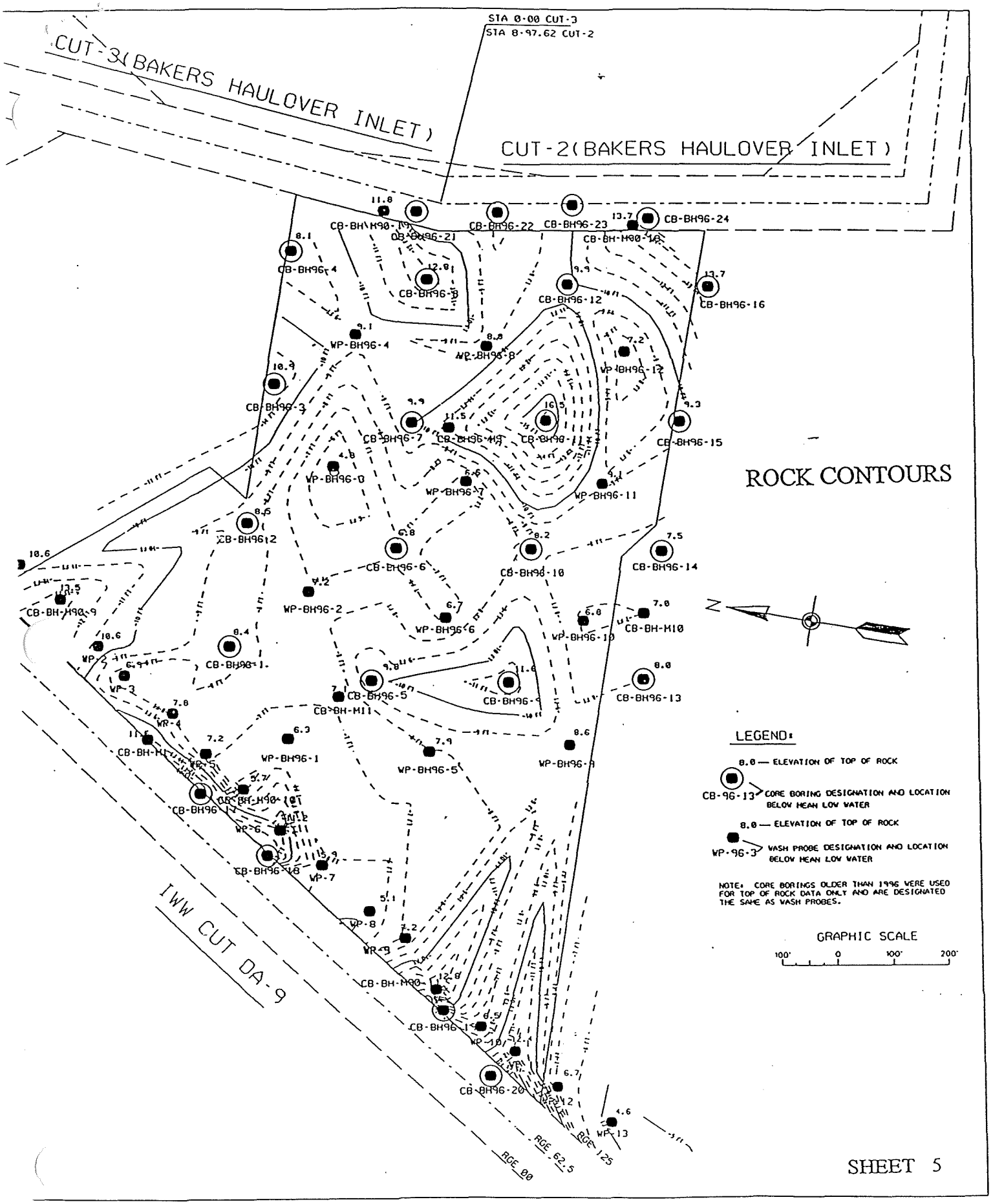


VICINITY MAP

ENCLOSURE 1


STA 0+00 CUT-2
STA 20+00 CUT-1
STA 18+00
STA 0+00 CUT-3
STA 8+97.62 CUT-2
ADVANCED
MAINTENANCE
AREA

ENCLOSURE 2


STA 0+00 CUT-3
STA 8+97.62 CUT-2
CUT-3(BAKERS HAULOVER INLET)
CUT-2(BAKERS HAULOVER INLET)
ROCK CONTOURS
IWW CUT DA-9
LEGEND:
8.0 — ELEVATION OF TOP OF ROCK
CB-96-13 CORE BORING DESIGNATION AND LOCATION BELOW MEAN LOW WATER
8.0 — ELEVATION OF TOP OF ROCK
WP-96-3 WASH PROBE DESIGNATION AND LOCATION BELOW MEAN LOW WATER
NOTE: CORE BORINGS OLDER THAN 1996 WERE USED FOR TOP OF ROCK DATA ONLY AND ARE DESIGNATED THE SAME AS WASH PROBES.
GRAPHIC SCALE
100' 0 100' 200'
RGE 00
RGE 62.5
RGE 125
SHEET 5

ENCLOSURE 3

DREDGING COST FOR IWW - VICINITY OF BAKERS HAULOVER INLET					
WITH AND WITHOUT ADVANCE MAINTENANCE					
Estimated shoaling rate = 22,000 cubic yards per year in the IWW - vicinity of Bakers Haulover Inlet.					
Mobilization and Demobilization cost are slightly higher for advanced maintenance for extra pipeline.					
E&D costs are slightly higher for Adv Maint due to additional surveying and material sampling costs.					
Estimates assume a 20 percent contingency factor.					
Existing Condition-No Advance Maintenance - Annual Requirement					
item	quantity	unit	unit cost		cost
Mobilization and Demobilization	1 job	job	LS		$ 400,000
Dredging	22,000	cu. yds	$ 6.00		$ 132,000
Subtotal					$ 532,000
E&D					$ 90,000
S&A	0.075				$ 39,900
Total Cost of Operation					$ 661,900
Dredging Operation - Advanced Maintenance (assume 4 year dredging period)					
item	quantity	unit	unit cost		cost
Mobilization and Demobilization	1	job	LS		$ 435,000
Dredging	22,000	cu. yds	$ 6.00		$ 132,000
Advanced Dredging	120,000	cu. yds	$ 5.00		$ 600,000
Subtotal					$ 1,167,000
E&D					$ 105,000
S&A	0.075				$ 87,525
Total Cost of Operation					$ 1,359,525
Cost over a 4 year dredging period	without	with			
	Adv Maint	Adv Maint			
Year 1	$661,900	$1,359,525			
Year 2	$661,900				
Year 3	$661,900				
Year 4	$661,900				
4-year total	$2,647,600	$1,359,525			
Annual Cost	$661,900	$ 339,881			
Potential Savings over 4 year dredging period		$1,288,075			
Potential Annual Savings		$322,019			
L:\COPM\EXCEL\BH-ADVMN.XLS					

ENCLOSURE 4

IWW
Vic. BAKERS Haulover

CESAD-CO-ON (CESAJ-CO-ON/9 August 1993) (1110-2-1150a) 1st End
Mr. Russell/dsm/(404) 331-6745
SUBJECT: IWW J to M - Advance Maintenance, Cut DA-9

Commander, South Atlantic Division, U.S. Army Corps of Engineers,
77 Forsyth Street, SW, Room 313, Atlanta, Georgia 30335-6801
13 August 1993

FOR COMMANDER, JACKSONVILLE DISTRICT, ATTN: CESAJ-CO-ON

1. Your request to perform advanced maintenance dredging in Cut DA-9 is approved.

2. You should continue to monitor the cost of maintenance to assure that the advanced dredging results in the least costly method for maintaining the channel.

FOR THE COMMANDER:

JOHN J. BLAKE, P.E.
Director of Construction-Operations

IWW J to M Dade County Project Authorization

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

CESAJ-CO-ON (1130) 9 August 1993

MEMORANDUM FOR Commander, South Atlantic Division, 77 Forsyth Street, S.W., Atlanta, Georgia 30335

SUBJECT: IWW J to M - Advance Maintenance, Cut DA-9

1. Sand material moves through Bakers Haulover Inlet and is deposited in Cut DA-9 over a half mile reach of channel. The quantity of material in the channel is usually around 30,000 to 40,000 cubic yards. Material in the setting basin is usually another 10,000 yards. The shoal becomes highly restrictive as you can see from our enclosed May 1993 survey.

2. In past years we have performed advance dredging with 13 feet required in the channel and 11 feet in the basin. We cannot go beyond these depths due to hard rock in the area. This past practice has resulted in dredging the area every two years. The small quantities involved however, result in a high cost to remove a small shoal.

3. We request approval to issue future IFB with the following additions:

a. Extend the 13-foot required depth in the channel to Sta 20.

b. Extend the 11 feet required depth in the basin to Sta 20.

c. Widened the basin 25 feet to range 175, Sta 41 to 20 and dredge to 11 feet or rock whichever is higher.

4. The contractor will be alerted to the fact that he may hit rock, but he will not be required to dredge rock.

5. We believe the wider basin along with the overdepth dredging should result in the channel staying open longer than 2 years. If we can achieve a 3-year maintenance cycle the savings will be significant. Accordingly dredging of the advanced maintenance material is the most economical method of maintaining the channel.

6. Plans and specification are now being prepared and are to be advertised 20 September 1993. We would appreciate your early reply.

IWW J to M Dade County Project Authorization

CESAJ-CO-ON
SUBJECT: IWW J to M - Advance Maintenance, Cut DA-9

7. Request your concurrence to perform advance maintenance.

FOR THE COMMANDER:

Girlamo DiChiara

Enclosures

GIRLAMO DiCHIARA
Chief Constructions-Operation
Division

CF:
CESAJ-EN-DL (w/encls)

IWW J to M Dade County Project Administration

CESAJ-CO-ON (1130) 2 October 1990

MEMORANDUM FOR RECORD

SUBJECT: Request for Additional Foot of Advance Maintenance, Bakers Haulover, Florida

1. Reference telephone conversation between Gail Gren, CESAJ-CO, Jim Kelly and Tucker Russel, CESAD, 28 September, 1990, subject as above.

2. This memorandum records the verbal approval of our request for one additional foot of overdepth dredging in the Intracoastal Waterway, cut DA-9, between stations 21+00 and 48+00. This additional foot increases required dredging depth to 13 feet, 10-foot project with 2 feet of overdepth and 1-foot of advance maintenance.

Sinfamo Di Chiara

GAIL G. GREN
Chief/Construction-Operations Division

NWW J to M Dade County Project Authorization

CESAJ-CO-ON (1130) 2 October 1990

MEMORANDUM FOR CESAJ-EN-DL

SUBJECT: Maintenance Dredging Vicinity of Bakers Haulover with Sunny Isles Beach D/A

1. Reference CESAJ-EN-DL memorandum dated 24 September 1990, subject as above, and CESAJ-CO-ON memorandum for the record dated 1 October 1990, copies enclosed.

2. Verbal acceptance of 3 feet of advance maintenance dredging in cut DA-9 between stations 21+00 and 43+00, including the settling basin, has been recieved from CESAD. Enclosed are exam surveys showing the areas that have been authorized for dredging to 13 feet.

3. Please compute the additional quantities and proceed with preparation of the Plans and Specifications.

4. Point of contact is Mr. Mark Skarbek at extension 1131.

Encls

GIRLAMO DiCHIARA
Acting Chief
Construction-Operations Division

Miami's Copy

PWN To M Dade County Project Authorization

Disk 04-10-90

Mark's Copy

CESAJ-CO-ON (1130) 9 October 1990

MEMORANDUM FOR CESAJ-EN-DL

SUBJECT: Maintenance Dredging, IWW, J-M, Vicinity of Bakers Haulover Inlet, Florida

1. Reference telephone conversation between Bob Schmitt, CESAJ-EN-DL and Mark Skarbek, CESAJ-CO-ON, 3 October, 1990, subject as above.

2. This memorandum records the verbal approval given to Engineering's suggestion to extend the one additional foot of over-depth dredging in the Intracoastal Waterway, cut DA-9, to station 48+00 instead of 43+00.

3. Point of Contact for this project is Mark Skarbek, extension 1131.

Gail G. Gren

GAIL G. GREN
Chief, Construction-Operations Division

IWW J to M Dade County Project Authorization

CESAJ-CO-ON (1130) 2 October 1990

MEMORANDUM FOR RECORD

SUBJECT: Request for Additional Foot of Advance Maintenance, ~~Bakers Haulover, Florida~~

1. Reference telephone conversation between Gail Gren, CESAJ-CO, Jim Kelly and Tucker Russel, CESAD, 28 September, 1990, subject as above.

2. This memorandum records the verbal approval of our request for one additional foot of overdepth dredging in the Intracoastal Waterway, cut DA-9, between stations 21+00 and 48+00. This additional foot increases required dredging depth to 13 feet, 10 foot project with 2 feet of overdepth and 1 foot of advance maintenance.

GAIL G. GREN
Chief Construction-Operations Division

CESAJ-CO-ON/Skarbek
bkj/2539 02-10-90
CESAJ-CO-ON/Beasley
CESAJ-CO-O/Adams
CESAJ-CO-A/DiChiara
CESAJ-CO/Gren

ESA CONSULTATION – NATIONAL MARINE FISHERIES SERVICE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
(727) 824-5312; FAX 824-5309
http://sero.nmfs.noaa.gov

OCT 25 2007

F/SER31:MCB

Brigadier General Joseph Schroedel
U.S. Army Corps of Engineers, South Atlantic Division
Room 9M15
60 Forsyth Street, S.W.
Atlanta, GA 30303-8801

Dear BG Schroedel:

This is in response to your April 30, 2007, letter on behalf of the combined U.S. Army Corps of Engineers' (COE) South Atlantic districts requesting reinitiation of consultation on the regional biological opinion, "The Continued Dredging of Channels and Borrow Areas in the Southeastern United States," dated September 25, 1997 (SARBO).

My staff is currently coordinating and assisting COE biologists in preparing a draft biological assessment, in anticipation of the formal consultation in the coming months. It should be noted that the COE is not required to suspend dredging or relocation trawling operations pending the conclusion of the reinitiated consultation, so long as the continuation of operations (by all districts) would not violate section 7(a)(2) or 7(d) of the ESA. Therefore, the combined South Atlantic COE districts may continue their hopper dredging activities under the auspices of the 1997 SARBO. So long as the COE follows the reasonable and prudent measures, and implementing terms and conditions outlined in the SARBO, and continues to ensure that its actions will not jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat, the protective coverage of the biological opinion and the Endangered Species Act (ESA) will not lapse. Section 7(o)(2) of the ESA specifically states that "any taking that is in compliance with the terms and conditions specified in a written statement provided under subsection (b)(4)(iv) shall not be considered to be prohibited taking of the species concerned."

We appreciate all the COE's past and ongoing conservation efforts during hopper dredging activities in the Gulf and South Atlantic, and look forward to the continuation of our collaborative efforts to conserve threatened and endangered species.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

DEPARTMENT OF THE ARMY
SOUTH ATLANTIC DIVISION, CORPS OF ENGINEERS
ROOM 313, 77 FORSYTH ST., S.W.
ATLANTA, GEORGIA 30335-6801

REPLY TO
ATTENTION OF:

CESAD-ET-PR (1105-2-10b) 29 OCT 1997

MEMORANDUM FOR

COMMANDER, CHARLESTON DISTRICT
COMMANDER, JACKSONVILLE DISTRICT
COMMANDER, SAVANNAH DISTRICT
COMMANDER, WILMINGTON DISTRICT

Subject: National Marine Fisheries Service, Regional Biological Opinion on Hopper Dredging along the South Atlantic Coast

1. Reference the Endangered Species Act Section 7 Consultation, Biological Opinion for The Continued Hopper Dredging of Channels and Borrow Areas in the Southeastern United States, National Marine Fisheries Service (NMFS) 25 September 1997 (Encl 1).

2. The referenced document was sent to your District Sea Turtle Coordinator by electronic mail on 29 September 1997, without the signed NMFS transmittal letter. The purpose of this memorandum is to transmit copies of the complete document to you, and to provide some guidance on its implementation.

3. During the spring of 1997 we experienced an unanticipated high level of sea turtle entrainments in our hopper dredges along the Atlantic coast. Within a month of starting work, we were approaching our incidental take limit for loggerheads, despite having taken all sea turtle protection measures we had available to us. Our commitment to protect sea turtles while maintaining safe navigation channels for defense and commerce, forced us to make some very hard choices. The result was that from March until the new Regional Biological Opinion (RBO) went into effect on 1 October 1997, we had taken 29 loggerhead sea turtles, completed work at six projects and terminated the remaining six projects with less than about half of the work being completed. Fortunately we did not take any of the endangered species of sea turtles and we were able to complete most of the critical work, or critical project reaches, during that period.

4. The Corps of Engineers has a commitment to protect sea turtles, as was exemplified by our willingness to terminate Corps projects and the NMFS reciprocated by being very cooperative during the Section 7 Consultation process.

CESAD-ET-PR 29 OCT 1997
Subject: National Marine Fisheries Service, Regional Biological Opinion on Hopper Dredging along the South Atlantic Coast

We received an Interim Biological Opinion which extended our incidental take of loggerhead sea turtles from 20 to 35, enabling us to resume our necessary hopper dredging after just a brief delay. We must continue to do everything we can to maintain this excellent working relationship with the NMFS.

5. In implementing the new 1997 RBO, we again renew our commitment to maintaining a balance between reducing sea turtle entrainments to the lowest levels we can achieve while performing necessary dredging for navigation. The Hopper Dredging Protocol for Atlantic Coast (Encl 2) is our guidance for helping achieve this objective. The Protocol is a living document and will be revised by CESAD as appropriate. Your input into improving the Protocol is welcomed at any time, as are any suggestions you may have on how we can further reduce sea turtle takes. I also encourage you to share your views and ideas on this through our Internet newsgroup, usace.sad.turtles.

6. Should you have any questions or would like additional information, you may contact John DeVeaux, CESAD-ET-CO, at (404) 331-6742 or Rudy Nyc, CESAD-ET-PR, at (404) 331-4619 or by e-mail which is preferred.

I know you all are working this hard... your thoughts/suggestions are welcome -

2 Encl
as

R. L. VANANTWERP
Brigadier General, USA
Commanding

CF (w/encls):
COMMANDER, MOBILE DISTRICT

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

SEP 25 1997

R. L. VanAntwerp
Brigadier General, U.S. Army
Division Engineer
South Atlantic Division, Corps of Engineers
Room 313, 77 Forshyth St., S.W.
Atlanta, Georgia 30355-6801

Dear Brigadier General VanAntwerp;

Enclosed is the regional biological opinion concerning the use of hopper dredges in channels and borrow areas along the Southeast U.S. Atlantic coast. This biological opinion amends the regional opinion conducted in 1995, and supersedes the interim biological opinion issued on April 9, 1997. The opinion recognizes the efforts of the Corps of Engineer's (COE) South Atlantic Division (SAD) to minimize sea turtle takes through application of new technology such as draghead deflectors, seasonal dredging windows, termination of projects in which high rates of turtle takes are observed, and elevated staff effort to identify and resolve site-specific problems. Despite these major efforts and continuing plans by the COE to improve the effectiveness of the rigid draghead deflector and to resolve dredging schedules to reduce the likelihood of sea turtle interactions, NMFS believes that further sea turtle takes are likely in future years. However, we believe that these takes are not likely to jeopardize the continued existence of any species. An annual incidental take, by injury or mortality of 35 loggerheads 7 Kemp's ridleys, 7 green turtles, 2 hawksbills, and 5 shortnose sturgeon is listed in the incidental take statement appended to the enclosed opinion. This annual take level can be monitored over fiscal years to be consistent with project contracts.

I appreciate your continued commitment to reduce sea turtle takes associated with dredging in your Division. COE Division and District staff have facilitated the excellent working relationship that exists between our offices within the SAD. We look forward to continuing these cooperative efforts in sea turtle conservation.

Sincerely,

for Hilda Diaz-Soltero
Office Director
Office of Protected Resources

Endangered Species Act - Section 7 Consultation

Biological Opinion

Agency: U.S. Army Corps of Engineers, South Atlantic Division

Activity: The continued hopper dredging of channels and borrow areas in the southeastern United States

Consultation Conducted By: National Marine Fisheries Service, Southeast Regional Office

Date Issued: September 25, 1997

Background

Hopper dredging in channels and borrow areas along the southeastern coast of the United States during the spring of 1997 resulted in an unanticipated high rate of loggerhead turtle take. The number of takes quickly approached the incidental take level established in the regional biological opinion (BO) issued to the Army Corps of Engineers (COE) on August 25, 1995. A formal consultation considering the take rates as well as the dredging locations and conditions was conducted and an interim biological opinion (IBO) was issued on April 9, 1997 and is incorporated herein by reference. The IBO concluded that continued hopper dredging during the 1997 fiscal year was likely to take additional sea turtles but was not likely to jeopardize the continued existence of any species. The incidental take, by injury or mortality, of seven (7) documented Kemp's ridleys, seven (7) green turtles, two (2) hawksbills, sixteen (16) loggerhead turtles, and five (5) shortnose sturgeon was set pursuant in the IBO. This modification added 15 loggerheads to the annual incidental take level, bringing the 1997 fiscal year total incidental take level to 35 loggerheads.

The history of Endangered Species Act (ESA) Section 7 consultations on the deployment of hopper dredges to maintain the depths of southeastern channels is discussed in the August 25, 1995 BO and is incorporated herein by reference. Although no endangered sea turtles have been taken in any channel dredging projects during the 1997 fiscal year, 28 loggerheads have been taken, including 9 loggerheads taken subsequent to the issuance of the IBO (Table 1).

During 1997, the COE responded to high rates of sea turtle takes by assessing each dredging project, modifying draghead deflectors when apparently necessary, conducting relative abundance surveys and relocation trawling, and ultimately ending a number of projects prior to completion (Kings Bay, Brunswick Harbor, Savannah Harbor, Morehead City).

1991 Biological Opinion

Two hundred twenty-five sea turtle takes, including 22 live turtles, were documented between 1980 and 1990 in the Southeast channels despite limited observer coverage in most channels throughout most of that decade (Table 2a.). Seventy-one of these turtles were taken in four months of dredging in the Canaveral ship channel in 1980, the first year in which observers were required. Twenty-one were observed in over two years of dredging in the Kings Bay Channel in 1987-1989, after observers were first deployed on dredges in that channel. Observers were required on most hopper dredges after 1989. Documented takes of turtles on dredges in Brunswick and other Southeast U.S. channels indicated that sea turtles were vulnerable to hopper dredges in all southeastern channels during warmer months. These observations resulted in the Section 7 consultation that concluded with a BO issued on November 25, 1991.

The November 1991 BO was the first cumulative area consultation between NMFS and COE's South Atlantic Division (SAD) regarding hopper dredging. The BO considered hopper dredging in channels from the Canaveral in Florida through Oregon Inlet, North Carolina. The 1991 BO concluded that continued unrestricted hopper dredging in Southeast U.S. channels could jeopardize the continued existence of listed sea turtles. The Opinion established a reasonable and prudent alternative to unrestricted hopper dredging which prohibited the use of a hopper dredge in the Canaveral ship channel, and from April 1 through November 30 in other southeastern channels north of Canaveral. An incidental take level was established based on assumptions that takes would be significantly reduced due to limited dredging windows, but that water temperatures in some years would result in turtle presence in channels during December and March. Observers were required on dredges equipped with outflow and/or inflow screening in March and December. The presence or absence of turtles in December would determine the further need for observer coverage into January. The documented incidental take of a total of five (5) Kemp's ridley, green, hawksbill or leatherback turtle mortalities in any combination of which no more than two (2) are Kemp's ridley, or fifty (50) loggerhead turtle mortalities was set. The Opinion anticipated that seasonal restrictions on hopper dredging would be adjusted on a channel-by-channel basis as better information on turtle occurrence was collected.

Additionally, the development and testing of a draghead deflector was promoted.

1995 Biological Opinion

Between 1992 and 1995, only 16 sea turtle takes were documented (Table 2b.), including three that were alive when collected during dredging operations in the SAD under the dredging windows established in the November 1991 BO (see above). During that period COE developed a rigid draghead deflector that appeared to be effective during videotaped dredging trials using mock turtles, as well as during experimental dredging associated with trawling in the Canaveral Channel. COE also completed a study of six Southeast channels to determine seasonal abundance and spatial distribution of these turtles. A discussion of the findings can be found in the COE report entitled "Assessment of Sea Turtle Abundance in Six South Atlantic U.S. Channels" (Dickerson et al. 1994), summarized in the 1995 BO. Based on the new information, COE requested expanded dredging windows and observer requirements. NMFS considered their request and developed alternative dredging windows and observer requirements and added requirements for the use of hopper dredges in borrow areas along the east coast.

After 1995, COE districts within the SAD generally required observers in some channels, such as Kings Bay, throughout the winter, beyond the new monitoring windows. SAD hopper dredge projects were initially conducted in the middle of the dredging windows, when nearshore waters were cool. During 1996, only nine sea turtle takes, including one green turtle and eight loggerheads, were documented (Table 2c.). No more than three takes occurred in any project. The new dredging windows and draghead deflector requirements appeared to provide good protection to sea turtles.

Hopper dredging operations contracted for the 1997 fiscal year were planned for early in the calendar year, however a number of operations were not begun until late winter. Beginning on March 2, 1997, loggerhead takes occurred in Kings Bay at rates higher than previously observed. Six turtles were taken in four days of dredging. While consulting with NMFS regarding this unprecedented rate of loggerhead takes, a COE specialist from the Waterways Experiment Station proposed some modifications to the draghead with the potential to reduce sea turtle takes. Relocation trawling was also initiated, beginning March 9,1997; however, as can be seen on Table 2, these efforts did not preclude further sea turtle takes in Kings Bay. Dredging was terminated on March 12, 1997, with only 53 percent of the project completed.

Table 1 lists the sea turtle takes observed in hopper dredges throughout the SAD during 1997, as well as the steps taken by COE to reduce the likelihood of takes. Deflector dragheads were re-engineered to fit specific dredges wherever possible and relocation trawling was initiated. Dredging was terminated prior to completion of projects in Kings Bay, Brunswick Harbor, Savannah Harbor and Charleston Harbor. Consultation was reinitiated to consider the effects of the remaining hopper dredging projects anticipated for the 1997 fiscal year. In addition to those specific projects listed in the resulting April 1997 IBO, dredging at Reach II of the Myrtle Beach dredge disposal area is likely to begin before the fiscal year ends. Despite ongoing dredging at the Oregon Inlet, no sea turtle takes have been documented since May 15.

Proposed Activity

This consultation addresses the use of hopper dredges in channels and borrow areas along the Atlantic portion of COE's SAD within the existing dredging windows (Table 3). Channels dredged by hopper dredges include: Oregon Inlet, Morehead and Wilmington Harbors, Charleston, Port Royal and Savannah harbors, Brunswick, Kings Bay, Jacksonville, St. Augustine and Ponce de Leon inlets, West Palm Beach, Miami and Key west channels. Borrow areas that may be dredged by hopper dredges include areas off of Dade County Florida and Myrtle Beach South Carolina.

Draghead deflectors will be used on all projects and observers will be required at least during those periods identified in Table 3. Year-round observer coverage will likely be required by the COE for most channels, particularly those with histories of high sea turtle catch rates such as Kings Bay. Within the South Atlantic Division, the COE will try to schedule dredging of the highest risk areas (Canaveral, Brunswick, Savannah, and Kings Bay) during periods when nearshore waters are coolest -- after December 15 but well before March. Priority for winter dredging will also be given to areas that have substrates that reduce the efficiency of the deflector (Wilmington Harbor channel, Reach 1 of Myrtle Beach). Completion of all projects during the cold-water months will be attempted when possible.

Listed Species and Critical Habitat

Listed species under the jurisdiction of the NMFS that may occur in channels along the southeastern United States and which may be affected by dredging include:

THREATENED:
(1) the threatened loggerhead turtle - Caretta caretta

ENDANGERED:

(1) the endangered right whale - Eubalaena glacialis
(2) the humpback whale - Megaptera novaeangliae
(3) the endangered/threatened green turtle - Chelonia mydas
(4) the endangered Kemp's ridley turtle - Lepidochelys kempii
(5) the endangered hawksbill turtle - Eretmochelys imbricata
(6) the endangered shortnose sturgeon - Acipenser brevirostrum

Green turtles in U.S. waters are listed as threatened, except for the Florida breeding population which is listed as endangered.

Additional endangered species which are known to occur along the Atlantic coast include the finback (Balaenoptera physalus), the sei (Balaenoptera borealis), and sperm (Physeter macrocephalus) whales and the leatherback sea turtle (Dermochelys coriacea). NMFS has determined that these species are unlikely to be adversely affected by hopper dredging activities.

Information on the biology and distribution of sea turtles can be found in the 1991 and 1995 BOs, which are incorporated by reference. Channel specific information has been collected by COE for channels at Morehead City, Charleston, Savannah, Brunswick, Fernandina and Canaveral, and is presented in detail in COE summary report entitled "Assessment of Sea Turtle Abundance in Six South Atlantic US Channels" (Dickerson et al., 1994) and in the COE Biological Assessment.

There is no significant new information regarding the status of these species that has not been discussed in the BOs that have been incorporated by reference (March 12, 1997 and August 25, 1995).

Assessment of Impacts

The Biological Opinion issued in 1991 contained strict dredging windows that appeared to be very effective at limiting the number of sea turtles taken by hopper dredges during channel maintenance dredging in the Southeast U.S. along the Atlantic coast. Between 1991 and 1995, no more than 8 turtles were taken in any year, and many of those taken were released alive. Studies conducted by the COE (Dickerson et al., 1994) documented turtle distribution and abundance in six channels that suggesting the existing windows were accurate. However, the COE requested expansion of existing windows to lessen the burden of maintenance dredging while testing and further developing a rigid draghead deflector design. The deflector was effective at pushing aside mock turtles when tested during 1994, and preliminary field trials in the Canaveral shipping channel had encouraging results. NMFS considered this new information, presented by the COE in a biological assessment forwarded to NMFS in November 1994. The resulting BO, issued August 25 1995 expanded dredging windows and modified observer requirements.

Only 9 sea turtle takes were documented in 1996, suggesting that the expanded dredging windows and the deflector requirements provided protection to sea turtles that was similar to the previously more-restrictive windows. However, the COE's internal policy resulted in conduct of most of the hopper dredging projects during months when coastal waters were still cold, consistent with the previous dredging. The increased rate of take observed during 1997 and discussed below suggests that the restriction of hopper dredging to months when nearshore waters are cold remains the best method for minimizing sea turtle takes.

Unfortunately, a number of dredging projects contracted for early 1997 in the SAD but not restricted to mid-winter months, were delayed into the Spring. This delay coincided with a unseasonably warm winter, when the waters of Kings Bay reached 60°F in early March. The incidental take of nine loggerheads in Kings Bay over only 11 days of dredging indicated that the nearshore abundance of loggerheads was high, apparently higher than during the late 1980's when observers were first deployed on hopper dredges in Kings Bay.

There were other indicators of high nearshore sea turtle abundance along the Southeast U.S. Atlantic coast during 1997. Commercial shrimp trawling conducted without the use of turtle excluder devices (TEDs) offshore of South Carolina and Georgia between May 15 and July 15 resulted in sea turtle catch rates higher than previously documented. Sixty nine sea turtles were taken in 29 days of shrimping off of South Carolina, including 65 loggerheads, 3 ridleys and 1 leatherback. Forty-six sea turtles were taken in 17 days of towing off of Georgia. The sea turtle catch per unit effort (CPUE) for this operation is about 0.35 turtles per hour of trawling, standardized to 100 feet (30.5 m) of total headrope length fished. The CPUE (same units) for commercial shrimp trawling in the 1970s and 1980s reported by Henwood and Stuntz (1987a) was only 0.0487. Loggerhead turtles were the predominant species reported by Henwood and Stuntz and have also been predominantly observed in this study. They account for most of the increase in overall CPUE. The CPUE for loggerheads alone has been greater than 0.30 turtles per hour, while the value reported in Henwood and Stuntz was 0.0456 turtles per hour. The rates of taking for leatherback and Kemp's ridley turtles in the Atlantic study area have also been higher than anticipated.

The high relative density of sea turtles during 1997 may be due to an unseasonably warm winter or other factors contributing to annual variations in abundance, due to an actual increase in the abundance of benthic immature sea turtles in the loggerhead population, or due to a combination of these factors. Trends in the status of loggerheads are generally identified at the nesting beach, when the most accessible life stage, adult nesting

females, can be counted. Because they mature at 20 to 30 years of age, increases or decreases in the abundance of benthic immature loggerheads as determined by incidental captures in nearshore waters would not be observed for decades. While nesting beach surveys suggest that the South Florida population of loggerheads increased and now appears to be stable, increases have not been apparent on nesting beaches of Georgia and South Carolina. Further work on the development of multi-year in-water sampling sites is needed to identify trends in multiple age-classes of the loggerhead population.

The COE noted that 14 of the 28 takes that occurred during 1997 were on the same dredge, the Eagle. The high rate of takes, particularly on this dredge, suggested that the deflecting draghead was not installed properly or was not being operated properly. Takes occurred in a number of the 1997 dredge projects during clean-up. Ridges left behind after the initial dredging are leveled during clean-up, but the draghead passes over troughs. Takes occurring during clean-up may be difficult to avoid since the draghead deflector must remain hard on the bottom to be effective.

The COE has been conducting meetings between districts within the SAD to discuss the results of assessments of channel conditions and dredge inspections. They have determined that the draghead deflector has not been working properly due to poor education of the dredge operators on its proper use, and due to poor tailoring of the deflector to specific dragheads. Increased efforts to educate dredge operators are planned. Additionally, since fewer than 10 private hopper dredges operate within SAD, engineers that have designed the conceptual deflector will be sent to the dredges to insure that the deflectors are adapted to each draghead and that the operators understand how to use the deflector effectively.

CUMULATIVE EFFECTS

"Cumulative effects" are those effects of future state or private activities, not involving Federal actions, that are reasonably certain to occur within the action area of the Federal action subject to consultation. These are discussed in detail in the biological opinions incorporated by reference.

Conclusion:

NMFS believes that the elevated rate of observed sea turtle takes by dredges in the southeastern United States during March of 1997 was likely due to increased abundance of loggerheads in nearshore waters due to an unseasonably warm winter. There is no way to predict whether similar conditions will be encountered in upcoming seasons. Over the past six years, the COE's SAD has

continuously expressed a commitment to minimize sea turtle takes, and has conducted research and taken repeated steps to further this goal. Repeated termination of dredging operations due to high sea turtle takes during 1997 confirms their commitment to avoid sea turtle takes. Further efforts to educate the dredging industry and recruit their interest and involvement in avoiding sea turtle takes are necessary and are planned by the COE. Additionally, the COE has committed to additional efforts to improve the effectiveness of the deflecting draghead. The sea turtle deflector should be tailored to each hopper dredge draghead and the dredge operators should be fully trained in the operation of the draghead to ensure proper use and improve effectiveness. Improvements in operator and deflector performance are necessary prior to reliance on the draghead as a mechanism for reducing sea turtle takes.

NMFS anticipates that the COE's interest in improving the performance of the deflector, their commitment to limit the use of hopper dredges in channels of high sea turtle abundance during periods when nearshore waters are likely to be cold, and their overall goal of further reducing sea turtle takes during hopper dredge activities will minimize the interactions of hopper dredges with sea turtles. However, annual variation in the abundance of sea turtles in some channels and borrow areas make it likely that sea turtle takes will still occur. Additionally, overall increases in loggerhead and Kemp's ridley populations are anticipated due to TED requirements that have reduced the mortality rates of benthic lifestages of these species. Lastly, in some years high levels of hopper dredging activity may be necessary. For example, termination of projects prior to completion during FY 1997 may result in an increase in the number and length of hopper dredging projects necessary for channel maintenance during FY 1998. Therefore, NMFS believes that up to 35 loggerheads may be taken by injury or mortality, as well as 7 Kemp's ridleys, 7 green turtles, 2 hawksbills, and 5 shortnose sturgeon. These takes are not likely to jeopardize the continued existence of these species and the ongoing commitment by the COE to further minimize takes may reduce the likelihood of sea turtle takes in the future even if nearshore sea turtle abundances increase.

Conservation Recommendations

Pursuant to section 7(a)(1) of the ESA, conservation recommendations are made to assist COE in reducing or eliminating adverse impacts to loggerhead, green, and Kemp's ridley turtles that result from hopper dredging in the southeastern United States. The recommendations made in the 1995 BO are pertinent to this consultation as well, and therefore remain valid. Further recommendations are given below.

- Because of the possibility of annual variation in water temperatures, sea turtle abundance, and hopper dredging demand, NMFS has retained the dredging windows established in the 1995 BO. However, the COE has expressed a commitment to deploy hopper dredges during cold-water periods in channels with high sea turtle abundance or with substrates that render the deflector ineffective. NMFS appreciates the COE's commitment to do this, and recommends that the SAD priority list be finalized and distributed to the Districts and NMFS prior to the initiation of dredging during FY 1998.

- The COE should work with the dredging industry to insure their understanding of the importance of sea turtle conservation and to increase the industry's interest in minimizing sea turtle takes.

- Greater than 50% of the loggerheads taken in North Carolina may be from the northern nesting assemblage of loggerheads. While recent loggerhead nesting beach surveys did not identify a decline in the number of nesting females on beaches north of Cape Canaveral, increases observed in the south Florida nesting assemblage have not been noted. High sea turtle catch rates during only the early weeks of the wood debris clean-up conducted by COE off Cape Fear during 1997, as well as preliminary work conducted in North Carolina, suggest that turtles may be abundant in North Carolina channels primarily during migration into and emigration out of North Carolina inshore waters. The COE should work with the NMFS Beaufort Laboratory and the North Carolina Division of Marine Fisheries to document the movements of sea turtles off North Carolina during spring and fall months. Results from these studies may provide insights into further safe dredging windows to minimize the likelihood of takes of loggerheads from the more vulnerable northern nesting assemblage. Summer windows would reduce the pressure to complete all SAD hopper dredging during cold-water periods.

- The COE should investigate further modifications of the draghead to minimize the need for clean-up. Some method to level the peaks and valleys created by dredging would reduce the amount of time dragheads are removed from the bottom sediments.

Incidental Take Statement

Section 7(b)(4) of the Endangered Species Act (ESA) requires that when a proposed agency action is found to be consistent with section 7(a)(2) of the ESA, and the proposed action may incidentally take individuals of listed species, NMFS will issue a statement that specifies the impact of any incidental taking of endangered or threatened species. It also states that reasonable and prudent measures, and terms and conditions to implement the measures, be provided that are necessary to minimize such impacts. Only incidental taking resulting from the agency action, including incidental takings caused by activities approved by the agency, that are identified in this statement and that comply with the specified reasonable and prudent alternatives, and terms and conditions, are exempt from the takings prohibition of section 9(a), pursuant to section 7 of the ESA.

Based on the high rate of sea turtle takes observed during of 1997, increases in the Kemp's ridley population, possible increases in the benthic lifestages of loggerhead populations, annual variation in nearshore abundance of sea turtles and hopper dredge demands, the NMFS anticipates that hopper dredging in the Southeast U.S. Atlantic area of the SAD may result in the injury or mortality of sea turtles and shortnose sturgeon. Therefore, a low level of incidental take, and terms and conditions necessary to minimize and monitor takes, are established. The annual (by fiscal year) documented incidental take, by injury or mortality, of seven (7) Kemp's ridleys, seven (7) green turtles, two (2) hawksbills, thirty-five (35) loggerhead turtles, and five (5) shortnose sturgeon is set pursuant to section 7(b)(4) of the ESA.

To ensure that the specified levels of take are not exceeded early in any project, COE should reinitiate consultation for any project in which more than one turtle is taken within 24 hours, or once five or more turtles are taken. The Southeast Region, NMFS, will cooperate with COE in the review of such incidents to determine the need for developing further mitigation measures or to terminate the remaining dredging activity.

Section 7(b)(4)(c) of the ESA specifies that in order to provide an incidental take statement for an endangered or threatened species of marine mammal, the taking must be authorized under section 101(a)(5) of the Marine Mammal Protection Act of 1972 (MMPA). Since no incidental take in the Atlantic Region has been authorized under section 101(a)(5) of the MMPA, no statement on incidental take of endangered right whales is provided.

The reasonable and prudent measures that the NMFS believes are necessary to minimize the impact of hopper dredging in channels and borrow areas in the southeastern United States have been

discussed with COE. The following terms and conditions are established, in addition to those identified in the 1995 BO, to implement these measures and to document the incidental take should such take occur.

1. The COE's draghead deflector engineer that assistant in this design design should inspect the rigid draghead deflector annually to ensure that the deflector has been tailored appropriately to each draghead. Additionally, the inspector should assess whether the dredge operator appears to be familiar with the operation of the draghead deflector and provide necessary training where appropriate.

2. If the rigid draghead deflector appears to be ineffective in Wilmington Harbor and slows the dredging project such that the amount of time the hopper dredge will be deployed is increased, the deflector should be removed from the draghead for that channel.

3. The COE should develop an educational/training program for dredge operators to increase their understanding of how the draghead deflector works and why it is necessary.

Table 2a. Sea turtle takes (includes live, injured and killed) observed on hopper dredges prior to the regional consultation. Observers were not required on all projects until 1989, after which extensive monitoring was required.

Year	Project	Turtle Takes
1980 Total = 71	Canaveral	50 Cc, 3 Cm, 18 Unidentified
1981 Total = 6	Canaveral	3 Cc, 1 Cm, 2 Unidentified
1984/1985 Total = 12	Canaveral	1 Cc, 11 Unidentified
1986 Total = 9	Canaveral	5 Cc
	Kings Bay	1 Cc, 3 Cm
1987 Total = 5	Kings Bay	3 Cc, 1 Cm, 1 Unidentified
1988 Total = 46	Brunswick	1 Cc
	Canaveral	13 Cc, 3 Cm, 18 Unidentified
	Kings Bay	6 Cc, 3 Lk, 2 Cm
1989 Total = 21	Canaveral	9 Cm, 2 Unidentified
	Kings Bay	8 Cc, 1 Cm
	Savannah	1 Cc
1990 Total = 12	Canaveral	3 Cc, 5 Cm
	Kings Bay	4 Cc
1991 Total = 43	Brunswick	20 Cc, 1 Lk, 1 Unidentified
	Charleston	3 Cc
	Kings Bay	1 Cc
	Savannah	17 Cc

Cc = *Caretta caretta*, Loggerhead ; Cm = *Chelonia mydas*, Green turtle; Lk = *Lepidochelys kempi*, Kemp's ridley turtle

Table 2b. Sea turtle takes (includes live, injured and killed) observed on hopper dredges between the November 1991 and the August 1995 Regional Biological Opinion

Year	Project	Turtle Takes
1992 Total = 2	Port Royal, SC	2 Cc
1994 Total = 8	Canaveral	1 Cm
	Morehead City	1 Cc
	Kings Bay	2 Cc
	Savannah	3 Cc, 1 Lk
1995 Total = 6	Canaveral	1 Cc
	Palm Beach	3 Cc, 2 Cm

Cc = *Caretta caretta*, Loggerhead ; Cm = *Chelonia mydas*, Green turtle; Lk = *Lepidochelys kempi*, Kemp's ridley turtle

Table 2c. Sea turtle takes (includes live, injured and killed) observed on hopper dredges after the August 25, 1995 Biological Opinion

Year	Project	Turtle Takes
1996 Total = 9	Morehead City Harbor	1 Cc
	Myrtle Beach (Borrow Area Reach I)	2 Cc
	Kings Bay	1 Cc
	Palm Beach	1 Cc, 1 Cm
	Wilmington Harbor	3 Cc
1997 Total = 28	Brunswick Harbor	1 Cc
	Charleston Harbor	5 Cc
	Kings Bay	9 Cc
	Morehead City Harbor	6 Cc
	Myrtle Beach (Borrow Area Reach 1)	3 Cc
	Savannah Harbor	3 Cc
	Wilmington Harbor (Ocean Bar)	1 Cc

SOUTH ATLANTIC COAST HOPPER DREDGING (Calendar Year 97)

Project	Dredge Period	Approximate Amount of Work Completed	Turtle Takes	Mitigative Measures Taken	Remarks
Kings Bay	3/1/97 to 3/12/97	Removed 437,000 out of 821,000 CY Approximately 53% completed.	L 3/2/97 L 3/4/97 L 3/5/97 L 3/6/97 L 3/6/97 L 3/6/97 L 3/8/97 L 3/8/97 L 3/12/97	Sea turtle deflecting draghead used. Jacksonville Dist. specialist inspected deflector on 3/6/97. Relocation trawling started 3/9/97. Extensive, ongoing consultation with NMFS as takes occurred. All work terminated 3/12/97 due to high take levels even though relocation trawling had become operational.	Water temp. 57 to 58 F. Dredge Eagle 1. Two takes in one batch on 3/6/97 and 3/8/97. Contract required removal of relatively small veneer of material. Most takes occurred through starboard dragarm. Rapidity of takes was a surprise to all concerned.
Brunswick Harbor	2/6/97 to 3/19/97	Removed 975,400 CY. Work stopped at 50% completion.	L 3/9/97	Sea turtle deflecting draghead used. Sea turtle abundance, based on visual observations, prompted termination of work because of potential for unacceptable levels of entrainment.	Water temp 63 F. Dredge RN Weeks. Historic abundance of sea turtles and high levels of entrainment in 1991 was part of the reason for termination of work.
Savannah Harbor	3/4/97 to 3/22/97	Removed about 545,500 CY, or about 52% of what could have been dredged.	L 3/14/97 L 3/22/97 L 3/22/97	Sea turtle deflecting draghead used. Dredging terminated so as not to take any more sea turtles.	Water temp. 63 F. Numerous sea turtles sighted. Dredge Ouachita was 'skimming' high areas to bring depth to acceptable levels quickly before leaving for urgent work in Mississippi River.
Charleston Harbor	3/14/97 to 3/26/97	Bid qty 900,000 CY Req. qty 408,000 CY Removed qty 350,000 CY. About 39% completed.	L 3/19/97 L 3/20/97 L 3/21/97 L 3/25/97 L 3/26/97	WES expert / developer of sea turtle deflecting draghead system, conducted onboard inspection and made recommendations. Some changes to draghead and dredging operation made. Relocation trawling performed.	Water temp. 61 F. Dredge Eagle 1.
Myrtle Beach borrow area (Phase 1)	9/15/96 to 5/13/97	Bid qty 2.5 million CY. Work completed.	L 4/15/97 L 5/04/97 L 5/09/97	Sea turtle deflecting draghead used. Relative abundance trawling on 3/28-29/97, with 12 hours of "nets in water", yielded one loggerhead. Trawling on 5/8 thru 5/13/97 yielded no sea turtles.	This is one of 3 phases / reaches of total project. Part of work in all phases is by pipeline dredge. Total quantity of material to be dredged is about 6 million CY
Morehead City Harbor	4/25/97 to 5/16/97)	About 120,000 CY removed out of about 1,720,000 CY. About 7% of work completed.	L 4/27/97 L 4/30/97 L 5/01/97 L 5/02/97 L 5/15/97 L 5/15/97	Sea turtle deflecting draghead. Relocation trawling began 5/8/97 and continued until termination of dredging. One loggerhead captured on 5/9/97. Nighttime trawling performed 5/10 & 5/11 with no turtles captured. Because of concern over extensive takes, dredging terminated with only 7 % of work done.	Dredge Manhatten Island
Wilmington Harbor (Interior Channels)	2/14/97 to 3/13/97	About 217,300 CY removed. Work completed.	No takes		Dredge McFarland
MOTSU	3/14/97 to 4/3/97	About 60,000 CY. removed. Work completed.	No takes		Dredge McFarland
Wilmington Harbor (Ocean Bar)	4/3/97 to 4/30/97	About 300,000 CY Work completed.	L 4/07/97	Sea turtle deflecting draghead.	Dredge RN Weeks
Dade County Beach (Miami Reach)	3/30/97 7/20/97 (estimate)	About 380,00 of 475,000 CY completed as of 6/6/97.	No takes	Based on past dredging and anecdotal information about sea turtlesin area, takes are not anticipated.	

L = Loggerhead CY = Cubic Yards

TABLE 3: Current requirements for dredging windows, observer requirements and use of hopper dredges in borrow areas along the east coast established in the August 1995 BO.

AREA		SEA TURTLE MONITORING: NAVIGATION CHANNELS		SEA TURTLE MONITORING: BORROW AREAS	
	WHALE MONITORING	WINDOWS	MONITORING	WINDOWS	MONITORING
North Carolina to Pawleys Island, SC (includes channels at Oregon Inlet, Morehead City and Wilmington)	One observer (daytime coverage) between 1 Dec and 31 Mar. Monitoring by dredge operator and sea turtle observer between 1 Apr and 30 Nov.	Year Round	Two observers (100% monitoring) 1 Apr - 30 Nov	Year Round	One observer (50% monitoring) 1 Apr - 30 Nov
Pawleys Island, SC to Tybee Island, GA (includes channels at Charleston, Port Royal and Savannah)	One observer (daytime coverage) between 1 Dec and 31 Mar. Monitoring by dredge operator and sea turtle observer between 1 Apr and 30 Nov.	1 Nov - 31 May	Two observers (100% monitoring) 1 Nov - 30 Nov and 1 Apr - 31 May	Year Round	One observer (50% monitoring) 1 Apr - 30 Nov
Tybee Island, GA to Titusville, FL (includes channels at Brunswick, Kings Bay, Jacksonville, St. Augustine, and Ponce de Leon Inlet)	Aerial surveys in right whale critical habitat, 1 Dec thru 31 Mar. One observer (daytime coverage) between 1 Dec and 31 Mar.	1 Dec - 15 Apr	Two observers (100% monitoring) 1 Apr - 15 Apr	Year Round	One observer (50% monitoring) 1 Apr - 15 Dec
Titusville, FL to Key West, FL (includes channels at West Palm Beach, Miami and Key West)	Whale observations are not necessary beyond those conducted between monitoring of dredge spoil.	Year Round	Two observers (100% monitoring) year round	Year Round	One observer (50% monitoring) year round

South Atlantic Division Corps of Engineers
Hopper Dredging Protocol for Atlantic Coast
FY 98 - FY 03

1. Sea turtle deflecting dragheads will be used at all times.

2. Districts will inspect sea turtle deflecting dragheads systems to ensure that they are fully operational, prior to initiation of work.

3. Districts will ensure that draghead operators know how to properly use the sea turtle deflecting system.

4. Maintenance dredging at Savannah, Brunswick and Kings Bay Harbors must be restricted to 15 December through the end of March. Maintenance dredging at Charleston and Wilmington Harbors must be restricted to 1 December through the end of March where the sea turtle deflecting draghead system can not be used effectively. Dredging may begin as soon as mid-November in those portions of the Wilmington and Charleston Harbor channels where the sea turtle deflecting draghead can be used effectively. All Districts will cooperate to ensure that their scheduling of hopper dredging contracts, does not interfere with this Division priority work area.

5. Sea turtle observers, inflow screens and overflow screens will be used during all dredging operations, except for the months of January and February, which are optional. Variations from this provision may be granted by Division, but must be justified from a technical perspective.

6. All sea turtle takes will be reported promptly to SAD-ET-CO/PD and posted at usace.sad.turtle newsgroup on the Internet.

7. If two sea turtle takes occur within 24 hours, you should immediately notify the Division POC so that he can initiate reconsultation with National Marine Fisheries Service.

8. If a third take occurs on the project the district will cease operations and notify the South Atlantic Division. Continuation of dredging will occur only after cleared by Division. Upon taking three turtles, District will develop a risk assessment along with an appropriate risk management plan, and submit that to Division for assessment. Generally relative abundance and relocation trawling would be an integral part of a risk assessment and management plan. Should a total take of 5 sea turtles occur, for whatever reason, all work will be terminated unless other prior agreements had been reached with Division.

9. If a total of two endangered species of sea turtles are taken during a project, work will be suspended until further guidance from Division has been received.

10. Arrangements will be made for appropriate observation of all species of whales. The hopper dredge must not get closer than 750 yards of a right whale. Jacksonville and Savannah Districts will contribute their share of funding for the Right Whale Early Warning System early enough in the year to ensure that this is not a cause for delay in the program.

11. From Jacksonville District north through Wilmington District, sea turtle observers will also be responsible for monitoring takes of shortnose sturgeon. All takes of shortnose sturgeon must be reported to Division. Should a total take of three shortnose sturgeons occur, District will terminate hopper dredging until further guidance has been received from Division.

ESA CONSULTATION – US FISH AND WILDLIFE SERVICE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

February 7, 2017

Jason A. Kirk
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Service CPA Code:	04EF2000-2015-CPA-0394
Service Consultation Code:	04EF2000-2015-F-0286
Date Received:	August 3, 2015
Consultation Initiation Date:	December 7, 2016
Project:	Dade County Beach Erosion Control and Hurricane Protection Project
County:	Miami-Dade

Dear Colonel Kirk:

This document transmits the U.S. Fish and Wildlife Service's (Service) decision document to the U.S. Army Corps of Engineers (Corps) for the placement of sand along approximately 3.7 miles (mi) of shoreline along Miami-Dade County, Florida (Project). The Corps determined that the Project may affect, and is likely to adversely affect the endangered green sea turtle (*Chelonia mydas*), the endangered hawksbill sea turtle (*Eretmochelys imbricata*), the endangered Kemp's ridley sea turtle (*Lepidochelys kempii*), the endangered leatherback sea turtle (*Dermochelys coriacea*), and the threatened Northwest Atlantic Ocean Distinct Population Segment of the loggerhead sea turtle (*Caretta caretta*); and may affect, but is not likely to adversely affect the threatened piping plover (*Charadrius melodus*), the threatened red knot (*Calidris canutus rufa*), and the endangered West Indian manatee (*Trichechus manatus*; manatee). For the purposes of this document, the five identified sea turtles will be referred to collectively as sea turtles. This document is provided in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*).

The Service and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) share Federal jurisdiction for sea turtles under the Act. The Service has responsibility for sea turtles on the nesting beach and the NOAA Fisheries has jurisdiction for sea turtles in the marine environment.

Our analysis in this document will only address activities that may impact nesting sea turtles, their nests and eggs, and hatchlings as they emerge from the nest and crawl to the sea. Please note the provisions of this consultation do not apply to sea turtles in the marine environment,

such as swimming juvenile and adult sea turtles or loggerhead critical habitat in the marine environment. If applicable, you are required to consult with the NOAA Fisheries on this Project. For further information on Act compliance with the NOAA Fisheries, please contact Rachel Sweeney, Chief of the Interagency Cooperation Branch, by e-mail at rachel.sweeney@noaa.gov or by phone at 727-209-5953.

This analysis is based on information provided in the Corps' July 31, 2015, letter and March 2016 Environmental Assessment. A complete record of this consultation is on file at the South Florida Ecological Services Office, Vero Beach, Florida.

Consultation History

On August 3, 2015, the Service received a copy of the Corps' letter dated July 31, 2015.

On December 7, 2016, the Service emailed the Corps a request for additional information and later in the day received an email from the Corps in response to our request for additional information. Consequently, the Service had sufficient information to initiate formal consultation with the Corps concerning the potential effects of the Project on sea turtles, manatees, piping plovers, and red knots.

DESCRIPTION OF THE PROPOSED ACTION

The Corps proposes to place beach compatible sand on approximately 3.7 mi of shoreline along Miami-Dade County, Florida (Figure 1). The proposed Project involves placement of approximately 3,6000,000 cubic yards of sand within portions of a fill template extending between the Florida Department of Environmental Protection (DEP) reference monuments R-7 and R-74 (Figure 1) over the next 20 years (2016 and 2036). The federally authorized limits of the Main Segment extend from Baker's Haulover Inlet to Government Cut, and 1.2 mi north of Baker's Haulover Inlet through Haulover Beach Park which encompasses DEP reference monuments R-19 to R-74 (Figure 1). The federally authorized limits of the Sunny Isles Segment extend 2.5 mi north of Haulover Beach Park which encompasses DEP reference monuments R-7 to R-19.3 (Figure 1). The Bureau of Ocean Energy Management is a cooperating agency for this Project due to the proposed use of two sand sources located within Outer Continental Shelf waters offshore of Martin and St. Lucie counties. Additional proposed inshore sand sources located in Miami-Dade County include one at Baker's Haulover Inlet and Lummus Park, respectively; and three upland sand mines (ACI [Miami-Dade County], and Ortona and Witherspoon [both in Glades County]) (Figure 2). For in-and-offshore sand sources, the sand will be dredged hydraulically and placed in the fill template through a series of discharge pipes. Once the dredged material has been deposited within the fill template, bulldozers will move and grade the material to produce the authorized design fill profile.

If upland sands mine sources are utilized, the material will be dredged and the water slurry pumped to a sorting machine that will sort the varying grain sizes, etc. to fulfill all requirements as outlined in the Florida Administrative Code subsection 62B-41.007. Afterwards, the sand will be placed in a large pile where it will dry out before being loaded into dump trucks for transport.

The contractor will likely employ a 'mixed fleet' of long-haul road trucks including two-axel and six-axel dump trucks to transfer the sand to the staging sites where it will be stockpiled. Smaller all-terrain dump trucks will be used to transfer the sand from the staging sites to the beach for placement within the fill templates, and bulldozers used to grade the sand to the permitted design fill profile.

All beach corridors, staging areas, stock piles, and pipeline corridors will be selected to avoid effects to upland habitat. Construction vehicles and equipment must traverse or be stored within these designated areas, corridors, and/or within the pipeline corridor. In addition, all construction pipes will be placed parallel to the shoreline and positioned as far landward as possible up to the vegetated dune line. Existing vegetated habitat at these sites and corridors shall be protected to the maximum extent possible to minimize disturbance; therefore, impacts associated with the beach access corridors, pipeline corridors, stock piles, staging areas, and beach fill template are not anticipated. If impacts occur, all impacted areas and vegetation will be restored to preconstruction condition and elevation. In addition, all impacts to nearshore hardbottom habitat and seagrasses will be avoided. All loose debris will be removed and properly disposed of prior to sand placement. The intent of the Project is to renourish the shoreline in order to protect infrastructure and property, improve the shoreline for recreational use, and to provide shoreline stabilization.

Minimization measures

The Corps will follow and implement the Reasonable and Prudent Measures (RPMs) and the Terms and Conditions identified in the revised Statewide Programmatic Biological Opinion (2015-SPBO; Service 2015), and the Conservation Measures of the Programmatic Piping Plover Biological Opinion (P^3BO; Service 2013) that apply to the Project concerning nesting sea turtles and piping plovers, respectively. The P^3BO conservation measures will also minimize effects to red knots.

To minimize impacts to manatees from the proposed Project, the Corps has agreed to follow and implement the Florida Fish and Wildlife Conservation Commission's (FWC) Standard Manatee Conditions for In-Water Work (FWC 2011), and the minimization measures outlined for manatees in the 2015-SPBO.

Action Area

The action area is defined as all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action. The Service identifies the action area to include the sand fill template, staging areas, beach access and pipeline corridors, two offshore borrow areas, three upland sand mines and corresponding transport corridors, and Baker's Haulover Inlet and Lummus Park ebb shoals. The Project is located along the Atlantic Ocean, Miami-Dade County, Florida, at latitude 25.942417 and longitude -80.119128.

THREATENED AND ENDANGERED SPECIES

Piping plover

The Service has determined the Project's impact to non-optimal piping plover habitat is consistent with the analysis in the P^3BO. As previously stated, the Corps has agreed to follow and implement the Conservation Measures outlined in the P^3BO that apply to the Project. As it relates to survey guidelines defined in P^3BO Conservation Measure #2, the Service approves a reduction in the survey effort, and the following revised survey guidelines can be implemented by the Corps:

1. One preconstruction winter shorebird survey will be conducted within a 10-day timeframe beginning the first Friday in February, as outlined in the Florida Shorebird Alliance's Winter Shorebird Survey (http://flshorebirdalliance.org). If the February preconstruction survey is not possible, two preconstruction winter shorebird surveys will be conducted as close as possible to the February dates and at least 15 days apart, and reported to the FWC (https://public.myfwc.com/crossdoi/ shorebirds/loginform.aspx). Preconstruction surveys will not be conducted between May 16 and July 14. If piping plovers are documented during the preconstruction survey, the Service will be contacted for potential implementation of additional conservation measures prior to construction commencement. In addition, a February winter shorebird survey will be conducted as outlined above, for 2 years post-construction. All shorebird survey data will be forwarded to the Service annually upon completion.
2. The person(s) conducting the surveys must demonstrate the qualifications and ability to identify shorebird species and be able to provide the information outlined in the Winter Shorebird Survey.

Because the Project, as proposed, is consistent with the analysis for non-optimal piping plover habitat in the P^3BO, the Corps has concurrence for the piping plover for this Project through the concurrence contained within P^3BO. A report must be submitted by July 31 of each year in which monitoring is completed, as described in Term and Condition 9 of the P^3BO.

Red knot

Red knots may use the Project area during winter and migration periods. In Florida, red knots are commonly found along sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, shallow coastal impoundments, and mangrove and brackish lagoons. Red knots forage along sandy beaches during spring and fall migration throughout Florida. To date, critical habitat has not been proposed or designated for the red knot. According to our Geographic Information System database and eBird (eBird 2016), no red knots have been documented in the action area. Because suitable habitat for the red knot and piping plover is similar, minimization measures for potential effects to red knots in non-optimal habitat will be incorporated into the Project through the Corps' implementation of the Conservation Measures to reduce impacts on piping plovers for projects located in non-optimal piping plover habitat as outlined in the P^3BO.

Based on the implementation of P^3BO's Conservation Measures, the fact that red knots have not been documented in the area, and the Project area being located in non-optimal red knot habitat, the Service concurs that the Project, as proposed, may affect but is not likely to adversely affect this species.

Sea turtles

The Project is located adjacent to sea turtle nesting habitat, and therefore could adversely affect nesting sea turtles, their nests, and hatchlings. The purpose of the proposed Project is to protect the shoreline from ongoing erosion. Without the restorative activities, erosion is expected to continue, potentially impacting sea turtle nesting. Consequently, the proposed Project could have beneficial effects to nesting sea turtles.

The Service has determined the Project's effects concerning sand placement activities are consistent with those analyzed in the 2015-SPBO. Therefore, it is appropriate to apply the 2015-SPBO to the Project. Based on the Corps' commitment to implement the minimization measures, RPMs, and the Terms and Conditions identified in the 2015-SPBO that apply to the Project, the Project's take coverage for listed sea turtles is henceforth covered under the 2015-SPBO.

West Indian manatee

The Project occurs within the geographic range of the manatee and is located in the manatee consultation area. The Corps has agreed to implement the FWC *Standard Manatee Construction Conditions for In-water Work* (FWC 2011), the minimization measures outlined in the 2015-SPBO, and the minimization measures outlined in the Corps' SPBO biological assessment (Corps 2011), to avoid potential impacts on manatees. Based on the proposed protection measures, the Service concurs that the Project, as proposed, may affect, but is not likely to adversely affect this species. The Project is not located within designated critical habitat for the manatee.

REINITIATION NOTICE

This concludes consultation on the action outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

1. The amount or extent of incidental take outlined in the 2015-SPBO is exceeded. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation;
2. New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this analysis;
3. The agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this analysis; or
4. A new species is listed or critical habitat designated that may be affected by the action.

Thank you for your cooperation in the effort to conserve fish and wildlife resources. Should you have additional questions or require clarification regarding this letter, please contact Jeff Howe at 772-469-4283.

Sincerely yours,

FOR Roxanna Hinzman
Field Supervisor
South Florida Ecological Services Office

cc: electronic only
Corps, Jacksonville, Florida (Terri Jordan-Sellers)
DEP, Tallahassee, Florida (Lanie Edwards)
EPA, West Palm Beach, Florida (Ron Miedema)
FWC, Tallahassee, Florida (FWC-CPS, Robbin Trindell)
NOAA Fisheries, Fort Lauderdale, Florida (Audra Livergood)
NOAA Fisheries, West Palm Beach, Florida (Jocelyn Karazsia)
Service, St. Petersburg, Florida (Anne Marie Lauritsen, Peter Plage)

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U.S. Fish and Wildlife Service (Service). 2015. Statewide programmatic biological opinion to the U.S. Army Corps of Engineers (Service Log No. 41910-2011-F-0170) for shore protection activities along the coast of Florida (March 13, 2015). Jacksonville, Panama City, and Vero Beach Field Offices, Florida.

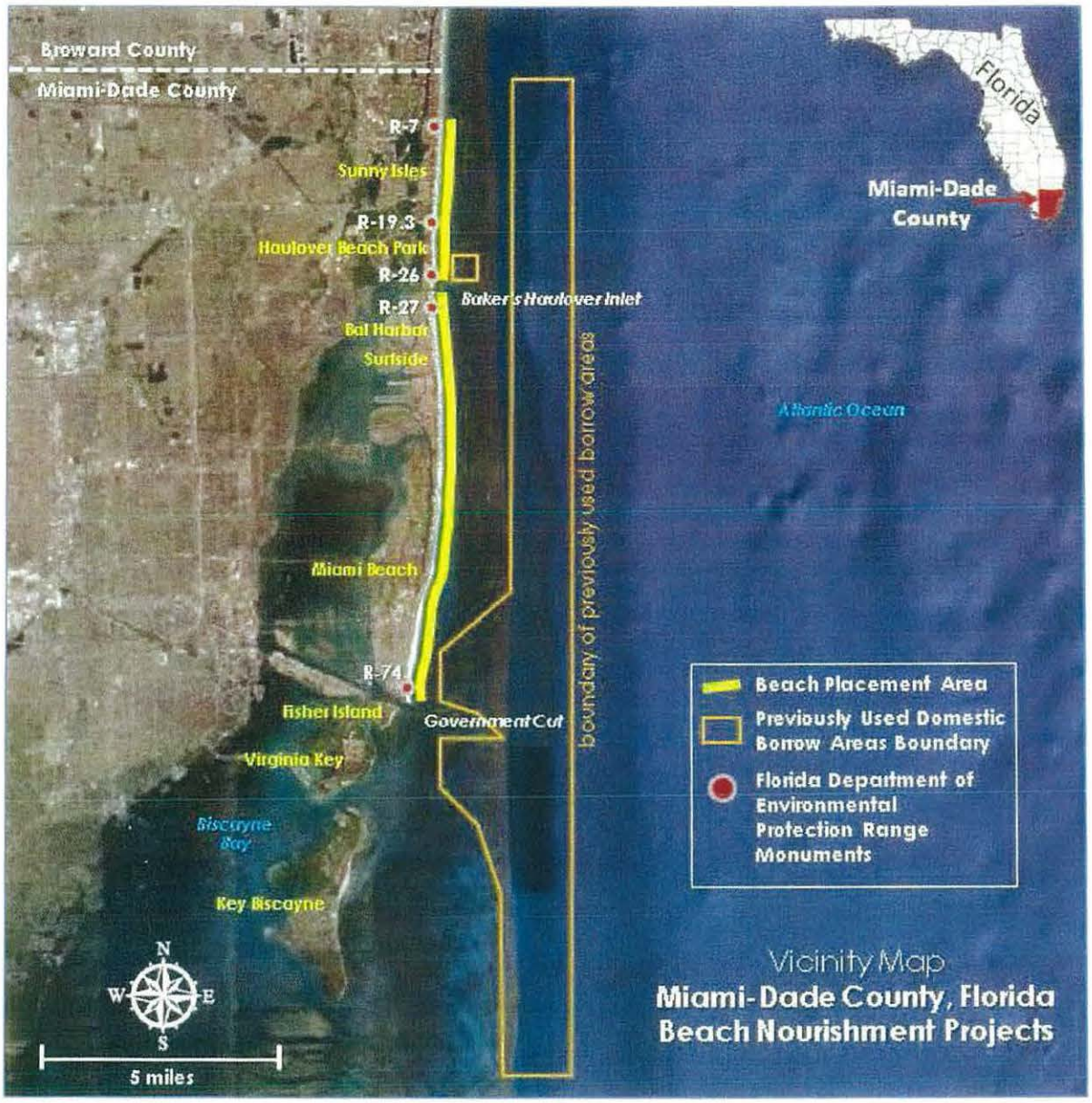

Figure 1. Location of the Dade County Beach Erosion Control and Hurricane Protection project in Miami-Dade County, Florida.

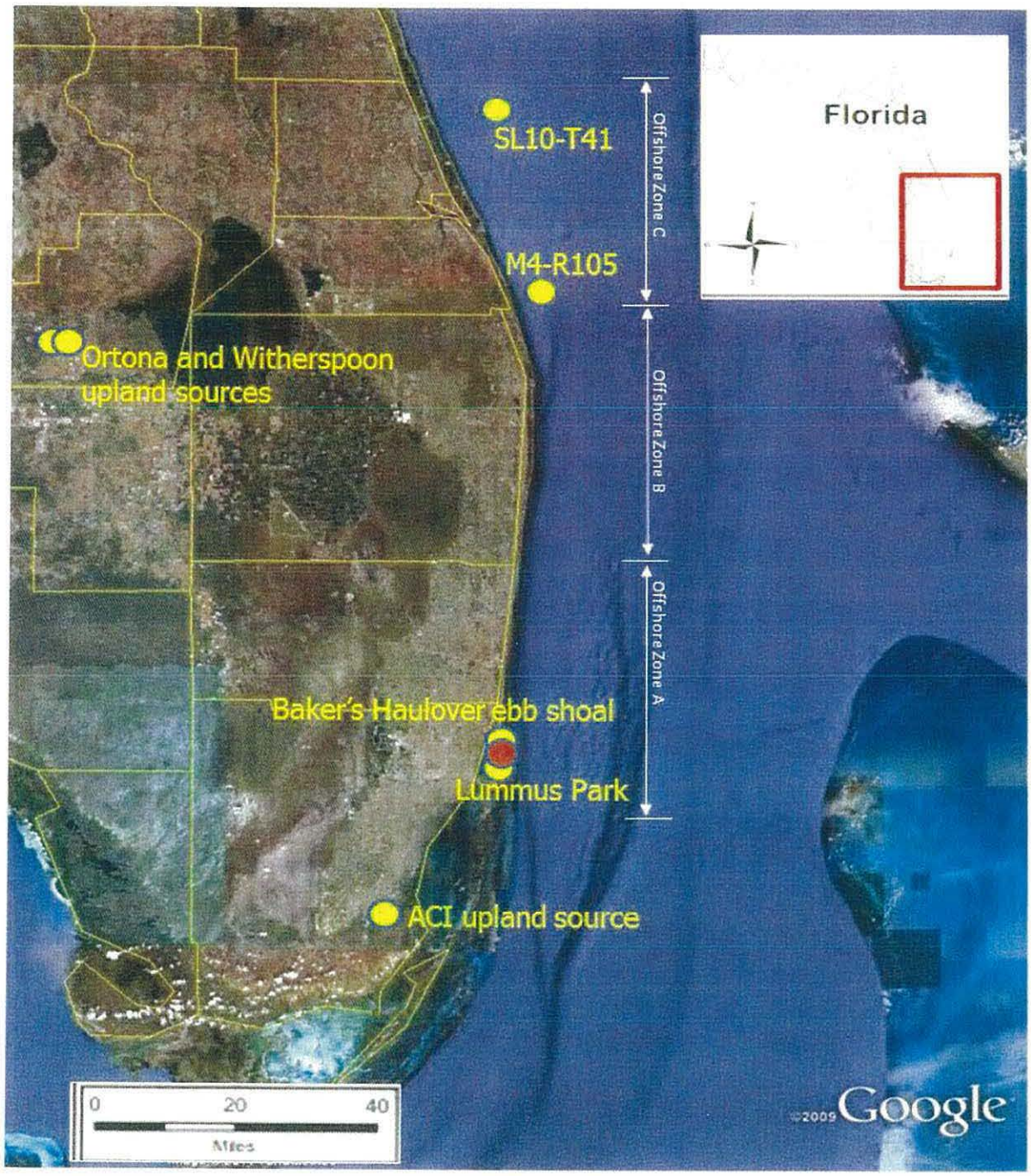

Figure 2. Location of the proposed sand sources for the Dade County Beach Erosion Control and Hurricane Protection project in Miami-Dade County, Florida.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

Service Log Number: 41910-2011-F-0170

March 13, 2015

Alan M. Dodd, Colonel
District Commander
U.S. Army Corps of Engineers
701 San Marco Boulevard, Room 372
Jacksonville, Florida 32207-8175

Dear Colonel Dodd:

This letter transmits the U.S. Fish and Wildlife Service's revised Statewide Programmatic Biological Opinion (SPBO) for the U.S. Army Corps of Engineers (Corps) Civil Works and Regulatory sand placement activities in Florida and their effects on the following sea turtles: Northwest Atlantic Ocean distinct population segment (NWAO DPS) of loggerhead (*Caretta caretta*) and its designated terrestrial critical habitat; green (*Chelonia mydas);* leatherback (*Dermochelys coriacea*); hawksbill (*Eretmochelys imbricata*); and Kemp's ridley (*Lepidochelys kempii*) ; and the following beach mice: southeastern (*Peromyscus polionotus niveiventris*); Anastasia Island (*Peromyscus polionotus phasma*); Choctawhatchee (*Peromyscus polionotus allophrys*); St. Andrews (*Peromyscus polionotus peninsularis*); and Perdido Key (*Peromyscus polionotus trissyllepsis*) and their designated critical habitat. It does not address effects of these activities on the non-breeding piping plover (*Charadrius melodus*) and its designated critical habitat or for the red knot (*Calidris canutus rufa*). Effects of Corps planning and regulatory shore protection activities on the non-breeding piping plover and its designated critical habitat within the North Florida Ecological Services office area of responsibility and the South Florida Ecological Services office area of responsibility are addressed in the Service's May 22, 2013, Programmatic Piping Plover Biological Opinion. Effects of shore protection activities for the piping plover in the Panama City Ecological Services office area of responsibility will be addressed on a project by project basis.

Each proposed project will undergo an evaluation process by the Corps to determine if it properly fits within a programmatic approach. The project description will determine if the project is appropriate to apply to this programmatic consultation. If it is determined that the minimization measures, Reasonable and Prudent Measures, and Terms and Conditions in the SPBO are applicable to the project, it will be covered by this programmatic consultation. If not, the Corps will consult separately on individual projects that do not fit within this programmatic approach.

We will meet annually during the fourth week of August to review the sand placement projects, assess new data, identify information needs, and scope methods to address those needs, including, but not limited to, evaluations and monitoring specified in this SPBO, reviewing results, formulating or amending actions that minimize take of listed species, and monitoring the effectiveness of those actions.

The entire programmatic consultation will be reviewed every five years or sooner if new information concerning the projects or protected species occurs. Reinitiation of formal consultation is also required 10 years after the issuance of this SPBO.

We are available to meet with agency representatives to discuss the remaining issues with this consultation. If you have any questions, please contact Peter Plage at the North Florida Ecological Services Office at (904) 731-3085, Jeffrey Howe at the South Florida Ecological Services Office at (772) 469-4283, or Lisa Lehnhoff at the Panama City Ecological Services Office at (850) 769-0552, extension 241.

Sincerely,

for Larry Williams
State Supervisor

Shore Protection Activities along the Coast of Florida

Statewide Programmatic Biological Opinion

(Revised)

February 27, 2015

Prepared by:
U.S. Fish and Wildlife Service

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Acronyms

ABM	Alabama Beach Mouse
Act	Endangered Species Act
AFB	Air Force Base
AIBM	Anastasia Island Beach Mouse
ASP	Anastasia State Park
BO	Biological Opinion
CBM	Choctawhatchee Beach Mouse
CBRA	Coastal Barrier Resources Act
CCAFS	Cape Canaveral Air Force Station
CFR	Code of Federal Regulations
CH	Critical Habitat
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
Corps	U.S. Army Corps of Engineers
DOI	U.S. Department of the Interior
DTRU	Dry Tortugas Recovery Unit
F	Fahrenheit
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FMNM	Fort Matanzas National Monument
FR	*Federal Register*
FWC	Florida Fish and Wildlife Conservation Commission

FWC/FWRI	Florida Fish and Wildlife Conservation Commission's Florida Fish and Wildlife Research Institute
GCRU	Greater Caribbean Recovery Unit
GINS	Gulf Islands National Seashore
GTMNERR	Guana Tolomato Matanzas National Estuarine Research Reserve
HCP	Habitat Conservation Plan
IMA	Important Manatee Areas
INBS	Index Nesting Beach Survey
IPCC	Intergovernmental Panel on Climate Change
ITP	Incidental Take Permit
K	Carrying Capacity
MANLAA	May Affect, but is Not Likely to Adversely Affect
MHW	Mean High Water
MHWL	Mean High Water Line
MMPA	Marine Mammal Protection Act
mtDNA	Mitochondrial Deoxyribonucleic Acid
NGMRU	Northern Gulf of Mexico Recovery Unit
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRU	Northern Recovery Unit
NWAO DPS	Northwest Atlantic Ocean Distinct Population Segment
NWR	National Wildlife Refuge
PBA	Programmatic Biological Assessment
PCE	Primary Constituent Elements

PFRU	Peninsular Florida Recovery Unit
PHVA	Population and Habitat Viability Analysis
PKBM	Perdido Key Beach Mouse
PKSP	Perdido Key State Park
PSI	Per Square Inch
PVA	Population Viability Analysis
SABM	St. Andrews Beach Mouse
SAJ	South Atlantic Jacksonville
SAM	South Atlantic Mobile
SAV	submerged aquatic vegetation
SEBM	Southeastern Beach Mouse
Service	U.S. Fish and Wildlife Service
SNBS	Statewide Nesting Beach Survey
SPBO	Statewide Programmatic Biological Opinion
SR	State Road
TED	Turtle Excluder Device
TEWG	Turtle Expert Working Group
U.S.C.	United States Code
U.S.	United States

March 13, 2015

Alan M. Dodd, Colonel
District Commander
U.S. Army Corps of Engineers
701 San Marco Boulevard, Room 372
Jacksonville, Florida 32207-8175

Service Federal Activity No:	41910-2010-F-0284
Applicant:	U.S. Army Corps of Engineers
Date Started:	May 30, 2007
Project Title:	Shore Protection Activities
Ecosystem:	Florida Coastline
Counties:	Nassau, Duval, St. Johns, Flagler, Volusia, Brevard, Indian River, St. Lucie, Martin, Palm Beach, Broward, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, Escambia.

Dear Colonel Dodd:

This document is the U.S. Fish and Wildlife Service's (Service) Statewide Programmatic Biological Opinion (SPBO) for the U.S. Army Corps of Engineers (Corps) planning and regulatory shore protection activities in Florida and their effects on the Northwest Atlantic Ocean distinct population (NWAO DPS) of loggerhead (*Caretta caretta*) and its designated terrestrial critical habitat, green (*Chelonia mydas),* leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*), and Kemp's ridley (*Lepidochelys kempii*) sea turtles, and southeastern (*Peromyscus polionotus niveiventris*), Anastasia Island (*Peromyscus polionotus phasma*), Choctawhatchee (*Peromyscus polionotus allophrys*), St. Andrews (*Peromyscus polionotus peninsularis*), and Perdido Key (*Peromyscus polionotus trissyllepsis*) beach mice and designated critical habitat (CH) for the Perdido Key beach mouse (PKBM), Choctawhatchee beach mouse (CBM), and St. Andrews beach mouse (SABM) **(Table 1)**. This SPBO is provided in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq*.). We have assigned Service Federal Activity number 41910-2010-F-0284 for this consultation.

The Corps determined that the proposed project "may affect and is likely to adversely affect the above listed species (**Table 1)**. The Corps also has determined that the proposed project "may affect, but is not likely to adversely affect" (MANLAA) the West Indian (Florida) manatee (*Trichechus manatus latirostris*), the roseate tern (*Sterna dougallii dougallii*), the beach jacquemontia (*Jacquemontia reclinata*), and the Garber's spurge (*Chamaesyce garberi*) **(Table 2)**. Based on our review of the project plans and the incorporation of the minimization measures listed

in the final Programmatic Biological Assessment (PBA) as conditions of the projects where these species are known to exist, we concur with these determinations.

Table 1. Status of federally listed species within the Action Area that may be adversely affected by the shore protection activities.

SPECIES COMMON NAME	SPECIES SCIENTIFIC NAME	STATUS/CH
Mammals		
Choctawhatchee beach mouse	*Peromyscus polionotus allophrys*	Endangered(CH)
Southeastern beach mouse	*Peromyscus polionotus niveiventris*	Threatened
Anastasia Island beach mouse	*Peromyscus polionotus phasma*	Endangered
St. Andrews beach mouse	*Peromyscus polionotus peninsularis*	Endangered (CH)
Perdido Key beach mouse	*Peromyscus polionotus trissyllepsis*	Endangered (CH)
Birds		
Piping Plover*	*Charadrius melodus*	Threatened
Red Knot*	*Calidris canutus rufa*	Proposed
Reptiles		
Green sea turtle	*Chelonia mydas*	Endangered
Hawksbill turtle	*Eretmochelys imbricata*	Endangered
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Loggerhead sea turtle (Northwest Atlantic Ocean population)	*Caretta caretta*	Threatened (CH)

* Not covered by the revised SPBO

Table 2. Species and critical habitat evaluated for effects and those where the Service has concurred with a "may affect, not likely to adversely affect (MANLAA)" determination.

SPECIES COMMON NAME	SPECIES SCIENTIFIC NAME	STATUS/CH	PRESENT IN ACTION AREA	MANLAA
Florida manatee	*Trichechus manatus latirostris*	Endangered (CH)	Yes	Yes
Roseate tern	*Sterna dougallii dougallii*	Threatened	Yes	Yes
Beach jacquemontia	*Jacquemontia reclinata*	Endangered	Yes	Yes
Garber's spurge	*Chamaesyce garberi*	Threatened	Yes	Yes

Florida Manatee

For all dredging activities, including offshore dredging activities associated with submerged borrow areas and navigational channel maintenance:

The Corps has determined that the proposed projects "may affect, but are not likely to adversely affect" the Florida manatee. The Service has reviewed the draft PBA and concurs that, if the 2011 Standard Manatee In-water Construction Conditions are made a condition of the issued permit or Corps project plan and implemented, these activities are not likely to adversely affect the Florida manatee. We also conclude that these activities will not adversely modify its critical habitat. These findings fulfill section 7 requirements of the Act in regard to manatees. In addition, because no incidental take of manatees is anticipated, no such authorization under the Marine Mammal Protection Act (MMPA) is needed. The web link to these conditions: http://www.fws.gov/northflorida/Manatee/Manate_Key_Programmatic/20130425_gd_Appendix%20B_2011_Standard%20Manatee%20Construction%20Conditions.pdf.

For all dredging activities within estuaries and adjacent to the shore, inlets, and/or inshore areas including channels associated with submerged borrow areas and navigational channels:

If the 2011 Standard Manatee In-water Construction Conditions <u>and</u> the following additional conditions are made a condition of the issued permit or Corps project plan and implemented, the Service would be able to concur with a determination by the Corps that these activities are not likely to adversely affect the Florida manatee. We also conclude that these activities will not

adversely modify its critical habitat. These findings fulfill section 7 requirements of the Act in regard to manatees. In addition, because no incidental take of manatees is anticipated, no such authorization under the Marine Mammal Protection Act (MMPA) is needed.

Additional conditions:

1. Barges shall install mooring bumpers that provide a minimum 4-foot standoff distance under maximum compression between other moored barges and large vessels, when in the vicinity of inlets, river mouths, and large estuaries where manatees are known to congregate.

2. Pipelines shall be positioned such that they do not restrict manatee movement to the maximum extent possible. Plastic pipelines shall be weighted or floated. Pipelines transporting dredged material within the vicinity of inlets, river mouths, and large estuaries where manatees are known to congregate shall be weighted or secured to the bottom substrate as necessary to prevent movement of the pipeline and to prevent manatee entrapment or crushing.

3. In the event that such positioning has the potential to impact submerged aquatic vegetation (SAV) or nearshore hardbottom, the pipeline may be elevated or secured to the bottom substrate to minimize impacts to SAV.

For dredging activities located within Important Manatee Areas (IMAs), including Warm Water Aggregation Areas (WWAAs):

Important Manatee Areas (IMAs) are areas where large numbers of manatees occur because of the presence of warm water sites (including power plants, springs, etc.), feeding sites, drinking water sites, and other attractants. Manatees congregate at these sites to shelter from the cold, rest, feed and drink, travel, and engage in other activities. Current IMA maps, including maps of Warm Water Aggregation Areas (WWAAs) and areas of inadequate protection (AIPs), can be found at the Corps' weblink: http://www.saj.usace.army.mil/Missions/Regulatory/SourceBook.aspx.

Dredging activities that occur within the IMA sites (including WWAAs) are not included in this SPBO. For dredging activities within IMAs, the Corps shall contact the appropriate FWS Ecological Services Office for project-specific conditions. See Table 3.

Table 3. FWS Ecological Services (ES) offices and areas of responsibility (counties).

County	Service ES Office	Address	Telephone
Brevard, Citrus, Dixie, Duval, Flagler, Hernando, Hillsborough, Levy, Manatee, Nassau, Pasco, Pinellas, St Johns, Taylor, Volusia	North Florida ES Office	7915 Baymeadows Way Jacksonville, FL 32256	(904) 731-3336
Broward, Charlotte, Collier, Indian River, Lee, Martin, Miami-Dade, Monroe, Palm Beach, St Lucie, Sarasota	South Florida ES Office	1339 20th Street Vero Beach, FL 32960	(772) 562-3909
Bay, Escambia, Franklin, Gulf, Jefferson, Okaloosa, Santa Rosa, Taylor, Wakulla, Walton,	Panama City ES Office	1601 Balboa Avenue Panama City, FL 32405	(850) 769-0552

Although this does not represent a biological opinion for the manatee as described in section 7 of the Act, it does fulfill the requirements of the Act and no further action is required regarding manatees. It also fulfills the requirements of the MMPA. If modifications are made in the programmatic action or additional information becomes available, re-initiation of consultation may be required.

Loggerhead Terrestrial Critical Habitat

The Corps has determined that the proposed projects "may affect, but are not likely to adversely affect" the terrestrial critical habitat of the Northwest Atlantic Ocean loggerhead sea turtle population. The Service concurs with the Corps' determination and furthermore concludes that the proposed projects will not adversely modify the terrestrial critical habitat of the Northwest Atlantic Ocean loggerhead sea turtle population.Designated Critical Habitat: The Service has designated terrestrial critical habitat for Northwest Atlantic loggerhead population on July 10, 2014. NOTE: The proposed rule was dated March 25, 2013 (78 FR 18000) and the notice of availability of the economic analysis for the proposed rule (78 FR 42921) was dated July 18, 2013. The final rule of terrestrial critical habitat includes 88 units encompassing approximately 1,102 kilometers (685 miles) of mapped shoreline along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi: http://www.fws.gov/northflorida/SeaTurtles/2014_Loggerhead_CH/Maps/2014_NWA_Loggerhead_Terrestrial_CH_index_maps.pdf.

Table 4. List of NWAO DPS loggerhead critical habitat in the terrestrial habitat Florida and ownership.

Critical Habitat Unit	Length of Unit in kilometers (miles)	Federal Lands	State Lands	Private and Other (counties and municipalities)
LOGG-T-FL-01: South Duval County Beaches–County line at Duval and St. Johns Counties	11.5 (7.1)	0 (0)	0 (0)	11.5 (7.1)
LOGG-T-FL-02: Fort Matanzas National Monument, St. Johns County	1.4 (0.9)	1.4 (0.9)	0 (0)	0 (0)
LOGG-T-FL-03: River to Sea Preserve at Marineland — North Peninsula State Park, Flagler and Volusia Counties	31.8 (19.8)	0 (0)	6.1 (3.8) North Peninsula State Park, Washington Oaks Garden State Park (in Guana Tolomato Matanzas NERR), and Gamble Rogers Memorial State Recreation Area at Flagler Beach	25.7 (16.0)
LOGG-T-FL-04: Canaveral National Seashore North, Volusia County	18.2 (11.3)	18.2 (11.3) Canaveral National Seashore	0 (0)	0 (0)

Critical Habitat Unit	Length of Unit in kilometers (miles)	Federal Lands	State Lands	Private and Other (counties and municipalities)
LOGG-T-FL-05: Canaveral National Seashore South — Merritt Island NWR-Kennedy Space, Brevard County	28.4 (17.6)	28.4 (17.6) includes Canaveral National Seashore (Brevard portion) and Merritt Island NWR/KSC	0 (0)	0 (0)
LOGG-T-FL-06: Central Brevard Beaches, Brevard County	19.5 (12.1)	0 (0)	0 (0)	19.5 (12.1)
LOGG-T-FL-07: South Brevard Beaches, Brevard County	20.8 (12.9)	4.2 (2.6) Archie Carr NWR	1.5 (1.0) Sebastian Inlet State Park	15.0 (9.3)
LOGG-T-FL-08: Sebastian Inlet — Indian River Shores, Indian River County	4.1 (2.5)	0.9 (0.6) Archie Carr NWR	3.2 (2.0) Sebastian Inlet State Park	0 (0)
LOGG-T-FL-09: Fort Pierce Inlet — St. Lucie Inlet, St. Lucie and Martin Counties	35.2 (21.9)	0 (0)	0 (0)	35.2 (21.9)
LOGG-T-FL-10: St. Lucie Inlet — Jupiter Inlet, Martin and Palm Beach Counties	24.9 (15.5)	4.8 (3.0) Hobe Sound NWR	3.7 (2.3) St. Lucie Inlet Preserve State Park	16.4 (10.2)
LOGG-T-FL-11: Jupiter Inlet — Lake Worth Inlet, Palm Beach County	18.8 (11.7)	0 (0)	2.5 (1.5) John D. MacArthur Beach State Park	16.3 (10.1)

Critical Habitat Unit	Length of Unit in kilometers (miles)	Federal Lands	State Lands	Private and Other (counties and municipalities)
LOGG-T-FL-12: Lake Worth Inlet — Boynton Inlet, Palm Beach County	24.3 (15.1)	0 (0)	0 (0)	24.3 (15.1)
LOGG-T-FL-13: Boynton Inlet — Boca Raton Inlet, Palm Beach County	22.6 (14.1)	0 (0)	0 (0)	22.6 (14.1)
LOGG-T-FL-14: Boca Raton Inlet — Hillsboro Inlet, Palm Beach and Broward Counties	8.3 (5.2)	0 (0)	0 (0)	8.3 (5.2)
LOGG-T-FL-15: Long Key, Monroe County	4.2 (2.6)	0 (0)	4.2 (2.6) Long Key State Park	0 (0)
LOGG-T-FL-16: Bahia Honda Key, Monroe County	3.7 (2.3)	0 (0)	3.7 (2.3) Bahia Honda Key State Park	0 (0)
LOGG-T-FL-17: Longboat Key, Manatee and Sarasota Counties	16.0 (9.9)	0 (0)	0 (0)	16.0 (9.9)
LOGG-T-FL-18: Siesta and Casey Keys, Sarasota County	20.8 (13.0)	0 (0)	0 (0)	20.8 (13.0)
LOGG-T-FL-19: Venice Beaches and Manasota Key, Sarasota and Charlotte Counties	26.0 (16.1)	0 (0)	1.9 (1.2) Stump Pass Beach State Park	24.1 (15.0)

Critical Habitat Unit	Length of Unit in kilometers (miles)	Federal Lands	State Lands	Private and Other (counties and municipalities)
LOGG-T-FL-20: Knight, Don Pedro, and Little Gasparilla Islands, Charlotte County	10.8 (6.7)	0 (0)	1.9 (1.2) Don Pedro Island State Park	8.9 (5.5)
LOGG-T-FL-21: Gasparilla Island, Charlotte and Lee Counties	11.2 (6.9)	0 (0)	1.5 (1.0) Gasparilla Island State Park	9.6 (6.0)
LOGG-T-FL-22: Cayo Costa, Lee County	13.5 (8.4)	0 (0)	13.2 (8.2) Cayo Costa State Park	0.3 (0.2)
LOGG-T-FL-23: Captiva Island, Lee County	7.6 (4.7)	0 (0)	0 (0)	7.6 (4.7)
LOGG-T-FL-24: Sanibel Island West, Lee County	12.2 (7.6)	0 (0)	0 (0)	12.2 (7.6)
LOGG-T-FL-25: Little Hickory Island, Lee and Collier Counties	8.7 (5.4)	0 (0)	0 (0)	8.7 (5.4)
LOGG-T-FL-26: Wiggins Pass — Clam Pass, Collier County	7.7 (4.8)	0 (0)	2.0 (1.2) Delnor-Wiggins Pass State Park	5.7 (3.6)
LOGG-T-FL-27: Clam Pass — Doctors Pass, Collier County	4.9 (3.0)	0 (0)	0 (0)	4.9 (3.0)
LOGG-T-FL-28: Keewaydin Island and Sea Oat Island, Collier County	13.1 (8.1)	0 (0)	12.4 (7.7) Rookery Bay NERR	0.7 (0.5)
LOGG-T-FL-29: Cape Romano, Collier County	9.2 (5.7)	0 (0)	7.2 (4.5) Rookery Bay NERR	2.0 (1.2)

Critical Habitat Unit	Length of Unit in kilometers (miles)	Federal Lands	State Lands	Private and Other (counties and municipalities)
LOGG-T-FL-30: Ten Thousand Islands North, Collier County	7.8 (4.9)	2.9 (1.8) Ten Thousand Islands NWR	4.9 (3.1) Rookery Bay NERR	0 (0)
LOGG-T-FL-31: Highland Beach, Monroe County	7.2 (4.5)	7.2 (4.5) Everglades National Park	0 (0)	0 (0)
LOGG-T-FL-32: Graveyard Creek — Shark Point, Monroe County	0.9 (0.6)	0.9 (0.6) Everglades National Park	0 (0)	0 (0)
LOGG-T-FL-33: Cape Sable, Monroe County	21.3 (13.2)	21.3 (13.2) Everglades National Park	0 (0)	0 (0)
LOGG-T-FL-34: Dry Tortugas, Monroe County	5.7 (3.6)	5.7 (3.6) Dry Tortugas National Park	0 (0)	0 (0)
LOGG-T-FL-35: Marquesas Keys, Monroe County	5.6 (3.5)	5.6 (3.5) Key West NWR	0 (0)	0 (0)
LOGG-T-FL-36: Boca Grande Key, Monroe County	1.3 (0.8)	1.3 (0.8) Key West NWR	0 (0)	0 (0)
LOGG-T-FL-37: Woman Key, Monroe County	1.3 (0.8)	1.3 (0.8) Key West NWR	0 (0)	0 (0)
LOGG-T-FL-38: Perdido Key, Escambia County	20.2 (12.6)	11.0 (6.8) Gulf Islands National Seashore	2.5 (1.6) Perdido Key State Park	6.7 (4.2)
LOGG-T-FL-39: Mexico Beach and St. Joe Beach, Bay and Gulf Counties	18.7 (11.7)	0 (0)	0 (0)	18.7 (11.7)

Critical Habitat Unit	Length of Unit in kilometers (miles)	Federal Lands	State Lands	Private and Other (counties and municipalities)
LOGG-T-FL-40: St. Joseph Peninsula, Gulf County	23.5 (14.6)	0 (0)	15.5 (9.7) T.H. Stone Memorial St. Joseph Peninsula State Park and St. Joe Bay State Buffer Preserve	8.0 (4.9)
LOST-T-FL-41: Cape San Blas, Gulf County	11.0 (6.8)	0 (0)	0.1 (0.1) St. Joseph Bay State Buffer Preserve	10.8 (6.7)
LOGG-T-FL-42: St. Vincent Island, Franklin County	15.1 (9.4)	15.1 (9.4) St. Vincent NWR	0 (0)	0 (0)
LOGG-T-FL-43: Little St. George Island, Franklin County	15.4 (9.6)	0 (0)	15.4 (9.6) Apalachicola NERR	0 (0)
LOGG-T-FL-44: St. George Island, Franklin County:	30.7 (19.1)	0 (0)	14.0 (8.7) Dr. Julian G. Bruce St. George Island State Park	16.7 (10.4)
LOGG-T-FL-45: Dog Island, Franklin County	13.1 (8.1)	0 (0)	0 (0)	13.1 (8.1)
Florida State Totals	**637.1 (396.4)**	**130.3 (81.0)**	**117.4.0 (72.9)**	**390.3 (242.6)**

The primary constituent elements (PCEs) for loggerhead terrestrial critical habitat are those specific elements of the biological and physical features (BPF) that provide for the species' life-history processes and are essential to the conservation of the species. PBFs include those habitat components that support foraging, roosting, and sheltering and the physical features necessary for maintaining the natural processes that support these habitat components. The PBFs and PCEs are described as follows:

Physical and Biological Features (PBF):

PBF 1: Sites for Breeding, Reproduction, or Rearing (or Development) of Offspring

PBF 2: Habitats Protected from Disturbance or Representative of the Historical, Geographic, and Ecological Distributions of the Species

Primary Constituent Elements (PCE):

(1) Suitable nesting beach habitat that has (a) relatively unimpeded nearshore access from the ocean to the beach for nesting females and from the beach to the ocean for both post-nesting females and hatchlings and (b) is located above MHW to avoid being inundated frequently by high tides.

(2) Sand that (a) allows for suitable nest construction, (b) is suitable for facilitating gas diffusion conducive to embryo development, and (c) is able to develop and maintain temperatures and a moisture content conducive to embryo development.

(3) Suitable nesting beach habitat with sufficient darkness to ensure nesting turtles are not deterred from emerging onto the beach and allows hatchlings and post-nesting females to orient successfully to the sea.

(4) Natural coastal processes or artificially created or maintained habitat mimicking natural conditions.

Substantial amounts of sand are deposited along Gulf of Mexico and Atlantic Ocean beaches to protect coastal properties in anticipation of preventing erosion and to mimic what otherwise would be natural processes of overwash and island migration. Constructed beaches tend to differ from natural beaches in several important ways for sea turtles. They are typically wider, flatter, and more compacted, and the sediments are moister than those on natural beaches (Nelson *et al*. 1987; Ackerman *et al.* 1991; Ernest and Martin 1999).

Regarding PCE 1 and PCE 4 for sand placement projects, construction on the beach during sea turtle nesting and hatching season can obstruct nesting females from accessing the beach and hatchlings from entering the water unimpeded. To minimize these impacts, the Corps has agreed to avoid construction during peak nesting and hatching season in the higher density beaches within the entire NWAO DPS of the loggerhead sea turtle as described. This SPBO includes required terms and conditions that minimize incidental take of turtles and reduces the impacts to the PCE 3 by limiting activities at night and placing equipment and staging areas off the nesting beach.

More nests are washed out on the wide, flat beaches resulting from sand placement than narrower steeply sloped natural beaches. This phenomenon may persist through the second postconstruction year and results from the placement of nests near the seaward edge of the beach berm where dramatic profile changes, caused by erosion and scarping occur as the beach equilibrates to a more natural contour.

A study performed for the Florida Department of Environmental Protection (FDEP) promoted the test construction of a more "turtle-friendly" beach. The Service, along with the National Fish and Wildlife Foundation and the Florida Fish and Wildlife Conservation Commission (FWC), began a study to determine if statistically significant improvements in nesting success, nest densities, and/or hatchling production can be achieved through modifications to the traditional construction template for beach nourishment projects. It is anticipated that a more natural beach profile will reduce the incidence of scarping, improve nesting success, and reduce the proportion of nests placed along the seaward portion of the berm (those at increased risk of being lost to erosion

during profile equilibration), relative to a traditionally built beach. The Corps remains committed to incorporating the results of this study into future design templates.

A significantly larger proportion of turtles emerging on engineered beaches abandon their nesting attempts than turtles emerging on natural or prenourished beaches, even though more nesting habitat is available (Trindell *et al*. 1998; Ernest and Martin 1999; Herren 1999), with nesting success approximately 10 to 34 percent lower on nourished beaches than on control beaches during the first year post-nourishment. This reduction in nesting success is most pronounced during the first year following project construction and is most likely the result of changes in physical beach characteristics (beach profile, sediment grain size, beach compaction, frequency and extent of escarpments) associated with the nourishment project (Ernest and Martin 1999). This directly impacts PCE 2 above; however, on severely eroded sections of beach, where little or no suitable nesting habitat exists, and sand placement can result in increased nesting (Ernest and Martin 1999). The placement of sand on a beach with reduced dry foredune habitat 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. In addition, a nourished beach that is designed and constructed to mimic a natural beach system may benefit sea turtles more than the eroding beach it replaces.

Regarding PCE 3, during construction, any lights directly visible on the beach during the nesting and hatching seasons are minimized by shielding and directing the lights downward and away from the nesting beach as required in the Terms and Conditions of this SPBO.

The newly created wider and flatter beach berm exposes sea turtles and their nests to lights that were less visible, or not visible, from nesting areas before the sand placement activity leading to a higher probability of hatchling mortality due to disorientation. Changing to sea turtle compatible lighting can be accomplished at the local level through voluntary compliance or by adopting appropriate regulations. The Terms and Conditions in the Biological Opinion require a lighting survey prior to construction and post construction to determine the additional level of impacts as a result of the proposed project. The Terms and Conditions include working with the local sponsor to minimize the impacts of lighting as a result of the proposed project.

The Service has determined that with the incorporation of the conservation measures as described above, that the proposed projects will not adversely affect nor adversely modify the terrestrial critical habitat of the Northwest Atlantic Ocean loggerhead sea turtle population.

Migratory Birds

In order to comply with the Migratory Bird Treaty Act (16 U.S.C. 701 *et seq*.) and reduce the potential for this project to impact nesting shorebirds, the Corps or the Applicant should follow the latest Florida Fish and Wildlife Conservation Commission (FWC) standard guidelines to protect

against impacts to nesting shorebirds during implementation of this project during the periods from February 15 to August 31.

Consultation History

1980s and 1990s — Beach nourishment projects in Florida began to occur frequently in the late 1980s and early 1990s. During that time, sea turtle protection measures were developed based on research findings available at that time. These measures addressed sand compaction, escarpment formation, and timing restrictions for projects in six south Florida counties with high nesting densities. In the mid-1990s, a sea turtle Biological Opinion (BO) template was developed that included protection measures and information on the status of sea turtles. In 1995, an expanded version of the sea turtle template BO was developed to incorporate new guidance on the required format for BOs and a biological rationale for the Terms and Conditions to be imposed. This document underwent review by four State conservation agencies and the Corps, and was subsequently revised. The primary purposes of the template BO were to: (1) incorporate a standardized format and language required for use in all BOs based on guidance from the Service's Washington Office, (2) assist Service biologists in the preparation of BOs, (3) increase consistency among Service field offices, and (4) increase consistency between the Service and the State agencies.

March 7 and 8, 2006 — The Corps met with the Services' three Florida field office representatives, a representative of the FWC, and a representative of the FDEP. The purpose of that meeting was to begin discussions about a regional consultation for sand placement activities along the coast of Florida and preparation of a PBA for sand placement activities in Florida. In addition to sea turtles, other Federal and state protected species were included in the discussions. At that meeting, the following topics were discussed:

1. Sand placement activities;
2. Sand source and placement methods;
3. Species and habitat;
4. Geographic scope;
5. Information availability; and
6. Minimization of impacts.

July 13, 2006 — A second meeting was held to further discuss the draft PBA. The Service provided the Corps with copies of the latest BO templates for each species to be considered. The Service held conference calls with the species recovery leads during August 2006.

October 16, 2006 The Service received the draft PBA via email from the Corps for sand placement activities along the coast of Florida.

October 27, 2006 The Service provided the Corps with draft comments on the PBA via email.

October 31, 2006 The Corps provided a response to the Service's comments on the PBA via email.

November 9, 2006 The Service and the Corps held a conference call to discuss the comments.

December 20, 2006 The Service sent the Corps a letter with the final comments on the draft PBA.

September 18 and 19, 2007
The Corps met with the Services' three Florida field office representatives, a representative of the FWC, and a representative of the FDEP. The purpose of this meeting was to discuss the Terms and Conditions to be included in the BO.

October 5, 2007 The Service sent the Corps, via email, the modifications to the draft Reasonable and Prudent Measures and Terms and Conditions for the sea turtles and beach mice as discussed in the previous meeting.

November 1, 2007 The Corps provided the Service with comments via email on the revised Reasonable and Prudent Measures and Terms and Conditions for the sea turtles and beach mice.

March 31, 2008 The Service revised the Reasonable and Prudent Measures and Terms and Conditions for the sea turtles and beach mice. The Service also revised the minimization measures for the manatee. The revisions were sent to the Corps.

September 16, 2008 The Service sent the Corps via mail the draft SPBO.

October 2, 2008 The Corps provided the Service via email with a summary of the remaining issues concerning the Reasonable and Prudent Measures and Terms and Conditions for the sea turtles and beach mice.

October 15, 2008 The Service sent the Corps, via email, the modifications to the draft Reasonable and Prudent Measures and Terms and Conditions for the sea turtles and beach mice as discussed in the previous email.

March 11, 2009	The Service received via email examples of previous agreements between the Corps and the local sponsor to carry out the Terms and Conditions in previous BOs.
April 7, 2009	The Service sent an email to the Corps with an update of the progress of our analysis of including piping plovers in the SPBO.
August 26, 2009	The Service sent to the Corps via email the latest Terms and Conditions for sea turtles and beach mice.
September 17, 2009	The Corps sent an email to the Service describing the actions to be taken for the completion and submittal of the PBA.
January 6, 2010	The Corps and the Service participated in a meeting to finalize the draft SPBO.
January 21, 2010	The Corps sent to the Service via email the revised draft PBA.
March 25, 2010	The Corps and the Service participated in an implementation meeting and submittal of the final PBA.
February 22, 2011	The Corps submitted the final PBA to the Service.
April 18, 2011	The Service sent the final Statewide PBO to the Corps.
June 21, 2010	The Corps provided written concerns with the final Statewide PBO
June 30, 2011	The Service revised the final Statewide PBO.
July 18, 2011	The Corps provided written agreement with the changes that were made and asked for additional changes.
July 22, 2011	The Service made additional revisions per the Corps request.
July 25, 2011	The Corps provided written agreement with the additional revisions.
March 25, 2013	The Service published the proposed rule for loggerhead terrestrial critical habitat.
March 3, 2014	The Corps contacted the Service on revising the SPBO to include loggerhead critical habitat in the terrestrial environment.
August 25, 2014	The Service provided the Corps with a Draft Revised SPBO

September 4, 2014	The Corps and Service met and discussed the Draft Revised SPBO at the annual SPBO meeting.
October 23, 2014	The Service received a letter from the Corps requesting the SPBO be revised to include loggerhead critical habitat.
November 3, 2014	The Service sent a draft Revised SPBO to the Corps for review and comment
November 20, 2014	The Corps agreed with the changes made to the draft Revised SPBO
November 24, 2014	The Corps submitted proposed section 7(a)(1) conservation recommendations
January 30, 2014	The Corps and Service agreed on proposed section 7(a)(1) conservation recommendations and finalized draft revised SPBO

This SPBO is based on the PBA, and information provided during meetings and discussions with the Corps' representatives and information from the Florida Fish and Wildlife Conservation Commission's Florida Fish and Wildlife Research Institute (FWC/FWRI) sea turtle databases. A complete administrative record of this consultation is on file in the Service's North Florida, Panama City, and South Florida Ecological Services Offices.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action includes all activities associated with the placement of compatible sediment on beaches of the Atlantic and Gulf coasts of Florida encompassing both South Atlantic Jacksonville (SAJ) and South Atlantic Mobile (SAM) Corps Districts. Additionally, the proposed action includes the replacement and rehabilitation of groins that are included as design components of beach projects for longer retention time and stabilization of associated sediment placed on the beach. This SPBO includes projects authorized through the Corps Regulatory Program, and funded or carried out as part of its Civil Works program. Corps Regulatory activities may include the involvement of other Federal agencies, such as the Department of Defense, Bureau of Ocean Energy Management, and the Federal Emergency Management Agency (FEMA). The shore protection activities covered in the SPBO encompass the following shore protection activities:

1. Sand placement originating from Dredged Material Management Areas (DMMAs), offshore borrow sites, and other compatible sand sources;
2. Sand placement as an associated authorization of sand extraction from the outer continental shelf by the Bureau of Ocean Energy Management;

3. Sand washed onto the beach from being placed in the swash zone;
4. Sand by-passing/back-passing (sand discharge on beach);
5. Current Operations and Maintenance (O&M) dredging of navigation channels with beach disposal (does not include new navigation projects or expansion (deepening or widening) of existing authorized navigation projects); and
6. Groins and jetty repair or replacement.

For nearshore borrow sites, the Corps must provide information to the Service on the sand flow when this sand is removed from these nearshore areas. If removal of sand from these nearshore areas is shown to cause increased erosion on the adjacent beach, a separate consultation will be required.

A detailed description of each activity is found in the final PBA. The history of shore protection activities throughout the Atlantic and Gulf Coasts of Florida is extensive and consists of a myriad of actions performed by local, State, and Federal entities. Future beach placement actions addressed in this SPBO may include maintenance of these existing projects or beaches that have not experienced a history of beach placement activities.

The Service and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) share Federal jurisdiction for sea turtles under the Act. The Service has responsibility for sea turtles on the nesting beach. NMFS has jurisdiction for sea turtles in the marine environment. This SPBO only addresses activities that may impact nesting sea turtles, their nests and eggs, and hatchlings as they emerge from the nest and crawl to the sea. NMFS will assess and consult with the Corps concerning potential impacts to sea turtles in the marine environment and the shoreline updrift and downdrift area of the project.

Corps Commitments as listed in the final PBA

The following paragraph from the final PBA summarizes the Corps' Commitments as listed below:

"For Corps projects, please note that "fish and wildlife enhancement" activities (which are beyond mitigation of project impacts) must be authorized as a project purpose or project feature or must be otherwise approved through Corps headquarters (Engineer Regulation ER 1105-2-100 Appendix G, Amendment #1, 30 Jun 2004). At the present time, no beach fill placement or shore protection activity in Florida has fish and wildlife enhancement as a project purpose or project feature. Since adding fish and wildlife enhancement as a project purpose or feature is not a budgetary priority (ER 1105-2-100 22 Apr 2000, Appendix C, part C-3b.(3)), authorization and funding for such is not expected."

<u>Sea Turtles</u>

1. Avoid construction during the peak nesting and hatching season in the higher density beaches, and to the maximum extent practicable during all other nesting times and locations;

2. Except for O&M disposal actions, implement sea turtle nest monitoring and relocation plan during construction if nesting window cannot be adhered to;

3. Except for O&M disposal actions, escarpments that are identified prior to or during the nesting season that interfere with sea turtle nesting (exceed 18 inches in height for a distance of 100 feet) can be leveled to the natural beach for a given area. If it is determined that escarpment leveling is required during the nesting or hatching season, leveling actions should be directed by the Service. For Corps Civil Works projects, leveling of escarpments would be limited to the term of the construction or as otherwise may be authorized and funded;

4. Placement of pipe parallel to the shoreline and as far landward as possible so that a significant portion of available nesting habitat can be utilized, nest placement is not subject to inundation or washout, and turtles do not become trapped landward of the pipe;

5. Temporary storage of pipes and equipment will be located off the beach to the maximum extent possible;

6. The Corps will continue to work with the FDEP to identify aspects of beach nourishment construction templates that negatively impact sea turtles and develop and implement alternative design criteria that may minimize these impacts;

7. Except for O&M disposal actions, Service compaction assessment guidelines will be followed and tilling will be performed where appropriate. For Corps Civil Works projects, assessment of compaction and tilling will be limited to the term of the construction or as otherwise may be authorized and funded; and

8. All lighting associated with project construction will be minimized to the maximum extent possible, through reduction, shielding, angling, etc., while maintaining compliance with all Corps, U.S. Coast Guard, and OSHA safety requirements.

<u>Beach Mice</u>

1. Pipeline routes for beach construction projects will avoid identified primary constituent elements for beach mouse critical habitat to the maximum extent practicable;

2. Implementation of a trapping and relocation plan if avoidance alternatives of occupied habitat are not practical; and

3. Implementation of a lighting plan to reduce, shield, lower, angle, etc. light sources in order to minimize illumination impacts on nocturnal beach mice during construction.

Action Area

The Service has described the action area to include sandy beaches of the Atlantic Coast of Florida (Key West to Fernandina/Kings Bay) and the Gulf Coast (Ten Thousand Islands to Alabama State

Line) for reasons that will be explained and discussed in the "EFFECTS OF THE ACTION" section of this consultation.

Underlying Dynamics of a Barrier Island

Of all the states and provinces in North America, Florida is most intimately linked with the sea. Florida's 1,200-mile coastline (exclusive of the Keys) is easily the longest in the continental U.S. Of the 1,200 miles, 745 miles are sandy and mostly in the form of barrier islands. The coastline is dynamic and constantly changing as a result of waves, wind, tides, currents, sea level change, and storms. The entire state lies within the coastal plain, with a maximum elevation of about 400 feet, and no part is more than 60 miles from the Atlantic Ocean or Gulf of Mexico.

The east coast of Florida consists of a dynamic shoreline, with a relatively sloped berm, coarse-grained sand, and moderate to high surf (Witherington 1986). The southeast coast of Florida consists of continuous, narrow, sandy barrier islands bordering a narrow continental shelf (Wanless and Maier 2007). The dynamics of the east coast shoreline are due to the occurrence of storm surges and seas from tropical storms that occur mainly during August through early October. More erosion events can also occur during late September through March due to nor'easters. The impacts of these two types of storms may vary from event to event and year to year.

Northwest (panhandle) and Southwest Florida beaches are considered to be low energy beaches with a gradual offshore slope and low sloped fine grained quartz sand beaches. As along the east coast of Florida, the shoreline dynamics are shaped by tropical storms and hurricanes. Although Gulf beaches may experience winter erosion, they are largely protected from the severe nor'easters.

Coasts with greater tidal ranges are more buffered against storm surges than are those with low tidal ranges, except when the storm strikes during high tide. Mean tidal ranges decrease southward along the Atlantic coast from a mean of seven feet at the Florida-Georgia line to less than two feet in Palm Beach County. The mean tidal range along the Gulf Coast is less than three feet (microtidal) except in the extreme south where it ranges from three to four feet. Because of its lower elevation and lower wave energy regime, the West Coast of the peninsula is subject to greater changes during storm events than is the east coast.

Microtidal coasts have a high vulnerability to sea level rise and barrier islands respond by migrating landward. Migration occurs as a result of overwash from extreme storms that flatten topography and deposit sand on the backside of the island, extending the island landward (Young 2007). Significant widening can occur from a single storm event. For example, Dauphin Island, a barrier island in Alabama, has nearly doubled its width following Hurricanes Ivan and Katrina in 2004 and 2005, respectively.

Sea level has risen globally approximately 7.1 inches in the past century (Douglas 1997). Climate models predict a doubling of the rate of sea level rise over the next 100 years (Pendleton *et al.* 2004). Recent studies indicate a trend toward increasing hurricane number and intensity (Emanuel

2005, Webster *et al.* 2005). Barrier islands need to be able to move and respond to these conditions. By locking in a barrier island's location with infrastructure, the island loses its ability to migrate to higher elevations which can lead to its eventual collapse (Moore 2007).

Overwash from less intense storms can positively affect island topography. Low natural berms can develop along beach fronts, but generally can be exceeded by overwash from frontal storms. The berm is an accretionary feature at the landward extreme of wave influence. Sediment is transported over the berm crest and is deposited in a nearshore overwash fan and in breach corridors. Overwash deposition provides source sand for re-establishing dunes. Onshore winds transport the sediment from overwash fans to the dunes, gradually building back dune elevation during storm-free periods.

The interaction between the biology and geomorphology of barrier islands is complex. Just as the barrier island undergoes a process of continual change, so do the ecological communities present. Vegetation zones gradually re-establish following storms, and in turn affect physical processes such as sand accretion, erosion, and overwash. The beach front, dunes, and overwash areas all provide important habitat components. Many barrier island species are adapted to respond positively to periodic disturbance. As the island widens, new feeding habitat (sand/mud flats) is created for shorebirds such as the piping plover. The beaches provide nesting habitat for sea turtles. Early colonizer plants are favored as a food source by beach mice. These barrier island habitats are becoming increasingly rare as our Nation's coastlines rapidly develop and are stabilized.

SEA TURTLES

STATUS OF THE SPECIES/CRITICAL HABITAT

The Service and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) share Federal jurisdiction for sea turtles under the Act. The Service has responsibility for sea turtles on the nesting beach. NMFS has jurisdiction for sea turtles in the marine environment. This SPBO addresses nesting sea turtles, their nests and eggs, and hatchlings as they emerge from the nest and crawl to the sea. Five species of sea turtles are analyzed in this SPBO: the loggerhead, green, leatherback, hawksbill, and Kemp's ridley.

Loggerhead Sea Turtle

The loggerhead sea turtle was federally listed as a threatened species on July 28, 1978 (43 *Federal Register* [*FR*] 32800). The Service and the National Marine Fisheries Service (NMFS) listed the Northwest Atlantic Ocean distinct population segment (DPS) of the loggerhead sea turtle as threatened on September 22, 2011 (76 *FR* 58868). The loggerhead occurs throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans.

The loggerhead sea turtle grows to an average weight of about 200 pounds and is characterized by a large head with blunt jaws. Adults and subadults have a reddish-brown carapace. Scales on the top of the head and top of the flippers are also reddish-brown with yellow on the borders. Hatchlings are a dull brown color (NMFS 2009a). The loggerhead feeds on mollusks, crustaceans, fish, and other marine animals.

The loggerhead may be found hundreds of miles out to sea, as well as in inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers. Coral reefs, rocky places, and ship wrecks are often used as feeding areas.

Within the Northwest Atlantic, the majority of nesting activity occurs from April through September, with a peak in June and July (Williams-Walls *et al*. 1983, Dodd 1988, Weishampel *et al*. 2006). Nesting occurs within the Northwest Atlantic along the coasts of North America, Central America, northern South America, the Antilles, Bahamas, and Bermuda, but is concentrated in the southeastern U.S. and on the Yucatán Peninsula in Mexico on open beaches or along narrow bays having suitable sand (Sternberg 1981, Ehrhart 1989, Ehrhart *et al*. 2003, NMFS and Service 2008).

Critical habitat has been designated for the NWAO DPS of the loggerhead sea turtle. **Table 4** has the list of the critical habitat units within the project area.

Green Sea Turtle

The green sea turtle was federally listed on July 28, 1978 (43 *FR* 32800). Breeding populations of the green turtle in Florida and along the Pacific Coast of Mexico are listed as endangered; all other populations are listed as threatened. The green sea turtle has a worldwide distribution in tropical and subtropical waters.

The green sea turtle grows to a maximum size of about four feet and a weight of 440 pounds. It has a heart-shaped shell, small head, and single-clawed flippers. The carapace is smooth and colored gray, green, brown and black. Hatchlings are black on top and white on the bottom (NMFS 2009b). Hatchling green turtles eat a variety of plants and animals, but adults feed almost exclusively on seagrasses and marine algae.

Major green turtle nesting colonies in the Atlantic occur on Ascension Island, Aves Island, Costa Rica, and Surinam. Within the U.S., green turtles nest in small numbers in the U.S. Virgin Islands and Puerto Rico, and in larger numbers along the east coast of Florida, particularly in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties (NMFS and Service 1991). Nesting also has been documented along the Gulf coast of Florida from Escambia County through Santa Rosa County in northwest Florida and from Pinellas County through Collier County in southwest Florida (FWC 2009a).

Most green turtles spend the majority of their lives in coastal foraging grounds. These areas include fairly shallow waters both open coastline and protected bays and lagoons. While in these

areas, green turtles rely on marine algae and seagrass as their primary diet constituents, although some populations also forage heavily on invertebrates. These marine habitats are often highly dynamic and in areas with annual fluctuations in seawater and air temperatures, which can cause the distribution and abundance of potential green turtle food items to vary substantially between seasons and years (Carballo *et al.*, 2002). Many prey species that are abundant during winter and spring periods become patchy during warm summer periods. Some species may altogether vanish during extreme temperatures, such as those that occur during El Niño Southern Oscillation events (Carballo *et al.*, 2002).

Open beaches with a sloping platform and minimal disturbance are required for nesting.

Critical habitat for the green sea turtle has been designated for the waters surrounding Culebra Island, Puerto Rico, and its outlying keys.

Leatherback Sea Turtle

The leatherback sea turtle was federally listed as an endangered species on June 2, 1970 (35 *FR* 8491). Leatherbacks have the widest distribution of the sea turtles; nonbreeding animals have been recorded as far north as the British Isles and the Maritime Provinces of Canada and as far south as Argentina and the Cape of Good Hope (Pritchard 1992). Foraging leatherback excursions have been documented into higher-latitude subpolar waters. They have evolved physiological and anatomical adaptations (Frair *et al.* 1972, Greer *et al.* 1973) that allow them to exploit waters far colder than any other sea turtle species would be capable of surviving.

The adult leatherback can reach four to eight feet in length and weigh 500 to 2,000 pounds. The carapace is distinguished by a rubber-like texture, about 1.6 inches thick, made primarily of tough, oil-saturated connective tissue. Hatchlings are dorsally mostly black and are covered with tiny scales; the flippers are edged in white, and rows of white scales appear as stripes along the length of the back (NMFS 2009c). Jellyfish are the main staple of its diet, but it is also known to feed on sea urchins, squid, crustaceans, tunicates, fish, blue-green algae, and floating seaweed. This is the largest, deepest diving of all sea turtle species.

Leatherback turtle nesting grounds are distributed worldwide in the Atlantic, Pacific and Indian Oceans on beaches in the tropics and sub-tropics. The Pacific Coast of Mexico historically supported the world's largest known concentration of nesting leatherbacks.

The leatherback turtle regularly nests in the U.S. Caribbean in Puerto Rico and the U.S. Virgin Islands. Along the U.S. Atlantic coast, most nesting occurs in Florida (NMFS and Service 1992). Leatherback nesting has also been reported on the northwest coast of Florida (LeBuff 1990, FWC 2009a); and in southwest Florida a false crawl (nonnesting emergence) has been observed on Sanibel Island (LeBuff 1990). Nesting has also been reported in Georgia, South Carolina, and North Carolina (Rabon *et al.* 2003) and in Texas (Shaver 2008).

Adult females require sandy nesting beaches backed with vegetation and sloped sufficiently so the distance to dry sand is limited. Their preferred beaches have proximity to deep water and generally rough seas.

Marine and terrestrial critical habitat for the leatherback sea turtle has been designated at Sandy Point on the western end of the island of St. Croix, U.S. Virgin Islands (50 Code of Federal Regulations (CFR) 17.95).

Hawksbill Sea Turtle

The hawksbill sea turtle was federally listed as an endangered species on June 2, 1970 (35 *FR* 8491). The hawksbill is found in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. The species is widely distributed in the Caribbean Sea and western Atlantic Ocean.

Data collected in the Wider Caribbean reported that hawksbills typically weigh around 176 pounds or less; hatchlings average about 1.6 inches straight length and range in weight from 0.5 to 0.7 ounces. The carapace is heart shaped in young turtles, and becomes more elongated or egg-shaped with maturity. The top scutes are often richly patterned with irregularly radiating streaks of brown or black on an amber background. The head is elongated and tapers sharply to a point. The lower jaw is V-shaped (NMFS 2009d).

Within the continental U.S., hawksbill sea turtle nesting is rare and is restricted to the southeastern coast of Florida (Volusia through Miami-Dade Counties) and the Florida Keys (Monroe County) (Meylan 1992, Meylan *et al.* 1995). However, hawksbill tracks are difficult to differentiate from those of loggerheads and may not be recognized by surveyors. Therefore, surveys in Florida likely underestimate actual hawksbill nesting numbers (Meylan *et al.* 1995). In the U.S. Caribbean, hawksbill nesting occurs on beaches throughout Puerto Rico and the U.S. Virgin Islands (NMFS and Service 1993).

Critical habitat for the hawksbill sea turtle has been designated for selected beaches and/or waters of Mona, Monito, Culebrita, and Culebra Islands, Puerto Rico.

Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle was federally listed as endangered on December 2, 1970 (35 *FR* 18320). The Kemp's ridley, along with the flatback sea turtle (*Natator depressus*), has the most geographically restricted distribution of any sea turtle species. The range of the Kemp's ridley includes the Gulf coasts of Mexico and the U.S., and the Atlantic coast of North America as far north as Nova Scotia and Newfoundland.

Adult Kemp's ridleys, considered the smallest sea turtle in the world, weigh an average of 100 pounds with a carapace measuring between 24-28 inches in length. The almost circular carapace has a grayish green color while the plastron is pale yellowish to cream in color. The carapace is often as wide as it is long. Their diet consists mainly of swimming crabs, but may also include fish, jellyfish, and an array of mollusks.

The majority of nesting for the entire species occurs on the primary nesting beach at Rancho Nuevo, Mexico (Marquez-Millan 1994). Outside of nesting, adult Kemp's ridleys are believed to spend most of their time in the Gulf of Mexico, while juveniles and subadults also regularly occur along the eastern seaboard of the U.S. (Service and NMFS 1992). There have been rare instances when immature ridleys have been documented making transatlantic movements (Service and NMFS 1992). It was originally speculated that ridleys that make it out of the Gulf of Mexico might be lost to the breeding population (Hendrickson 1980), but data indicate that many of these

turtles are capable of moving back into the Gulf of Mexico (Henwood and Ogren 1987). In fact, there are documented cases of ridleys captured in the Atlantic that migrated back to the nesting beach at Rancho Nuevo (Schmid and Witzell 1997, Schmid 1998, Witzell 1998).

Hatchlings, after leaving the nesting beach, are believed to become entrained in eddies within the Gulf of Mexico, where they are dispersed within the Gulf and Atlantic by oceanic surface currents until they reach about 7.9 inches in length, at which size they enter coastal shallow water habitats (Ogren 1989).

No critical habitat has been designated for the Kemp's ridley sea turtle.

Life history

Loggerhead Sea Turtle

Loggerheads are long-lived, slow-growing animals that use multiple habitats across entire ocean basins throughout their life history. This complex life history encompasses terrestrial, nearshore, and open ocean habitats. The three basic ecosystems in which loggerheads live are the:

1. Terrestrial zone (supralittoral) - the nesting beach where both oviposition (egg laying) and embryonic development and hatching occur.

2. Neritic zone - the inshore marine environment (from the surface to the sea floor) where water depths do not exceed 656 feet (200 meters). The neritic zone generally includes the continental shelf, but in areas where the continental shelf is very narrow or nonexistent, the neritic zone conventionally extends to areas where water depths are less than 656 feet.

3. Oceanic zone - the vast open ocean environment (from the surface to the sea floor) where water depths are greater than 656 feet.

Maximum intrinsic growth rates of sea turtles are limited by the extremely long duration of the juvenile stage and fecundity. Loggerheads require high survival rates in the juvenile and adult stages, common constraints critical to maintaining long-lived, slow-growing species, to achieve positive or stable long-term population growth (Congdon *et al.* 1993, Heppell 1998, Crouse 1999, Heppell *et al.* 1999, 2003, Musick 1999).

The generalized life history of Atlantic loggerheads is shown in **Figure 1** (from Bolten 2003).

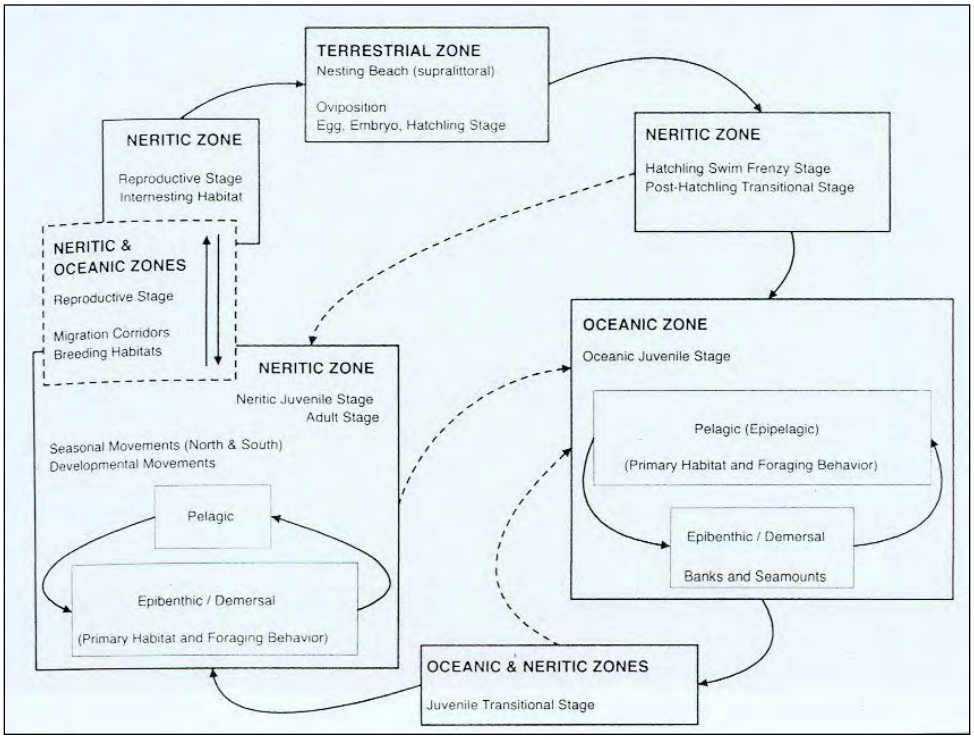

Figure 1. Life history stages of a loggerhead turtle. The boxes represent life stages and the corresponding ecosystems, solid lines represent movements between life stages and ecosystems, and dotted lines are speculative (Bolten 2003).

Numbers of nests and nesting females are often highly variable from year to year due to a number of factors including environmental stochasticity, periodicity in ocean conditions, anthropogenic effects, and density-dependent and density-independent factors affecting survival, somatic growth, and reproduction (Meylan 1982, Hays 2000, Chaloupka 2001, Solow *et al.* 2002). Despite these sources of variation, and because female turtles exhibit strong nest site fidelity, a nesting beach survey can provide a valuable assessment of changes in the adult female population, provided that the study is sufficiently long and effort and methods are standardized (Meylan 1982, Gerrodette and Brandon 2000, Reina *et al*. 2002). **Table 4** summarizes key life history characteristics for loggerheads nesting in the U.S.

Table 5. Typical values of life history parameters for loggerheads nesting in the U.S. (NMFS and Service 2008).

Life History Trait	Data
Clutch size (mean)	100-126 eggs[1]
Incubation duration (varies depending on time of year and latitude)	Range = 42-75 days[2,3]
Pivotal temperature (incubation temperature that produces an equal number of males and females)	84˚F[5]
Nest productivity (emerged hatchlings/total eggs) x 100 (varies depending on site specific factors)	45-70 percent[2,6]
Clutch frequency (number of nests/female/season)	3-4 nests[7]
Internesting interval (number of days between successive nests within a season)	12-15 days[8]
Juvenile (<34 inches Curved Carapace Length) sex ratio	65-70 percent female[4]
Remigration interval (number of years between successive nesting migrations)	2.5-3.7 years[9]
Nesting season	late April-early September
Hatching season	late June-early November
Age at sexual maturity	32-35 years[10]
Life span	>57 years[11]

[1] Dodd (1988).
[2] Dodd and Mackinnon (1999, 2000, 2001, 2002, 2003, 2004).
[3] Witherington (2006) (information based on nests monitored throughout Florida beaches in 2005, n = 865).
[4] National Marine Fisheries Service (2001); Foley (2005).
[5] Mrosovsky (1988).
[6] Witherington (2006) (information based on nests monitored throughout Florida beaches in 2005, n = 1,680).
[7] Murphy and Hopkins (1984); Frazer and Richardson (1985); Hawkes *et al*. 2005; Scott 2006.
[8] Caldwell (1962), Dodd (1988).
[9] Richardson *et al.* (1978); Bjorndal *et al.* (1983).
[10] Snover (2005).
[11] Dahlen *et al.* (2000).

Loggerheads nest on ocean beaches and occasionally on estuarine shorelines with suitable sand. Nests are typically laid between the high tide line and the dune front (Routa 1968, Witherington

1986, Hailman and Elowson 1992). Wood and Bjorndal (2000) evaluated four environmental factors (slope, temperature, moisture, and salinity) and found that slope had the greatest influence on loggerhead nest-site selection on a beach in Florida. Loggerheads appear to prefer relatively narrow, steeply sloped, coarse-grained beaches, although nearshore contours may also play a role in nesting beach site selection (Mortimer 1982; Provancha and Ehrhart 1987).

The warmer the sand surrounding the egg chamber, the faster the embryos develop (Mrosovsky and Yntema 1980). Sand temperatures prevailing during the middle third of the incubation period also determine the sex of hatchling sea turtles (Mrosovsky and Yntema 1980). Incubation temperatures near the upper end of the tolerable range produce only female hatchlings while incubation temperatures near the lower end of the tolerable range produce only male hatchlings.

Loggerhead hatchlings pip and escape from their eggs over a one to three day interval and move upward and out of the nest over a two to four day interval (Christens 1990). The time from pipping to emergence ranges from four to seven days with an average of 4.1 days (Godfrey and Mrosovsky 1997). Hatchlings emerge from their nests en masse almost exclusively at night, and presumably using decreasing sand temperature as a cue (Hendrickson 1958, Mrosovsky 1968, Witherington *et al.* 1990). Moran *et al*. (1999) concluded that a lowering of sand temperatures below a critical threshold, which most typically occurs after nightfall, is the most probable trigger for hatchling emergence from a nest. After an initial emergence, there may be secondary emergences on subsequent nights (Carr and Ogren 1960, Witherington 1986, Ernest and Martin 1993, Houghton and Hays 2001).

Hatchlings use a progression of orientation cues to guide their movement from the nest to the marine environments where they spend their early years (Lohmann and Lohmann 2003). Hatchlings first use light cues to find the ocean. On naturally lighted beaches without artificial lighting, ambient light from the open sky creates a relatively bright horizon compared to the dark silhouette of the dune and vegetation landward of the nest. This contrast guides the hatchlings to the ocean (Daniel and Smith 1947, Limpus 1971, Salmon *et al.* 1992, Witherington and Martin 1996, Witherington 1997, Stewart and Wyneken 2004).

Loggerheads in the Northwest Atlantic display complex population structure based on life history stages. Based on mitochondrial deoxyribonucleic acid (mtDNA), oceanic juveniles show no structure, neritic juveniles show moderate structure and nesting colonies show strong structure (Bowen *et al*. 2005). In contrast, a survey using microsatellite (nuclear) markers showed no significant population structure among nesting populations (Bowen *et al*. 2005), indicating that while females exhibit strong philopatry, males may provide an avenue of gene flow between nesting colonies in this region.

Green Sea Turtle

Green sea turtles deposit from one to nine clutches within a nesting season, but the overall average is about 3.3 nests. The interval between nesting events within a season varies around a mean of about 13 days (Hirth 1997). Mean clutch size varies widely among populations. Average clutch size reported for Florida was 136 eggs in 130 clutches (Witherington and Ehrhart 1989). Only occasionally do females produce clutches in successive years. Usually two or more years intervene between breeding seasons (NMFS and Service 1991). Age at sexual maturity is believed to be 20 to 50 years (Hirth 1997).

Leatherback Sea Turtle

Leatherbacks nest an average of five to seven times within a nesting season, with an observed maximum of 11 nests (NMFS and Service 1992). The interval between nesting events within a season is about nine to 10 days. Clutch size averages 80 to 85 yolked eggs, with the addition of usually a few dozen smaller, yolkless eggs, mostly laid toward the end of the clutch (Pritchard 1992). Nesting migration intervals of two to three years were observed in leatherbacks nesting on the Sandy Point National Wildlife Refuge, St. Croix, U.S. Virgin Islands (McDonald and Dutton 1996). Leatherbacks are believed to reach sexual maturity in six to 10 years (Zug and Parham 1996).

Hawksbill Sea Turtle

Hawksbills nest on average about 4.5 times per season at intervals of approximately 14 days (Corliss *et al.* 1989). In Florida and the U.S. Caribbean, clutch size is approximately 140 eggs, although several records exist of over 200 eggs per nest (NMFS and Service 1993). On the basis of limited information, nesting migration intervals of two to three years appear to predominate. Hawksbills are recruited into the reef environment at about 14 inches in length and are believed to begin breeding about 30 years later. However, the time required to reach 14 inches in length is unknown and growth rates vary geographically. As a result, actual age at sexual maturity is unknown.

Kemp's Ridley Sea Turtle

Nesting occurs from April into July during which time the turtles appear off the Tamaulipas and Veracruz coasts of Mexico. Precipitated by strong winds, the females swarm to mass nesting emergences, known as "arribadas or arribazones," to nest during daylight hours. The period between Kemp's ridley arribadas averages approximately 25 days (Rostal *et al.* 1997), but the precise timing of the arribadas is highly variable and unpredictable (Bernardo and Plotkin 2007). Clutch size averages 100 eggs and eggs typically take 45 to 58 days to hatch depending on temperatures (Marquez-Millan 1994, Rostal 2007).

Some females breed annually and nest an average of one to four times in a season at intervals of 10 to 28 days. Analysis by Rostal (2007) suggested that ridley females lay approximately 3.1 nests per nesting season. Interannual remigration rate for female ridleys is estimated to be

approximately 1.8 (Rostal 2007) to 2.0 years (Marquez-Millan *et al.* 1989). Age at sexual maturity is believed to be between 10 to 17 years (Snover *et al*. 2007).

Population dynamics

Loggerhead Sea Turtle

The loggerhead occurs throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. However, the majority of loggerhead nesting is at the western rims of the Atlantic and Indian Oceans. The most recent reviews show that only two loggerhead nesting beaches have greater than 10,000 females nesting per year (Baldwin *et al.* 2003, Ehrhart *et al.* 2003, Kamezaki *et al.* 2003, Limpus and Limpus 2003, Margaritoulis *et al.* 2003): South Florida (U.S.) and Masirah (Oman). Those beaches with 1,000 to 9,999 females nesting each year are Georgia through North Carolina (U.S.), Quintana Roo and Yucatán (Mexico), Cape Verde Islands (Cape Verde, eastern Atlantic off Africa), and Western Australia (Australia). Smaller nesting aggregations with 100 to 999 nesting females annually occur in the Northern Gulf of Mexico (U.S.), Dry Tortugas (U.S.), Cay Sal Bank (Bahamas), Sergipe and Northern Bahia (Brazil), Southern Bahia to Rio de Janerio (Brazil), Tongaland (South Africa), Mozambique, Arabian Sea Coast (Oman), Halaniyat Islands (Oman), Cyprus, Peloponnesus (Greece), Island of Zakynthos (Greece), Turkey, Queensland (Australia), and Japan.

The loggerhead is commonly found throughout the North Atlantic including the Gulf of Mexico, the northern Caribbean, the Bahamas archipelago, and eastward to West Africa, the western Mediterranean, and the west coast of Europe.

The major nesting concentrations in the U.S. are found in South Florida. However, loggerheads nest from Texas to Virginia. Total estimated nesting in Florida, where 90 percent of nesting occurs, has fluctuated between 52,374 and 98,602 nests per year from 2009-2013 (FWC 2014, http://myfwc.com/media/2786250/loggerheadnestingdata09-13.pdf). About 80 percent of loggerhead nesting in the southeast U.S. occurs in six Florida counties (Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties). Adult loggerheads are known to make considerable migrations between foraging areas and nesting beaches (Schroeder *et al.* 2003, Foley *et al.* 2008). During non-nesting years, adult females from U.S. beaches are distributed in waters off the eastern U.S. and throughout the Gulf of Mexico, Bahamas, Greater Antilles, and Yucatán.

From a global perspective, the U.S. nesting aggregation is of paramount importance to the survival of the species as is the population that nests on islands in the Arabian Sea off Oman (Ross 1982, Ehrhart 1989). The status of the Oman loggerhead nesting population, reported to be the largest in the world (Ross 1979), is uncertain because of the lack of long-term standardized nesting or foraging ground surveys and its vulnerability to increasing development pressures near major nesting beaches and threats from fisheries interaction on foraging grounds and migration routes (Possardt 2005). The loggerhead nesting aggregations in Oman and the U.S. account for the majority of nesting worldwide.

Green Sea Turtle

The majority of nesting occurs along the Atlantic coast of eastern central Florida, with an average of 10,377 each year from 2008 to 2012 (B. Witherington, Florida Fish and Wildlife Conservation Commission, pers. comm., 2013). In the U.S. Pacific, over 90 percent of nesting throughout the Hawaiian archipelago occurs at the French Frigate Shoals, where about 200 to 700 females nest each year (NMFS and Service 1998b). Elsewhere in the U.S. Pacific, nesting takes place at scattered locations in the Commonwealth of the Northern Marianas, Guam, and American Samoa. In the western Pacific, the largest green turtle nesting aggregation in the world occurs on Raine Island, Australia, where thousands of females nest nightly in an average nesting season (Limpus *et al.* 1993). In the Indian Ocean, major nesting beaches occur in Oman where 30,000 females are reported to nest annually (Ross and Barwani 1995).

Leatherback Sea Turtle

A dramatic drop in nesting numbers has been recorded on major nesting beaches in the Pacific. Spotila *et al.* (2000) have highlighted the dramatic decline and possible extirpation of leatherbacks in the Pacific.

The East Pacific and Malaysia leatherback populations have collapsed. Spotila *et al.* (1996) estimated that only 34,500 females nested annually worldwide in 1995, which is a dramatic decline from the 115,000 estimated in 1980 (Pritchard 1982). In the eastern Pacific, the major nesting beaches occur in Costa Rica and Mexico. At Playa Grande, Costa Rica, considered the most important nesting beach in the eastern Pacific, numbers have dropped from 1,367 leatherbacks in 1988-1989 to an average of 188 females nesting between 2000-2001 and 2003-2004. In Pacific Mexico, 1982 aerial surveys of adult female leatherbacks indicated this area had become the most important leatherback nesting beach in the world. Tens of thousands of nests were laid on the beaches in 1980s, but during the 2003-2004 seasons a total of 120 nests was recorded. In the western Pacific, the major nesting beaches lie in Papua New Guinea, Papua, Indonesia, and the Solomon Islands. These are some of the last remaining significant nesting assemblages in the Pacific. Compiled nesting data estimated approximately 5,000 to 9,200 nests annually with 75 percent of the nests being laid in Papua, Indonesia.

However, the most recent population size estimate for the North Atlantic alone is a range of 34,000 to 94,000 adult leatherbacks (TEWG 2007). In Florida, the number of nests has been increasing since 1979 (Stewart *et al.* 2011). The average annual number of nests in the 1980s was 63 nests, which rose to 263 nests in the 1990s and to 754 nests in the 2000s (Stewart *et al.* 2011). In 2012, 1,712 nests were recorded statewide (http://myfwc.com/research/wildlife/sea-turtles/nesting/).

Nesting in the Southern Caribbean occurs in the Guianas (Guyana, Suriname, and French Guiana), Trinidad, Dominica, and Venezuela. The largest nesting populations at present occur in the western Atlantic in French Guiana with nesting varying between a low of 5,029 nests in 1967 to a high of 63,294 nests in 2005, which represents a 92 percent increase since 1967 (TEWG 2007). Trinidad supports an estimated 6,000 leatherbacks nesting annually, which represents more than 80

percent of the nesting in the insular Caribbean Sea. Leatherback nesting along the Caribbean Central American coast takes place between Honduras and Colombia. In Atlantic Costa Rica, at Tortuguero, the number of nests laid annually between 1995 and 2006 was estimated to range from 199 to 1,623.

In Puerto Rico, the main nesting areas are at Fajardo on the main island of Puerto Rico and on the island of Culebra. Between 1978 and 2005, annual population growth rate was estimated to be 1.10 percent (TEWG 2007). Recorded leatherback nesting on the Sandy Point National Wildlife Refuge on the island of St. Croix, U.S. Virgin Islands between 1990 and 2005, ranged from a low of 143 in 1990 to a high of 1,008 in 2001 (Garner *et al*. 2005). In the British Virgin Islands, annual nest numbers have increased in Tortola from zero to six nests per year in the late 1980s to 35 to 65 nests per year in the 2000s (TEWG 2007).

The most important nesting beach for leatherbacks in the eastern Atlantic lies in Gabon, Africa. It was estimated there were 30,000 nests along 60 miles of Mayumba Beach in southern Gabon during the 1999-2000 nesting season (Billes *et al*. 2000). Some nesting has been reported in Mauritania, Senegal, the Bijagos Archipelago of Guinea-Bissau, Turtle Islands and Sherbro Island of Sierra Leone, Liberia, Togo, Benin, Nigeria, Cameroon, Sao Tome and Principe, continental Equatorial Guinea, Islands of Corisco in the Gulf of Guinea and the Democratic Republic of the Congo, and Angola. In addition, a large nesting population is found on the island of Bioko (Equatorial Guinea) (Fretey *et al*. 2007). .

Hawksbill Sea Turtle

About 15,000 females are estimated to nest each year throughout the world with the Caribbean accounting for 20 to 30 percent of the world's hawksbill population. Only five regional populations remain with more than 1,000 females nesting annually (Seychelles, Mexico, Indonesia, and two in Australia) (Meylan and Donnelly 1999). Mexico is now the most important region for hawksbills in the Caribbean with about 3,000 nests per year (Meylan 1999). In the U.S. Pacific, hawksbills nest only on main island beaches in Hawaii, primarily along the east coast of the island of Hawaii. Hawksbill nesting has also been documented in American Samoa and Guam (NMFS and Service 1998c).

Kemp's Ridley Sea Turtle

Most Kemp's ridleys nest on the coastal beaches of the Mexican states of Tamaulipas and Veracruz, although a small number of Kemp's ridleys nest consistently along the Texas coast (TEWG 1998). In addition, rare nesting events have been reported in Alabama, Florida, Georgia, South Carolina, and North Carolina. Historical information indicates that tens of thousands of ridleys nested near Rancho Nuevo, Mexico, during the late 1940s (Hildebrand 1963). The Kemp's ridley population experienced a devastating decline between the late 1940s and the mid 1980s. The total number of nests per nesting season at Rancho Nuevo remained below 1,000 throughout the 1980s, but gradually began to increase in the 1990s. In 2009, 16,273 nests were documented along the 18.6 miles of coastline patrolled at Rancho Nuevo, and the total number of nests

documented for all the monitored beaches in Mexico was 21,144 (Service 2009). In 2010, a total of 13,302 nests were documented in Mexico (Service 2010). In addition, 207 and 153 nests were recorded during 2009 and 2010, respectively, in the U.S., primarily in Texas.

Status and distribution

Loggerhead Sea turtle

Five recovery units have been identified in the Northwest Atlantic based on genetic differences and a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries (NMFS and Service 2008). Recovery units are subunits of a listed species that are geographically or otherwise identifiable and essential to the recovery of the species. Recovery units are individually necessary to conserve genetic robustness, demographic robustness, important life history stages, or some other feature necessary for long-term sustainability of the species. The five recovery units identified in the Northwest Atlantic (**Figure 2**) are:

1. Northern Recovery Unit (NRU) - defined as loggerheads originating from nesting beaches from the Florida-Georgia border through southern Virginia (the northern extent of the nesting range);

2. Peninsula Florida Recovery Unit (PFRU) - defined as loggerheads originating from nesting beaches from the Florida-Georgia border through Pinellas County on the west coast of Florida, excluding the islands west of Key West, Florida;

3. Dry Tortugas Recovery Unit (DTRU) - defined as loggerheads originating from nesting beaches throughout the islands located west of Key West, Florida;

4. Northern Gulf of Mexico Recovery Unit (NGMRU) - defined as loggerheads originating from nesting beaches from Franklin County on the northwest Gulf coast of Florida through Texas; and

5. Greater Caribbean Recovery Unit (GCRU) - composed of loggerheads originating from all other nesting assemblages within the Greater Caribbean (Mexico through French Guiana, The Bahamas, Lesser Antilles, and Greater Antilles).

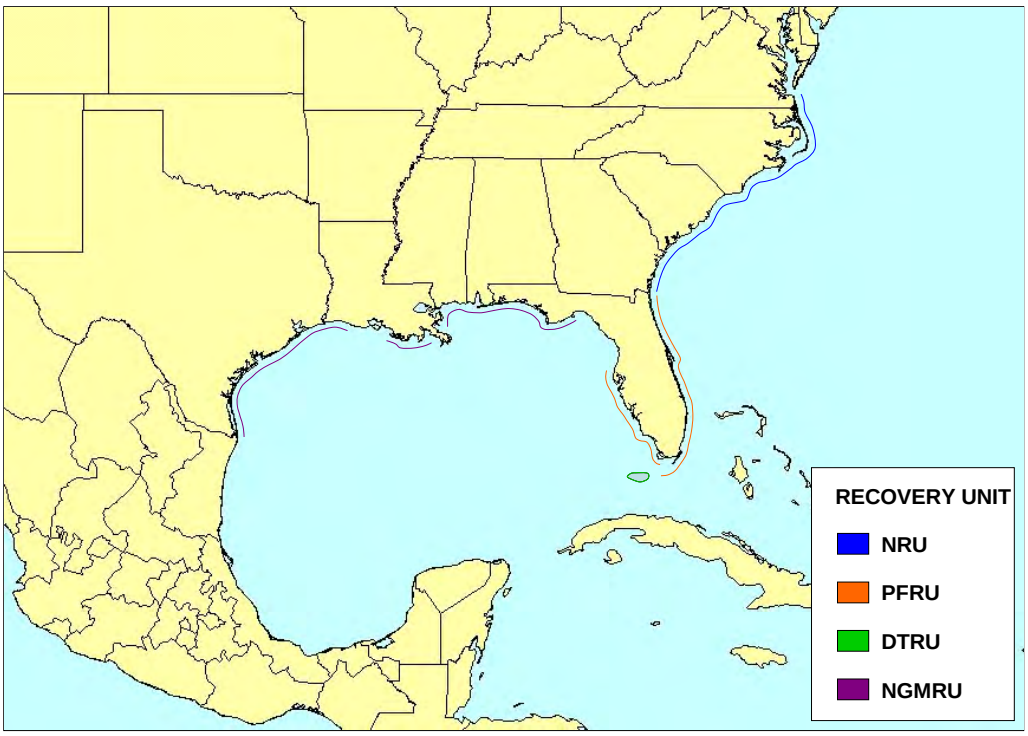

Figure 2. Map of the distribution of the loggerhead recovery units.

The mtDNA analyses show that there is limited exchange of females among these recovery units (Ehrhart 1989, Foote *et al.* 2000, NMFS 2001, Hawkes *et al.* 2005). Based on the number of haplotypes, the highest level of loggerhead mtDNA genetic diversity in the Northwest Atlantic has been observed in females of the GCRU that nest at Quintana Roo, Mexico (Encalada *et al.* 1999, Nielsen *et al*. 2012).

Nuclear DNA analyses show that there are no substantial subdivisions across the loggerhead nesting colonies in the southeastern U.S. Male-mediated gene flow appears to be keeping the subpopulations genetically similar on a nuclear DNA level (Francisco-Pearce 2001).

Historically, the literature has suggested that the northern U.S. nesting beaches (NRU and NGMRU) produce a relatively high percentage of males and the more southern nesting beaches (PFRU, DTRU, and GCRU) a relatively high percentage of females (e.g., Hanson *et al.* 1998, NMFS 2001, Mrosovsky and Provancha 1989). The NRU and NGMRU were believed to play an important role in providing males to mate with females from the more female-dominated subpopulations to the south. However, in 2002 and 2003, researchers studied loggerhead sex ratios

for two of the U.S. nesting subpopulations, the northern and southern subpopulations (NGU and PFRU, respectively) (Blair 2005, Wyneken *et al.* 2005). The study produced interesting results. In 2002, the northern beaches produced more females and the southern beaches produced more males than previously believed. However, the opposite was true in 2003 with the northern beaches producing more males and the southern beaches producing more females in keeping with prior literature. Wyneken *et al.* (2005) speculated that the 2002 result may have been anomalous; however, the study did point out the potential for males to be produced on the southern beaches. Although this study revealed that more males may be produced on southern recovery unit beaches than previously believed, the Service maintains that the NRU and NGMRU play an important role in the production of males to mate with females from the more southern recovery units.

The NRU is the second largest loggerhead nesting aggregation in the Northwest Atlantic. Annual nest totals from northern beaches averaged 5,215 nests from 1989-2008, a period of near-complete surveys of NRU nesting beaches (NMFS and Service 2008), representing approximately 1,272 nesting females per year (4.1 nests per female, Murphy and Hopkins 1984). The loggerhead nesting trend from daily beach surveys showed a significant decline of 1.3 percent annually. Nest totals from aerial surveys conducted by the South Carolina Department of Natural Resources showed a 1.9 percent annual decline in nesting in South Carolina since 1980. Overall, there is strong statistical data to suggest the NRU has experienced a long-term decline (NMFS and Service 2008).

The PFRU is the largest loggerhead nesting assemblage in the Northwest Atlantic. A near-complete nest census of the PFRU undertaken from 1989 to 2007 reveals a mean of 64,513 loggerhead nests per year representing approximately 15,735 females nesting per year (4.1 nests per female, Murphy and Hopkins 1984) (FWC 2008d). This near-complete census provides the best statewide estimate of total abundance, but because of variable survey effort, these numbers cannot be used to assess trends. Loggerhead nesting trends are best assessed using standardized nest counts made at INBS sites surveyed with constant effort over time. In 1979, the Statewide Nesting Beach Survey (SNBS) program was initiated to document the total distribution, seasonality, and abundance of sea turtle nesting in Florida. In 1989, the INBS program was initiated in Florida to measure seasonal productivity, allowing comparisons between beaches and between years (FWC 2009b). Of the 190 SNBS surveyed areas, 33 participate in the INBS program (representing 30 percent of the SNBS beach length).

INBS nest counts from 1989–2010 show a shallow decline. However, recent trends (1998–2010) in nest counts have shown a 25 percent decline, with increases only observed in the most recent 6-year period, 2008–2013 although there was no trend observed (FWC/FWRI 2014). The analysis that reveals this decline uses nest-count data from 345 representative Atlantic-coast index zones (total length = 187 miles) and 23 representative zones on Florida's southern Gulf coast (total length = 14.3 miles). The spatial and temporal coverage (annually, 109 days and 368 zones) accounted for an average of 70 percent of statewide loggerhead nesting activity between 1989 and 2010.

The NGMRU is the third largest nesting assemblage among the four U.S. recovery units. Nesting surveys conducted on approximately 186 miles of beach within the NGMRU (Alabama and Florida only) were undertaken between 1995 and 2007 (statewide surveys in Alabama began in 2002). The mean nest count during this 13-year period was 906 nests per year, which equates to about 221 females nesting per year (4.1 nests per female, Murphy and Hopkins 1984; FWC 2008d). Evaluation of long-term nesting trends for the NGMRU is difficult because of changed and expanded beach coverage. Loggerhead nesting trends are best assessed using standardized nest counts made at INBS sites surveyed with constant effort over time. There are 12 years (1997-2008) of Florida INBS data for the NGMRU (FWC 2008d). A log-linear regression showed a significant declining trend of 4.7 percent annually (NMFS and Service 2008).

The DTRU, located west of the Florida Keys, is the smallest of the identified recovery units. A near-complete nest census of the DTRU undertaken from 1995 to 2004, excluding 2002, (nine years surveyed) reveals a mean of 246 nests per year, which equates to about 60 females nesting per year (4.1 nests per female, Murphy and Hopkins 1984) (FWC 2008d). Surveys after 2004 did not include principal nesting beaches within the recovery unit (*i.e.*, Dry Tortugas National Park). The nesting trend data for the DTRU are from beaches that are not part of the INBS program, but are part of the SNBS program. There are nine years of data for this recovery unit. A simple linear regression accounting for temporal autocorrelation revealed no trend in nesting numbers. Because of the annual variability in nest totals, a longer time series is needed to detect a trend (NMFS and Service 2008).

The GCRU is composed of all other nesting assemblages of loggerheads within the Greater Caribbean. Statistically valid analyses of long-term nesting trends for the entire GCRU are not available because there are few long-term standardized nesting surveys representative of the region. Additionally, changing survey effort at monitored beaches and scattered and low-level nesting by loggerheads at many locations currently precludes comprehensive analyses. The most complete data are from Quintana Roo and Yucatán, Mexico, where an increasing trend was reported over a 15-year period from 1987-2001 (Zurita *et al.* 2003). However, since 2001, nesting has declined and the previously reported increasing trend appears not to have been sustained (NMFS and Service 2008). Other smaller nesting populations have experienced declines over the past few decades (e.g., Amorocho 2003).

Recovery Criteria (only the Demographic Recovery Criteria are presented below; for the Listing Factor Recovery Criteria, please see NMFS and Service 2008)

1. Number of Nests and Number of Nesting Females
   a. Northern Recovery Unit
      i. There is statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is 2 percent or greater resulting in a total annual number of nests of 14,000 or greater for this recovery unit (approximate distribution of nests is North Carolina =14 percent [2,000 nests], South Carolina =66 percent [9,200 nests], and Georgia =20 percent [2,800 nests]); and

ii. This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

b. Peninsular Florida Recovery Unit
   i. There is statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is statistically detectable (one percent) resulting in a total annual number of nests of 106,100 or greater for this recovery unit; and
   ii. This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

c. Dry Tortugas Recovery Unit
   i. There is statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is three percent or greater resulting in a total annual number of nests of 1,100 or greater for this recovery unit; and
   ii. This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

d. Northern Gulf of Mexico Recovery Unit
   i. There is statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is three percent or greater resulting in a total annual number of nests of 4,000 or greater for this recovery unit (approximate distribution of nests (2002-2007) is Florida= 92 percent [3,700 nests] and Alabama =8 percent [300 nests]); and
   ii. This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

e. Greater Caribbean Recovery Unit
   i. The total annual number of nests at a minimum of three nesting assemblages, averaging greater than 100 nests annually (e.g., Yucatán, Mexico; Cay Sal Bank, Bahamas) has increased over a generation time of 50 years; and
   ii. This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

2. Trends in Abundance on Foraging Grounds
   A network of in-water sites, both oceanic and neritic, across the foraging range is established and monitoring is implemented to measure abundance. There is statistical confidence (95 percent) that a composite estimate of relative abundance from these sites is increasing for at least one generation.

3. Trends in Neritic Strandings Relative to In-water Abundance
   Stranding trends are not increasing at a rate greater than the trends in in-water relative abundance for similar age classes for at least one generation.

The Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle was signed in 2008 (NMFS and Service 2008), and the Recovery Plan for U.S. Pacific Populations of the Loggerhead Turtle was signed in 1998 (NMFS and Service 1998e).

Green Sea Turtle

Annual nest totals documented as part of the Florida SNBS program from 1989-2008 have ranged from 435 nests laid in 1993 to 12,752 in 2007. The nest count for 2013 was more than twice the count from 2007 with a total of 36,195 nests recorded (http://myfwc.com/research/wildlife/sea-turtles/nesting/statewide/). Nesting occurs in 26 counties with a peak along the east coast, from Volusia through Broward Counties. Although the SNBS program provides information on distribution and total abundance statewide, it cannot be used to assess trends because of variable survey effort. Therefore, green turtle nesting trends are best assessed using standardized nest counts made at INBS sites surveyed with constant effort over time (1989-2009). Green sea turtle nesting in Florida is increasing based on 19 years (1989-2009) of INBS data from throughout the state (FWC 2009a). The increase in nesting in Florida is likely a result of several factors, including: (1) a Florida statute enacted in the early 1970s that prohibited the killing of green turtles in Florida; (2) the species listing under the Act afforded complete protection to eggs, juveniles, and adults in all U.S. waters; (3) the passage of Florida's constitutional net ban amendment in 1994 and its subsequent enactment, making it illegal to use any gillnets or other entangling nets in State waters; (4) the likelihood that the majority of Florida green turtles reside within Florida waters where they are fully protected; (5) the protections afforded Florida green turtles while they inhabit the waters of other nations that have enacted strong sea turtle conservation measures (e.g., Bermuda); and (6) the listing of the species on Appendix I of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which stopped international trade and reduced incentives for illegal trade from the U.S.

Recovery Criteria

The U.S. Atlantic population of green sea turtles can be considered for delisting if, over a period of 25 years, the following conditions are met:

1. The level of nesting in Florida has increased to an average of 5,000 nests per year for at least six years. Nesting data must be based on standardized surveys;

2. At least 25 percent (65 miles) of all available nesting beaches (260 miles) is in public ownership and encompasses at least 50 percent of the nesting activity;

3. A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds; and

4. All priority one tasks identified in the recovery plan have been successfully implemented.

The Recovery Plan for U.S. Population of Atlantic Green Turtle was signed in 1991 (NMFS and Service 1991), the Recovery Plan for U.S. Pacific Populations of the Green Turtle was signed in 1998 (NMFS and Service 1998b), and the Recovery Plan for U.S. Pacific Populations of the East Pacific Green Turtle was signed in 1998 (NMFS and Service 1998a).

Leatherback Sea Turtle

Declines in leatherback nesting have occurred over the last two decades along the Pacific coasts of Mexico and Costa Rica. The Mexican leatherback nesting population, once considered to be the world's largest leatherback nesting population (historically estimated to be 65 percent of the worldwide population), is now less than one percent of its estimated size in 1980. Spotila *et al.* (1996) estimated the number of leatherback sea turtles nesting on 28 beaches throughout the world from the literature and from communications with investigators studying those beaches. The estimated worldwide population of leatherbacks in 1995 was about 34,500 females on these beaches with a lower limit of about 26,200, and an upper limit of about 42,900. This is less than one-third the 1980 estimate of 115,000. Leatherbacks are rare in the Indian Ocean and in very low numbers in the western Pacific Ocean. The largest population is in the western Atlantic. Using an age-based demographic model, Spotila *et al.* (1996) determined that leatherback populations in the Indian Ocean and western Pacific Ocean cannot withstand even moderate levels of adult mortality and that the Atlantic populations are being exploited at a rate that cannot be sustained. They concluded that leatherbacks are on the road to extinction and further population declines can be expected unless action is taken to reduce adult mortality and increase survival of eggs and hatchlings.

In the U.S., nesting populations occur in Florida, Puerto Rico, and the U.S. Virgin Islands. In Florida, the SNBS program documented an increase in leatherback nesting numbers from 98 nests in 1988 to between 800 and 900 nests per season in the early 2000s (FWC 2009a, Stewart and Johnson 2006). Although the SNBS program provides information on distribution and total abundance statewide, it cannot be used to assess trends because of variable survey effort. Therefore, leatherback nesting trends are best assessed using standardized nest counts made at INBS sites surveyed with constant effort over time (1989-2009). An analysis of the INBS data has shown a substantial increase in leatherback nesting in Florida since 1989 (FWC 2009b, TEWG Group 2007).

Recovery Criteria

The U.S. Atlantic population of leatherbacks can be considered for delisting if the following conditions are met:

1. The adult female population increases over the next 25 years, as evidenced by a statistically significant trend in the number of nests at Culebra, Puerto Rico, St. Croix, U.S. Virgin Islands, and along the east coast of Florida;

2. Nesting habitat encompassing at least 75 percent of nesting activity in U.S. Virgin Islands, Puerto Rico, and Florida is in public ownership; and.

3. All priority one tasks identified in the recovery plan have been successfully implemented.

The Recovery Plan for Leatherback Turtles in the U.S. Caribbean, Atlantic, and Gulf of Mexico was signed in 1992 (NMFS and Service 1992), and the Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle was signed in 1998 (NMFS and Service 1998d).

Hawksbill Sea Turtle

The hawksbill sea turtle has experienced global population declines of 80 percent or more during the past century and continued declines are projected (Meylan and Donnelly 1999). Most populations are declining, depleted, or remnants of larger aggregations. Hawksbills were previously abundant, as evidenced by high-density nesting at a few remaining sites and by trade statistics.

Recovery Criteria

The U.S. Atlantic population of hawksbills can be considered for delisting if, over a period of 25 years, the following conditions are met:

1. The adult female population is increasing, as evidenced by a statistically significant trend in the annual number of nests on at least five index beaches, including Mona Island and Buck Island Reef National Monument;

2. Habitat for at least 50 percent of the nesting activity that occurs in the U.S. Virgin Islands and Puerto Rico is protected in perpetuity;

3. Numbers of adults, subadults, and juveniles are increasing, as evidenced by a statistically significant trend on at least five key foraging areas within Puerto Rico, U.S. Virgin Islands, and Florida; and

4. All priority one tasks identified in the recovery plan have been successfully implemented.

The Recovery Plan for the Hawksbill Turtle in the U.S. Caribbean, Atlantic, and Gulf of Mexico was signed in 1993 (NMFS and Service 1993), and the Recovery Plan for U.S. Pacific Populations of the Hawksbill Turtle was signed in 1998 (NMFS and Service 1998c).

Kemp's Ridley Sea Turtle

Today, under strict protection, the population appears to be in the early stages of recovery. The recent nesting increase can be attributed to full protection of nesting females and their nests in Mexico resulting from a binational effort between Mexico and the U.S. to prevent the extinction of the Kemp's ridley, and the requirement to use Turtle Excluder Devices (TEDs) in shrimp trawls both in the U.S. and Mexico.

The Mexico government also prohibits harvesting and is working to increase the population through more intensive law enforcement, by fencing nest areas to diminish natural predation, and by relocating most nests into corrals to prevent poaching and predation. While relocation of nests into corrals is currently a necessary management measure, this relocation and concentration of eggs into a "safe" area is of concern since it can reduce egg viability.

Recovery Criteria

The goal of the recovery plan is for the species to be reduced from endangered to threatened status. The Recovery Team members feel that the criteria for a complete removal of this species from the endangered species list need not be considered now, but rather left for future revisions of the plan. Complete removal from the federal list would certainly necessitate that some other instrument of protection, similar to the MMPA, be in place and be international in scope. Kemp's ridley can be considered for reclassification to threatened status when the following four criteria are met:

1. Continuation of complete and active protection of the known nesting habitat and the waters adjacent to the nesting beach (concentrating on the Rancho Nuevo area) and continuation of the bi-national protection project;

2. Elimination of mortality from incidental catch in commercial shrimping in the U.S. and Mexico through the use of TEDs and achievement of full compliance with the regulations requiring TED use;

3. Attainment of a population of at least 10,000 females nesting in a season; and

4. Successful implementation of all priority one recovery tasks in the recovery plan.

The Recovery Plan for the Kemp's Ridley Sea Turtle was signed in 1992 (Service and NMFS 1992). Significant new information on the biology and population status of Kemp's ridley has become available since 1992. Consequently, a full revision of the recovery plan has been completed by the Service and NMFS. The Bi-National Recover Plan for the Kemp's Ridley Sea

turtle (2011) provides updated species biology and population status information, objective and measurable recovery criteria, and updated and prioritized recovery actions.

Common threats to sea turtles in Florida

Anthropogenic factors that impact hatchlings and adult female turtles on land, or the success of nesting and hatching include: beach erosion; armoring and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; beach driving; coastal construction and fishing piers; exotic dune and beach vegetation; and poaching. An increased human presence at some nesting beaches or close to nesting beaches has led to secondary threats such as the introduction of exotic fire ants (*Solenopsis* spp.), feral hogs (*Sus scrofa*), dogs (*Canis familiaris),* and an increased presence of native species (e.g., raccoons (*Procyon lotor*), armadillos (*Dasypus novemcinctus*), and opossums (*Didelphis virginiana*)), which raid nests and feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the western North Atlantic coast, other areas along these coasts have limited or no protection.

Anthropogenic threats in the marine environment include oil and gas exploration and transportation; marine pollution; underwater explosions; hopper dredging; offshore artificial lighting; power plant entrainment or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; and poaching and fishery interactions. On April 20, 2010, an explosion and fire on the Mobile Offshore Drilling Unit *Deepwater Horizon* MC252 occurred approximately 50 miles southeast of the Mississippi Delta. A broken well head at the sea floor resulted in a sustained release of oil, estimated at 35,000 and 60,000 barrels per day. On July 15, the valves on the cap were closed, which effectively shut in the well and all sub-sea containment systems. Damage assessment from the sustained release of oil is currently ongoing and the Service does not have a basis at the present time to predict the complete scope of effects to sea turtles range-wide.

Fibropapillomatosis, a disease of sea turtles characterized by the development of multiple tumors on the skin and internal organs, is also a mortality factor, particularly for green turtles. This disease has seriously impacted green turtle populations in Florida, Hawaii, and other parts of the world. The tumors interfere with swimming, eating, breathing, vision, and reproduction, and turtles with heavy tumor burdens may die.

Analysis of the species/critical habitat likely to be affected

The threatened loggerhead sea turtle, the endangered green sea turtle, the endangered leatherback sea turtle, the endangered hawksbill sea turtle, and the endangered Kemp's ridley sea turtle are currently listed because of their reduced population sizes caused by overharvest and habitat loss with continuing anthropogenic threats from commercial fishing, disease, and degradation of remaining habitat. The proposed action has the potential to adversely affect nesting females of these species, their nests, and hatchlings on all nesting beaches where shore protection activities (including the placement of compatible sediment, repair or replacement of groins and jetties, and navigation channel maintenance on the beaches of the Atlantic and Gulf coasts of Florida) occur.

The Service and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) share Federal jurisdiction for sea turtles under the Act. The Service has responsibility for sea turtles on the nesting beach. NMFS has jurisdiction for sea turtles in the marine environment.

In accordance with the Act, the Service completes consultations with all Federal agencies for actions that may adversely affect sea turtles on the nesting beach. The Service's analysis only addresses activities that may impact nesting sea turtles, their nests and eggs, and hatchlings as they emerge from the nest and crawl to the sea. NMFS assesses and consults with Federal agencies concerning potential impacts to sea turtles in the marine environment, including updrift and downdrift nearshore areas affected by sand placement projects on the beach.

The proposed action has the potential to adversely affect nesting females, nests, and hatchlings within the proposed project area. Potential effects include destruction of nests deposited within the boundaries of the proposed project, harassment as a result of construction activities in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches; disorientation of hatchling turtles resulting from project lighting on beaches adjacent to the construction area as they emerge from the nest and crawl to the water; disorientation that occurs after project construction due to landward lights impacting the elevated berm; and behavior modification of nesting females due to escarpment formation within the project area during a nesting season resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs. The quality of the placed sand could affect the ability of female turtles to nest, the suitability of the nest incubation environment, and the ability of hatchlings to emerge from the nest. The effects of the proposed action on sea turtles will be considered further in the remaining sections of this biological opinion.

Some individuals in a population are more "valuable" than others in terms of the number of offspring they are expected to produce. An individual's potential for contributing offspring to future generations is its reproductive value. Because of delayed sexual maturity, reproductive longevity, and low survivorship in early life stages, nesting females are of high value to a population. The loss of a nesting female in a small recovery unit would represent a significant loss to the recovery unit. The reproductive value for a nesting female has been estimated to be approximately 253 times greater than an egg or a hatchling (NMFS and Service 2008). However, the SPBO includes avoidance and minimization measures that reduce the possibility of mortality of a nesting female on the beach as a result of the project. Therefore, we do not anticipate the loss of any nesting females on the beach as a result of the activities listed in this SPBO.

Sand placement projects are anticipated to result in decreased nesting and loss of nests that do get laid within the project area for two subsequent nesting seasons following the completion of the proposed sand placement. However, it is important to note that it is unknown whether nests that would have been laid in a project area during the two subsequent nesting seasons had the project not occurred are actually lost from the population or if nesting is simply displaced to adjacent beaches. Regardless, eggs and hatchlings have a low reproductive value; each egg or hatchling has been estimated to have only 0.004 percent of the value of a nesting female (NMFS and Service

2008). Thus, even if the majority of the eggs and hatchlings that would have been produced on the project beach are not realized for up to 2 years following project completion, the Service would not expect this loss to have a significant effect on the recovery and survival of the species, for the following reasons: 1) some nesting is likely just displaced to adjacent non-project beaches, 2) not all eggs will produce hatchlings, and 3) destruction and/or failure of nests will not always result from a sand placement project. A variety of natural and unknown factors negatively affect incubating egg clutches, including tidal inundation, storm events, and predation.

During project construction, direct mortality of the developing embryos in nests within the project area may occur for nests that are missed and not relocated. The exact number of these missed nests is not known. However, in two separate monitoring programs on the east coast of Florida where hand digging was performed to confirm the presence of nests and thus reduce the chance of missing nests through misinterpretation, trained observers still missed about 6 to 8 percent of the nests because of natural elements (Martin 1992, Ernest and Martin 1993). This must be considered a conservative number, because nests missed during surveys are not always discovered after hatching. In another study, Schroeder (1994) found that even under the best of conditions, about 7 percent of nests can be misidentified as false crawls by highly experienced sea turtle nest surveyors. Missed nests are usually identified by signs of hatchling emergences in areas where no nest was previously documented. Signs of hatchling emergence are very easily obliterated by the same elements that interfere with detection of nests.

In the U.S., consultations with the Service have included military missions and operations, beach nourishment and other shoreline protection projects, and actions related to protection of coastal development on sandy beaches along the coast. Much of the Service's section 7 consultation involves beach nourishment projects. A list of the Service's consultations completed over the last 5 years is included in Appendix A. The Act does not require entities conducting projects with no Federal nexus to apply for a section 10(a)(1)(B) permit. This is a voluntary process and is applicant driven. Section 10(a)(1)(A) permits are scientific permits that include activities that would enhance the survival and conservation of a listed species. Those permits are not listed as they are expected to benefit the species and are not expected to contribute to the cumulative take assessment.

A list of completed NMFS consultations is included in Appendix B.

ENVIRONMENTAL BASELINE

Status of the species/critical habitat within the action area

INBS nest counts represent approximately 69 percent of known loggerhead nesting in Florida, 74 percent of known green turtle nesting, and 34 percent of known leatherback nesting (FWC 2009a). The INBS program was established with a set of standardized data-collection criteria to measure seasonal nesting, and to allow accurate comparisons between both beaches and years. The reliability of these comparisons results from the uniformity of beach-survey effort in space and time, and from the specialized annual training of beach surveyors. Under the core INBS program,

178 miles of nesting beach have been divided into zones, known as core index zones, averaging 0.5 mile in length. These beaches are monitored daily beginning May 15 and ending August 31. On all index beaches, researchers record nests and nesting attempts by species, the location of each nest, and the date each nest was laid.

Nesting surveys begin at or just before sunrise. Turtle crawls are identified as a true nesting crawl or false crawl (*i.e.*, nonnesting emergence). Nests are marked with stakes and some are surrounded with surveyor flagging tape and, if needed, screened or caged to prevent predation. The marked nests are monitored throughout the incubation period for storm damage, predation, hatching activity and hatching and emerging success. Nest productivity surveys may continue into mid-November depending on nest incubation periods. All monitoring is conducted in accordance with the FWC's Marine Turtle Conservation Guidelines.

Loggerhead Sea Turtle

Five loggerhead sea turtle recovery units have been identified in the Northwest Atlantic (NMFS and Service 2008). Mitochondrial DNA analyses show that there is limited exchange of females among these recovery units (Foote *et al*. 2000, NMFS 2001, Hawkes *et al*. 2005). However, nuclear DNA analyses show that there are no substantial subdivisions across the loggerhead nesting colonies in the southeastern U.S. Male-mediated gene flow appears to be keeping the subpopulations genetically similar on a nuclear DNA level (Francisco-Pearce 2001). The NRU and NGMRU are believed to play an important role in providing males to mate with females from the more female-dominated recovery units.

Two (NGMRU and PFRU) of the five nesting subpopulations occur within the proposed Action Area. Northwest Florida, which accounts for 92 percent of the NGMRU in nest numbers, consists of approximately 234 miles of nesting shoreline. The PFRU makes up 1,166 miles of shoreline and consists of approximately was 69,982 nests per year (2008 to 2012)..

Recovery Units	**Nesting Range**
NGMRU	Escambia through Franklin Counties
PFRU	Pinellas through Nassau Counties

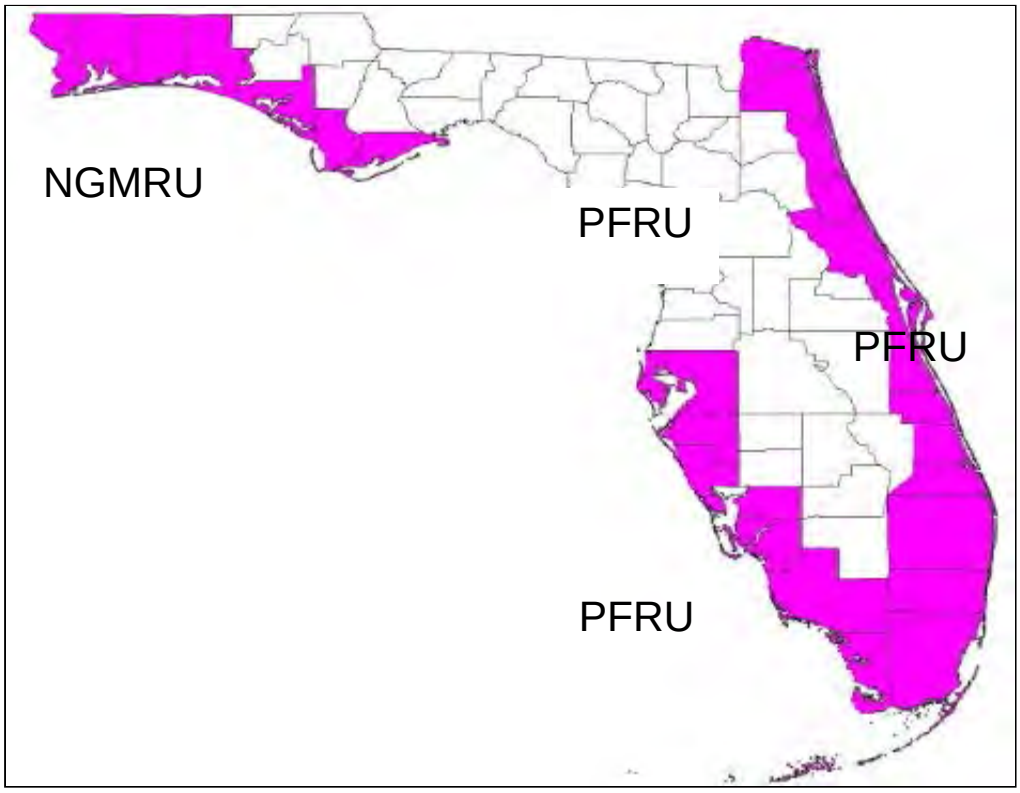

Figure 3. Distribution of loggerhead sea nesting in the PFRU and NGMRU in Florida.

The main loggerhead sea turtle nesting and hatching season throughout Florida is shown in **Table 5.**

Table 6. Loggerhead sea turtle nesting and hatching season for Florida.

AREA	COUNTIES	SEA TURTLE NESTING SEASON THROUGH HATCHING SEASON
Northern Gulf of Mexico	Escambia through Pasco	May 1 through October 31
Southern Gulf of Mexico	Pinellas through Monroe	April 1 through November 30
Southern Florida Atlantic	Brevard through Miami-Dade	March 1 through November 30
Northern Florida Atlantic	Nassau through Volusia	April 15 through November 30

An updated analysis by FWC/FWRI reveals a shallow decline in loggerhead nest numbers around the State of Florida based on INBS nest counts from 1989 through 2010 (FWC/FWRI 2010). Analysis of nest counts over the last six years (2009 through 2013) have found no trend, although when added to the data from 1989, the overall change is an increase in loggerhead nests since 1989 (FWC/FWRI 2014). The five year average (2008 to2012) for the PFRU was 69,982 nests. The five-year average (2008 to 2012) for the NGMRU was 966 nests.

Sea turtles play a vital role in maintaining healthy and productive ecosystems. Nesting sea turtles introduce large quantities of nutrients from the marine ecosystem to the beach and dune system (Bouchard and Bjorndal 2000). In the U.S., loggerheads play a particularly important role in this regard due to their greater nesting numbers. The nutrients they leave behind on the nesting beaches in the form of eggs and eggshells play an important role for dune vegetation and terrestrial predator populations (Bouchard and Bjorndal 2000). In a study at Melbourne Beach, Florida, Bouchard and Bjorndal (2000) estimated that only 25 percent of the organic matter introduced into nests by loggerheads returned to the ocean as hatchlings. They found that 29-40 percent of all nutrients were made available to detritivores, decomposers, and plants, while 26-31 percent of all nutrients were consumed by nest predators. Thus, all loggerhead recovery units play a vital role in the maintenance of a healthy beach and dune ecosystem within their geographic distribution.

Green Sea Turtle

Green turtle nest numbers are increasing in Florida with a record number of nests being recorded during the 2013 season (FWC 2014). The five year average (2008 to 2012) for green turtles within the action area was 10,384 nests. The number of green turtle nests recorded in Florida during the 2013 nesting season was a record high of 36,195.

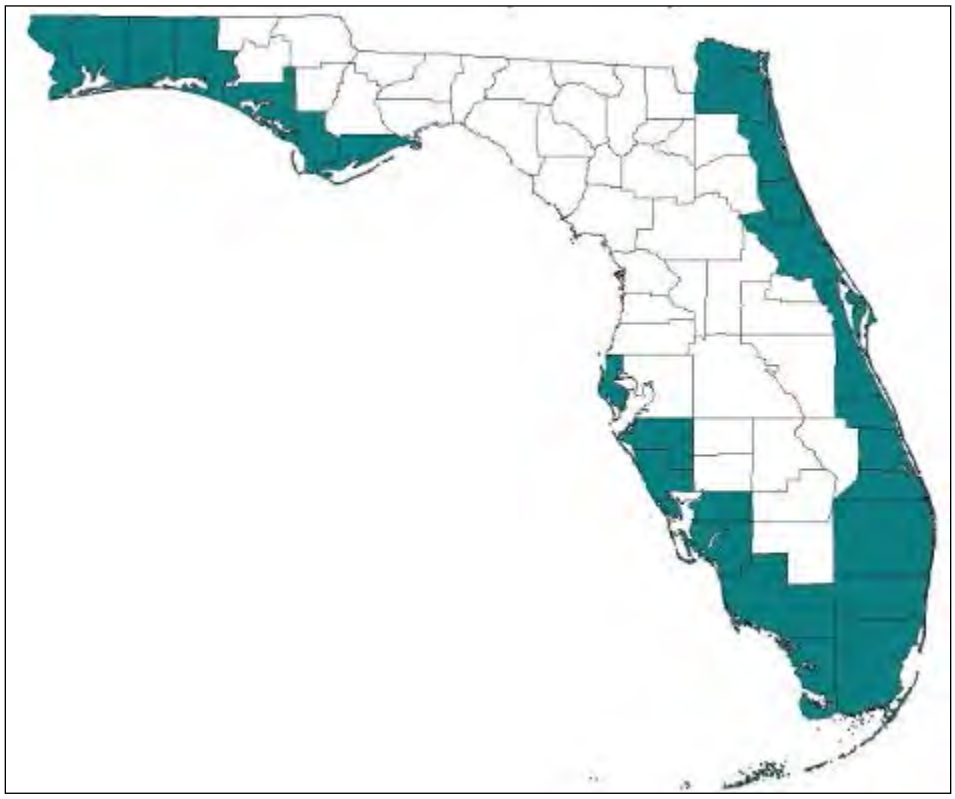

Figure 4. Distribution of green sea turtle nesting in Florida.

The main green sea turtle nesting and hatching season throughout Florida is shown in **Table 6**.

Table 7. Green sea turtle nesting and hatching season for Florida.

AREA	COUNTIES	SEA TURTLE NESTING SEASON THROUGH HATCHING SEASON
Northern Gulf of Mexico	Escambia through Pasco	May 15 through October 31
Southern Gulf of Mexico	Pinellas through Monroe	May 15 through October 31
Southern Florida Atlantic	Brevard through Miami-Dade	May 1 through November 30
Northern Florida Atlantic	Nassau through Volusia	May 15 through November 15

Leatherback Sea Turtle

Leatherback nest numbers are increasing in Florida with a record number of leatherback nests recorded during the 2009 season (FWC 2009a). The five year average (2008 to 2012) for leatherback sea turtles within the action area was 1,435 nests with a total of 896 nests recorded in 2013.

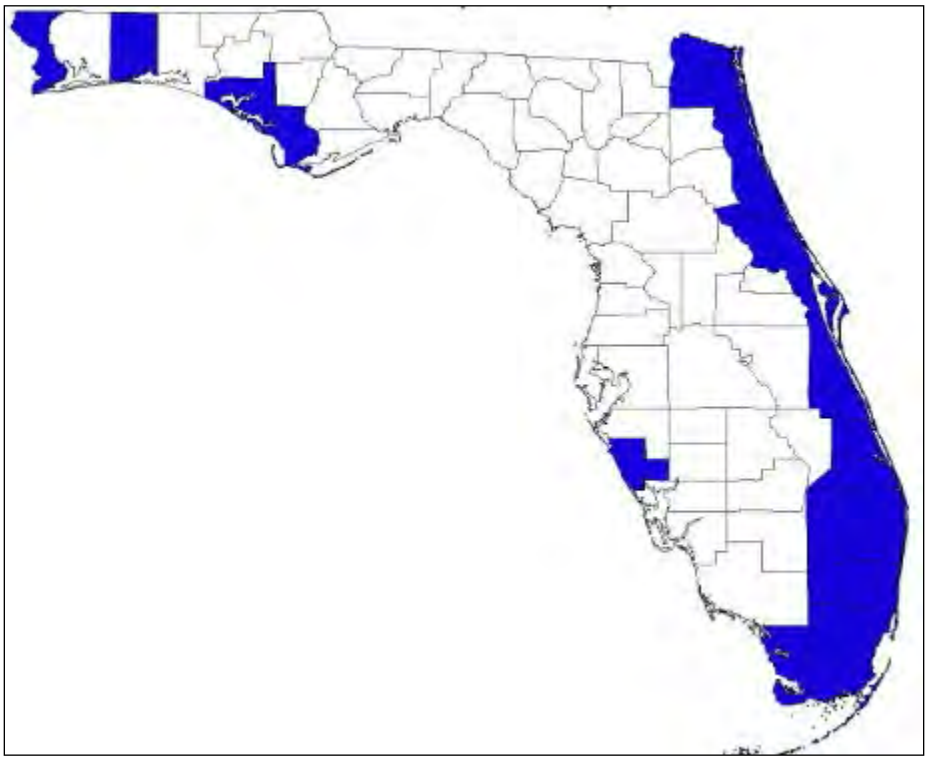

Figure 5. Distribution of leatherback sea turtle nesting in Florida.

The main leatherback sea turtle nesting and hatching season throughout Florida is shown in **Table 7**.

Table 8. Leatherback sea turtle nesting and hatching season for Florida.

AREA	COUNTIES	SEA TURTLE NESTING SEASON THROUGH HATCHING SEASON
Northern Gulf of Mexico	Escambia through Pasco	May 1 through September 30
Southern Florida Atlantic	Brevard through Miami-Dade	February 15 through November 30
Northern Florida Atlantic	Nassau through Volusia	April 15 through September 30

Hawksbill Sea Turtle

Forty-six hawksbill nests have been documented in Florida from 1979-2013 in Volusia, Martin, Palm Beach, Broward, Miami-Dade, Monroe, and Manatee counties (FWC/FWRI 2014a). The hawksbill sea turtle nesting and hatching season throughout Florida is shown in **Table 8**.

Table 9. Hawksbill sea turtle nesting and hatching season for Florida.

AREA	COUNTIES	SEA TURTLE NESTING SEASON THROUGH HATCHING SEASON
Southern tip of Florida	Monroe	June 1 through December 31
Southern Florida Atlantic	Brevard through Miami-Dade	June 1 through December 31
Northeast Florida	Volusia	June 1 through December 31
Southwest Florida	Manatee	June 1 through December 31

Kemp's Ridley Sea Turtle

Eighty Kemp's ridley nests have been documented in Florida from 1979-2013 in Duval, Flagler, Volusia, Brevard, Martin, Palm Beach, Lee, Charlotte, Sarasota, Pinellas, Franklin, Gulf, Walton, Okaloosa, Santa Rosa, and Escambia counties (FWC/FWRI 2014).

Factors affecting species habitat within the action area

In accordance with the Act, the Service completes consultations with all federal agencies for actions that may adversely affect sea turtles. In Florida, consultations have included military missions and operations, beach nourishment and other shoreline protection, and actions related to protection of coastal development on sandy beaches of Florida's Atlantic Coast (Key West to

Fernandina/Kings Bay) and the Gulf Coast (Ten Thousand Islands to Alabama State Line) (**Appendix A**).

Coastal Development

Loss of nesting habitat related to coastal development has had the greatest impact on nesting sea turtles in Florida. Beachfront development not only causes the loss of suitable nesting habitat, but can result in the disruption of powerful coastal processes accelerating erosion and interrupting the natural shoreline migration (National Research Council 1990b). This may in turn cause the need to protect upland structures and infrastructure by armoring, groin placement, beach emergency berm construction and repair, and beach nourishment which cause changes in, additional loss of, or impact to, the remaining sea turtle habitat.

Hurricanes

Hurricanes were probably responsible for maintaining coastal beach habitat upon which sea turtles depend through repeated cycles of destruction, alteration, and recovery of beach and dune habitat. Hurricanes generally produce damaging winds, storm tides and surges, and rain, which can result in severe erosion of the beach and dune systems. Overwash and blowouts are common on barrier islands. Hurricanes and other storms can result in the direct or indirect loss of sea turtle nests, either by erosion or washing away of the nests by wave action, inundation or "drowning" of the eggs or hatchlings developing within the nest or indirectly by loss of nesting habitat. Depending on their frequency, storms can affect sea turtles on either a short-term basis (nests lost for one season and/or temporary loss of nesting habitat) or long term, if frequent (habitat unable to recover). How hurricanes affect sea turtle nesting also depends on its characteristics (winds, storm surge, rainfall), the time of year (within or outside of the nesting season), and where the northeast edge of the hurricane crosses land.

Because of the limited remaining nesting habitat in a natural state with no development landward of the sandy beach, frequent or successive severe weather events could threaten the ability of certain sea turtle populations to survive and recover. Sea turtles evolved under natural coastal environmental events such as hurricanes. The extensive amount of predevelopment coastal beach and dune habitat allowed sea turtles to survive even the most severe hurricane events. It is only within the last 20 to 30 years that the combination of habitat loss to beachfront development and destruction of remaining habitat by hurricanes has increased the threat to sea turtle survival and recovery. On developed beaches, typically little space remains for sandy beaches to become reestablished after periodic storms. While the beach itself moves landward during such storms, reconstruction or persistence of structures at their prestorm locations can result in a loss of nesting habitat.

The 2004 hurricane season was the most active storm season in Florida since weather records began in 1851. Hurricanes Charley, Frances, Ivan, and Jeanne, along with Tropical Storm Bonnie, damaged the beach and dune system, upland structures and properties, and infrastructure in the

majority of Florida's coastal counties. The cumulative impact of these storms exacerbated erosion conditions throughout the state.

The 2005 hurricane season was a record-breaking season with 27 named storms. Hurricanes Dennis, Katrina, Ophelia, Rita, and Wilma, and Tropical Storms Arlene and Tammy impacted Florida. The cumulative impact of these storms exacerbated erosion conditions in south and northwest Florida.

A common question is whether the 2004 and 2005 hurricane seasons contributed to reduced loggerhead nest numbers observed from 2004-2007. Although Florida has been subject to numerous hurricanes in recent years, these storm events cannot account for the recent decline (1998-2010) observed in the number of loggerhead nests on Florida beaches. The hurricanes have a very limited effect on nesting activity of adult female turtles. Because loggerheads that hatch on Florida beaches require some 20 to 30 years to reach maturity, storm impacts would not manifest themselves for many years. Moreover, hurricane impacts to nests tend to be localized and often occur after the main hatching season for the loggerhead is over (FWC 2008a).

Erosion

The designation of a Critically Eroded Beach is a planning requirement of the State's Beach Management Funding Assistance Program http://www.dep.state.fl.us/beaches/programs/becp/index.htm. A segment of beach shall first be designated as critically eroded in order to be eligible for State funding. A critically eroded area is a segment of 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. Critically eroded areas may also include peripheral segments or gaps between identified critically eroded areas which, although they may be stable or slightly erosional now, their inclusion is necessary for continuity of management of the coastal system or for the design integrity of adjacent beach management projects (FDEP 2009). It is important to note, that for an erosion problem area to be critical, there shall exist a threat to or loss of one of four specific interests – upland development, recreation, wildlife habitat, or important cultural resources.

Beachfront Lighting

Artificial beachfront lighting may cause disorientation (loss of bearings) and misorientation (incorrect orientation) of sea turtle hatchlings. Visual signs are the primary sea-finding mechanism for hatchlings (Mrosovsky and Carr 1967, Mrosovsky and Shettleworth 1968, Dickerson and Nelson 1989, Witherington and Bjorndal 1991). Artificial beachfront lighting is a documented cause of hatchling disorientation and misorientation on nesting beaches (Philibosian 1976, Mann 1977, Witherington and Martin 1996). The emergence from the nest and crawl to the sea is one of the most critical periods of a sea turtle's life. Hatchlings that do not make it to the sea quickly become food for ghost crabs, birds, and other predators, or become dehydrated and may never reach the sea. Some types of beachfront lighting attract hatchlings away from the sea while some lights cause adult turtles to avoid stretches of brightly illuminated beach. Research has

documented significant reduction in sea turtle nesting activity on beaches illuminated with artificial lights (Witherington 1992). During the 2007 to 2010 sea turtle nesting seasons in Florida, turtle hatchlings that were documented as being disoriented ranged from 44,828 to more than 64,000 hatchlings per year (**Table 9**) (FWC/FWRI 2014b). Exterior and interior lighting associated with condominiums had the greatest impact causing approximately 42 percent of documented hatchling disorientation/misorientation. Other causes included urban sky glow and street lights (FWC 2007a).

Table 10. Documented disorientations along the Florida coast (FWC 2007a).

Year	Total Number of Hatchling Disorientation Events	Total Number of Hatchlings Involved in Disorientation Events	Total Number of Adult Disorientation Events
2001	743	28,674	19
2002	896	43,226	37
2003	1,446	79,357	18
2004	888	46,487	24
2005	976	41,521	50
2006	1,521	71,798	40
2007	1,410	64,433	25
2008	1,192	49,623	62
2009	1,274	44,828	42
2010	1,513	46,978	82

Predation

Predation of sea turtle eggs and hatchlings by native and introduced species occurs on almost all nesting beaches. Predation by a variety of predators can considerably decrease sea turtle nest hatching success. The most common predators in the southeastern U.S. are ghost crabs (*Ocypode quadrata*), raccoons, feral hogs, foxes (*Urocyon cinereoargenteus* and *Vulpes vulpes*), coyotes (*Canis latrans*), armadillos, and fire ants (Dodd 1988, Stancyk 1995). In the absence of nest protection programs in a number of locations throughout the southeast U.S., raccoons may depredate up to 96 percent of all nests deposited on a beach (Davis and Whiting 1977, Hopkins and Murphy 1980, Stancyk *et al.* 1980, Talbert *et al*. 1980, Schroeder 1981, Labisky *et al.* 1986). In response to increasing predation of sea turtle nests by coyotes, foxes, hogs, and raccoons, multi-agency cooperative efforts have been initiated and are ongoing throughout Florida, particularly on public lands.

Driving on the Beach

The operation of motor vehicles on the beach affects sea turtle nesting by interrupting or striking a female turtle on the beach, headlights disorienting or misorienting emergent hatchlings, vehicles running over nests or hatchlings attempting to reach the ocean, and vehicle tracks traversing the beach which interfere with hatchlings crawling to the ocean. Hatchlings appear to become diverted not because they cannot physically climb out of the rut (Hughes and Caine 1994), but because the sides of the track cast a shadow and the hatchlings lose their line of sight to the ocean horizon (Mann 1977). The extended period of travel required to negotiate tire tracks and ruts may increase the susceptibility of hatchlings to dehydration and depredation during migration to the ocean (Hosier *et al.* 1981). Driving on the beach can cause sand compaction which may result in adverse impacts on nest site selection, digging behavior, clutch viability, and emergence by hatchlings, decreasing nest success and directly killing preemergent hatchlings (Mann 1977, Nelson and Dickerson 1987, Nelson 1988).

The physical changes and loss of plant cover caused by vehicles on dunes can lead to various degrees of instability, and therefore encourage dune migration. As vehicles move either up or down a slope, sand is displaced downward. Since the vehicles also inhibit plant growth, and open the area to wind erosion, dunes may become unstable, and begin to migrate. Unvegetated sand dunes may continue to migrate across stable areas as long as vehicle traffic continues. Vehicular traffic through dune breaches or low dunes on an eroding beach may cause an accelerated rate of overwash and beach erosion (Godfrey *et al.* 1978). If driving is required, the area where the least amount of impact occurs is the beach between the low and high tide water lines. Vegetation on the dunes can quickly reestablish provided the mechanical impact is removed.

In 1985, the Florida Legislature severely restricted vehicular driving on Florida's beaches, except that which is necessary for cleanup, repair, or public safety. This legislation also allowed an exception for five counties to continue to allow vehicular access on coastal beaches due to the availability of less than 50 percent of its peak user demand for off-beach parking. The counties affected by this exception are Volusia, St. Johns, Gulf, Nassau, and Flagler Counties, as well as limited vehicular access on Walton County beaches for boat launching.

Climate Change

The varying and dynamic elements of climate science are inherently long term, complex, and interrelated. Regardless of the underlying causes of climate change, glacial melting and expansion of warming oceans are causing sea level rise, although its extent or rate cannot as yet be predicted with certainty. At present, the science is not exact enough to precisely predict when and where climate impacts will occur. Although we may know the direction of change, it may not be possible to predict its precise timing or magnitude. These impacts may take place gradually or episodically in major leaps.

Climate change is evident from observations of increases in average global air and ocean temperatures, widespread melting of snow and ice, and rising sea level, according to the Intergovernmental Panel on Climate Change Report (IPCC 2007a). The IPCC Report (2007a) describes changes in natural ecosystems with potential widespread effects on many organisms,

including marine mammals and migratory birds. The potential for rapid climate change poses a significant challenge for fish and wildlife conservation. Species' abundance and distribution are dynamic, relative to a variety of factors, including climate. As climate changes, the abundance and distribution of fish and wildlife will also change. Highly specialized or endemic species are likely to be most susceptible to the stresses of changing climate. Based on these findings and other similar studies, the U.S. Department of the Interior (DOI) requires agencies under its direction to consider potential climate change effects as part of their long-range planning activities (Service 2007c).

Climatic changes in Florida could amplify current land management challenges involving habitat fragmentation, urbanization, invasive species, disease, parasites, and water management. Global warming will be a particular challenge for endangered, threatened, and other "at risk" species. It is difficult to estimate, with any degree of precision, which species will be affected by climate change or exactly how they will be affected. The Service will use Strategic Habitat Conservation planning, an adaptive science-driven process that begins with explicit trust resource population objectives, as the framework for adjusting our management strategies in response to climate change (Service 2006). As the level of information increases relative to the effects of global climate change on sea turtles and its designated critical habitat, the Service will have a better basis to address the nature and magnitude of this potential threat and will more effectively evaluate these effects to the range-wide status of sea turtles.

Florida is one of the areas most vulnerable to the consequences of climate change. Sea level rise and the possibility of more intense hurricanes are the most serious threats to Florida potentially from climate change. Florida has over 1,350 miles of coastline, low-lying topography, and proximity to the hurricane-prone subtropical mid-Atlantic Ocean and Gulf of Mexico.

One of the most serious threats to Florida's coasts comes from the combination of elevated sea levels and intense hurricanes. Florida experiences more landings of tropical storms and hurricanes than any other state in the U.S. Storm surges due to hurricanes will be on top of elevated sea levels, tides, and wave action. As a result, barrier islands and low-lying areas of Florida will be more susceptible to the effects of storm surge. An important element of adaptation strategy is how to protect beaches, buildings and infrastructure against the effects of rising seas and wind, wave action, and storm surge due to hurricanes while maintaining viable nesting habitat along Florida's coasts.

Temperatures are predicted to rise from 1.6^{o}F to 9°F for North America by the end of this century (IPCC 2007a,b). Alterations of thermal sand characteristics could result in highly female-biased sex ratios because sea turtles exhibit temperature dependent sex determination (e.g., Glen and Mrosovsky 2004, Hawkes *et al*. 2008).

Along developed coastlines, and especially in areas where shoreline protection structures have been constructed to limit shoreline movement, rising sea levels will cause severe effects on nesting females and their eggs. Erosion control structures can result in the permanent loss of dry nesting beach or deter nesting females from reaching suitable nesting sites (National Research Council

1990a). Nesting females may deposit eggs seaward of the erosion control structures potentially subjecting them to repeated tidal inundation or washout by waves and tidal action.

Based on the present level of available information concerning the effects of global climate change on the status of sea turtles and their designated critical habitat, the Service acknowledges the potential for changes to occur in the action area, but presently has no basis to evaluate if or how these changes are affecting sea turtles or their designated critical habitat. Nor does our present knowledge allow the Service to project what the future effects from global climate change may be or the magnitude of these potential effects.

EFFECTS OF THE ACTION

This section is an analysis of the beneficial, direct, and indirect effects of the proposed actions on nesting sea turtles, nests, eggs, and hatchling sea turtles within the Action Area. The analysis includes effects interrelated and interdependent of the project activities. An interrelated activity is an activity that is part of a proposed action and depends on the proposed activity. An interdependent activity is an activity that has no independent utility apart from the action.

Factors to be considered

The proposed projects will occur within habitat that is used by sea turtles for nesting and may be constructed during a portion of the sea turtle nesting season. Long-term and permanent impacts could include a change in the nest incubation environment from the sand placement activities. Short-term and temporary impacts to sea turtle nesting activities could result from project work occurring on the nesting beach during the nesting or hatching period, from changes in the physical characteristics of the beach from the placement of the sand including the profile and from sediment-induced changes in the nest incubation environment.

Proximity of action: Sand placement activities would occur within and adjacent to nesting habitat for sea turtles and dune habitats that ensure the stability and integrity of the nesting beach. Specifically, the project would potentially impact loggerhead, green, leatherback, hawksbill, and Kemp's ridley nesting females, their nests, nesting habitat, and hatchling sea turtles.

Distribution: Sand placement activities that may impact nesting and hatchling sea turtles and sea turtle nests would occur along Gulf of Mexico and Atlantic Ocean coasts.

Timing: The timing of the sand placement activities could directly and indirectly impact nesting females, their nests, and hatchling sea turtles when conducted between March 1 and November 30.

Nature of the effect: The effects of the sand placement activities may change the nesting behavior of adult female sea turtles, diminish nesting success, and reduce hatching and emerging success. Sand placement can also change the incubation conditions within the nest. Any decrease in productivity and/or survival rates would contribute to the vulnerability of the sea turtles nesting in Florida.

Duration: The sand placement activity may be a one-time activity or a multiple-year activity and each sand placement project may take between three and seven months to complete. Thus, the direct effects would be expected to be short-term in duration. Indirect effects from the activity may continue to impact nesting and hatchling sea turtles and sea turtle nests in subsequent nesting seasons.

Disturbance frequency: Sea turtle populations in Florida may experience decreased nesting success, hatching success, and hatchling emergence success that could result from the sand placement activities being conducted at night during one nesting season, or during the earlier or later parts of two nesting seasons. Disturbance due to alterations of the incubation substrate and beach profile could persist for several years, depending on continued presence of placed sand in the nesting beach.

Disturbance intensity and severity: Depending on the amount (including post-disaster work) and the timing of the sand placement activities during sea turtle nesting season, effects to the sea turtle populations of Florida, and potentially the U.S. populations, could be important.

Analyses for effects of the action

Beneficial Effects

The placement of sand on a beach with reduced dry foredune habitat 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. In addition, a nourished beach that is designed and constructed to mimic a natural beach system may benefit sea turtles more than an eroding beach it replaces.

Adverse Effects

Through many years of research, it has been documented that beach nourishment can have adverse effects on nesting female sea turtles and hatchlings and sea turtle nests. Results of monitoring sea turtle nesting and beach nourishment activities provide additional information on how sea turtles respond to nourished beaches, minimization measures, and other factors that influence nesting, hatching, and emerging success. Science-based information on sea turtle nesting biology and review of empirical data on beach nourishment monitoring is used to manage beach nourishment activities to eliminate or reduce impacts to nesting and hatchling sea turtles and sea turtle nests so that beach nourishment can be accomplished. Measures can be incorporated pre-, during, and post-construction to reduce impacts to sea turtles. Because of the long history of sea turtle monitoring in Florida, it is not necessary to require studies on each project beach to document those effects each time.

Direct Effects

Direct effects are those direct or immediate effects of a project on the species or its habitat. Placement of sand on a beach in and of itself may not provide suitable nesting habitat for sea turtles. Although sand placement activities may increase the potential nesting area, significant negative impacts to sea turtles may result if protective measures are not incorporated during project construction. Sand placement activities during the nesting season, particularly on or near high density nesting beaches, can cause increased loss of eggs and hatchlings and, along with other mortality sources, may significantly impact the long-term survival of the species. For instance, projects conducted during the nesting and hatching season could result in the loss of sea turtles through disruption of adult nesting activity and by burial or crushing of nests or hatchlings. While a nest monitoring and egg relocation program would reduce these impacts, nests may be inadvertently missed (when crawls are obscured by rainfall, wind, or tides) or misidentified as false crawls during daily patrols. In addition, nests may be destroyed by operations at night prior to beach patrols being performed. Even under the best of conditions, about seven percent of the nests can be misidentified as false crawls by experienced sea turtle nest surveyors (Schroeder 1994).

Nest relocation

Besides the potential for missing nests during surveys and a nest relocation program, there is a potential for eggs to be damaged by nest movement or relocation, particularly if eggs are not relocated within 12 hours of deposition (Limpus *et al.* 1979). Nest relocation can have adverse impacts on incubation temperature (and hence sex ratios), gas exchange parameters, hydric environment of nests, hatching success, and hatchling emergence (Limpus *et al.* 1979, Ackerman 1980, Parmenter 1980, Spotila *et al.* 1983, McGehee 1990). Relocating nests into sands deficient in oxygen or moisture can result in mortality, morbidity, and reduced behavioral competence of hatchlings. Water availability is known to influence the incubation environment of the embryos and hatchlings of turtles with flexible-shelled eggs, which has been shown to affect nitrogen excretion (Packard *et al.* 1984), mobilization of calcium (Packard and Packard 1986), mobilization of yolk nutrients (Packard *et al.* 1985), hatchling size (Packard *et al.* 1981, McGehee 1990), energy reserves in the yolk at hatching (Packard *et al.* 1988), and locomotory ability of hatchlings (Miller *et al.* 1987).

In a 1994 Florida study comparing loggerhead hatching and emerging success of relocated nests with nests left in their original location, Moody (1998) found that hatching success was lower in relocated nests at nine of 12 beaches evaluated. In addition, emerging success was lower in relocated nests at 10 of 12 beaches surveyed in 1993 and 1994. Many of the direct effects of beach nourishment may persist over time. These direct effects include increased susceptibility of relocated nests to catastrophic events, the consequences of potential increased beachfront development, changes in the physical characteristics of the beach, the formation of escarpments, repair/replacement of groins and jetties and future sand migration.

Equipment

The use of heavy machinery on beaches during a construction project may also have adverse effects on sea turtles. Equipment left on the nesting beach overnight can create barriers to nesting females emerging from the surf and crawling up the beach, causing a higher incidence of false crawls and unnecessary energy expenditure.

The operation of motor vehicles or equipment on the beach to complete the project work at night affects sea turtle nesting by: interrupting or colliding with a female turtle on the beach; headlights disorienting or misorienting emergent hatchlings; vehicles running over nesting females or hatchlings attempting to reach the ocean, and vehicle tracks traversing the beach interfering with hatchlings crawling to the ocean. Apparently, hatchlings become diverted not because they cannot physically climb out of the rut (Hughes and Caine 1994), but because the sides of the track cast a shadow and the hatchlings lose their line of sight to the ocean horizon (Mann 1977). The extended period of travel required to negotiate tire tracks and ruts may increase the susceptibility of hatchlings to dehydration and depredation during migration to the ocean (Hosier *et al*. 1981). Driving directly above or over incubating egg clutches or on the beach can cause sand compaction which may result in adverse impacts on nest site selection, digging behavior, clutch viability, and emergence by hatchlings, decreasing nest success and directly killing preemergent hatchlings (Mann 1977, Nelson and Dickerson 1987, Nelson 1988).

Depending on when the dune project is completed, dune vegetation may have become established in the vicinity of dune restoration sites. The physical changes and loss of plant cover caused by vehicles on vegetated areas or dunes can lead to various degrees of instability and cause dune migration. As vehicles move over the sand, sand is displaced downward, lowering the substrate. Since the vehicles also inhibit plant growth, and open the area to wind erosion, the beach and dunes may become unstable. Vehicular traffic on the beach or through dune breaches or low dunes may cause acceleration of overwash and erosion (Godfrey *et al.* 1978). Driving along the beachfront should be limited to between the low and high tide water lines. To minimize the impacts to the beach and recovering dunes, transport and access to the dune restoration sites should be from the road. However, if the work needs to be conducted from the beach, work areas for the truck transport and bulldozer/bobcat equipment should be designated and marked.

Artificial lighting

Visual cues are the primary sea-finding mechanism for hatchling sea turtles (Mrosovsky and Carr 1967, Mrosovsky and Shettleworth 1968, Dickerson and Nelson 1989, Witherington and Bjorndal 1991). When artificial lighting is present on or near the beach, it can misdirect hatchlings once they emerge from their nests and prevent them from reaching the ocean (Philibosian 1976, Mann 1977, FWC 2007a). In addition, a significant reduction in sea turtle nesting activity has been documented on beaches illuminated with artificial lights (Witherington 1992). Therefore, construction lights along a project beach and on the dredging vessel may deter females from coming ashore to nest, misdirect females trying to return to the surf after a nesting event, and misdirect emergent hatchlings from adjacent non-project beaches.

The newly created wider and flatter beach berm exposes sea turtles and their nests to lights that were less visible, or not visible, from nesting areas before the sand placement activity leading to a higher mortality of hatchlings. Review of over 10 years of empirical information from beach nourishment projects indicates that the number of sea turtles impacted by lights increases on the post-construction berm. A review of selected nourished beaches in Florida (South Brevard, North Brevard, Captiva Island, Ocean Ridge, Boca Raton, Town of Palm Beach, Longboat Key, and Bonita Beach) indicated disorientation reporting increased by approximately 300 percent the first nesting season after project construction and up to 542 percent the second year compared to prenourishment reports (Trindell *et al.* 2005).

Specific examples of increased lighting disorientations after a sand placement project include Brevard and Palm Beach Counties, Florida. A sand placement project in Brevard County, completed in 2002, showed an increase of 130 percent in disorientations in the nourished area. Disorientations on beaches in the County that were not nourished remained constant (Trindell 2007). This same result was also documented in 2003 when another beach in Brevard County was nourished and the disorientations increased by 480 percent (Trindell 2007). Installing appropriate beachfront lighting is the most effective method to decrease the number of disorientations on any developed beach including nourished beaches. A shoreline protection project was constructed at Ocean Ridge in Palm Beach County, Florida, between August 1997 and April 1998. Lighting disorientation events increased after nourishment. In spite of continued aggressive efforts to identify and correct lighting violations in 1998 and 1999, 86 percent of the disorientation reports were in the nourished area in 1998 and 66 percent of the reports were in the nourished area in 1999 (Howard and Davis 1999).

While the effects of artificial lighting have not been specifically studied on each beach that is nourished in Florida, based on the experience of increased artificial lighting disorientations on other Florida beaches, impacts are expected to potentially occur on all nourished beaches statewide.

Changing to sea turtle compatible lighting can be easily accomplished at the local level through voluntary compliance or by adopting appropriate regulations. Of the 27 coastal counties in Florida where sea turtles are known to nest, 21 have passed beachfront lighting ordinances in addition to 58 municipalities (http://myfwc.com/media/418420/seaturtle_lightordmap.pdf). Local governments have realized that adopting a lighting ordinance is the most effective method to address artificial lighting along the beachfront.

Indirect Effects

Indirect effects are those effects that are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Effects from the proposed project may continue to affect sea turtle nesting on the project beach and adjacent beaches in future years.

Increased susceptibility to catastrophic events

Nest relocation within a nesting season may concentrate eggs in an area making them more susceptible to catastrophic events. Hatchlings released from concentrated areas also may be subject to greater predation rates from both land and marine predators, because the predators learn where to concentrate their efforts (Glenn 1998, Wyneken *et al.* 1998).

Increased beachfront development

Pilkey and Dixon (1996) stated that beach replenishment frequently leads to more development in greater density within shorefront communities that are then left with a future of further replenishment or more drastic stabilization measures. Dean (1999) also noted that the very existence of a beach nourishment project can encourage more development in coastal areas. Following completion of a beach nourishment project in Miami during 1982, investment in new and updated facilities substantially increased tourism there (National Research Council 1995). Increased building density immediately adjacent to the beach often resulted as much larger buildings that accommodated more beach users replaced older buildings. Overall, shoreline management creates an upward spiral of initial protective measures resulting in more expensive development which leads to the need for more and larger protective measures. Increased shoreline development may adversely affect sea turtle nesting success. Greater development may support larger populations of mammalian predators, such as foxes and raccoons, than undeveloped areas (National Research Council 1990a), and can also result in greater adverse effects due to artificial lighting, as discussed above.

Changes in the physical environment

Beach nourishment may result in changes in sand density (compaction), beach shear resistance (hardness), beach moisture content, beach slope, sand color, sand grain size, sand grain shape, and sand grain mineral content if the placed sand is dissimilar from the original beach sand (Nelson and Dickerson 1988a). These changes could result in adverse impacts on nest site selection, digging behavior, clutch viability, and hatchling emergence (Nelson and Dickerson 1987, Nelson 1988).

Beach nourishment projects create an elevated, wider, and unnatural flat slope berm. Sea turtles nest closer to the water the first few years after nourishment because of the altered profile (and perhaps unnatural sediment grain size distribution) (Ernest and Martin 1999, Trindell 2005) (**Figure 6**).

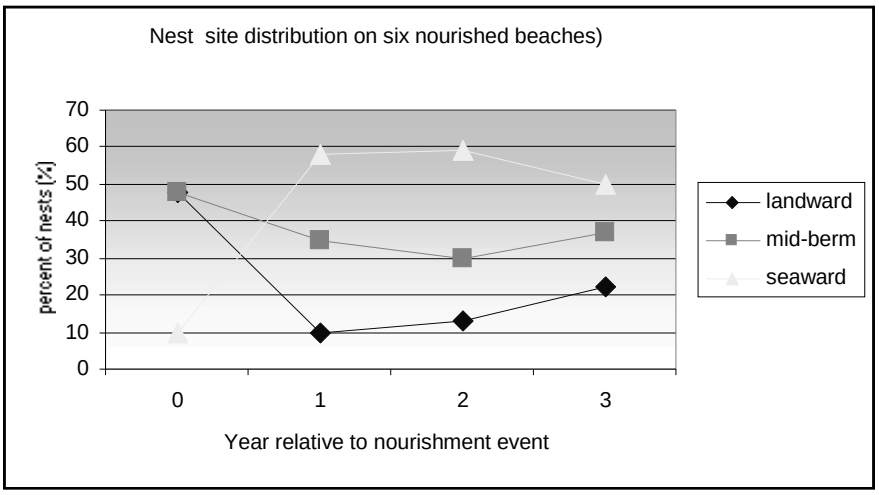

Figure 6. Review of sea turtle nesting site selection following nourishment (Trindell 2005).

Beach compaction and unnatural beach profiles resulting from beach nourishment activities could negatively impact sea turtles regardless of the timing of projects. Very fine sand or the use of heavy machinery can cause sand compaction on nourished beaches (Nelson *et al.* 1987, Nelson and Dickerson 1988a). Significant reductions in nesting success (*i.e.*, false crawls occurred more frequently) have been documented on severely compacted nourished beaches (Fletemeyer 1980, Raymond 1984, Nelson and Dickerson 1987, Nelson *et al.* 1987), and increased false crawls may result in increased physiological stress to nesting females. Sand compaction may increase the length of time required for female sea turtles to excavate nests and cause increased physiological stress to the animals (Nelson and Dickerson 1988b). Nelson and Dickerson (1988c) concluded that, in general, beaches nourished from offshore borrow sites are harder than natural beaches, and while some may soften over time through erosion and accretion of sand, others may remain hard for 10 years or more.

These impacts can be minimized by using suitable sand and by tilling (minimum depth of 36 inches) compacted sand after project completion. The level of compaction of a beach can be assessed by measuring sand compaction using a cone penetrometer (Nelson 1987). Tilling of a nourished beach with a root rake may reduce the sand compaction to levels comparable to unnourished beaches. However, a pilot study by Nelson and Dickerson (1988c) showed that a tilled nourished beach will remain uncompacted for up to one year. Multi-year beach compaction monitoring and, if necessary, tilling would ensure that project impacts on sea turtles are minimized.

A change in sediment color on a beach could change the natural incubation temperatures of nests in an area, which, in turn, could alter natural sex ratios. To provide the most suitable sediment for nesting sea turtles, the color of the nourished sediments should resemble the natural beach sand in the area. Natural reworking of sediments and bleaching from exposure to the sun would help to

lighten dark nourishment sediments; however, the timeframe for sediment mixing and bleaching to occur could be critical to a successful sea turtle nesting season.

Escarpment formation

On nourished beaches, steep escarpments may develop along the water line interface as the beach adjusts from an unnatural construction profile to a more natural beach profile (Coastal Engineering Research Center 1984, Nelson *et al.* 1987). These escarpments can hamper or prevent access to nesting sites (Nelson and Blihovde 1998). Researchers have shown that female sea turtles coming ashore to nest can be discouraged by the formation of an escarpment, leading to situations where they choose marginal or unsuitable nesting areas to deposit eggs (e.g., in front of the escarpments, which often results in failure of nests due to prolonged tidal inundation). This impact can be minimized by leveling any escarpments prior to the nesting season.

Construction of groins and jetties

Groins and jetties are shore-perpendicular structures that are designed to trap sand that would otherwise be transported by longshore currents. Jetties are defined as structures placed to keep sand from flowing into channels (Kaufman and Pilkey 1979, Komar 1983). In preventing normal sand transport, these structures accrete updrift beaches while causing accelerated beach erosion downdrift of the structures (Komar 1983, Pilkey *et al.* 1984, National Research Council 1987), a process that results in degradation of sea turtle nesting habitat. As sand fills the area updrift from the groin or jetty, some littoral drift and sand deposition on adjacent downdrift beaches may occur due to spillover. However, these groins and jetties often force the stream of sand into deeper offshore water where it is lost from the system (Kaufman and Pilkey 1979). The greatest changes in beach profile near groins and jetties are observed close to the structures, but effects eventually may extend many miles along the coast (Komar 1983).

Jetties are placed at ocean inlets to keep transported sand from closing the inlet channel. Together, jetties and inlets are known to have profound effects on adjacent beaches (Kaufman and Pilkey 1979). Witherington *et al.* (2005) found a significant negative relationship between loggerhead nesting density and distance from the nearest of 17 ocean inlets on the Atlantic coast of Florida. The effect of inlets in lowering nesting density was observed both updrift and downdrift of the inlets, leading researchers to propose that beach instability from both erosion and accretion may discourage loggerhead nesting.

Construction or repair of groins and jetties during the nesting season may result in the destruction of nests, disturbance of females attempting to nest, and disorientation of emerging hatchlings from project lighting. Following construction, the presence of groins and jetties may interfere with nesting turtle access to the beach, result in a change in beach profile and width (downdrift erosion, loss of sandy berms, and escarpment formation), trap hatchlings, and concentrate predatory fishes, resulting in higher probabilities of hatchling predation.

Escarpments may develop on beaches between groins as the beaches equilibrate to their final profiles. These escarpments are known to prevent females from nesting on the upper beach and can cause them to choose unsuitable nesting areas, such as seaward of an escarpment. These nest sites commonly receive prolonged tidal inundation and erosion, which results in nest failure (Nelson and Blihovde 1998). As groin structures fail and break apart, they spread debris on the beach, which may further impede nesting females from accessing suitable nesting sites and trap both hatchlings and nesting turtles.

Species' response to a proposed action

The following summary illustrates sea turtle responses to and recovery from a nourishment project comprehensively studied by Ernest and Martin (1999). A significantly larger proportion of turtles emerging on nourished beaches abandoned their nesting attempts than turtles emerging on natural or prenourished beaches. This reduction in nesting success is most pronounced during the first year following project construction and is most likely the result of changes in physical beach characteristics associated with the nourishment project (e.g., beach profile, sediment grain size, beach compaction, frequency and extent of escarpments). During the first post-construction year, the time required for turtles to excavate an egg chamber on untilled, hard-packed sands increases significantly relative to natural conditions. However, tilling (minimum depth of 36 inches) is effective in reducing sediment compaction to levels that did not significantly prolong digging times. As natural processes reduced compaction levels on nourished beaches during the second post-construction year, digging times returned to natural levels (Ernest and Martin 1999).

During the first post-construction year, nests on nourished beaches are deposited significantly seaward of the toe of the dune and significantly landward of the tide line than nests on natural beaches. More nests are washed out on the wide, flat beaches of the nourished treatments than on the narrower steeply sloped natural beaches. This phenomenon may persist through the second post-construction year monitoring and result from the placement of nests near the seaward edge of the beach berm where dramatic profile changes, caused by erosion and scarping, occur as the beach equilibrates to a more natural contour.

The principal effect of beach nourishment on sea turtle reproduction is a reduction in nesting success during the first year following project construction. Although most studies have attributed this phenomenon to an increase in beach compaction and escarpment formation, Ernest and Martin (1999) indicated that changes in beach profile may be more important. Regardless, as a nourished beach is reworked by natural processes in subsequent years and adjusts from an unnatural construction profile to a natural beach profile, beach compaction and the frequency of escarpment formation decline, and nesting and nesting success return to levels found on natural beaches.

BEACH MICE

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

The formal taxonomic classification of beach mouse subspecies follows the geographic variation in pelage and skeletal measurements documented by Bowen (1968). This peer-reviewed, published classification was also accepted by Hall (1981). Since the listing of the beach mice, further research concerning the taxonomic validity of the subspecific classification of beach mice has been initiated and/or conducted. Preliminary results from these studies support the separation of beach mice from inland forms, and support the currently accepted taxonomy (Bowen 1968) (*i.e.*, each beach mouse group represents a unique and isolated subspecies). Recent research using mitochondrial DNA data illustrates that Gulf Coast beach mouse subspecies form a well-supported and independent evolutionary cluster within the global population of the mainland or inland old field mice (Van Zant and Wooten 2006).

The old-field mouse (*Peromyscus polionotus)* is different in form and structure as well as being genetically diverse throughout its range in the southeastern U.S. (Bowen 1968, Selander *et al.* 1971). Currently there are 16 recognized subspecies of old-field mice (Hall 1981). Eight subspecies occupy coastal rather than inland habitat and are referred to as beach mice (Bowen 1968). Two existing subspecies of beach mouse and one extinct subspecies are known from the Atlantic coast of Florida and five subspecies live along the Gulf coast of Alabama and northwestern Florida.

Rivers and various inlets bisect the Gulf and Atlantic beaches and naturally isolate habitats in which the beach mice live. The outer coastline and barrier islands are typically separated from the mainland by lagoons, swamps, tidal marshes, and flatwood areas with hardpan soil conditions. However, these dispersal barriers are not absolute; sections of sand peninsulas may from time to time be cut off by storms and shift over time due to wind and current action. Human development has also fragmented the ranges of the subspecies. As a consequence of coastal development and the dynamic nature of the coastal environment; beach mouse populations are generally comprised of various disjunct populations.

<u>Atlantic Coast beach mice</u>

The southeastern beach mouse (SEBM) was listed as a threatened species under the Act in 1989 (54 *FR* 20598). Critical habitat was not designated for this subspecies. SEBM is also listed as threatened by the State of Florida. The original distribution of the SEBM was from Ponce Inlet, Volusia County, southward to Hollywood, Broward County, and possibly as far south as Miami in Miami-Dade County. It is currently restricted to Volusia, Brevard, and Indian River Counties. Formerly, this subspecies occurred along about 175 miles of Florida's southeast coast; it now occupies about 50 miles, a significant reduction in range (**Figure 7**).

This subspecies uses both beach dunes and inland areas of scrub vegetation. The most seaward vegetation typically consists of sea oats (*Uniola paniculata*), bitter panicgrass (*Panicum amarum*), railroad vine (*Ipomoea pes-caprae*), beach morning-glory (*Ipomoea stolonifera*), and camphorweed (*Heterotheca subaxillaris*). Further landward, vegetation is more diverse, including beach tea (*Croton punctatus*), pricklypear (*Opuntia humifusa*), saw palmetto (*Serenoa repens)*, wax myrtle (*Myrica cerifera)*, and sea grape (*Coccoloba uvifera*).

Anastasia Island beach mice

The Anastasia Island beach mouse (AIBM), was listed as endangered under the Act in 1989 (54 *FR* 20598). Critical habitat was not designated for the subspecies. AIBM is also listed as an endangered species by the State of Florida. The distribution of the AIBM has declined significantly, particularly in the northern part of its range. AIBM was historically known from the vicinity of the Duval-St. Johns County line southward to Matanzas Inlet, St. Johns County, Florida (Frank and Humphrey 1996). Included in their range, AIBM populations are found along 14.5 miles of Anastasia Island, mainly on 3.5 miles at Anastasia State Park (ASP) and one mile at Fort Matanzas National Monument (FMNM). AIBM have been found at low densities in dunes on the remainder of the island. Beach mice have also been located along sections of the 4.2 miles of dune habitat at Guana Tolomato Matanzas National Estuarine Research Reserve (GTMNERR)-Guana River. Anastasia Island is separated from the mainland of Florida to the west by extensive salt marshes and the Mantazas River, to the north by the St. Augustine Inlet, and to the south by the Matanzas Inlet which are both maintained and open. This has restricted the range of AIBM to 14.5 mile length of Anastasia Island and sections of GTMNERR-Guana River (**Figure 8**).

In 1992 to 1993, the Service funded the reintroduction of AIBM to GTMNERR in St. Johns County where historical habitat for the subspecies existed (Service 1993). GMTNERR-Guana River portion of the Reserve (4.0 miles of undeveloped beach) is nine miles north of the existing population of beach mice at ASP. Fifty-five mice (27 females and 28 males) were trapped at FMNM and ASP from September 24, to November 12, 1992, and placed in soft-release enclosures at the state park on September 27, and November 12, 1992. During follow-up trapping conducted in February 1993, beach mice occupied the entire 4.2-mile length of the park; 34 were captured and it was estimated that the population totaled 220. Quarterly trapping has been conducted since the reintroduction and mice have not been captured since September 2006. This may be a result of habitat loss alteration from storms or habitat conditions. Sneckenberger 2001 indicates that the scrub habitat found in the tertiary dunes provides a more stable level of food resources, which becomes crucial when food is scarce or nonexistent in the primary and secondary dunes. This suggests that access to primary, secondary, and scrub dune habitat is essential to beach mice at the individual level, which may be an issue for this population as A1A Highway separates/bisects the primary dune from the secondary dunes and scrub dune habitats.

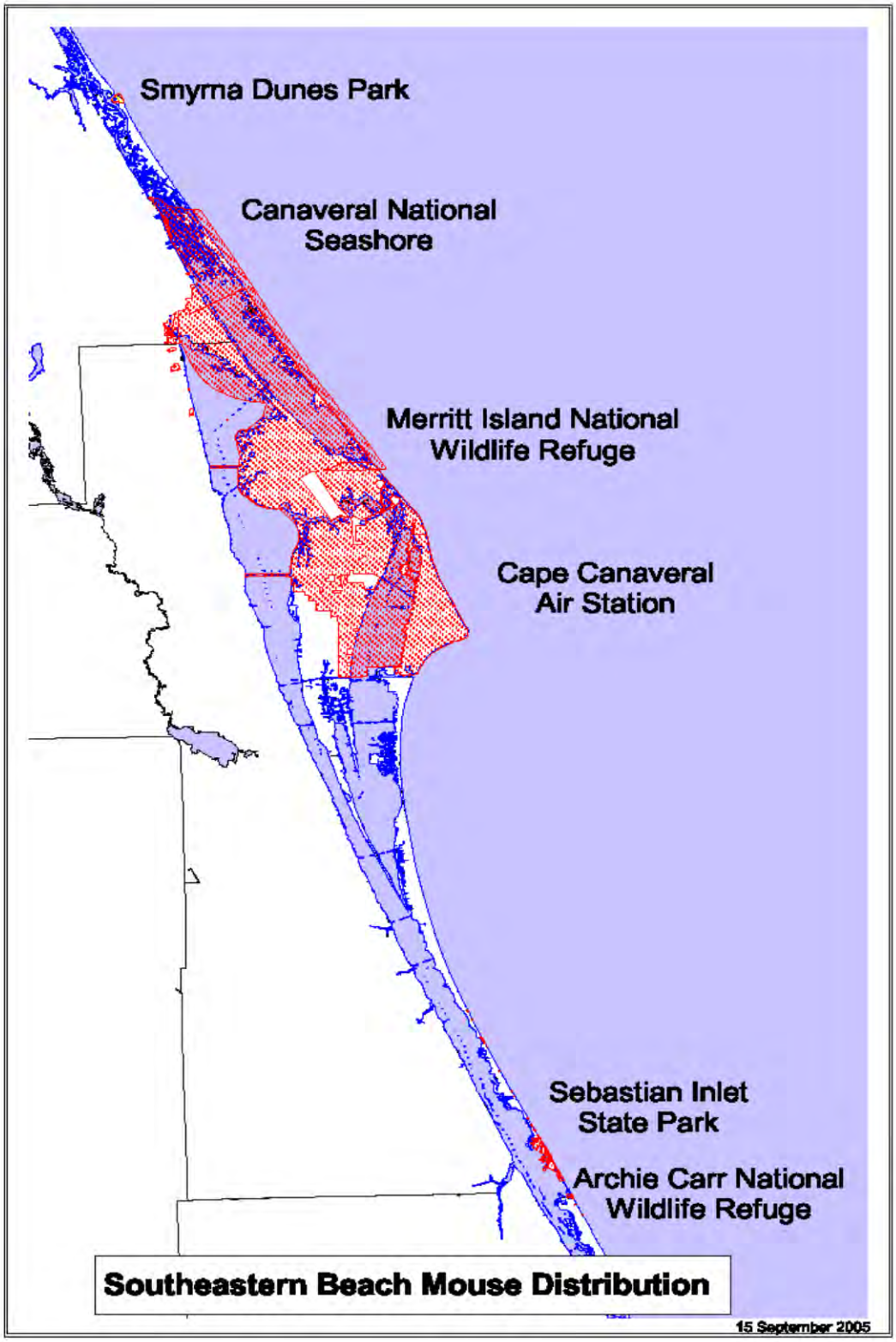

Figure 7. The distribution of the southeastern beach mouse.

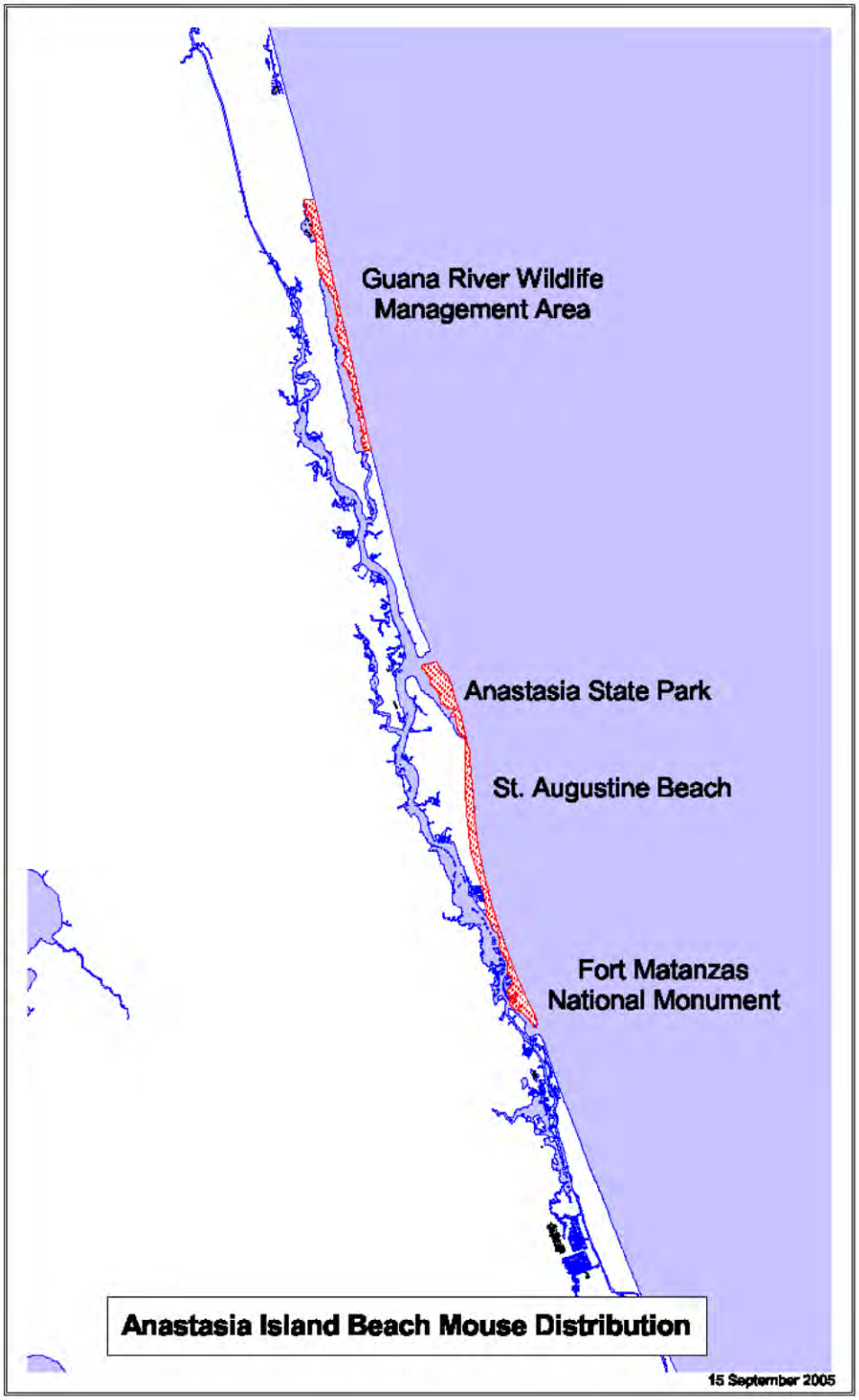

Figure 8. The distribution of the Anastasia Island beach mouse.

Gulf Coast Beach Mice

The CBM and the PKBM were listed with the Alabama beach mouse (ABM) (*Peromyscus polionotus ammobates*), as endangered species under the Act in 1985 (50 *FR* 23872). The SABM was listed under the Act in 1998 (63 *FR* 70053). CBM, SABM, and PKBM are also listed as endangered species by the State of Florida (FWC 2010). Critical habitat was designated for the CBM, and PKBM at the time of listing; however, critical habitat was revised in 2006 (71 *FR* 60238). Critical habitat was also designated for the SABM in 2006 (71 *FR* 60238).

The historical range of the CBM extended 53 miles between Destin Pass, Choctawhatchee Bay in Okaloosa County and East Pass in St. Andrew Bay, Bay County, Florida. PKBM historically ranged along the entire length of Perdido Key for 16.9 miles between Perdido Bay, Alabama (Perdido Pass) and Pensacola Bay, Florida (Bowen 1968). The historical range of the SABM extended 38 miles between Money Bayou in Gulf County, and Crooked Island at the East Pass of St. Andrews Bay, Bay County, Florida including the St. Joseph peninsula and the coastal mainland adjacent to St. Joseph Bay, Florida (**Figure 9**).

Critical habitat

Since the listing of the PKBM and CBM in 1985, research has refined previous knowledge of Gulf Coast beach mouse habitat requirements and factors that influence their use of habitat. Based on the current knowledge of the life history, biology, and ecology of the subspecies and the requirements of the habitat to sustain the essential life history functions of the subspecies, the primary constituent elements (PCE) of critical habitat for Gulf Coast beach mice consist of:

1. A contiguous mosaic of primary, secondary scrub vegetation, and dune structure, with a balanced level of competition and predation and few or no competitive or predaceous nonnative species present, that collectively provide foraging opportunities, cover, and burrow sites;

2. Primary and secondary dunes, generally dominated by sea oats that despite occasional temporary impacts and reconfiguration from tropical storms and hurricanes provide abundant food resources, burrow sites, and protection from predators;

3. Scrub dunes, generally dominated by scrub oaks, that provide food resources and burrow sites, and provide elevated refugia during and after intense flooding due to rainfall and/or hurricane induced storm surge;.

4. Functional, unobstructed habitat connections that facilitate genetic exchange, dispersal, natural exploratory movements, and recolonization of locally extirpated areas; and

5. A natural light regime within the coastal dune ecosystem, compatible with the nocturnal activity of beach mice, necessary for normal behavior, growth and viability of all life stages.

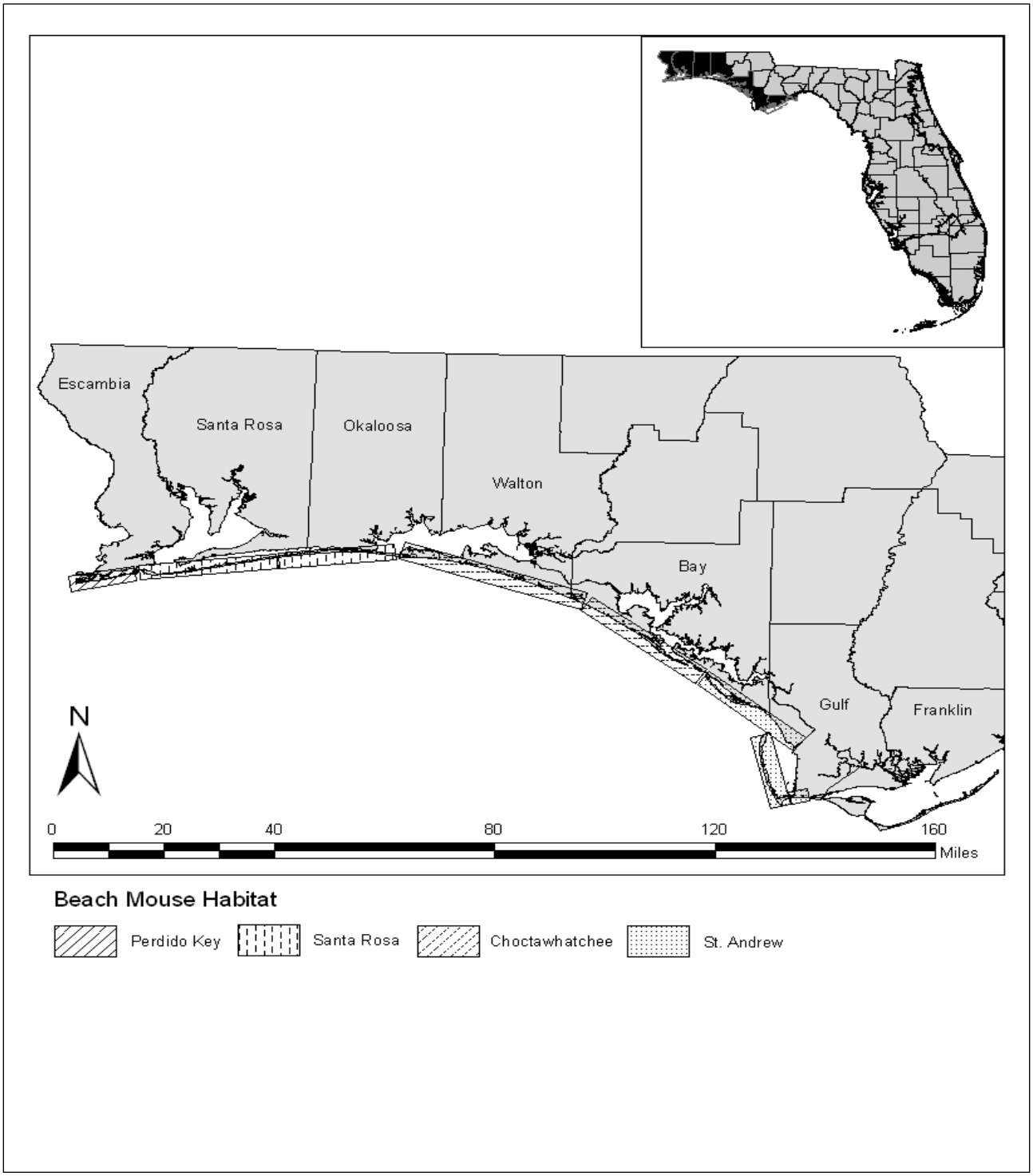

Figure 9. Historical range of Gulf Coast beach mouse subspecies.

Thirteen coastal dune areas (critical habitat units) in southern Alabama and the panhandle of Florida have been determined to be essential to the conservation of PKBM, CBM, and SABM and are designated as critical habitat (**Figures 10 through 12**). These 13 units include five units for PKBM, five units for CBM, and three units for the SABM. These units total 6,194 acres of coastal dunes, and include 1,300 acres for the PKBM in Escambia County, Florida and Baldwin County, Alabama (**Table 10**); 2,404 acres for the CBM, in Okaloosa, Walton, and Bay Counties, Florida (**Table 11**); and 2,490 acres for the SABM in Bay and Gulf Counties, Florida (**Table 12**).

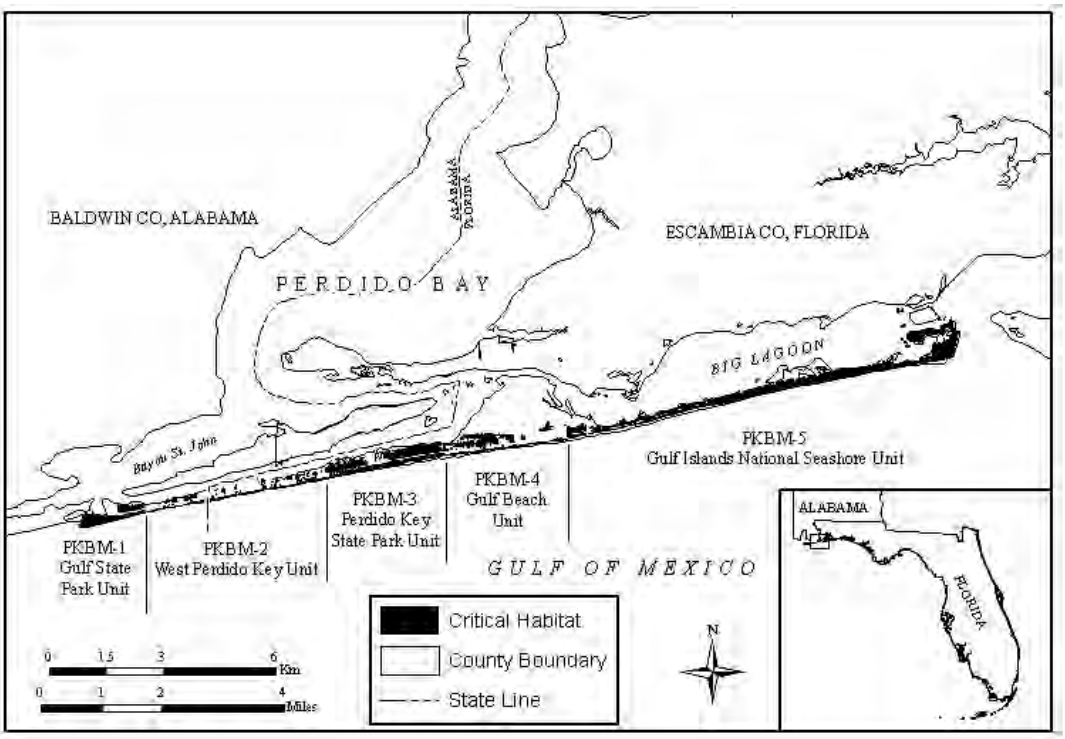

Figure 10. Critical habitat units designated for the Perdido Key beach mouse.

Table 11. Critical habitat units designated for the Perdido Key beach mouse.

Perdido Key Beach Mouse Critical Habitat Units	Federal Acres	State Acres	Local and Private Acres	Total Acres
1. Gulf State Park Unit	0	115	0	115
2. West Perdido Key Unit	0	0	147	147
3. Perdido Key State Park Unit	0	238	0	238
4. Gulf Beach Unit	0	0	162	162
5. Gulf Islands National Seashore Unit	638	0	0	638
Total	638	353	309	1300

Gulf State Park

The Gulf State Park Unit (PKBM-1) consists of 115 acres of PKBM habitat in southern Baldwin County, Alabama, on the westernmost region of Perdido Key. PKBM were known to inhabit this unit during surveys in 1979 and 1982, and by 1986 this was the only known existing population of the subspecies (Humphrey and Barbour 1981; Holler *et al*. 1989). This population of less than 30 individuals was the donor for the reestablishment of PKBM into Gulf Islands National Seashore in 1986. This project ultimately saved Perdido Key beach mice from extinction as the population at Gulf State Park was considered extirpated in 1998 due to tropical storms and predators (Moyers *et al*. 1999). In 2010, captive bred mice are released at Gulf State Park. This reintroduction was deemed a success and the population has continued to increase. The track tube monitoring was established at GSP in 2010, which began with only a 9 percent occurrence rate and the end of the year yielded an 83 percent occurrence rate, 2011 started with an 85 percent occurrence rate and continued to increase slightly until September 2011 which yielded a 73 percent occurrence rate in the tracking tubes (FWC 2012a and FWC 2014b). A 3-day trapping effort the week of May 7, 2012, continued to find PKBM distributed throughout habitat south of Highway 182. Two reproductively-active male PKBM were found north of Highway 182 (J. Gore pers. comm. 2012). The release appears to have been a success and PKBM are occupying all three public lands for the first time since being listed as endangered. Recent track tube data for 2013 shows an average of 93 percent occurrence of PKBM in the tracking tubes at GSP (FWC 2013a and FWC 2013b).

Beach mouse habitat in this unit consists of primary, secondary, and scrub dune habitat. Because scrub habitat is separated from the frontal dunes by a highway in some areas, the population inhabiting this unit can be especially vulnerable to hurricane impacts, and therefore further linkage to scrub habitat and/or habitat management would improve connectivity. This unit is managed by the Alabama Department of Conservation and Natural Resources and provides primary constituent elements (PCEs) 2, 3, 4, and 5. Threats specific to this unit that may require special management considerations include artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, and/or a decrease in habitat quality. This unit, which contains interior scrub habitat as well as primary and secondary dunes, serves as a re-designation and expansion of the original critical habitat designation (50 *FR* 23872). The original designation did not include scrub habitat which we now know is necessary for the long-term persistence of beach mouse populations.

The West Perdido Key Unit (PKBM-2) consists of 114 acres in southern Escambia County, Florida, and 33 acres in southern Baldwin County, Alabama. This unit encompasses essential features of beach mouse habitat from approximately 1.0 mile west of where the Alabama-Florida State line bisects Perdido Key east to 2.0 miles east of the State line and areas from the MHWL north to the seaward extent of human development or maritime forest. This unit consists of private lands and ultimately includes essential features of beach mouse habitat between Perdido Key State Park (Unit 3) and GSP (Unit 1). Beach mouse habitat in this unit consists of primary, secondary, and scrub dune habitat and provides PCEs 2, 3, and 4.

Habitat fragmentation and other threats specific to this unit are mainly due to development. Consequently, threats to this unit that may require special management considerations include habitat fragmentation and habitat loss, artificial lighting, presence of feral cats as well as other predators at unnatural levels, excessive foot traffic and soil compaction, and damage to dune vegetation and structure. This area was not known to be occupied at the time of listing. While no trapping has been conducted on these private lands to determine presence, sign of beach mouse presence was confirmed by the Service in 2013 and 2014 through observations of beach mouse burrows and tracks, and this unit is contiguous with two occupied units. Therefore, we have determined this unit to be currently occupied. This unit provides essential connectivity between two core population areas (PKBM-3 and PKBM-1), provides habitat for expansion, natural movements, and re-colonization, and is therefore essential to the conservation of the species. Specifically, this unit may have historically provided for the re-colonization of GSP (PKBM-1) and/or may facilitate similar re-colonization in the future as the habitat recovers from recent hurricane events.

The Perdido Key State Park Unit (PKBM-3) consists of 238 acres in southern Escambia County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of PKSP from approximately 2.0 miles east of the Alabama–Florida State line to 4.0 mile east of the State line and the area from the MHWL north to the seaward extent of the maritime forest. Beach mouse habitat in this unit consists of primary, secondary, and scrub dune habitat. This unit provides PCEs 2, 3, 4, and 5 and is essential to the conservation of the species. Improving and/or restoring habitat connections would increase habitat quality and provide more functional connectivity for dispersal, exploratory movements, and population expansion. This unit is managed by the Florida Park Service. Threats specific to this unit that may require special management considerations include artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, and/or a decrease in habitat quality. This unit serves as a redesignation and expansion of a zone included in the initial critical habitat designation (50 *FR* 23872); however, the zone did not include scrub habitat, which we now know is necessary for the long-term persistence of beach mouse populations.

Trapping efforts in this area were limited in the past. In 2000, a successful relocation program reestablished mice at PKSP. In 2004 and 2005, hurricane/tropical storm damage to the habitat at PKSP dropped PKBM detection to only 10 percent of the available habitat, indicating low densities (Loggins 2007). In 2005, the FWC started monitoring the presence of PKBM on public lands by tracking tubes. The Service and other land managers have relied on this data as a means of tracking the presence of PKBM in GSP, PKSP, and GINS. Tracking data from June 2006 indicated that about 25 percent of the available habitat was occupied at PKSP (FWC 2007). Trapping at PKSP and GINS in March 2007 was cancelled after one night after the capture of only one mouse (a fatality) and very limited sightings of beach mouse sign (tracks, burrows) (FWC 2007). Trapping conducted in April of 2008 found no mice on PKSP (J. Himes pers. comm. 2008). According to 2009 tracking data, there were no mice occurrences at PKSP until May 2009, then only sporadic occurrences until November 2009 as the occurrence data started to show a slow but steady increase (FWC 2014b). Tracking data from 2010 showed a dramatic increase in PKBM

occurrences within PKSP with 20 percent occurrence at the beginning of the year, and 84 percent occurrence at the end of 2010 (FWC 2010c). Trapping in 2010 on PKSP captured 11 individual beach mice (11 total captures) in February and 36 individuals (106 total captures) in May. At that time, information was insufficient to accurately estimate population size. These captures represent the minimum number of mice in the park for those months. Trapping at GINS and PKSP in spring 2010 generally confirmed the population was increasing with PKBM widely distributed at both public lands.

The number of track tubes visited by mice has increased over the past several years and recent years indicate almost all track tubes contain PKBM tracks. This is likely due to the fact that the storm-impacted coastal habitats have basically recovered and development and predator pressures have decreased. Data from 2011 showed that 96 percent (81 total traps) of track tubes registered beach mouse tracks, indicating that mice were becoming widespread throughout PKSP (J. Gore pers. comm. 2011, FWC 2012a, and FWC 2014b). The 2012 track tube surveys yielded 99 percent of track tubes with beach mouse tracks at PKSP (D. Greene pers. comm. 2012 and FWC 2012a, FWC 2012b, and FWC 2012c). During 2013, the track tube data indicates 97 percent of track tubes contained PKBM tracks (FWC 2013a and FWC 2013b).

There were effects to the Unit resulting from the overwash and inundation by storm surge that occurred several times during the 2004 and 2005 storm seasons. Blow outs occurred on the west and east portions of the PKSP. Two sections of the Hwy 292 were washed out. Park facilities were destroyed. Dune vegetation was significantly impacted, but has been restored passively and actively. Park facilities have been reconstructed in accordance with protected species guidelines.

The Gulf Beach Unit (PKBM-4) consists of 162 acres in southern Escambia County, Florida. This unit includes essential features of beach mouse habitat between GINS and Perdido Key State Park from approximately 4.0 miles east of the Alabama–Florida State line to 6.0 miles east of the State line and areas from the MHWL north to the seaward extent of human development or maritime forest. This unit consists of private lands. Beach mouse habitat in this unit consists of primary, secondary, and scrub dune habitat. Habitat fragmentation and other threats specific to this unit are mainly due to development. Consequently, threats to this unit that may require special management considerations include habitat fragmentation and habitat loss, artificial lighting, presence of feral cats as well as other predators at unnatural levels, excessive foot traffic and soil compaction, and damage to dune vegetation and structure. While not known to be occupied at the time of listing, a single beach mouse was trapped within the unit as a result of trapping efforts in 2004 (Service 2004). There have been no data collected within this unit to confirm either absence or presence since this single trapping event in 2004. However, Service personnel have observed burrows and tracks indicating PKBM are occupying the area. This unit provides PCEs 2, 3, and 4 and is essential to the conservation of the species. This unit includes high-elevation scrub habitat and serves as a refuge during storm events and as an important repopulation source if storms extirpate or greatly reduce local populations. This unit currently provides essential connectivity between two core populations GINS (PKBM-5) and PKSP (PKBM-3) and provides essential habitat for expansion, natural movements, and recolonization (PCE 4).

The Gulf Islands National Seashore Unit (Unit 5) consists of 638 acres in southern Escambia County, Florida, on the easternmost region of Perdido Key. This unit encompasses essential features of beach mouse habitat within the boundary of Gulf Islands National Seashore–Perdido Key Area (also referred to as Johnson Beach) from approximately 6.0 miles east of the Alabama–Florida State line to the eastern tip of Perdido Key at Pensacola Bay and the area from the MHWL north to the seaward extent of the maritime forest. Beach mouse habitat in this unit consists mainly of primary and secondary dune habitat, but provides the longest contiguous expanse of frontal dune habitat within the historic range of the PKBM. PBKM were known to inhabit this unit in 1979. No beach mice were captured during surveys in 1982 and 1986 (Humphrey and Barbour 1981; Holler *et al*. 1989). However the population was impacted by Hurricane Frederic (1979), and considered unoccupied at the time of listing. However, no beach mice were captured during surveys in 1982 and 1986 (Humphrey and Barbour 1981; Holler *et al*. 1989). In 1986, PKBM were re-established to GINS as part of the State of Florida and Service recovery efforts. In 2000 and 2001, PKBM captured from this site served as donors to re-establish beach mice at PKSP. Due to damage from storm surge during the 2004 and 2005 storm seasons, PKBM are detected on approximately 30 percent of the beach mouse habitat available (Loggins 2007). Tracking data from June 2006 indicated that about 32 percent of the available habitat was occupied at GINS (FWC 2007). Trapping at PKSP and GINS in March 2007 was cancelled after one night after the capture of only one mouse (a fatality) and very limited sightings of beach mouse sign (tracks, burrows) (FWC 2007). Trapping conducted in April of 2008 was more encouraging with the capture of 35 mice at GINS (S. Sneckenberger pers. comm. 2008). Through 2008-2010 the population continues to expand from GINS to PKSP and beyond. This is the first natural recolonization of a park without the need for a translocation. From 2010 to 2013, the track tube occurrences have averaged 84 percent, 94 percent, 95 percent, and 94 percent respectively (FWC 2014b, FWC 2012a, FWC 2012b, FWC 2012c, FWC 2013a, and FWC 2013b).

PKBM-5, in its entirety, possesses all five PCEs and is essential to the conservation of the species. However, most of this unit consists of frontal dunes, making the population inhabiting this unit particularly threatened by storm events. Threats specific to this unit that may require special management considerations include artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, and/or a decrease in habitat quality. This unit is managed by the National Park Service–Gulf Islands National Seashore. This unit was included in the initial critical habitat designation (50 *FR* 23872) as well as the 2006 revision (71 *FR* 60238). The majority of this unit was overwashed and inundated by storm surge several times during the 2004 and 2005 storm seasons. Park facilities were destroyed and most of the Park road was destroyed. Dune vegetation was washed away or covered with sand. Habitat has since recovered and was comprised of natural and human facilitated dune restoration by GINS staff. Park structures were reconstructed landward of their former locations and in accordance with protected species guidelines.

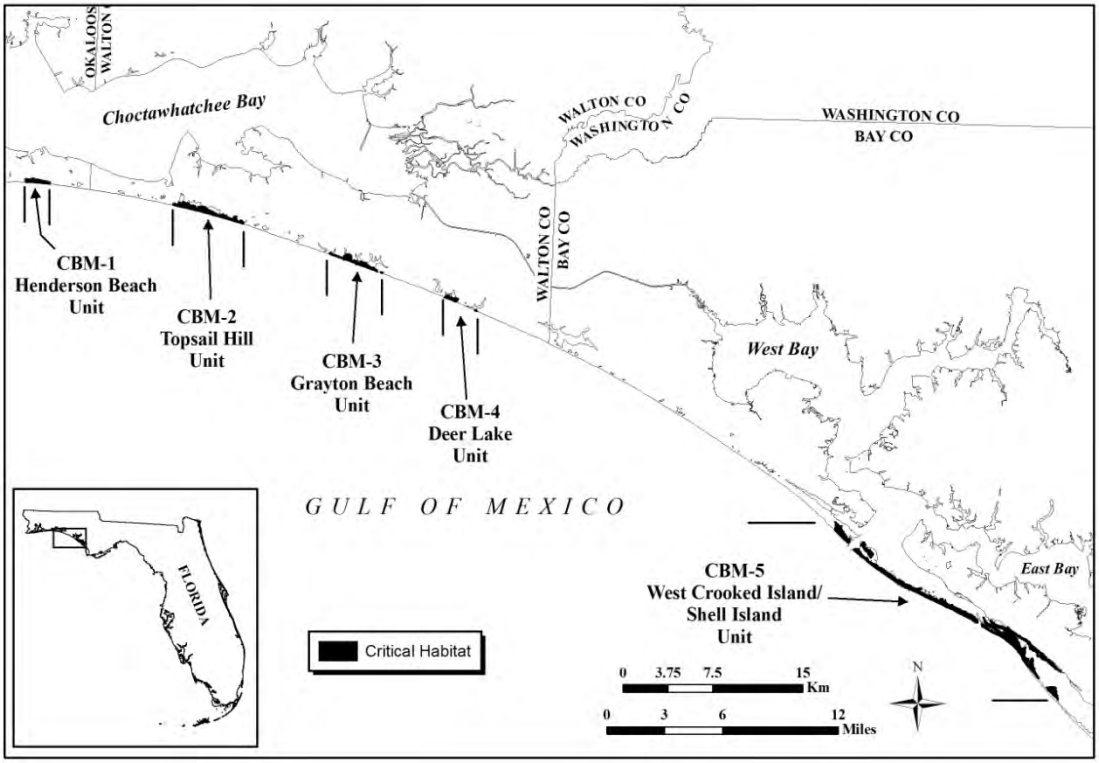

Figure 11. Critical habitat units designated for the Choctawhatchee beach mouse.

Table 12. Critical habitat units designated for the Choctawhatchee beach mouse.

Choctawhatchee Beach Mouse Critical Habitat Units	Federal Acres	State Acres	Local and Private Acres	Total Acres
1. Henderson Beach Unit	0	96	0	96
2. Topsail Hill Unit	0	277	31	308
3. Grayton Beach Unit	0	162	17	179
4. Deer Lake Unit	0	40	9	49
5. W. Crooked Island/Shell Island Unit	1333	408	30	1771
Total	1333	982	87	2404

The Henderson Beach unit (CBM–1) consists of 96 acres in Okaloosa County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of Henderson Beach State Park from 0.5 miles east of the intersection of Highway 98 and Scenic Highway 98 to 0.25 miles west of Matthew Boulevard and the area from the MHWL north to the seaward extent of the

maritime forest. This westernmost unit provides primary, secondary, and scrub dune habitat (PCEs 2 and 3). This unit is within the historical range of the subspecies; however, it was not known to be occupied at the time of listing and current occupancy is unknown because no recent efforts have been made to document beach mouse presence or absence. Because this unit includes protected, high-elevation scrub habitat, it may serve as a refuge during storm events and as an important source population if storms extirpate or greatly reduce local populations or populations to the east.

This unit is managed by the Florida Park Service and is essential to the conservation of the species. Threats specific to this unit that may require special management considerations include habitat fragmentation, Park development, artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

The Topsail Hill Unit (CBM–2) consists of 308 acres in Walton County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of Topsail Hill Preserve State Park, as well as adjacent private lands from 0.1 miles east of the Gulf Pines subdivision to 0.6 miles west of the Oyster Lake outlet and the area from the MHWL north to the seaward extent of human development or maritime forest. This unit provides primary, secondary, and scrub dune habitat and possesses all five PCEs. Its large, contiguous, high-quality habitat allows for natural movements and population expansion. Choctawhatchee beach mice were confirmed present in the unit in 1979 (Humphrey *et al*. 1987), were present at the time of listing, and are still present.

Beach mice have been captured on Stallworth County Park and Stallworth Preserve subdivision, a private development within the unit, and east of the Park (Service 2003a and Yanchis pers comm 2014). The population of Choctawhatchee beach mice inhabiting this unit appears to harbor unique genetic variation and displays a relatively high degree of genetic divergence considering the close proximity of this population to other populations (Wooten and Holler 1999).

This unit has portions with different ownership, purposes, and mandates. Threats specific to this unit that may require special management considerations include Park and residential development, artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

Lands containing the features essential to the conservation of the CBM within the area covered under the Habitat Conservation Plan (HCP) for the Stallworth County Preserve (4 acres) are excluded from critical habitat designation under section 4(b)(2) of the Act.

The Grayton Beach Unit (CBM–3) consists of 179 acres in Walton County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of Grayton Beach State Park, as well as adjacent private lands and inholdings, from 0.3 mi west of the Alligator Lake outlet east to 0.8 miles west of Seagrove Beach and the area from the MHWL north to the seaward

extent of human development or maritime forest. This unit provides primary, secondary, and scrub dune habitat (PCEs 2 and 3), habitat connectivity (PCE 4) and is essential to the conservation of the species. This unit also provides a relatively natural light regime (PCE 5). Beach mice were not detected in the unit in 1979 (Holler 1992a); however, they were found to be present in 1995 after Hurricane Opal (Moyers *et al.* 1999). While it seems likely that beach mice were present at the time of listing (and may have been present, but not detected, in 1979), the Service does not have data to confirm this assumption. Therefore, the Service considered this unit to be unoccupied at the time of listing. A program to strengthen and reestablish the population began in 1989 and yielded a persistent population at Grayton Beach State Park. A recent translocation of 43 CBM from Topsail State Park to Grayton Beach State Park in 2011 has proven successful as the 2013 follow-up trapping data indicated 93 new CBM at Grayton Beach State Park. According to 2013 track tube data, there is a 69 percent occurrence of beach mouse presence (average) at Grayton Beach State Park (FWC 2013a and FWC 2013b). Beach mice are also known to currently occupy the private lands immediately east of the park.

This unit has portions with different ownership, purposes, and mandates. Threats specific to this unit that may require special management considerations include hurricane impacts that may require dune restoration and revegetation, excessive open, unvegetated habitat due to recreational use or storm impacts that may require revegetation, Park development, artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

Lands containing the features essential to the conservation of the Choctawhatchee beach mouse within the area covered under the HCP for the Watercolor development (4 acres) are excluded from critical habitat designation under section 4(b)(2) of the Act.

The Deer Lake Unit (CBM–4) consists of 49 acres in Walton County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of Deer Lake State Park as well as adjacent private lands from approximately one mile east of the Camp Creek Lake inlet west to approximately 0.5 miles west of the inlet of Deer Lake and the area from the MHWL north to the seaward extent of maritime forest or human development. This unit provides primary, secondary, and scrub dune habitat (PCEs 2 and 3), habitat connectivity to adjacent lands (PCE 4), and is essential to the conservation of the species. This unit also provides a relatively natural light regime (PCE 5). Because live-trapping efforts in this area have been limited to incidental trapping, and beach mice were not detected in 1998 (Moyers *et al*. 1999), the Service considered this unit to be unoccupied at the time of listing. CBM were translocated from Topsail Hill Preserve State Park to private lands adjacent to this unit in 2003 and 2005 (Service 2003b, 2005a, 2005b, 2005c, 2005d). Tracking within the adjacent State park lands have indicated expansion of the population into the park. Recent track tube data from 2013 indicates Deer Lake State Park had a 73 percent (average) occurrence rate for monthly CBM presence (FWC 2013a and FWC 2013b).

This unit has portions with different ownership, purposes, and mandates. Threats specific to this unit that may require special management considerations include artificial lighting, presence of

feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

Lands containing the features essential to the conservation of the CBM within the area covered under the HCP/Incidental Take Permit (ITP) for Watersound (71 acres) are excluded from critical habitat designation under section 4(b)(2) of the Act (see Application of Section 4(a)(3) and Exclusions Under Section 4(b)(2) of the Act section below). This excluded area is 0.5 miles west of the Camp Creek Lake inlet to 0.5 miles east of the Camp Creek Lake inlet.

The West Crooked Island/ Shell Island Unit (CBM–5) consists of 1,771 acres in Bay County, Florida. This unit encompasses essential features of beach mouse habitat within the boundaries of St. Andrew State Park mainland from 0.1 miles east of Venture Boulevard east to the entrance channel of St. Andrew Sound, Shell Island east of the entrance of St. Andrew Sound east to East Pass, and West Crooked Island southwest of East Bay and east of the entrance channel of St. Andrew Sound, and areas from the MHWL north to the seaward extent of the maritime forest. Shell Island consists of State lands, Tyndall Air Force Base (AFB) lands, and small private inholdings. Choctawhatchee beach mice were known to inhabit the majority of Shell Island in 1987 (Holler 1992b) and were again confirmed present in 1998 (Moyers *et al*. 1999), 2002, and 2003 (Lynn 2003a). Because beach mice inhabited nearly the entire suitable habitat on the island less than two years prior to listing and were reconfirmed after listing, the Service considered this area to be occupied at the time of listing. The West Crooked Island population is the result of a natural expansion of the Shell Island population after the two islands became connected in 1998 and 1999, a result of Hurricanes Opal and Georges (Service 2003b). Shell Island was connected to the mainland prior to the 1930s when a navigation inlet severed the connection on the western end. Beach mice were documented at St. Andrew State Park mainland as late as the 1960s (Bowen 1968), though no records of survey efforts exist again until Humphrey and Barbour (1981) and Meyers (1983) at which time beach mice were not detected. Therefore, it seems likely that this area was not occupied at the time of listing. Current beach mouse population levels at this site are unknown, and live-trapping to document the absence of mice has not been conducted. Similar to the original designation, this Park was designated as critical habitat because it has features essential to the CBM. It is also within the historical range of the mouse. This unit supports the easternmost population of CBM, with the next known population 22 miles to the west.

This unit provides primary, secondary, and scrub dune habitat and possesses all five PCEs. Portions of this unit are managed by the Florida Park Service, while the remaining areas are federally (Tyndall AFB) and privately owned.

Threats specific to this unit that may require special management considerations include artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high residential or recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

Figure 12. Critical habitat units designated for the St. Andrew beach mouse.

Table 13. Critical habitat units designated for the St. Andrew beach mouse.

St. Andrew Beach Mouse Critical Habitat Units	Federal Acres	State Acres	Local and Private Acres	Total Acres
1. East Crooked Island Unit	649	0	177	826
2. Palm Point Unit	0	0	162	162
3. St. Joseph Peninsula Unit	0	1280	222	1502
Total	649	1280	561	2490

The East Crooked Island Unit (SABM–1) consists of 826 acres in Bay County, Florida. This unit encompasses essential features of beach mouse habitat on East Crooked Island from the entrance of St. Andrew Sound to one mile west of Mexico Beach, and the area from the MHWL to the seaward extent of the maritime forest (not including Raffield Peninsula). Beach mouse habitat in this unit consists of primary, secondary, and scrub dune habitat and possesses all five PCEs. SABM were known to inhabit the unit in 1986 and 1989 (James 1992), though the population was

presumably extirpated after 1989 due to impacts from hurricanes. The East Crooked Island population was reestablished with donors from St. Joseph State Park in 1997. This unit was occupied at the time of listing. Live-trapping in 2002 confirmed occupation of mice (Moyers and Shea 2002, Lynn 2002a, Slaby 2005). Recent track tube data indicates mice are still present in this unit (FWC 2013a and FWC 2013b). This unit maintains connectivity along the island and this unit is essential to provide a donor population following storm events.

The majority of this unit is federally owned (Tyndall AFB), while the remaining habitat is privately owned. Threats specific to this unit that may require special management considerations include artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational and military use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

The Palm Point Unit (SABM–2) consists of 162 acres of private lands in Gulf County, Florida. This unit encompasses habitat from Palm Point 1.25 miles northwest of the inlet of the Gulf County Canal to the southeastern boundary of St. Joseph Beach and the area from the MHWL to the seaward extent of the maritime forest. SABM were documented in the area by Bowen (1968) and were considered to have been present in this unit at the time of listing. Since SABM beach mouse habitat is limited to only two other areas, protecting this mainland site located within the species' historical range is needed for the subspecies' long-term persistence. As other viable opportunities are limited or nonexistent, this unit is essential to reduce the threats of stochastic events to this subspecies. Furthermore, as this unit is on the mainland, it is somewhat buffered from the effects of storm events. This area provides frontal and scrub dune habitat (PCEs 2 and 3), but may provide limited connectivity between habitats. Threats specific to this unit that may require special management considerations include habitat fragmentation, habitat loss, artificial lighting, presence of free-roaming cats as well as other predators at unnatural levels, and high residential use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

The St. Joseph Peninsula Unit (SABM–3) consists of 1,502 acres in Gulf County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of St. Joseph Peninsula State Park (Park) as well as south of the Park to the peninsula's constriction north of Cape San Blas (also known as the "stumphole" region) and area from the MHWL to the seaward extent of the maritime forest. Beach mouse habitat in this unit consists of primary, secondary, and scrub dune habitat, and provides a relatively contiguous expanse of habitat within the historical range of the SABM. This unit possesses all five PCEs and was occupied at the time of listing. SABM were known to inhabit this unit in 1986 and 1987 (James 1987, 1992, 1995, Gore 1994, Moyers *et al.* 1999, Slaby 2005). In addition, recent trapping and tracking efforts suggest that mice continue to occupy private lands south of the Park (K. Yanchis pers comm., FWS 2012). The Park alone does not provide sufficient habitat to allow for population expansion along the peninsula, which may be necessary for a population anchored by the tip of a historically dynamic peninsula. A continuous presence of beach mice along the peninsula is the species' best defense against local and complete extinctions due to storm events. The population of SABM inhabiting

this unit appears to possess unique genetic variation, and displays greater than expected genetic divergence from other populations (Wooten and Holler 1999).

The Florida Park Service manages portions of this unit, while the remaining area is privately owned. Threats specific to this unit that may require special management considerations include artificial lighting, habitat fragmentation and habitat loss, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality. The population inhabiting this unit may also be particularly susceptible to hurricanes due to its location within St. Joseph Bay (the peninsula is a thin barrier peninsula with a north–south orientation).

Life history (All subspecies of beach mice)

Beach mice are differentiated from the inland subspecies by the variety of fur (pelage) patterns on the head, shoulders, and rump. The overall dorsal coloration in coastal subspecies is lighter in color and less extensive than on those of the inland subspecies (Sumner 1926, Bowen 1968). Similarly, beach mouse subspecies can be differentiated from each other by pelage pattern and coloration.

The SEBM averages 5.47 inches in total length (average of 10 individuals = 5.07 inches, with a 2.04-inch tail length (Osgood 1909, Stout 1992). Females are slightly larger than males. These beach mice are slightly darker in appearance than some other subspecies of beach mice, but paler than inland populations of *P. polionotus* (Osgood 1909). SEBM have pale, buffy coloration from the back of their head to their tail, and their underparts are white. The white hairs extend up on their flanks, high on their jaw, and within 0.07 to 0.12 inches of their eyes (Stout 1992). There are no white spots above the eyes as with AIBM (Osgood 1909). Their tail is also buffy above and white below. Juvenile SEBM are more grayish in coloration than adults; otherwise they are similar in appearance (Osgood 1909).

The AIBM averages 5.45 inches in total length (average of 10 individuals); with 2.05 inches mean tail length (James 1992). This subspecies has a very pale, buff-colored head and back with extensive white coloration underneath the sides (Howell 1939). Bowen (1968) noted two distinct rump color pigmentations, one tapered and the other a squared pattern, which extended to the thighs.

The SABM has head and body lengths averaging 2.95 inches, and tail mean lengths averaging 2.05 inches (James 1992). This subspecies has a very pale, buff-colored head and back with extensive white coloration underneath and along the sides (Howell 1939). Bowen (1968) noted two distinct rump color pigmentations, one tapered and the other a squared pattern, which extended to the thighs.

The PKBM is slightly smaller than the other Gulf coast beach mouse subspecies (Bowen 1968). Head and body length ranges from 2.7 to 3.3 inches (Holler 1992b). The pigmentation of PKBM

is gray to gray-brown with the underparts white and coloration on the head is less pronounced. The line between pigmented and unpigmented pelage runs dorsally posterior above the eyes and behind the ears. Pigmentation patterns on the rump are either squared or squared superimposed on a tapered pattern (Bowen 1968). There is no tail stripe.

CBM have head and body lengths ranging from 2.7 to 3.5 inches (Holler 1992a). This beach mouse is distinctly more orange-brown to yellow-brown than the other Gulf coast beach mouse subspecies (Bowen 1968). Pigmentation on the head either extends along the dorsal surface of the nose to the tip, or ends posterior to the eyes leaving the cheeks white. A dorsal tail stripe is either present or absent.

Behavior

Peromyscus polionotus is the only member of the genus that digs an extensive burrow. Beach mice are semifossorial, using their complex burrows as a place to rest during the day and between nightly foraging bouts, escape from predators, have and care for young, and hold limited food caches. Burrows of *P. polionotus* generally consist of an entrance tunnel, nest chamber, and escape tunnel. Burrow entrances are usually placed on the sloping side of a dune at the base of a shrub or clump of grass. The nest chamber is formed at the end of the level portion of the entrance tunnel at a depth of 23.6 to 35.4 inches, and the escape tunnel rises from the nest chamber to within 9.8 inches of the surface (Blair 1951). Nests of beach mice are constructed in the nest chamber of their burrows, a spherical cavity about 1.5 to 2.5 inches in diameter. The nest comprises about one-fourth of the size of the cavity and is composed of sea oat roots, stems, leaves and the chaffy parts of the panicles (Ivey 1949). Beach mice have been found to select burrow sites based on a suite of biotic and abiotic features including dune slope, soil compaction, vegetative cover, and height above sea level (Lynn 2000a, Sneckenberger 2001). A shortage of potential burrow sites is considered to be a possible limiting resource.

Reproduction and Demography

Studies on *Peromyscus* species in peninsular Florida suggest that these species may achieve greater densities and undergo more significant population fluctuations than their temperate relatives, partially because of their extended reproductive season (Bigler and Jenkins 1975). Subtropical beach mice can reproduce throughout the year; however, their peak reproductive activity is generally during late summer, fall, and early winter. Extine (1980) reported peak reproductive activity for SEBM on Merritt Island during August and September, based on external characteristics of the adults. This peak in the timing and intensity of reproductive activity was also correlated to the subsequent peak in the proportion of juveniles in the population in early winter (Extine 1980). Peak breeding season for Gulf Coast beach mice is autumn and winter, declining in spring, and falling to low levels in summer (Rave and Holler 1992, Blair 1951). However, pregnant and lactating beach mice have been observed in all seasons (Moyers *et al.* 1999).

Sex ratios in beach mouse populations are generally 1:1 (Extine 1980, Rave and Holler 1992).

Beach mice are believed to be generally monogamous (Smith 1966, Foltz 1981, Lynn 2000a). While a majority of individuals appear to pair for life, paired males may sire extra litters with unpaired females. Beach mice are considered sexually mature at 55 days of age; however some are capable of breeding earlier (Weston 2007). Gestation averages 28 to 30 days (Weston 2007) and the average litter size is four pups (Fleming and Holler 1990). Littering intervals may be as short as 26 days (Bowen 1968).

Apparent survival rate estimates (products of true survival and site fidelity) of beach mice along the Gulf Coasts of Florida and Alabama have demonstrated that their average life span is about nine months (Swilling 2000). Other research indicated that 63 percent of Alabama beach mice lived (or remained in the trapping area) for four months or less, 37 percent lived 5 months or greater and two percent lived 12 to 20 months (Rave and Holler 1992). Less than half (44 percent) of beach mice captured for the first time were recaptured the next season (Holler *et al*. 1997). Greater than 10 percent of mice were recaptured three seasons after first capture; and four to eight percent were recaptured more than one year after initial capture. Beach mice held in captivity have lived three years or more (Blair 1951, Holler 1995).

Habitat and Movement

Beach mice inhabit coastal dune ecosystems on the Atlantic and Gulf Coasts of Florida and the Gulf Coast of Alabama. The dune habitat is generally categorized as: primary dunes (characterized by sea and other grasses), secondary dunes (similar to primary dunes, but also frequently include such plants as woody goldenrod (*Chrysoma pauciflosculosa*), false rosemary (*Conradina canescens*), and interior or scrub dunes (often dominated by scrub oaks and yaupon (*Ilex vomitoria*). Contrary to the early belief that beach mice were restricted to (Howell 1909, 1921, Ivey 1949), or preferred the frontal dunes (Blair 1951, Pournelle and Barrington 1953, Bowen 1968), recent research has shown that scrub habitat serves an invaluable role in the persistence of beach mouse populations (Swilling *et al.* 1998, Sneckenberger 2001). Beach mice occupy scrub dunes on a permanent basis and studies have found no detectable differences between scrub and frontal dunes in beach mouse body mass, home range size, dispersal, reproduction, survival, food quality, and burrow site availability (Swilling *et al.* 1998, Swilling 2000, Sneckenberger 2001). While seasonally abundant, the availability of food resources in the primary and secondary dunes fluctuates (Sneckenberger 2001). In contrast, the scrub habitat provides a more stable level of food resources, which becomes crucial when food is scarce or nonexistent in the primary and secondary dunes. This suggests that access to primary, secondary, and scrub dune habitat is essential to beach mice at the individual level.

The sea oat zone of primary dunes is considered essential habitat of beach mice on the Atlantic Coast (Humphrey and Barbour 1981, Humphrey *et al.* 1987, Stout 1992). The SEBM has also been reported from sandy areas of adjoining coastal strand/scrub vegetation (Extine 1980, Extine and Stout 1987), which refers to a transition zone between the fore dune and the inland plant community (Johnson and Barbour 1990). Beach mouse habitat is heterogeneous, and distributed in patches that occur both parallel and perpendicular to the shoreline (Extine and Stout 1987). Because this habitat occurs in a narrow band along Florida's coast, structure and composition of

the vegetative communities that form the habitat can change dramatically over distances of several feet.

Primary dune vegetation described from SEBM habitat includes sea oats, bitter panicgrass, railroad vine, beach morning-glory, saltmeadow cordgrass (*Spartina patens*), lamb'squarters (*Chenopodium album*), saltgrass (*Distichlis spicata*), and camphorweed (Extine 1980). Coastal strand and inland vegetation is more diverse, and can include pricklypear, saw palmetto, wax myrtle, Florida rosemary (*Ceratiola ericoides*), sea grape, and sand pine (*Pinus clausa*) (Extine and Stout 1987). Extine (1980) observed this subspecies as far as 0.62 miles inland on Merritt Island; he concluded that the dune scrub communities he found them in represent only marginal habitat for the SEBM. SEBM have been documented in coastal scrub more than a mile from the beach habitat at Kennedy Space Center/Merritt Island National Wildlife Refuge (NWR) and Cape Canaveral Air Force Station (CCAFS) (Stout *et al*. 2006). Extine (1980) and Extine and Stout (1987) reported that the SEBM showed a preference for areas with clumps of palmetto, sea grape, and expanses of open sand.

Essential habitat of the AIBM is characterized by patches of bare, loose, sandy soil (Humphrey and Frank 1992a). Although they are mainly found in the sea oat zone of the primary zone, they will occur in sandy areas with broomsedge (*Andropogon* sp.) (Service 1993). Ivy (1949) reported AIBM to occur in woody vegetation as far as 500 feet inland. Pournelle and Barrington (1953) found this subspecies in scrub as far as 1,800 feet from the dunes. Because this habitat occurs in a narrow band along Florida's coast, structure and composition of the vegetative communities that form the habitat can change dramatically over distances of only a few feet. Much of the habitat within the range of the AIBM has been converted to condominiums and housing developments. The majority of the high quality habitat, densely occupied by beach mice, remains along the length of both ASP and FMNM, at either end of Anastasia Island.

Two main types of movement have been identified for small mammals: within home-range activity and long-range dispersal. Such movements are influenced by a suite of factors, such as availability of mates, predation risk, and habitat quality. Movement and home range studies have been conducted for most beach mouse subspecies, but are limited to natural habitat (*i.e*., research has been conducted on public lands within contiguous beach mouse habitat, not within a development or in a fragmented landscape). Novak's (1997) study of the home range of CBM on Shell Island indicated males had a mean home range of 1.0 ± 4.1 acres and females had a mean home range of 0.81 ± 2.18 acres. Lynn (2000a) found male and female radio-tagged ABM had a mean home range of 1.68 ± 0.27 acres and 1.73 ± 0.40 acres, respectively. Swilling *et al.* (1998) observed one radio-collared ABM to travel over 328 feet during nightly forays after Hurricane Opal to obtain acorns from the scrub dunes. Using radio telemetry, Lynn (2000a) documented an ABM that traveled one mile within a 30-minute period. Moyers and Shea (2002) trapped a male and female CBM that moved about 637 feet and 2,720 feet in one night, respectively. Gore and Schaefer (1993) documented a marked Santa Rosa beach mouse crossing State Road (SR) 399, a two-lane highway. Lynn and Kovatch (2004) through mark and recapture trapping documented PKBM that crossed SR 292, a two-lane highway and right-of-way (100-feet wide).

Sneckenberger (2001) found significant seasonal differences in the movement of ABM, and suggested that this was a result of seasonal fluctuations in food availability, food quality, and nutritional needs. Smith (2003) found that Santa Rosa beach mice demonstrated an increase in movement as habitat isolation increased suggesting that longer travel distances were needed to obtain necessary resources. Smith also found that Santa Rosa beach mice had a preference for vegetation cover and connectivity, which is likely a behavioral response to increased predation risk in open areas. Thus, while beach mice are able and do travel great distances the travel pathways should have vegetated cover and no large gaps or open areas. Previous connectivity research suggests critical thresholds exist for species persistence in fragmented landscapes (With and Crist 1995). As fragmentation increases and connectivity is lost, species' ability to move through and between habitats is reduced in a nonlinear fashion.

Foraging

Beach mice are nocturnal and forage for food throughout the dune system. Beach mice feed primarily upon seeds and fruits, and appear to forage based on availability and have shown no preferences for particular seeds or fruits (Moyers 1996). Beach mice also eat small invertebrates, especially during late spring and early summer when seeds are scarce (Ehrhart 1978, Moyers 1996). Research suggests that the availability of food resources fluctuates seasonally in Gulf Coast coastal dune habitat, specifically that the frontal dunes appear to have more species of high quality foods, but these sources are primarily grasses and annuals that produce large quantities of small seeds in a short period of time. Foods available in the scrub consist of larger seeds and fruits that are produced throughout a greater length of time and linger in the landscape (Sneckenberger 2001). Nutritional analysis of foods available in each habitat revealed that seeds of plant species in both habitats provide a similar range of nutritional quality.

Population dynamics

Population size

Estimating animal abundance or population size is an important and challenging scientific issue in wildlife biology (Otis *et al.* 1978, Pollock *et al.* 1990). A number of different census methods are available to estimate wildlife populations, each with particular benefits and biases. Beach mouse surveys involve live trapping mark-recapture studies, which is a common method with small mammals. A five-night minimum trapping period has been standard practice since 1987 for Gulf Coast beach mice. As the referenced trapping events were not designed similarly or using a standardized sampling techniques, data should not be compared between subspecies or trapping events, nor should densities (mice per 100 trap nights) be inferred beyond the trapping area during that trapping session.

Population densities of beach mice typically reach peak numbers in the late autumn into spring (Rave and Holler 1992, Holler *et al*. 1997). Peak breeding period occurs in autumn and winter, apparently coinciding with the increased availability of seeds and fruits from the previous growing season. Seasonal and annual variation in size of individual populations may be great (Rave and Holler 1992, Holler *et al.* 1997). Food supplementation studies showed that old field mouse

populations increased when foods were abundant; thus, populations of old field mice appear to be food-limited (Smith 1971, Galindo-Leal and Krebs 1998). Similar studies have not been conducted with beach mouse populations.

Gulf Coast Beach Mice

In 1979, Humphrey and Barbour (1981) estimated about 515 CBM existed on Topsail Hill and Shell Island. That estimate was used during the Federal listing of the CBM in 1985. Population estimates on Shell Island from February 1993 to March 1994, ranged from 105 to 338 CBM on a 23-acre study area (Novak 1997). Just prior to Hurricane Opal in 1995, it was estimated that Shell Island supported 800 to 1,200 CBM (Gore 1999). Three years following Hurricane Opal in June 1998, one trapping effort at six different sites on Shell Island resulted in a cumulative population estimate of 195 CBM (164 CBM captured) (Moyers *et al*. 1999). The east portion of the island has been trapped from 2000 to 2003. Population estimates have ranged between 24 and 67 CBM (Lynn 2004b). At Topsail Hill Preserve State Park, trapping conducted in March 2003 and March 2005 yielded a population estimate of 190 to 250 CBM (Service 2003a, Sneckenberger 2005). From late 2006 through 2007 results of tracking tubes surveys at Topsail Hill Preserve State Park suggested that the CBM population was not densely distributed (FWC 2008b). Trapping of four 100-trap transects yielded population estimates of 190, 250, less than 10 (too few to estimate), and 87 in 2003, 2005, 2006, and 2007, respectively (Service 2007a). The track and trapping data together indicate that Topsail Hill Reserve State Park currently does not support a high population of beach mice. In 2003 and again in 2005, a total of 26 mice were translocated from Topsail Hill Preserve State Park to the WaterSound private development adjacent to Deer Lake State Park. Trapping has been sporadic on WaterSound but has yielded population estimates of 5 to 46 individuals in 2003 to 2007 (Moyers 2007). Deer Lake State Park has not been trapped; however, tracks have been observed as recently as 2006 (FWC 2008b). Population estimates from trapping at Grayton Beach State Park (main unit) from 1995 to 2000, ranged from 25 to 116 CBM (Moyers *et al.* 1999, Van Zant 2000). The central unit was trapped for three nights in August 2002; however, no mice were captured (Lynn 2002b). Limited tracking surveys were accomplished in 2003, 2004 and 2005 and beach mouse tracks were observed (Kovatch 2003, Toothacker 2004, FWC 2008b). The western area, although it provides CBM habitat, has not been documented as occupied by CBM (Moyers *et al.* 1999, Van Zant 2000). The population estimates for the WaterColor development for the two years prior to and one year following development ranged from 3 to 7 CBM (St. Joe Company 1999). CBM were last captured in February of 2001 at WaterSound; quarterly trapping has continued on the site through mid-2008 without CBM being captured (St. Joe/Arvida 2003). Auburn University trapped West Crooked Island in October 2000, and the Service trapped the area in 2001 to 2003. The population estimate ranged from a low of 174 to a high of 244 CBM (Lynn 2000b, 2002d, 2002e, 2002f, 2002g, 2003b). The Service estimated the total population of CBM in 2003, to be about 600 to 1,000 beach mice. A recent translocation of 43 CBM from Topsail State Park to Grayton Beach State Park in 2011 has proven successful as the 2013 follow-up trapping data indicated 93 new CBM at Grayton Beach State Park. According to 2013 track tube data, there is a 69 percent occurrence of beach mouse presence (average) at Grayton Beach State Park (FWC 2013a and FWC 2013b). Recent track tube data

from 2013 indicates Deer Lake State Park had a 73 percent (average) occurrence rate for monthly CBM presence (FWC 2013a and FWC 2013b).

Since its listing in 1985, PKBM population estimates never reached more than 400 to 500 individuals until 2003. Before Hurricane Ivan (2004) a population estimate of 500 to 800 was divided between two populations - the Johnson Beach Unit of GINS and PKSP (Service 2004). The status of PKBM at Gulf State Park (GSP) is uncertain, likely extirpated in 1999. In October 2005, following the active hurricane seasons of 2004 and 2005, a trapping effort of less than one-third of the habitat available on public lands yielded captures of less than 30 individuals. Tracking data from June 2006 indicated that about 25 and 32 percent of the available habitat was occupied at PKSP and GINS, respectively (Loggins 2007). Trapping at PKSP and GINS in March 2007, was cancelled after one night after the capture of only one mouse (a fatality) and very limited sightings of beach mouse sign (tracks, burrows) (Loggins 2007). With no tracks observed in the tube surveys the PKBM may now be absent from PKSP (FWC 2008b). According to 2009 tracking data, there were no mice occurrences at PKSP until May 2009, then only sporadic occurrences until November 2009 as the occurrence data started to show a slow but steady increase (FWC 2014b). Tracking data from 2010 showed a dramatic increase in PKBM occurrences within PKSP with 20 percent occurrence at the beginning of the year, and 84 percent occurrence at the end of 2010 (FWC 2010c). Trapping in 2010 on PKSP captured 11 individual beach mice (11 total captures) in February and 36 individuals (106 total captures) in May. At that time, information was insufficient to accurately estimate population size. These captures represent the minimum number of mice in the park for those months. Trapping at GINS and PKSP in spring 2010 generally confirmed the population was increasing with PKBM widely distributed at both public lands. Recent data from 2011 showed that 96 percent (81 total traps) of track tubes registered beach mouse tracks, indicating that mice were becoming widespread throughout PKSP (J. Gore pers. comm. 2011, FWC 2012a, and FWC 2014b). The 2012 track tube surveys yielded 99 percent of track tubes with beach mouse tracks at PKSP (D. Greene pers. comm. 2012 and FWC 2012a, FWC 2012b, and FWC 2012c). During 2013, the track tube data indicates 97 percent of track tubes contained PKBM tracks (FWC 2013a and FWC 2013b). At GINS, the number of PKBM has not increased since the initial high levels in winter of 2005-2006 (FWC 2008b). However, population estimates indicate there may be a few hundred PKBM at GINS (Gore 2008). Trapping conducted in April of 2008 was more encouraging with the capture of 35 mice at GINS (S. Sneckenberger pers. comm. 2008). Through 2008-2010 the population continues to expand from GINS to PKSP and beyond. This is the first natural recolonization of a park without the need for a translocation. From 2010 to 2013, the track tube occurrences at GINS have averaged 84 percent, 94 percent, 95 percent, and 94 percent respectively (FWC 2014b, FWC 2012a, FWC 2012b, FWC 2012c, FWC 2013a, and FWC 2013b).

The SABM even at its lowest population probably numbered several hundred individuals (Gore as cited in 63 *FR* 70055). James (1992) estimated that the East Crooked Island subpopulation to be about 150. However, by 1996, SABM were no longer found on East Crooked Island. Following Hurricane Opal in 1995, Mitchell *et al.* (1997) estimated the St. Joe Peninsula State Park population to be between 300 and 500 mice. In November 1997 and January 1998, 19 pairs of St. Andrew beach mice were relocated from St. Joseph Peninsula State Park to East Crooked Island,

Tyndall Air Force Base (Moyers *et al.* 1999). Trapping surveys conducted on East Crooked Island in 2000 and 2002 through 2007 indicated that beach mice occupied the entire island (Lynn 2002c, FWC 2008b). Population estimates ranged from 71 to 133 mice (Lynn 2002c). The FWC (2008b) estimates 22 miles of habitat as occupied by SABM throughout the mouse's historical range with population estimates of about 3,000 mice at East Crooked Island and about 1,775 mice in the front dunes at St. Joseph State Park. Data from 2008-2012 on East Crooked Island showed a decrease in SABM, with average track tube occurrences of 97 percent, 97 percent, 96 percent, 87 percent, and 83 percent, respectively (FWC 2014b and FWC 2012a). However, recent data from 2013 indicates 95 percent of track tubes contained SABM tracks (FWC 2013a and FWC 2013b). Surveys conducted from 2008-2012 at Rish Park yielded average track tube occurrence that fluctuated between 79 percent, 91 percent, 76 percent, 79 percent, and 83 percent, respectively (FWC 2014b and FWC 2012a). More recent data in 2013 showed an average of 73 percent of track tubes contained SABM tracks (FWC 2013a and FWC 2013b).

Atlantic Coast Beach Mice

Populations of the SEBM have been estimated to be around 5,000 to 6,000 mice. Recent surveys have confirmed that SEBM are found on the beaches of Canaveral National Seashore, Merritt Island NWR, and CCAFS in Brevard County, all on federally protected lands. In April 2002, a population of SEBM was documented at the Smyrna Dunes Park, at the north end of New Smyrna Beach (Sauzo 2004). Prior to 2006, populations of the SEBM were thought extirpated from both sides of the Sebastian Inlet (Bard 2004). However, during surveys in June 2006, a single mouse was located at the very southern end of the Sebastian Inlet State Park. Mice were also found at Jungle Trail on the Pelican Island National Wildlife Refuge, another area where they where thought extirpated. Additional surveys of other areas south of Brevard County have not located any mice and indicate the distribution of this subspecies in the counties south of Brevard, severely fragmented. SEBM are no longer believed to occur at Jupiter Island, Palm Beach, Lake Worth, Hillsboro Inlet or Hollywood Beach (Service 1999).

Although the distribution of the AIBM has declined significantly, particularly in the northern part of its range, the populations at ASP and FMNM have continued to fluctuate seasonally between two and 90 mice per acre. It is thought that populations should be characterized by a range rather than a static value (Frank and Humphrey 1996). Quarterly surveys of these two sites have shown that the populations have remained stable. Due to the limited dune habitat at the ASP, this population has not been able to maintain a stable population and it is unknown how many mice remain.

Population variability

Beach mouse populations fluctuate on a seasonal and annual basis. Attempts to explain population dynamics have revealed an incomplete understanding of the species and its population cycles. It is clear that beach mice, like all rodents, are known for high reproductive rates and experience extreme highs and lows in population numbers. Depressed beach mouse populations may be associated with tropical storms and drought, perhaps resulting from reduced habitat and food

resources. These fluctuations can be a result of reproduction rates, food availability, habitat quality and quantity, catastrophic events, disease, and predation (Blair 1951, Bowen 1968, Smith 1971, Hill 1989, Rave and Holler 1992, Swilling *et al.* 1998, Swilling 2000).

Population stability

Population viability analysis (PVA) is essentially a demographic modeling exercise to predict the likelihood a population will continue to exist over time (Groom and Pascual 1997). The true value in using this analytical approach is not to determine the probability of a species' extinction, but to clarify factors that have the most influence on a species' persistence. From 1996 to 1999, the Service funded Auburn University to develop a PVA for beach mice (Holler *et al*. 1999, Oli *et al.* 2001). Four subpopulations of Gulf Coast beach mice subspecies were modeled. They consisted of two subpopulations of PKBM, one at GINS-Perdido Key Area and one at Florida Point, and two subpopulations of ABM, one at Bon Secour NWR and one at Fort Morgan State Park. They used a stochastic (random) differential equation (Wiener-drift) model, applied to long term demographic data. The model is stochastic because it incorporates the variable effects of the environment upon population change. However, it did not model the effects of hurricanes on the habitat or population of beach mice.

The Oli *et al.* (2001) analyses indicated that all four subpopulations were at risk of extinction, with habitat fragmentation as the most influential factor. The GINS-Perdido Key Area had the highest risk for extinction; the PKBM had a 100 percent chance of reaching one individual (becoming functionally extinct) within 21 (mode) or 45 (median) years. At Florida Point, the PKBM had a low risk of becoming functionally extinct (1.3 percent) within 13 to 20 years. However, following Hurricane Opal in 1995, and subsequent predation pressure, the PKBM population at Florida Point was believed extirpated in 1999. This localized extirpation clearly demonstrates that while PVA's are useful in determining significant factors in species survival, they have limited use in predicting the time to extinction for a given species.

More recently, the Conservation Breeding Specialist Group (Traylor-Holzer 2004, 2005, 2006) was contracted by the Service to conduct a population and habitat viability analysis (PHVA) on ABM using the Vortex population simulation model (Lacy 1993). The goal was to develop an ABM population model and use the model to assess the status of the ABM habitat, and populations and projections for continued existence. The PHVA results projects the ABM to have a 26.8 percent $\pm$ 1.0 percent likelihood of extinction over the next 100 years. Much of this risk is due to hurricane impacts on ABM populations and habitat, which can result in population declines. The model suggests that hurricanes are a driving force for ABM populations, both directly and also indirectly as their impacts interact with other factors, including development of higher elevation (scrub) habitat and predation by cats. Due to the similarities in the subspecies and proximal location, it can be inferred that these factors also have a strong influence on the persistence of PKBM populations. When reviewing PHVA results, it is crucial that the actual values for the risk of extinction are not the focus of the interpretation. The true value of a PHVA is the ability to compare management strategies and development scenarios, run sensitivity analyses, and determine the main influence(s) on population persistence.

Similar to the land use arrangement on Perdido Key, the Fort Morgan peninsula (occupied by ABM) consists of three areas of public lands separated by two areas of private lands, which allow for limited (varied) dispersal between the public lands. The current level of dispersal between public lands through private lands is unknown, but is affected by development and habitat degradation. Without dispersal between public lands through private lands, the PHVA results project the ABM to have a 41.2 percent ± 1.1 percent likelihood of extinction. If all privately-owned habitat between the public lands is lost, the likelihood of extinction increases to 46.8 percent ± 1.1 percent. Again, it can be inferred that a similar increase in risk of extinction would occur with the PKBM if dispersal could not occur through private lands.

Despite the similarities in the subspecies, it is important to note that carrying capacity (K), which was found to be a strong influence on the model, would be different in PKBM. For ABM, K was estimated using maximum ABM density estimates (4.5 to 11.6 ABM per acre) and acres of habitat (2,989 acres). As density estimates for PKBM would likely be lower, and remaining PKBM habitat is less than 1,300 acres, the Vortex model for PKBM would likely project a greater likelihood of extinction.

The Service contracted with the Georgia Cooperative Fish and Wildlife Research Unit to critique the PVAs for the ABM accomplished by Oli *et al.* (2001) and Conservation Breeding Specialist Group (Traylor-Holzer 2006). Conroy and Runge (2006) indicated that neither PVA provided reliable estimates of extinction probability for ABM. They recommended that future PVA work should incorporate sampling, temporal, and possibly spatial variance for input variables and should clearly and explicitly express uncertainty in extinction output. Until this can be done, reliable estimates of extinction probability for the ABM (and other beach mouse subspecies) cannot be estimated.

Species that are protected across their ranges have lower probabilities of extinction (Soulé and Wilcox 1980). Beach mouse populations persist naturally through local extirpations due to storm events or the harsh, stochastic nature of coastal ecosystems. Historically, these areas would be recolonized as population densities increase and dispersal occurred from adjacent populated areas. In addition, from a genetic perspective, beach mice recover well from population size reductions (Wooten 1994), given sufficient habitat is available for population expansion after the bottleneck occurs. As human development has fragmented the coastal dune landscape, beach mice can no longer recolonize along these areas as they did in the past (Holliman 1983). As a continuous presence of beach mice or suitable habitat along the coastline is no longer possible and any hurricane can impact the entire range of each subspecies, the probability of beach mice persisting would be enhanced by the presence of contiguous tracts of suitable habitat occupied by multiple independent populations (Shaffer and Stein 2000). The history of the PKBM alone illustrates the need for multiple populations (a now potentially extirpated population was the source of the two remaining populations of the subspecies) (Holler *et al.* 1989, 71 *FR* 60238). While maintaining multiple populations of beach mouse subspecies provides protection from total loss (extinction), especially when migration and relocations are possible (Oli *et al.* 2001), conservation of each subspecies necessitates protection of genetic variability throughout their ranges (Ehrlich 1988).

Preservation of natural populations is therefore crucial, as the loss of a population of beach mice can result in a permanent loss of alleles (Wooten and Holler 1999). This loss of genetic variability cannot be regained through translocations or other efforts.

Status and Distribution

The distribution of all the beach mouse subspecies is significantly reduced from their historical ranges due to modification and destruction of the coastal dune ecosystem inhabit. Habitat loss and alteration was likely a primary cause of the extinction of one subspecies, the Pallid beach mouse, which was endemic to barrier beach between Matanzas and Ponce de Leon inlets in Volusia and Flagler Counties (Humphrey and Barbour 1981).

Atlantic Coast Beach Mice

The distribution of the SEBM has declined significantly, particularly in the southern part of its range. Historically, it was reported to occur along about 174 miles of Florida's central and southeast Atlantic coast from Ponce (Mosquito) Inlet, Volusia County, to Hollywood Beach, Broward County (Hall 1981). Bangs (1898) reported it as extremely abundant on all the beaches of the east peninsula from Palm Beach at least to Mosquito (Ponce) Inlet. During the 1990s, the SEBM was reported only from Volusia County (Canaveral National Seashore); in Brevard County (Canaveral National Seashore, Kennedy Space Center/Merritt Island NWR, and CCAFS); a few localities in Indian River County (Sebastian Inlet State Park, Treasure Shores Park, and several private properties), and St. Lucie County (Pepper Beach County Park and Fort Pierce Inlet State Park) (Humphrey *et al*. 1987, Robson 1989, Land Planning Group, Inc. 1991, Humphrey and Frank 1992b, Service 1993). The SEBM is geographically isolated from all other subspecies of beach mice.

Populations of the SEBM are still found on the beaches of Canaveral National Seashore, Merritt Island NWR, and CCAFS in Brevard County, all on federally protected lands. In April 2002, a population of SEBM was documented at the Smyrna Dunes Park, at the north end of New Smyrna Beach (Sauzo 2004). Populations from the north side of Sebastian Inlet appear to be extirpated (Bard 2004). SEBM were documented on the south side of Sebastian Inlet in 2006, although none have been found since then.

The status of the species south of Brevard County is currently unknown. The surveys conducted during the mid-1990s indicated the distribution of this subspecies in the counties south of Brevard County was severely limited and fragmented. There are not enough data available to determine population trends for these populations. These surveys revealed that it occurred only in very small numbers where it was found. In Indian River County, the Treasure Shores Park population experienced a significant decline in the 1990s, and it is uncertain whether populations still exist at Turtle Trail or adjacent to the various private properties (Jennings 2004). Trapping efforts documented a decline from an estimated 300 individuals down to numbers in the single digits. In 2006, a population off Jungle Trail at Pelican Island NWR was discovered (Van Zant 2006). No beach mice were found during surveys in St. Lucie County and it is possible that this species is

extirpated there. The SEBM no longer occurs at Jupiter Island, Palm Beach, Lake Worth, Hillsboro Inlet or Hollywood Beach (Service 1999).

The primary reason for the significant reduction in the range of the SEBM is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated SEBM habitat in the southern part of its range. This increased urbanization has also increased the recreational use of dunes, and harmed the vegetation essential for dune maintenance. Loss of dune vegetation results in widespread wind and water erosion and reduces the effectiveness of the dune to protect other beach mouse habitat. In addition to this increased urbanization, coastal erosion is responsible for the loss of the dune environment along the Atlantic coast, particularly during tropical storms and hurricanes. The extremely active 2004 hurricane season had a pronounced affect on Florida's Atlantic coast beaches and beach mouse habitat.

The encroachment of residential housing onto the Atlantic coast also increases the likelihood of predation and harassment by free-roaming cats and dogs. A healthy population of SEBM on the north side of Sebastian Inlet State Park in Brevard County was completely extirpated by 1972, presumably by free-roaming cats (Bard 2004). Urbanization of coastal habitat could also lead to potential competition of beach mice with house mice (*Mus musculus*) and introduced rats.

The distribution of the beach mouse is limited due to modification and destruction of its coastal habitats due mostly to developmental pressures. One additional Atlantic coast subspecies, the pallid beach mouse (*P. p. decoloratus*), was formerly reported from two sites in Volusia County, but extensive surveys provide substantial evidence that this subspecies is extinct (Humphrey and Barbour 1981).

The distribution of the AIBM has declined significantly, particularly in the northern part of its range. Historically, it was reported to occur from the vicinity of the Duval-St. Johns County line southward to Matanzas Inlet, St. Johns County, Florida (Humphrey and Frank 1992a). It currently occurs only on Anastasia Island, primarily at the north (ASP) and south (FMNM) ends of the island, although beach mice still occur at low densities in remnant dunes along the entire length of the island (Service 1993). The original distribution consisted of about 50 miles of beach; current populations occupy about 14 miles of beach with possibly only 3 miles supporting viable populations (Service 1993).

In 1992 to 1993, 55 mice (27 females and 28 males) were reintroduced to GMTNERR-Guana River portion of the Reserve (4.0 miles of undeveloped beach) in St. Johns County. In 1993, the population was estimated at 220 mice. Quarterly trapping has been conducted since the reintroduction and mice have not been captured since September 2006. This may be a result of habitat loss or alteration from storms and or habitat conditions.

The primary reason for the significant reduction in the range of the AIBM is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated AIBM habitat in the northern two-thirds of its range. This increased urbanization has also increased the recreational use of dunes, and harmed the vegetation essential for dune

maintenance. Loss of dune vegetation results in widespread wind and water erosion and reduces the effectiveness of the dune to protect other beach mouse habitat. In addition to this increased urbanization, coastal erosion is responsible for the loss of the dune environment along the Atlantic coast, particularly during tropical storms and hurricanes. The extremely active 2004 hurricane season had a severe effect on Florida's Atlantic coast beaches and beach mouse habitat.

The encroachment of residential housing onto the Atlantic coast also increases the likelihood of predation by free-roaming cats and dogs. ASP has successfully reduced feral cat populations at the recreation area and has seen a benefit to the beach mice. Urbanization of coastal habitat could also lead to potential competition of beach mice with house mice and introduced rats.

Gulf Coast Beach Mice

PKBM populations have existed since the late 1970s as isolated populations along its historical range (16.9 miles). The effects of Hurricane Frederic (1979) coupled with increased habitat fragmentation due to human development led to the extirpation of all but one population of PKBM. The less than 30 individuals at Gulf State Park (at the westernmost end of Perdido Key) were once the only known existing population of PKBM (Holler *et al*. 1989). Beach mice from this site were used to reestablish PKBM at Gulf Islands National Seashore (GINS) between 1986 and 1988 (Holler *et al.* 1989). Then in 1999 the population at Gulf State Park was considered extirpated (Moyers *et al.* 1999). In 2000, 10 PKBM (five pairs) was relocated from GINS to PKSP. In February of 2001, this relocation was supplemented with an additional 32 PKBM (16 pairs). The PKBM were released on both north and south sides of SR 292 in suitable habitat. Two years of quarterly survey trapping indicated that the relocations of PKBM to PKSP were successful and this was considered an established population (Lynn and Kovatch 2004). PKBM were also trapped on private land between GINS and PKSP in 2004, increasing documentation of current occurrences of the mouse (Lynn 2004a). Based on the similarity of habitat between these areas and the rest of Perdido Key, as well as the continuity of the habitat, the mouse is believed to inhabit other private properties where suitable habitat exists north and south of SR 292. The PKBM is considered to occur on 42 percent of Perdido Key (1,227 acres of 2,949 acres) (**Table 14**).

Table 14. Perdido Key beach mouse habitat on Perdido Key in Florida and Alabama.

Area	Total in AL & FL		Total in Florida		Total in Alabama	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Perdido Key	2,949	100	2,615	89	334	11
PKBM habitat	**1,292**	100	**1,146**	**88**	148	12
Private lands	1,440	49	1,278	43	162	5
PKBM habitat	**302**	**23**	**270**	**24**	33	3
Public lands	1,509	51	1,337	45	172	6
			GINS		GSP	
			1,052		172	
			PKSP			
			285			
PKBM habitat	990	76	876	67	114	9
			GINS		GSP	
			638		114	
			PKSP			
			238			

[1]Data calculated by Service's Panama City, Florida using 2004 Digital Orthophoto Quarter-Quadrangle (DOQQ) aerial photography, 2005 parcel data from Baldwin County, Florida and 2005 parcel data from Escambia County, Florida and revised June 2006.

The listing of PKBM was based on data collected in 1983-84, and at that time the mouse was recovering from the effects of Hurricane Frederick in 1979. Following Hurricane Frederic estimated population numbers based on trapping were 13 PKBM found at one location (Gulf State Park). Just prior to listing, only one PKBM was captured in trapping surveys, this again being at Gulf State Park. Since that time, numbers have fluctuated dramatically based on hurricanes and/or translocation efforts, but were at their highest estimate ever documented just prior to Hurricane Ivan in 2004 at between 500-800 individuals. This was a result of significant partnership efforts and included translocation and habitat restoration on public lands. Even with the destructive hurricanes in 2004 and 2005, current numbers of PKBM, while low (no population estimates are available), are greater than one mouse and mice have been confirmed from two areas (PKSP and GINS). Survey efforts (tracking and trapping) have also been sporadic and inconsistent; therefore, it is difficult to establish long term trend information at this time.

CBM subpopulations currently persist along approximately 15 miles of Gulf of Mexico shoreline consisting of four isolated areas along 11 miles of beachfront within its former range. Another 5 miles outside of the CBM's known historical range has been recently colonized (Lynn, 2000a, 2003a). In the 1950s, the CBM was widespread and abundant at that time according to Bowen (1968). By 1979, Humphrey and Barbour (1981) reported only 40 percent of the original habitat remained undeveloped in noncontiguous areas. They also documented that the CBM had been extirpated from seven of its nine historical localities being restricted to the Topsail Hill area in

Walton County and Shell Island in Bay County. In 1985 when the CBM became federally protected, CBM were still only known from the Topsail Hill area and Shell Island, an area consisting of about 10 miles of coastline (50 *FR* 23872). In 1989, a cooperative interagency effort reintroduced CBM onto the central and west units of Grayton Beach State Park increasing the occupied coastline by another mile (Holler *et al*. 1989). In 1999, with the closing of East Pass and Shell Island connecting to West Crooked Island, CBM increased their range by approximately four miles (Lynn 2000b). CBM are now known to occupy approximately 15 miles of Gulf of Mexico beachfront; 12 of the 15 miles are publicly owned lands.

There are four subpopulations of CBM that exist: 1) Topsail Hill Preserve State Park (and adjacent eastern and western private lands), 2) Shell Island (includes St. Andrew State Park mainland and Shell Island with private inholdings and Tyndall AFB), 3) Grayton Beach (and adjacent eastern private lands), and 4) West Crooked Island. Approximately 96 percent of the lands known to be occupied by CBM are public lands. Translocations to establish a fifth subpopulation of CBM occurred in March of 2003 and 2005. CBM from Topsail Hill Preserve State Park were moved to private lands at Camp Creek/Water Sound in Walton County, Florida (Lynn 2003a, Service 2005a, 2005b, 2005c, 2005d).

Topsail Hill Preserve State Park consists of 1,637 acres of which 262 acres provide CBM habitat; the majority being occupied by CBM. The Florida Park Service prepared a Unit Management Plan for the Preserve that explicitly plans for conservation and protection of CBM habitats (FDEP 2007). Private lands on the east side consist of approximately 9.63 acres. Of that, 7 acres consist of the development known as the Stallworth Preserve. The Service issued an ITP for CBM associated with the Stallworth Preserve HCP in 1995; an amendment to the permit was issued in 1999. The remaining 2.63 acres has been purchased by Walton County with a grant from the Service. Private lands on the west side of the Preserve consist of 24 acres and include Four-Mile Village, a low density single family development, and the Coffeen Nature Preserve managed by the Sierra Club.

Shell Island consists of lands within the St. Andrew State Park, Tyndall AFB, and private lands. The Unit Management Plan for the State Park was completed in 1999. The plan identifies the need for protection and management of the CBM. Tyndall AFB manages their portion of Shell Island under the installation's Integrated Natural Resources Management Plan. The Service has joined with the State Park and Tyndall AFB since 1995 by providing funding to protect and restore CBM habitats on Shell Island.

The St. Andrew State Park mainland consists of 1,260 acres of which 123 acres are beach mouse habitat. Several tracking efforts looking for signs of CBM on the mainland were made between 1995 and 1998; no evidence was found that indicated the presence of the beach mouse (Moyers 1996, Moyers *et al.* 1999). However, live-trapping to document the absence of the mouse has not been conducted. Reintroduction of this area is considered an action to support recovery of CBM.

The Grayton Beach subpopulation consists of two units in Grayton Beach State Park. The Park is divided into a central and western unit and is currently connected by a narrow band of primary

dunes. Total acreage of the Park is 2,236 acres with 153 acres providing suitable CBM habitat. The Unit Management Plan for the Park identified the protection of the CBM as an important component. The Park has requested and received funds from the Service to implement CBM habitat restoration and protection. Portions of private lands (WaterColor and Seaside developments) on the east side of the central unit are occupied by CBM or provide suitable habitat.

West Crooked Island consists of 1,558 acres of which 730 acres provide CBM habitat and remains occupied by CBM (Lynn 2004b). The West Crooked Island subpopulation resulted from its connection to Shell Island in 1998-1999. The construction of the St. Andrew Pass navigation inlet in the early 1930s severed Shell Island from the mainland on its western end. Since then, the original pass, East Pass (or Old Pass) began to close. After passage of Hurricane Opal in 1995, East Pass temporarily closed and reopened; however, after passage of hurricanes Earl and Georges in 1998, the pass closed (Coastal Tech 1999, Middlemas 1999). CBM dispersed onto West Crooked Island from Shell Island colonizing most of the island within two years (Lynn 2004b). East Pass was reopened as a joint venture between Tyndall AFB and Bay County in December of 2001 but has since closed again.

SABM is now known to consist of two subpopulations, East Crooked Island and St. Joseph Peninsula State Park. The majority of the East Crooked Island subpopulation is located on Tyndall AFB and the other on the St. Joseph Peninsula State Park. Other important public lands for the conservation of the mouse would include Eglin Air Force Base lands at Cape San Blas and Billy Joe Rish Park. Private lands adjacent to Tyndall AFB and the State Park are either known to be occupied by SABM or contain habitat. Trapping by St Joe/Arvida on about 111 acres of SABM habitat at East Crooked Island was conducted in 2000, 2001, and 2003. The trapping confirmed existence of SABM on the property (Moyers and Shea 2002). However, trapping their property in St. Joseph Beach did not result in capture of any beach mice (Moyers and Shea 2002). Although SABM is thought to continue to occupy habitat south of St. Joseph Peninsula State Park, only tracking has been conducted to confirm its presence on private lands since the late 1990s. Private lands adjacent to public lands are available for population dispersal and food source during periods of high population and after severe weather events. However, subpopulations on large tracts of private land within the historical range of the subspecies are needed for conservation of the SABM.

Land development has been primarily responsible for the permanent loss of SABM habitat along its approximately 40-mile long historical range. In addition, construction of U.S. highway 98 accelerated the habitat loss from associated development. By the mid 1990's about 12 linear miles were known to be occupied (Gore 1994, 1995), indicating a 68 percent reduction in it historical distribution (63 *FR* 70053). An effort to re-establish the SABM back into its historical range was initiated around the time of listing (Moyers *et al.* 1999); however, the range reduction described above did not take this into account since the success of the reintroduction was not known at the time (63 *FR* 70053). Similar analyses have not been conducted since.

Our best documentation of the species' decline can be seen from trapping or tracking surveys conducted at various times throughout its range. By the mid to late 1980's concerns were raised

when trapping efforts failed to result in captures at West Crooked Island (Gore 1987). By 1990 the SABM appeared to only inhabit a small portion (approximately 11 linear miles) of its original range: west end of East Crooked Island and within St. Joseph Peninsula State Park (Gore 1990). SABM's apparent decline continued into the mid-1990's when in 1994, the population on East Crooked Island was "presumed to be extinct" (Wooten and Holler 1999), leaving only one known population on St. Joseph Peninsula (Moyers *et al.* 1999). Subsequent reintroduction efforts in 1997-1998 appeared to have re-established the population on East Crooked Island (Moyers *et al.* 1999).

Recovery Criteria

The Recovery Plan for the SEBM identifies the primary recovery objectives for the subspecies (Service 1993). The SEBM can be considered for delisting if 10 viable, self-sustaining populations can be established throughout a significant portion of its historical range. More specifically, delisting can be considered if the following conditions are met:

1. Viable populations are maintained on the five public land areas where the subspecies currently occurs. Each population should not fluctuate below an effective breeding size of 500 individuals;

2. Five additional viable populations are established throughout the historical range of the subspecies; and

3. These populations should be monitored for at least five years.

The Recovery Plan for the AIBM identifies the primary recovery objectives for the subspecies (Service 1993). The AIBM can be considered for reclassification from endangered to threatened status if five viable, self-sustaining populations can be established. Because the majority of this subspecies' historical range has been permanently destroyed, it is not likely that it can be fully recovered or delisted. For the AIBM to be considered for downlisting to threatened, it is required that those populations at the northern and southern end of Anastasia Island continue to be viable. Each population should support a breeding population of 500 individuals. Two additional viable populations shall be established within the mainland portion of the historical range. All of these populations should be monitored for five years.

The Recovery Plan for the PKBM, CBM, and ABM identifies the primary recovery objectives to be the stabilization of present populations by preventing further habitat deterioration, and the reestablishment of populations in areas where they were extirpated (Service 1987). For each of the subspecies to be considered for downlisting to threatened, it is required that there be a minimum of at least three distinct self-sustaining populations in designated critical habitat with at least 50 percent of the critical habitat being protected and occupied by beach mice (Service 1987).

While this is the currently approved Recovery Plan for the three beach mouse subspecies, studies and research since the Recovery Plan publication provided additional information concerning

recovery needs for the subspecies. Protection and enhancement of existing populations and their habitat, plus reestablishment of populations in suitable areas within their historical ranges, are necessary for the subspecies survival and recovery. Core beach mouse populations remain isolated and are vulnerable to natural and anthropogenic factors that may further reduce or degrade habitat and/or directly reduce beach mouse population sizes. Maximizing the number of independent populations is critical to species survival. Protection of a single, isolated, minimally viable population risks the extirpation or extinction of a species as a result of harsh environmental conditions, catastrophic events, or genetic deterioration over several generations (Kautz and Cox 2001). To reduce the risk of extinction through these processes, it is important to establish multiple protected populations across the landscape (Soulé and Simberloff 1986, Wiens 1996). Through the critical habitat designation process we are addressing this by designating five independent units for the subspecies spaced throughout its historical range, depending on the relative fragmentation, size, and health of habitat, as well as availability of areas with beach mouse PCEs.

The Service completed a five-year status review of the CBM and PKBM in August 2007 (Service 2007a, 2007b). For both subspecies the following was recommended: designate a beach mouse recovery coordinator; revise the recovery plan; accomplish viable populations, monitor habitat improvement, corridor persistence and hurricane response; conduct genetic studies and translocations as necessary; participate in education and outreach and complete an emergency response plan.

A Recovery Plan for the SABM was finalized in 2010 and the recovery objectives are to reestablish additional populations, threat minimization or removal, habitat protection and/or restoration, and outreach/education to the public. This recovery plan is up to date and includes current threats to SABM.

In accordance with the Act, Federal agencies (including the Service) consult with the Service for actions that may adversely affect beach mice and their designated habitat. In Florida, consultations have included military missions and operations, beach nourishment and other shoreline protection, and actions related to protection of coastal development (**Table 14**).

Table 15. Previous biological opinions within Florida that have been issued for projects that had adverse impact to the nesting beach mice.

PROJECT	YEAR	IMPACT (Habitat/critical habitat/individuals)
GINS Dune Protection (PKBM)	2000	0.01 acre (CH)
Translocation to PKSP (PKBM)	2000	≤ 3 beach mice (source mice from CH; relocation to CH and non-CH in PKSP)
Supplemental translocation to PKSP (PKBM)	2003	≤ 3 beach mice (source mice from CH; relocation to CH and non-CH in PKSP)

PROJECT	YEAR	IMPACT (Habitat/critical habitat/individuals)
FEMA Berm Orange Beach, AL (PKBM)	2003	0.14 acre non-CH
Service scientific collecting permit program (PKBM)	2004-2005	1 beach mouse per 400 trap-nights per area (partial CH)
Florencia Development (within Action Area) (PKBM)	2005	3.5 acres (non-CH)
PKSP Re-build (PKBM)	2005	1.99 acres (CH)
FEMA Berm Emergency consultation (within Action Area) (PKBM)	2005	Consultation not complete (non-CH)
GINS road rebuild (PKBM)	2005	1.7 acres (CH)
Magnolia West Development (within Action Area) (PKBM)	2006	5.2 acres (not CH at time of construction, presently CH)
Palazzo Development (PKBM)	2006	0.58 acre (not CH at time of construction, presently CH)
Searinity Development (PKBM)	2006	0.32 acre (not CH at time of construction, presently CH)
Retreat Development (PKBM)	2006	0.21 acre (not CH at time of construction, presently CH)
Bond Residence (PKBM)	2006	0.17 acre (CH)
Three-batch condo (Island Club, Marquesas, Lorelei) (PKBM)	2007	0.95 acres (CH)
Naval Air Station Pensacola Pensacola Pass navigation channel dredging (PKBM)	2007	6.3 miles (CH)
Paradise Island development (PKBM)	2007	0.91 acres (CH)
Calabria condo development (PKBM)	2008	0.33 acres (non-CH)
Escambia County beach nourishment (PKBM)	2008	0.16 acres (partial CH)
Seabreeze Condominiums (PKBM)	2009	0.39 acres
Spanish Key Parking Lot (PKBM)	2009	0.28 acres

PROJECT	YEAR	IMPACT (Habitat/critical habitat/individuals)
Perdido Key Fire Station (PKBM)	2010	0.43 acres (CH)
Evans Residence	2012	0.21 acre
Stern Residence	2012	0.07 acre
Whalen Residence	2012	0.18 acre
Carbone Residence	2012	0.74 acre
Lost Key	2012	26.1 acre
Stallworth Preserve Development (CBM)	1995	7 acres (CH)
Navy Panama City Beach site 4 construction (CBM)	2000	0.01 acre (CH)
East Pass Re-opening (CBM)	2001	Temporary, indirect take (CH)
WaterColor and WaterSound Developments (CBM)	2000	7.6 acres (non-CH)
Service scientific collecting permit (CBM)	2004-2005	1 beach mouse per 400 trap-nights per area (partial CH)
FEMA beach berms post hurricane Ivan emergency consultation (CBM)	2005	Consultation not complete (partial CH)
Western Lake Reopening consultation (CBM)	2006	2.7 acres annually for 5 years (CH)
FEMA Statewide post-disaster berm programmatic BO (PKBM, CBM, SABM, AIBM, and SEBM)	2007	75 miles for eroded shoreline(partial CH)
Angelos Development (CBM)	2009	0.42 acres
Bonfire Beach (SABM)	2008	38 acres
Ovation (SABM)	2010	5.41 acres (CH)
Sea Colony Development (AIBM)	1998	0.7 acres (non-CH)
Anastasia State Park beach nourishment (AIBM)	2005	50 linear feet (non-CH)

PROJECT	YEAR	IMPACT (Habitat/critical habitat/individuals)
Service scientific collecting permit program (AIBM)	2004-2005	1 beach mouse per 400 trap-nights per area (non-CH)
Rodent Control Program on CCAFS (SEBM)	2002	50 beach mice
Cape Canaveral Air Force borrow source (SEBM)	2007	300 linear feet (non-CH)
Service scientific collecting permit program (SEBM)	2004-2005	1 beach mouse per 400 trap-nights per area (non-CH)
CCAFS Routine Maintenance Programmatic (SEBM)	2008	Temporary loss of habitat during trenching/digging for pipeline installation and repair, roadside mowing, soil remediation, pole placement, wells, soil boring, lines of sight, scrub restoration

Common Threats to Beach Mice in Florida

Habitat Loss or Degradation

Coastal dune ecosystems are continually responding to inlets, tides, waves, erosion and deposition, longshore sediment transport and depletion, and fluctuations in sea level. The location and shape of barrier island beaches perpetually adjusts to these physical forces. Winds move sediment across the dry beach forming dunes and the island interior landscape. The natural communities contain plants and animals that are subject to shoreline erosion and deposition, salt spray, wind, drought conditions, and sandy soils. Vegetative communities include foredunes, primary and secondary dunes, interdunal swales, sand pine scrub, and maritime forests. During storm events, overwash is common and may breach the island at dune gaps or other weak spots, depositing sediments on the interior and backsides of islands, increasing island elevation and accreting the sound shoreline. Breaches may result in new inlets through the island.

The quality of the dune habitat (primary, secondary, and scrub) is an important factor in maintaining and facilitating beach mouse recovery. Habitat manipulation is an old and widely used tool in wildlife management. It is especially useful in improving habitat suitability to increase local populations of a species. For beach mice, improving habitat can enhance the abundance and diversity of food resources, increase the chances of meeting a mate, and reduce competition for food and burrow sites.

Long term trapping data has shown that beach mouse densities are cyclic and fluctuate by order of magnitude on a seasonal and annual basis. These fluctuations can be a result of reproduction rates, food availability, habitat quality and quantity, catastrophic events, disease, and predation (Blair 1951, Bowen 1968, Smith 1971, Hill 1989, Rave and Holler 1992, Swilling *et al.* 1998, Swilling

2000, Sneckenberger 2001). Without suitable habitat sufficient in size to support the natural cyclic nature of beach mouse populations, subspecies are at risk from local extirpation and extinction, and may not attain the densities necessary to persist through storm events and seasonal fluctuations of resources.

Habitat loss and fragmentation associated with residential and commercial real estate development is the primary threat contributing to the endangered status of beach mice (Holler 1992a, 1992b, Humphrey and Frank 1992a). Coastal commercial and residential development has fragmented all the subspecies into disjunct populations. Isolation of habitats by imposing barriers to species movement is an effect of fragmentation that equates to reduction in total habitat (Noss and Csuti 1997). Furthermore, isolation of small populations of beach mice reduces or precludes gene flow between populations and can result in the loss of genetic diversity. Demographic factors such as predation (especially by cats), diseases, and competition with house mice, are intensified in small, isolated populations, which may be rapidly extirpated by these pressures. Especially when coupled with events such as storms, reduced food availability, and/or reduced reproductive success, isolated populations may experience severe declines or extirpation (Caughley and Gunn 1996). The influence these factors have on populations or individuals is largely dependent on the degree of isolation.

The conservation of multiple large, contiguous tracts of habitat is essential to the persistence of beach mice. At present, large parcels of land exist mainly on public lands. Protection, management, and recovery of beach mice on public areas have been complicated by increased recreational use as public lands are rapidly becoming the only natural areas left on the coast. Public lands and their staff are now under pressure to manage for both the recovery of endangered species and recreational use. Where protection of large contiguous tracts of beach mouse habitat along the coast is not possible, establishing multiple independent populations is the best defense against local and complete extinctions due to storms and other stochastic events (Danielson 2005). Protecting multiple populations increases the chance that at least one population within the range of a subspecies will survive episodic storm events and persist while vegetation and dune structure recover.

Habitat connectivity also becomes essential where mice occupy fragmented areas lacking one or more habitat types. If scrub habitat is lacking from a particular tract, adjacent or connected tracts with scrub habitat are necessary for food and burrow sites when resources are scarce in the frontal dunes, and are essential to beach mouse populations during and immediately after hurricanes. Trapping data suggests that beach mice occupying the scrub following hurricanes recolonize the foredune once vegetation and some dune structure have recovered (Swilling *et al*. 1998, Sneckenberger 2001). Similarly, when frontal dune habitat is lacking from a tract and a functional pathway to frontal dune habitat does not exist, beach mice may not be able to attain the resources necessary to expand the population and reach the densities necessary to persist through the harsh summer season or the next storm. Functional pathways may allow for natural behavior such as dispersal and exploratory movements, as well as gene flow to maintain genetic variability of the population within fragmented or isolated areas. To that end, contiguous tracts or functionally connected patches of suitable habitat are essential to the long-term conservation of beach mice.

A lack of suitable burrow sites may be a consequence of habitat degradation. Beach mice use burrows to avoid predators, protect young, store food, and serve as refugia between foraging bouts and during periods of rest. Beach mice have been shown to select burrow sites based on a suite of abiotic and biotic factors. A limitation in one or more factors may result in a shortage of suitable sites and the availability of potential burrow sites in each habitat may vary seasonally. Beach mice tend to construct burrows in areas with greater plant cover, less soil compaction, steep slopes, and higher elevations above sea level (Lynn 2000a, Sneckenberger 2001). These factors are likely important in minimizing energy costs of burrow construction and maintenance while maximizing the benefits of burrow use by making a safe and physiologically efficient refuge. Similar to food resources, this fluctuation in availability of burrow sites suggests that a combination of primary, secondary, and scrub dune habitat is essential to beach mice at the individual level.

Predation

Beach mice have a number of natural predators including coachwhip (*Masticophis flagellum*) corn snakes (*Elaphe guttata guttata*), pygmy rattlesnake (*Sistrurus miliarius*), eastern diamondback rattlesnake (*Crotalus adamanteus*), short-eared owl (*Asio flammeus*), great-horned owl (*Bubo virginianus*), great blue heron (*Ardea herodias*), northern harrier (*Circus cyaneus*), red fox, gray fox, skunk (*Mephitis mephitis*), weasel (*Shallela frenata*), and raccoon (Blair 1951, Bowen 1968, Holler 1992a, Novak 1997, Moyers *et al.* 1999, Van Zant and Wooten 2003). Predation of beach mouse populations that have sufficient recruitment and habitat availability is natural and not a concern. However, predation pressure from natural and non-native predators may result in the extirpation of small, local populations of beach mice.

Free-roaming cats are believed to have a devastating effect on beach mouse persistence (Bowen 1968, Linzey 1978) and are considered to be the main cause of the loss of at least one population of beach mice (Holliman 1983). Cat tracks have been observed in areas of low trapping success for beach mice (Moyers *et al.* 1999). The PHVA for the ABM indicated that if each population had as few as one cat, which ate one mouse a day, rapid extinction would occur in over 99 percent of all iterations (Traylor-Holzer 2005).

In response to increasing depredation of sea turtle nests by coyote, fox, hogs, and raccoon, multi-agency cooperative effort have been initiated and are ongoing throughout Florida, in particular on public lands. These programs also benefit beach mice.

Hurricanes

Hurricanes can severely affect beach mice and their habitat, as tidal surge and wave action overwash habitat, leaving a flat sand surface denuded of vegetation; sand is deposited inland, completely or partially covering vegetation; blowouts between the ocean and bays and lagoons leave patchy landscapes of bare sand; primary dunes are sheared or eroded; and habitat is completely breached, creating channels from the ocean to bays and lagoons. Other effects include direct mortality of individuals, relocation/dispersal, and subsequent effects of habitat alterations

(that impact such factors as forage abundance/production and substrate elevation). Habitat impacts can be widespread, encompassing the range of the subspecies.

Until frontal dune topography and vegetation redevelop, scrub habitat maintains beach mice populations and provides the majority of food resources and potential burrow sites (Lynn 2000a, Sneckenberger 2001). While storms temporarily reduce population densities (often severely), this disturbance regime maintains open habitat and retards plant succession, yielding a habitat more suitable for beach mice than one lacking disturbance. The low-nutrient soil of the coastal dune ecosystem often receives a pulse of nutrients from the deposition of vegetative debris along the coastline (Lomascolo and Aide 2001). Therefore, as the primary and secondary dunes recover, beach mice recolonize this habitat readily as food plants develop to take advantage of the newly available nutrients. Recovery times vary depending upon factors such as hurricane characteristics (*i.e.*, severity, amount of associated rain, directional movement of the storm eye, storm speed), successional stage of habitat prior to hurricane, elevation, and restorative actions post hurricane. Depending on these factors, recovery of habitat may take from one to over 40 years.

The impact of hurricanes on plant communities temporarily affects food availability, and hence can limit population densities in impacted habitats soon after storms. Observations indicate that Hurricane Opal (a Category 3 storm in November 1995) caused a decrease in one population of ABM by 30 percent (Swilling *et al.* 1998). However, population densities in scrub habitat typically increased following hurricanes (Swilling *et al.* 1998). Sneckenberger (2001) also found atypical numbers of ABM in scrub following a hurricane. Five months post-storm, "densities (individuals/km) were up to 7.5 times greater in scrub areas than in frontal dune grids." Impacts of the storm may have been apparent as long as 17 months after the storm when scrub densities remained triple those of frontal dunes (Sneckenberger 2001). Moyers *et al.* (1999) found similar results for CBM at Grayton Beach State Park. When frontal and primary dunes sustained extensive damage during Hurricane Opal in 1995, beach mice were captured behind what remained of primary dune habitat. By 1998, however, primary dunes and the immediate habitat inland appeared to support higher numbers of beach mice.

In addition to the overall change in post Hurricane Opal distribution of ABM, Swilling *et al*. (1998) found the mean percent of newly marked individuals increased from 14 percent for the three trapping periods before the storm to an average of 26.7 percent for the same interval post hurricane. The average for the three trapping periods immediately following was even higher, at 42.7 percent of the individuals captured. Swilling *et al.* (1998) concluded that this increased presence of new individuals reflected increased reproduction. A statistical analysis of the data indicated that the number of females exhibiting signs of reproduction was significantly higher than normal (18.9 percent higher). Moyers *et al.* (1999) also found similar results at Topsail Hill Preserve State Park. Four to five months following Hurricane Opal, all female CBM captured were pregnant or lactating. Trapping six months after the hurricane, Moyers *et al.* (1999) noted that 51.5 percent of captured CBM were new unmarked beach mice.

Although hurricanes can significantly alter beach mouse habitat and population densities in certain habitats, some physical effects may benefit the subspecies. Hurricanes are probably responsible

for maintaining coastal dune habitat upon which beach mice depend through repeated cycles of destruction, alteration, and recovery of dune habitat. Holler *et al.* (1999) suggested that hurricanes could function to break up population subgroups and force population mixing. The resultant breeding between members of formerly isolated subgroups increases genetic heterogeneity and could decrease the probability of genetic drift and bottlenecks.

Beachfront Lighting

Artificial lighting increases the risk of predation and influences beach mouse foraging patterns and natural movements as it increases their perceived risk of predation. Foraging activities and other natural behaviors are influenced by many factors. Artificial lighting alters behavior patterns causing beach mice to avoid otherwise suitable habitat and decreases the amount of time they are active (Bird *et al.* 2004).

The presence of vegetative cover reduces predation risk and perceived predation risk of foraging beach mice, and allows for normal movements, activity, and foraging patterns. Foraging in sites with vegetative cover is greater and more efficient than in sites without cover (Bird 2002). Beach mice have also been found to select habitat for increased percent cover of vegetation, and decreased distance between vegetated patches (Smith 2003).

Genetic variability

Selander *et al.* (1971) conducted an electrophoretic study on 30 populations of *P. polionotus*, including populations of beach mouse subspecies. Based on 30 allozyme loci, they estimated that the level of allozyme variation found in beach mouse populations was at least 40 percent lower than the level of variation in nearby inland populations. This work indicates that beach mouse populations already have lower genetic variability before inbreeding, bottleneck events, or founder effects that may occur in a reintroduced population. Lower levels of heterozygosity has been linked to less efficient feeding, fewer demonstrations of social dominance and exploratory behavior, and smaller body size (Smith *et al.* 1975, Garten 1976, Teska *et al.* 1990). Research focused on inbreeding depression in old-field mice (including one beach mouse subspecies), determined that the effects of inbreeding negatively influenced factors such as litter size, number of litters, and juvenile survivorship (Lacy *et al.* 1995).

In 1995, the Service contracted with Auburn to conduct genetic analysis of: 1) post-reestablishment gene structure in PKBM and CBM; 2) microgeographic patterning and its relevance to alternate management approaches for ABM on the Bon Secour NWR; and 3) if feasible, the historical relationship of SABM from Crooked Island relative to CBM from Shell Island and SABM from St. Joseph Peninsula.

Results of the work for CBM found: 1) founder effects were observed in the Grayton Beach State Park population (fixation of alleles common to the donor population and allele frequency shifts); 2) incongruity in number and size of several alleles was observed between Grayton Beach State Park and Shell Island; 3) overall genetic divergence between the donor and reestablished

population was moderate; 4) genetic differences between Topsail Hill Preserve State Park and other CBM sites were higher than expected given the spatial proximity; 5) Topsail Hill Preserve State Park appears to be a reservoir for unique variation within the remaining populations of CBM; and 6) the overall relatedness estimated for Grayton Beach State Park suggested that any mating would involve close relatives (Wooten and Holler 1999).

Wooten and Holler (1999) recommended strategies for management of CBM based on genetics. Management of the Grayton Beach State Park population for genetic characteristics appears to be needed; however, additional genetic analyses will be needed. Relocation of CBM to Grayton Beach State Park from Shell Island should be continued.

Results of the work for PKBM found that: 1) founder effect (from Florida Point to GINS) did impact the GINS-Perdido Key Area subpopulation. Loss of rare alleles and allele frequency shifts were noted; 2) a low to moderate level of overall genetic divergence was observed; 3) data suggests that some effects of genetic drift were mediated by continued transfer of individuals; 4) levels of heterozygosity were unexpected given recent history; 5) average levels of relatedness among individuals is high which may portend future inbreeding related problems (however, no evidence of existing inbreeding was observed in the data); and 6) the overall level of microsatellite variation retained in the GINS-Perdido Key Area subpopulation was higher than anticipated. Wooten and Holler (1999) recommended management of PKBM based on genetics by: 1) preserving the natural population to the maximum extent possible since the loss of the Florida Point subpopulation resulted in the permanent loss of alleles; 2) using the GINS-Perdido Key Area subpopulation as a donor for reestablishment of other populations because of the retention of a substantial amount of genetic variation; and 3) reestablishment plans should include transfers between donor and reestablished subpopulations. In addition, translocations should be accomplished in pairs.

Analysis of genetic work focused on SABM indicated that there are two possible genetic histories for Crooked Island beach mice: 1) the last known beach mice from Crooked Island were derived from CBM or 2) the last known beach mouse from Crooked Island were unique from both CBM found on Shell Island or SABM found on St. Joseph peninsula (Van Zant 2003).

Climate Change (refer to page 49)

Analysis of the Species/Critical Habitat Likely to be Affected

Beach mice are currently federally protected because of their low numbers caused by habitat loss with continuing threats to their habitat (including critical habitat for CBM, PKBM, and SABM) and resulting affects from storm and post-storm events. The primary reason for the significant reduction in their range is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated beach mouse habitat. Coastal urbanization has also increased the recreational use of beachfront areas. Dune habitat maintenance is an important component of beach mouse conservation. Providing a healthy and continuous dune system assures mouse population stability. Integral to this is keeping visitors to the beach off the

dunes and replanting as necessary when impacts occur or are observed. The extremely active 2004 and 2005 hurricane seasons also had a severe effect on Florida's beaches and beach mouse habitat.

Critical habitat for three (PKBM, CBM, and SABM) of the five subspecies of beach mice has been designated and will be discussed. No critical habitat has been designated for the other two subspecies (SEBM and AIBM). Therefore, the proposed action would have no effect on designated critical habitat for these two subspecies because none is designated.

Generally, sand placement activities or dredged navigation channel material is not placed on existing beach mouse habitat consisting of vegetated dunes. Typical effects from these activities to beach mice and their habitats consist of the staging and storage of equipment, work vehicles, or materials and beach access for sand placement activities or dredged material placement. These effects may result in the permanent and temporary loss, degradation, or fragmentation of beach mouse habitat and changes in essential life history behaviors (dispersal and movement, foraging, seeking mates, breeding, and care of young). Beach mice spend their entire lives within the dune ecosystem and are nocturnal. Sand placement projects may occur at anytime of the year depending on their location and are usually conducted on a 24/7 schedule. The quality of the placed sand could affect the suitability of the beach and dunes to support beach mouse burrow construction and food sources. The effect of the activities covered under the consultation with incorporation of the proposed conservation measures on beach mice overall survival and recovery are considered in this SPBO.

ENVIRONMENTAL BASELINE

Status of the species/Critical Habitat within the Action Area (all subspecies of beach mice)

The action area encompasses the entire range of five subspecies of beach mice, and designated critical habitats of three beach mouse subspecies. Therefore, the previous discussion in "Status of the Species" applies here. The known distribution of the five subspecies of beach mice is a result of cursory surveys and intermittent trapping involving different projects. There has not been a systematic trapping study done in order to determine the status of each subspecies throughout their ranges.

Factors affecting the species environment within the action area

<u>Coastal development</u>

Beach mice were listed as endangered and threatened species primarily because of the fragmentation, adverse alteration, and loss of habitat due to coastal development. The threat of development-related habitat loss continues to increase. Other contributing factors include low population numbers, habitat loss from a variety of reasons (including hurricanes), predation or competition by animals related to human development (cats and house mice), and the existing strength or lack of regulations regarding coastal development.

Hurricanes

Hurricanes were probably responsible for maintaining coastal beach habitat upon which beach mice depend through repeated cycles of destruction, alteration, and recovery of dune habitat. Hurricanes generally produce damaging winds, storm tides and surges, and rain and can result in severe erosion of the beach and dune systems. Overwash and blowouts are common on barrier islands. Hurricanes can impact beach mice either directly (e.g., drowning) or indirectly (e.g., loss of habitat). Depending on their frequency, storms can affect beach mice on either a short-term basis (e.g., temporary loss of habitat) or long term (e.g., loss of food, which in turn may lead to increased juvenile mortality, resulting in a depressed breeding season). How hurricanes affect beach mice also depends on the characteristics (winds, storm surge, rainfall), the time of year (within or outside of the nesting season), and where the northeast edge of the hurricane crosses land.

Because of the limited remaining habitat, frequent or successive severe weather events could compromise the ability of certain populations of beach mice to survive and recover. Beach mice evolved under natural coastal environmental events such as hurricanes. The extensive amount of predevelopment coastal beach and dune habitat allowed beach mice to survive even the most severe hurricane events. It is only within the last 20 to 30 years that the combination of habitat loss to beachfront development and destruction of remaining habitat by hurricanes has increased the threat to beach mice survival and recovery. On developed beaches, typically little space remains for sandy beaches to become re-established after periodic storms. While the beach itself moves landward during such storms, reconstruction or persistence of structures at their prestorm locations can result in a major loss of habitat for beach mice.

The 2004 hurricane season was the most active storm season in Florida since weather records began in 1851. Hurricanes Charley, Frances, Ivan, and Jeanne, along with Tropical Storm Bonnie, damaged the beach and dune system, upland structures and properties, and infrastructure in the majority of Florida's coastal counties. The cumulative impact of these storms exacerbated erosion conditions throughout the state.

The 2005 hurricane season was a record-breaking season with 27 named storms. Hurricanes Dennis, Katrina, Ophelia, Rita, and Wilma, and Tropical Storms Arlene and Tammy impacted Florida. The cumulative impact of these storms exacerbated erosion conditions in south and northwest Florida.

Beachfront Lighting

Artificial lighting along developed areas of both coastlines continues to cause increase susceptibility to predators, altered foraging and breeding habits which impact beach mouse recovery. While a majority of coastal local governments and counties have adopted beachfront lighting ordinances compliance and enforcement is lacking in some areas. Further, the lighting in areas outside the beachfront ordinance coverage areas continues to be unregulated resulting in

urban glow. Even the darker areas of conservation managed lands are subject to surrounding sky glow.

Predation

A major continuing threat to beach mice is predation by free-roaming cats and other nonnative species. The domestic cat is not native to North America and is considered a separate species from its wild ancestral species, *Felis silvestris*. Cats are hunters, retaining this behavior from their ancestors. However, wildlife in the western Hemisphere did not evolve in the presence of a small, abundant predator like the domestic cat, and thus did not develop defenses against them. Cats were introduced to North America a few hundred years ago.

Free-roaming pets prey on small mammals, birds, and other native wildlife. In the U.S., on a nationwide basis, cats kill over a billion small mammals and hundreds of millions of birds each year. Worldwide, cats are second only to habitat destruction in contributing to the extinction of birds. Cats have been documented to take beach mice, sea turtle hatchlings, shorebirds, and migratory birds. A significant issue in the recovery of beach mice is predation by free-ranging pet and feral cats. Beach mice have a number of natural predators including snakes, owls, herons, and raccoons. Predation is part of the natural world. However, predation pressure from both natural and nonnative predators may result in the extirpation of small, local populations of beach mice in a very short time (Bowen 1968, Linzey 1978).

Climate Change

Based on the present level of available information concerning the effects of global climate change on the status of beach mice and its designated critical habitat, the Service acknowledges the potential for changes to occur in the action area, but presently has no basis to evaluate if or how these changes are affecting beach mice or its designated critical habitat nor does our present knowledge allow the Service to project what the future effects from global climate change may be or the magnitude of these potential effects.

EFFECTS OF THE ACTION

Factors to be considered

Aspects of the sand placement and dredged material placement activities will occur within habitat that is used by beach mice year round. The activities include the storage of equipment, work vehicles, or materials and creation, expansion, or use of beach access points for sand placement activities or dredged material placement. The work, depending on the location, may be conducted any time of the year. Most effects would be expected to be temporary. These short-term and temporary impacts could include loss of foraging habitat, altered beach mouse movement and dispersal activities. Long-term and permanent impacts from the sand placement activities such as excavation of dune habitat and degradation could impact beach mice by fragmentation of their habitat including critical habitat for the PKBM, CBM, and SABM.

There are typically different "levels" of access sites needed for a project. The primary access is a "lay-down" yard, where pipe is delivered and stored, and storage trailers, and other equipment and materials are stored. These are typically big paved parking lots, so that the Corps's trucks can access the area to drop off and pick up equipment. There's typically a beach access at that point to get the pipe and equipment onto the beach and that access is usually at least 50-ft wide (pipe sections are typically 40 to 50 feet long). In NW Florida and Alabama, these yards have been approximately eight miles apart.

"Intermediate areas" are used at about the quarter points of the project length. These are used for the fuel tank, welding equipment, and other items or systems that get used a couple of times a day. These locations can vary from two to three miles apart. In addition, there are access points to allow project vehicles and trucks on and off the beach. Based on previous projects it would be expected to have single-vehicle entry points at one-half to one-mile intervals.

Protective, avoidance, and minimization measures have been incorporated into the project plan to avoid or minimize the potential impacts from the sand placement and dredged material placement activities. However, even with these measures, impacts to beach mice are expected to occur from some aspects of the project activities. The activities are expected to directly or indirectly adversely affect beach mice and/or their habitat including designated critical habitat for the PKBM, CBM, and SABM. The work may occur on public and/or private lands.

Proximity of Action: Some aspects of the sand placement and dredged material placement activities would occur directly in beach mouse habitat. The storage or staging of pipe and other equipment, and vehicles, use or creation of beach access points, and placement of pipe, nourishment or dredged material could occur in habitat occupied or used by SEBM, AIBM, PKBM, CBM, and SABM. Beach mice spend their entire life cycle within the coastal dune system.

Distribution: The storage or staging of pipe and other equipment and vehicles and use of beach access points that could occur in habitat occupied or used by SEBM, AIBM, PKBM, CBM, and SABM may vary depending on the individual project length and existing beach accesses and non-beach mouse habitat that can be used for storage and staging.

Timing: The timing of the activities would directly and indirectly impact beach mice and their habitat depending on the season. Beach mice reproduce year-round with more mice being produced in the late winter and early spring. Impacts could include but would not be limited to disrupting mice seeking mates, constructing nest burrows, foraging for food, caring for their young, and young mice leaving the nest burrow dispersing into new habitat.

Nature of the Effect: The effects of the activities may include the temporary loss of habitat including the loss of a few beach mice from excavation of habitat for beach access and reduction of beach mouse activity including feeding, reproduction, and movement from loss or alteration of habitat. Activities that decrease the amount or quality of dune habitat or movement could affect beach mice by reducing the amount of available habitat and fragmenting the habitat.

Duration: Time to complete the project construction may vary depending on the project length, weather, and other factors (equipment mobilization and break downs, availability of fuel, lawsuits, etc.). Project work could take as little as a month and as long as a one or two years. Beach mouse habitats would remain disturbed until the project is completed and the habitats are restored. Dune restoration could be complete from 6 to 12 months after the project has been completed. The short generation time of beach mice combined with the time frames provided in this document (projects from 1 month to 2 years, dune restoration 6 to 12 months following project completion) will impact multiple generations of beach mice. The time to complete a project and restore the habitat can be a complete loss of habitat availability and use for multiple generations of beach mice.

Disturbance frequency: Depending on the sand placement activity and dredging project frequency, this could result in impacts to beach mice and their habitats at any time during the year on a minimum cycle of every 2 years. Following initial sand placement, activities could occur every year depending on the project location and erosion events. The actual number of times the sand placement would occur is unknown. Following initial sand placement or dredge material placement, maintenance activities could occur every two to 10 years depending on the project location and situation (erosion, long shore sand transportation, upstream activities, and weather events). Thus, impacts related to the subject activities would be expected to occur no more often than every two to three years. However, while not anticipated, work could occur annually in response to emergency events. The actual number of times the nourishment and dredging material disposal activities is unknown but can be based on previous work.

Disturbance intensity and severity: Depending on the frequency needed to conduct the nourishment and dredged material work and the existence of staging areas and beach access points, effects to the recovery of beach mouse may vary. However, the action area encompasses entire range of each subspecies and the overall intensity of the disturbance is expected to be minimal. The severity is also likely to be slight as few if any mice would be lost and dune habitats can be restored quickly if protected from other impacts (pedestrians and vehicles).

The staging and storage of equipment and materials and beach access points could occur within habitat occupied or used by SEBM, AIBM, PKBM, CBM, and SABM and could be adjacent to designated critical habitat for the PKBM, CBM, and SABM. Beach mice are permanent inhabitants of the coastal ecosystem conducting all their life cycles in this environment. While the current status of individual beach mouse subspecies is unknown, their general distribution is known.

Analysis for effects of the action

The action area consists of the Atlantic or Gulf beachfront including the wet and dry unvegetated beach, developing foredunes and interdunal swales, and areas that were formerly primary or secondary dunes. Sand placement or dredged material placement work would not occur on existing vegetated primary or secondary dunes. However, construction of or expansion of an existing beach access could be located through scrub, secondary, or primary dunes. Beach mice

would generally be found inhabiting stable primary, secondary, and scrub dunes on a permanent basis with other habitats being used periodically on a daily or seasonal basis for feeding and movement. Some of these areas also include critical habitat.

Direct and Indirect Impacts

Direct impacts are effects of the action on the species occurring during project implementation and construction (sand placement or dredged material placement). Direct loss of individual beach mice may occur during the creation or expansion of beach access points when heavy equipment clears the habitat and packs the sand. In general the length of time between project maintenance work is expected to be sufficient for beach mouse habitat to be restored. Thus, it is not anticipated that the nourishment and dredged material placement activities would result in permanent beach mouse habitat destruction (including critical habitat). However, habitat for all the beach mouse subspecies and critical habitat for the PKBM, CBM, and SABM that provides food or cover may be temporarily destroyed or altered from the activities.

Indirect effects are a result of a proposed action that occur later in time and are reasonably certain to occur. The indirect effect of the sand placement and dredged material placement activities would be newly created or expanded existing beach access points that act as barriers to beach mouse movement for foraging, or population expansion or dispersal. Maintaining the connectivity among habitats is vital to persistence of beach mice recovery. Recovery actions needed to assure the connectivity include restoration and maintenance of the dune system following project completion.

For the Service to determine if the project impacts on designated critical habitat would be an adverse modification, the Service shall determine if the impact on the habitat appreciably diminishes the capability of the critical habitat to satisfy essential requirements of beach mice. The long-term maintenance of the beach mouse populations in the project areas could be compromised if the sand placement and dredged material placement activities occur too frequently resulting in a long-term barrier to mice movement. However, our evaluation indicates the impacts to critical habitat should be temporary in nature based on past history of nourishment projects. In addition, the area to be directly affected within the individual subspecies would be a small percentage of the overall critical habitat and would not be expected to reduce the carrying capacity of the recovery unit or appreciably diminish the ability of the PCE's to provide for the essential functions of the critical habitat units.

Species' response to a proposed action

This SPBO is based on effects that are anticipated to beach mice (all life stages) as a result of the temporary physical disturbance of beach mice habitat from beach nourishment or dredged material placement and associated activities. Some individual beach mice (all life stages) may be lost during the initial construction or expansion of beach accesses where heavy equipment destroys dune habitat and compacts the sand within the access corridor. Any mice that survive the initial construction may move outside of the disturbed area and construct burrows elsewhere in the vicinity. This will result in increased exposure to predation due to the removal of their burrows.

Following access construction, a bare gap of sand could form a barrier to limit beach mouse movement within the area altering regular movement patterns. The bare areas could not be used for foraging, breeding or sheltering. These impacts are expected to be limited to the construction phase of the project (one month to two years). As the life span of a beach mouse is estimated to be approximately nine months, the loss of individual mice or the temporary loss of habitat could affect several generations of beach mice, but because beach mice can reproduce rapidly with adequate resources, colonization or recolonization of the restored habitat would be expected.

Beach mice have evolved to adapt to catastrophic weather events. Additional factors such as surrounding development pressure and nonnative predators may affect the species' ability to recover from the loss of individuals. However, the temporary loss of the habitat itself is not expected to permanently impact the populations as all beach mouse habitat within the project areas not permanently destroyed would be restored or maintained as part of the conservation measures committed to by the Corps or the Applicant. The temporary nature of the impacts to dune habitats is not expected to alter the function and conservation role of the remaining beach mouse habitat including designated critical habitat.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this SPBO. Future Federal actions that are unrelated to the proposed project are not considered in this opinion and require separate consultation pursuant to section 7 of the Act.

It is reasonably certain to expect that coastal development, human occupancy and recreational use along the Atlantic and Gulf coasts of Florida will increase in the future. Redevelopment along with new developments following the hurricane seasons of 2004 and 2005 are occurring as allowed by local zoning standards. It is unknown how much influence a nourished beach would contribute to the development and recreational use of the shoreline. Any projects that are within endangered or threatened species habitat will require section 7 consultation or section 10(a) (1)(B) permitting from the Service.

In recognizing the importance of coastal barrier islands along the Atlantic and Gulf coasts, Congress passed the Coastal Barrier Resources Act (CBRA) of 1982 and Coastal Barrier Improvement Act in 1991. The purpose of CBRA is "…to minimize the loss of human life, wasteful expenditure of Federal revenues, and the damage to fish, wildlife, and other natural resources associated with the coastal barriers along the Atlantic and Gulf coasts by restricting future Federal expenditures and financial assistance which have the effect of encouraging development of coastal barriers." Congress established the Coastal Barrier Resources System units that apply to the CBRA.

Escambia County is currently in the final permitting stages of a beach nourishment project for Perdido Key. The project would cover approximately 4 miles of beachfront along county and private lands, not including state and Federal lands. The Service completed an endangered species

consultation for the project in 2008. The project construction is expected to begin in late 2009-2010. The beach nourishment project is likely to enhance beach mouse habitat by providing an additional buffer to the dune habitats from storm events.

The Pensacola Naval Air Station has proposed to dredge their navigation channel resulting in the need to place eight million cubic yards of dredged material that is beach compatible. Because of cost, Perdido Key is the closest area to receive the material. Receiving areas include the Perdido Key Gulf beachfront (in lieu of the County implementing their project described above), PKSP, and GINS, Escambia County. The project could result in the placement of dredged material on 16 miles of beachfront including private, county, state, and Federal lands. The Navy has received their permits to complete the project. The Service completed an endangered species consultation for the project in 2007. The full project is on hold due to funding. However, the Federal navigation channel in the lower portion of the project area is expected to be maintenance dredged in 2009-2010.

Gulf County is currently completing a beach restoration project on St. Joseph peninsula and St. Joseph Peninsula State Park. The project will cover approximately 7.5 miles of Gulf of Mexico beachfront. The Service completed an endangered species consultation for the project. The project was completed in 2008.

CONCLUSION

Sea Turtles

After reviewing the current status of the loggerhead, green, leatherback, hawksbill, and Kemp's ridley sea turtles, the environmental baseline for the action area, the effects of the proposed activities, the "Conservation Measures," and the cumulative effects, it is the Service's biological opinion that work conducted under the Statewide Programmatic action, as proposed, is not likely to jeopardize the continued existence of the loggerhead, green, leatherback, hawksbill or Kemp's ridley sea turtles. Critical habitat has been designated for the NWAO DPS of the loggerhead sea turtle. **Table 4** has the list of the critical habitat units within the project area.

The conservation of the five loggerhead recovery units in the Northwest Atlantic is essential to the recovery of the loggerhead sea turtle. Each individual recovery unit is necessary to conserve genetic and demographic robustness, or other features necessary for long-term sustainability of the entire population. Thus, maintenance of viable nesting in each recovery unit contributes to the overall population. Three of the five loggerhead recovery units in the Northwest Atlantic occur within the action area, the PFRU, the DTRU, and the NGMRU. Sand placement is not expected to occur within the DTRU. The NGMRU averages about 1,000 nests per year. Northwest Florida accounts for 92 percent of this recovery unit in nest numbers (920 nests) and consists of approximately 234 miles of nesting shoreline. Of the available nesting habitat within the NGMRU, with most sand placement projects have a project life of five to seven years and channel maintenance activities occurring every two to three years, on average, sand placement impacts will

occur on 8.8 miles of sea turtle nesting shoreline per year. This is based on the average linear feet of beach on which sand placement occurred during nonemergency years from 2001 to 2008.

The PFRU averages 64,513 nests per year. The entire recovery unit occurs within Florida and consists of approximately 595 miles of sandy shoreline (http://www.dep.state.fl.us/beaches/publications/pdf/fl_beach.pdf). Of the available nesting habitat within the PFRU, sand placement activities will occur on 18.9 miles of nesting shoreline per year during nonemergency years. This is based on the average linear feet of beach on which sand placement occurred during non-emergency years from 2001 to 2008.

Generally, green, leatherback, hawksbill, and Kemp's ridley nesting overlaps with or occurs within the beaches where loggerhead sea turtles nest on both the Atlantic and Gulf of Mexico beaches. Thus, for green, leatherback, hawksbill, and Kemp's ridley sea turtles, sand placement activities will affect an average of 27.7 miles of shoreline per year. This is based on the average linear feet of beach on which sand placement occurred during nonemergency years from 2001 to 2008.

For all species of sea turtles, post-hurricane sand placement activities occurred on approximately 205 miles of shoreline for the 2004-2005 period following the emergency events (declared disasters and Congressional Orders). These activities are within the approximately 1,400 miles of available sea turtle nesting habitat in the southeastern U.S.

Research has shown that the principal effect of sand placement on sea turtle reproduction is a reduction in nesting success, and this reduction is most often limited to the first year following project construction. Research has also shown that the impacts of a nourishment project on sea turtle nesting habitat are typically short-term because a nourished beach will be reworked by natural processes in subsequent years, and beach compaction and the frequency of escarpment formation will decline. Although a variety of factors, including some that cannot be controlled, can influence how a nourishment project will perform from an engineering perspective, measures can be implemented to minimize impacts to sea turtles.

Beach Mice

The PKBM, CBM, and SABM occur on both public and private lands throughout their historical ranges. Both the SEBM and the AIBM are located completely on county, state, or federally protected lands, except for a small area in St. Johns County in which the AIBM are found on private lands along the Florida coast.

After reviewing the current status of the species of the SEBM, AIBM, PKBM, CBM, and SABM, the environmental baseline for the action area, the effects of beach nourishment and dredged material placement and associated activities, the "Conservation Measures," and the cumulative effects, it is the Service's biological opinion that the Statewide Programmatic action for these projects, as proposed, is not likely to jeopardize the continued existence of any of the above subspecies of beach mice and is not likely to destroy or adversely modify designated critical habitat for the PKBM, CBM, or SABM.

As discussed in the Effects of the Action section of this SPBO, we would not expect the carrying capacity of beach mouse habitat within the action area to be reduced. Beach mouse habitat will continue to provide for the biological needs of the subspecies as demonstrated below:

1. No permanent loss of beach mouse habitat will occur within the action area from the project construction or maintenance;

2. Temporary impacts to beach mouse habitat will be restored within the action area after project completion; and

3. A full complement of beach mouse habitat will remain within the action area after project completion.

Temporary impacts are expected to be limited to the construction/maintenance phase of the project and habitat restoration period following the project, which could be completed between one month and two years.

While a few beach mice may be lost, beach mice recover well from population size reductions (Wooten 1994) given sufficient habitat is available for population expansion after the bottleneck occurs. Therefore, we do not consider the potential loss of individuals to be significant.

Also, 50 feet of beach mouse critical habitat for each subspecies (PKBM, CBM, and SABM) could be temporarily affected each time a project is completed as a result of the sand placement activities. We would not anticipate that the loss of the critical habitat would alter or affect the remaining critical habitat in the action area for each subspecies (PKBM, CBM, and SABM) to the extent that it would appreciably diminish the habitat's capability to provide the intended conservation role for the subspecies in the wild.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the

agency action is not considered to be prohibited under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary and shall be implemented by the Corps so that they become binding conditions of any grant or permit issued to the Applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps shall report the progress of the action and its impacts on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF ANTICIPATED TAKE

Sea Turtles

The Service anticipates that no more than 27.7 miles of highly eroded shoreline along the Florida coastline (no more than 8.8 miles within the NGMRU and no more than 18.9 miles within the PFRU) would receive sand placement per year during nonemergency calendar years with a maximum of 102 miles of shoreline (38 miles within the NGMRU and 64 miles of shoreline within the PFRU) receiving sand during or following an emergency event (declared disaster or Congressional Order) as a result of the Statewide Programmatic action. This represents two percent of the entire shoreline per year during a nonemergency year and seven percent of the entire shoreline during an emergency year. Over the last 10 years, one Congressional Order occurred due to emergency events in the 2004-2005 period. The increased sand placement on 102 miles of shoreline is expected to occur once in a 10-year period due to emergency events. Incidental take of sea turtles will be difficult to detect for the following reasons:

1. Turtles nest primarily at night and all nests are not located because
    a. Natural factors, such as rainfall, wind, and tides may obscure crawls; and
    b. Human-caused factors, such as pedestrian and vehicular traffic, may obscure crawls, and result in nests being destroyed because they were missed during a nesting survey and egg relocation program;

2. The total number of hatchlings per undiscovered nest is unknown;

3. The reduction in percent hatching and emerging success per relocated nest over the natural nest site is unknown;

4. An unknown number of females may avoid the project beach and be forced to nest in a less than optimal area;

5. Lights may misdirect an unknown number of hatchlings and cause death; and

6. Escarpments may form and prevent an unknown number of females from accessing a suitable nesting site.

However, the level of take of these species due to disturbance and sand placement on suitable turtle nesting beach habitat can be anticipated because (1) turtles will continue to nest within the project site during and following sand placement; (2) sand placement activities will likely occur during a portion of the nesting season; (3) sand placement activities will modify the incubation substrate, beach slope, and sand compaction; and (4) artificial lighting will deter or misdirect nesting females and hatchlings during and following sand placement.

Take is expected to be in the form of: (1) destruction of all nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the project areas; (2) destruction of all nests deposited during the period when a nest survey and egg relocation program is not required to be in place within the boundaries of the projects; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the sand placement areas or on adjacent beaches during sand placement or construction activities; (5) misdirection of nesting and hatchling turtles on beaches adjacent to the sand placement or construction area as a result of project lighting including the ambient lighting from dredges; (6) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and (7) destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Service.

According to Schroeder (1994), there is an average survey error of seven percent; therefore, there is the possibility that some nests within the Action Area may be misidentified as false crawls and missed. However, due to implementation of the sea turtle protection measures, we anticipate that the take will not exceed seven percent of the nesting average in the action area. This number is not the level of take anticipated because the exact number cannot be predicted nor can the level of incidental take be monitored.

Beach Mouse

The Service has reviewed the biological information and other information relevant to this action. Based on this review, incidental take is anticipated from the sand placement activities may occur any time of the year within a ten-year period. The Service anticipates incidental take of beach mice would be difficult to detect for the following reasons: (1) an unknown number of beach mice may be injured, crushed or buried during beach access construction work and remain entombed in the sand; (2) beach mice are nocturnal, are small, and finding a dead or injured body is unlikely because of predation, and (3) changes in beach mouse essential life behaviors may not be detectable in standardized monitoring surveys.

For projects that occur within beach mouse habitat it is anticipated that no more than 50 linear feet of beach mouse habitat could be affected per sand placement activity for beach access within a subspecies range statewide as a result of the sand placement activities.

The incidental take is expected to be in the form of: (1) harm or harassment to all beach mice occupying the created or expanded beach access points; (2) harassment of beach mice from disturbance of foraging opportunities within the access areas during the construction period; (3) harassment of beach mice from temporary loss of foraging and burrow habitat; and (4) harassment of beach mice from temporary restriction of movement across access areas.

EFFECT OF THE TAKE

Sea Turtles

In the SPBO, the Service determined that the level of anticipated take is not likely to result in jeopardy to the loggerhead, green, leatherback, hawksbill or Kemp's ridley sea turtles. Loggerhead critical habitat has been designated in the project area. Based on the Corps incorporation of the conservation measures into the project, the Service concurs that the project may affect but is not likely to adversely affect nor adversely modify NWAO loggerhead critical habitat in the terrestrial environment. The Corps will consult with the NMFS on any impacts to critical habitat in the marine environment.

Incidental take of loggerhead nesting and hatchling sea turtles and sea turtle nests is anticipated to occur during project construction and during the life of the project. Take will occur on nesting habitat consisting of the length of the beach where the material will be placed or where jetty or groin maintenance is located but is not expected to exceed 8.8 miles of shoreline per year within the northwest portion of Florida for the NGMRU and 18.9 miles of shoreline per year within the PFRU during a nonemergency year. Take will occur on nesting habitat consisting of the length of the beach where the material will be placed or where groin maintenance is located but is not expected to exceed 102 miles of shoreline (38 miles of shoreline per year within the northwest portion of Florida for the NGMRU and 64 miles of shoreline per year within the PFRU) during an emergency (declared disasters or Congressional Orders) year. The increased sand placement of 102 miles of shoreline is expected to occur once in a 10-year period due to emergency events.

Incidental take of green, leatherback, hawksbill and Kemp's ridley nesting and hatchling sea turtles and sea turtle nests is anticipated to occur during project construction and during the life of the project or while placed sand remains on the beach. Take will occur on nesting habitat consisting of the length of the beach where the material will be placed or where jetty or groin maintenance is located but is not expected to exceed 27.7 miles (8.8 miles within the northwest portion of Florida and 18.9 miles within the northeast, south and west portion of Florida) of shoreline per year during a nonemergency year. Take will occur on nesting habitat consisting of the length of the beach where the material will be placed or where jetty or groin maintenance is located but is not expected to exceed 102 miles of shoreline (38 miles of shoreline per year within the northwest portion of

Florida for the NGMRU and 64 miles of shoreline per year within the PFRU) during an emergency (declared disasters or Congressional Orders) year.

Beach Mouse

In the SPBO, the Service determined that this level of anticipated take is not likely to result in jeopardy to AIBM, SEBM, PKBM, CBM, and SABM or in adverse modification or destruction of designated critical habitat for the PKBM, CBM, or SABM. Critical habitat for the SEBM and AIBM has not been designated; therefore, the project will not result in destruction or adverse modification of critical habitat for these subspecies.

Incidental take of SEBM, AIBM, PKBM, CBM, and SABM is anticipated to occur at beach access locations for the sand placement activities. Take will occur during project construction where beach access points are expanded or created and where equipment is staged or stored within beach mouse habitat along approximately 50 feet of vegetated dunes for beach access.

REASONABLE AND PRUDENT MEASURES

The Service has determined that the following reasonable and prudent measures are necessary and appropriate to minimize take of the loggerhead, green, leatherback, hawksbill, and Kemp's ridley sea turtles; SEBM, AIBM, CBM, PKBM, and SABM in the action area for the following activities:

A. Sand placement from beach nourishment, sand bypass, and sand back pass activities;

B. Sand placement from navigation channel maintenance; and

C. Groin and jetty repair or replacement.

If the Corps is unable to comply with the Reasonable and Prudent Measures and Terms and Conditions, the Corps as the construction agent or regulatory authority may:

1. Inform the Service why the term and condition is not reasonable and prudent for the specific project or activity and request exception under the SPBO or
2. Initiate consultation with the Service for the specific project or activity. The Service may respond by either of the following:
    a. Allowing an exception to the terms and conditions under the SPBO or
    b. Recommending or accepting initiation of consultation (if initiated by the Corps) for the specific project or activity.

Post construction requirements are listed in Reasonable and Prudent measures, A11, A12, A13, and A14. These post construction requirements may besubject to congressional authorization and the allocation of funds. Florida State statutes apply. If the Corps or Applicant cannot fulfill these Reasonable and Prudent Measures, the Corps must reinitiate consultation.

REASONABLE AND PRUDENT MEASURES for:

A. Projects that include sand placement from beach nourishment, sand bypass, and sand back pass activities primarily for shore protection (these projects are usually larger scaled) shall include the following measures:

A1. Conservation Measures included in the Corps' PBA that address protection of nesting sea turtles and beach mice shall be implemented in the Corps federally authorized project or regulated activity.

A2. Beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence and beach mouse burrow construction shall be used for sand placement.

A3. Sand placement shall not occur during the period of peak sea turtle egg laying and egg hatching, to reduce the possibility of sea turtle nest burial, crushing of eggs, or nest excavation. In Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward counties, sand placement shall not occur from May 1 through October 31. In St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas in Gulf County, St. George Island in Franklin County, and Manasota Key in Sarasota and Charlotte counties, sand placement shall not occur from June 1 through September 30. This time frame does not include Venice Beach and which has low density nesting. In Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte (except Manasota Key), Sarasota (except Manasota Key), Manatee, Hillsborough, Pinellas, Franklin (except St. George Island), Gulf (except St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas), Bay, Walton, Okaloosa, Santa Rosa, and Escambia counties, Florida, sand placement may occur during the sea turtle nesting season.

A4. All derelict material or other debris shall be removed from the beach prior to any sand placement.

A5. The beach profile template for the sand placement project shall be designed to mimic, the native beach berm elevation and beach slopes landward and seaward of the equilibrated berm crest.

A6. If a dune system is already part of the project design, the placement and design of the dune shall emulate the natural dune system to the maximum extent possible, including the dune configuration and shape.

A7. Predator-proof trash receptacles shall be installed and maintained at all beach access points used for the project construction to minimize the potential for attracting predators of sea turtles and beach mice.

A8. A meeting between representatives of the Applicant's or Corps, Service, FWC, the permitted sea turtle surveyor, and other species surveyors, as appropriate, shall be held prior to the commencement of work on this project.

A9. If the beach nourishment project will be conducted during the sea turtle nesting season, surveys for nesting sea turtles must be conducted by the FWC-authorized Marine Turtle Permit Holder. Surveys for early and late nesting sea turtles shall be conducted where appropriate.

A10. If nests are constructed in the area of proposed sand placement, the eggs shall be relocated to minimize sea turtle nest burial, crushing of eggs, or nest excavation.

A11. A post construction survey(s) of all artificial lighting visible from the project beach shall be completed by the Applicant or Corps.

A12. The Applicant or Corps shall ensure that daily nesting surveys are conducted by the FWC Marine Turtle Permit Holder for two nesting seasons following construction if the new sand still remains on the beach.

A13. Sand compaction shall be monitored and tilling shall be conducted if needed to reduce the likelihood of impacting sea turtle nesting and hatching activities.

A14. Escarpment formation shall be monitored and leveling shall be conducted if needed to reduce the likelihood of impacting nesting and hatchling sea turtles.

A15. Construction equipment and materials including pipes shall be stored off the beach in a manner that will minimize impacts to nesting and hatchling sea turtles and beach mice.

A16. Lighting associated with the project construction including on the dredge shall be minimized to reduce the possibility of disrupting and disorienting nesting and hatchling sea turtles and nocturnal activities of beach mice.

A17. During the sea turtle nesting season, the Corps shall not extend the beach fill more than 500 feet (or other agreed upon length if a FWC permit holder is present) between dusk and the time of completion the following day's nesting survey to reduce the impact to emerging sea turtles and burial of new nests.

A18. All vegetation planting shall be designed and conducted to minimize impacts to sea turtles and beach mice.

A19. Beach mouse habitat shall be avoided to the maximum extent possible when selecting sites for access corridors, storage and staging of equipment.

A20. Equipment and construction materials shall not be stored near the seaward dune toe in areas of occupied beach mouse habitat. This area is highly utilized by beach mice.

A21. Existing vegetated habitat at beach access points and travel corridors shall be protected to the maximum extent possible to ensure vehicles and equipment transport stay within the access corridor.

A22. Expanded or newly created beach access points shall be restored following construction.

A23. A report describing the actions taken shall be submitted to the Service following completion of the proposed work.

A24. The Service and the FWC shall be notified if a sea turtle adult, hatchling, or egg, or beach mouse is harmed or destroyed as a direct or indirect result of the project.

TERMS AND CONDITIONS

All conservation measures described in the Corps' Programmatic Biological Assessment are hereby incorporated by reference as Terms and Conditions within this document pursuant to 50 CFR §402.14(I) with the addition of the following Terms and Conditions. In order to be exempt from the prohibitions of section 9 of the Act, the Corps shall comply with the following Terms and Conditions, which implement the Reasonable and Prudent Measures, described above and outline reporting/monitoring requirements.

These Terms and Conditions are nondiscretionary.

Post construction requirements are listed in Terms and Conditions A11, A12, A13, and A14. These post construction requirements may be subject to congressional authorization and the allocation of funds. If the Corps or Applicant cannot fulfill these Terms and Conditions, the Corps must reinitiate consultation.

TERMS AND CONDITIONS for:

A. Projects that include sand placement from beach nourishment, sand bypass, and sand back pass activities primarily for shore protection shall include the following conditions:

All beaches

A1. Conservation Measures included in the Corps' PBA that address protection of nesting sea turtles and beach mice listed on pages 9 and 10 of the SPBO shall be implemented in the Corps federally authorized project or regulated activity.

A2. Beach-compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill must be sand that is similar to a native beach in the vicinity of the site that has not been affected by prior sand placement activity. The fill material must be similar in both coloration and grain size distribution to that native beach. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system. Fill material shall comply with FDEP requirements pursuant to the Florida Administrative Code (FAC) subsection 62B-41.005(15). If a variance is requested from FDEP, the Service must be contacted to discuss whether the project falls outside of the SPBO. A Quality Control Plan shall be implemented pursuant to FAC Rule 62B-41.008(1)(k)4.b.

A3. Sand placement shall not occur during the period of peak sea turtle egg laying and egg hatching to reduce the possibility of sea turtle nest burial, crushing of eggs, or nest excavation.

a. Sand placement projects in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward counties shall be started after October 31 and be completed before May 1. During the May 1 through October 31 period, no construction equipment or pipes may be placed and/or stored on the beach.

b. Sand placement projects in Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa and Escambia Counties may occur during the sea turtle nesting season except on publicly owned conservation lands such as state parks and areas where such work is prohibited by the managing agency or under applicable local land use codes (see exceptions in A3.c below).

c. For higher density nesting beaches in Gulf and Franklin counties sand placement shall not occur during the main part of the nesting season (June 1 through September 30). On Manasota Key located in Sarasota and Charlotte counties (excluding Venice Beach), sand placement shall not occur during the main part of the nesting season (May 1 through October 31). These beaches include St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas in Gulf County, and St. George Island in Franklin County.

The Service shall be contacted for coordination, on a project-by-project basis, if sand placement is needed on publicly owned conservation lands and in these higher density nesting beaches in Gulf and Franklin Counties and on Manasota Key in Sarasota and Charlotte counties during the above exclusionary period. The Service will determine whether work (1) may proceed in accordance with the Terms and Conditions; (2) may proceed in accordance with the Terms and Conditions and other requirements as developed by the Service; or (3) would require an individual emergency consultation.

Land managers on publicly owned conservation lands must be involved in the project coordination.

A4. All derelict concrete, metal, and coastal armoring geotextile material and other debris shall be removed from the beach to the maximum extent possible prior to any sand placement in accordance with the dates in A3. If debris removal activities take place during shorebird breeding or peak sea turtle nesting season (**Tables 17 and 18**), the work shall be conducted during daylight hours only and shall not commence until completion of daily seabird, shorebird or marine turtle surveys each day.

A5. The beach profile template for the sand placement project shall be designed to mimic, the native beach berm elevation and beach slopes landward and seaward of the equilibrated berm crest. Prior to drafting the plans and specifications for a beach nourishment project, the Corps must meet with the Service, FWC, and FDEP to discuss the beach profile surveys, dune formation (specifically on high density green turtle nesting beaches), and the sea turtle monitoring reports from previous placement events. The meeting will be used to discuss modifications to the beach profile based on the post-construction monitoring data.

Beach profile may vary depending on location, shoreline dynamics, nature of the fill material, and other factors. If a native beach berm elevation is not possible, due to the beach width, impacts to nearshore hardbottom, or other considerations, as discussed during the meeting, the alternative template shall include features to minimize impacts to sea turtle nesting success and the potential for ponding and escarpment formation for that beach. For all high density green turtle nesting beaches (http://ocean.floridamarine.org/SeaTurtleNesting/), the formation of a dune, either through direct creation or natural accretion, will be included in the project design. Dunes and other construction features must be within the scope of the Congressionally-authorized project, if it is a civil works project, and constructible without impacting other resources. If a recommended dune is not possible, the Corps will contact the Service to see if consultation needs to be reinitiated or discuss features incorporated with the profile that will enhance the existing dune. Dune features included in the profile design (or project) shall have a slope of 1.5:1 followed by a gradual slope of 4:1 for approximately 20 feet seaward on a high erosion beach (**Figure 13)** or a 4:1 slope (**Figure 14**) on a low erosion beach. The Corps must explore options to include a dune system in the project design for existing authorized projects and new non-Federal projects. If another slope is proposed for use, the Corps shall consult the Service. The seaward toe of the dune should be at least 20 feet from the waterline.

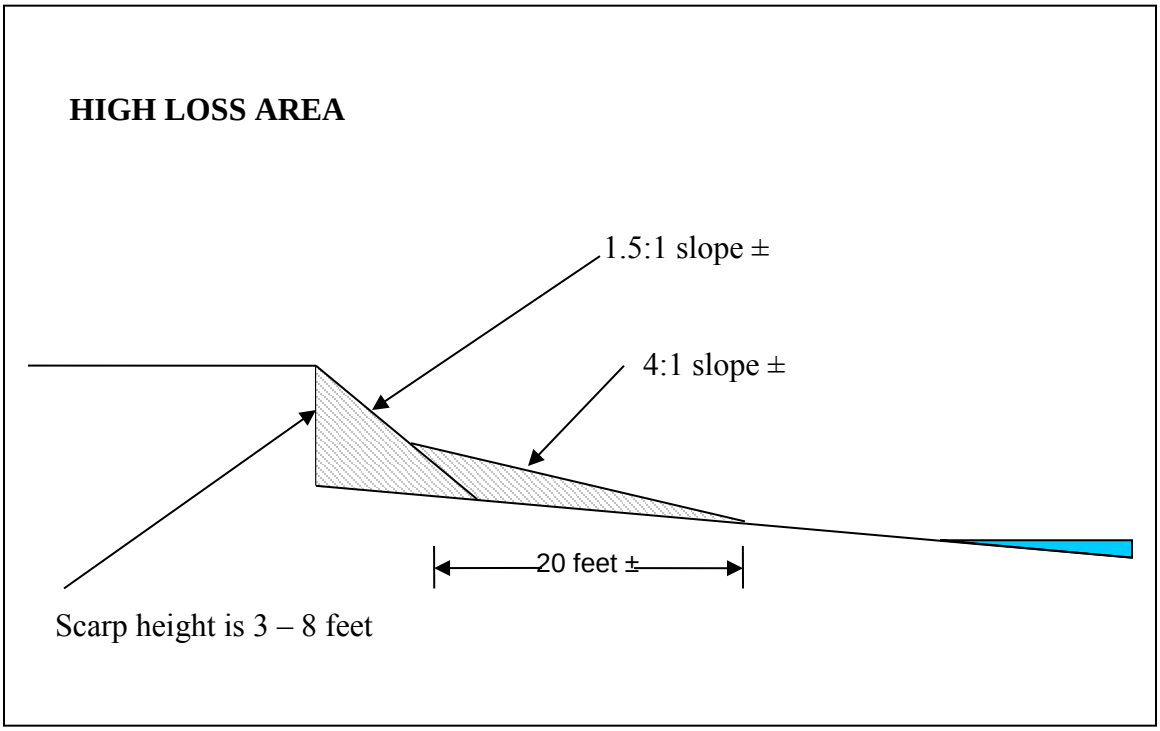

Figure 13. Recommended slope on a high erosion beach for sand placement projects that include the creation of a dune.

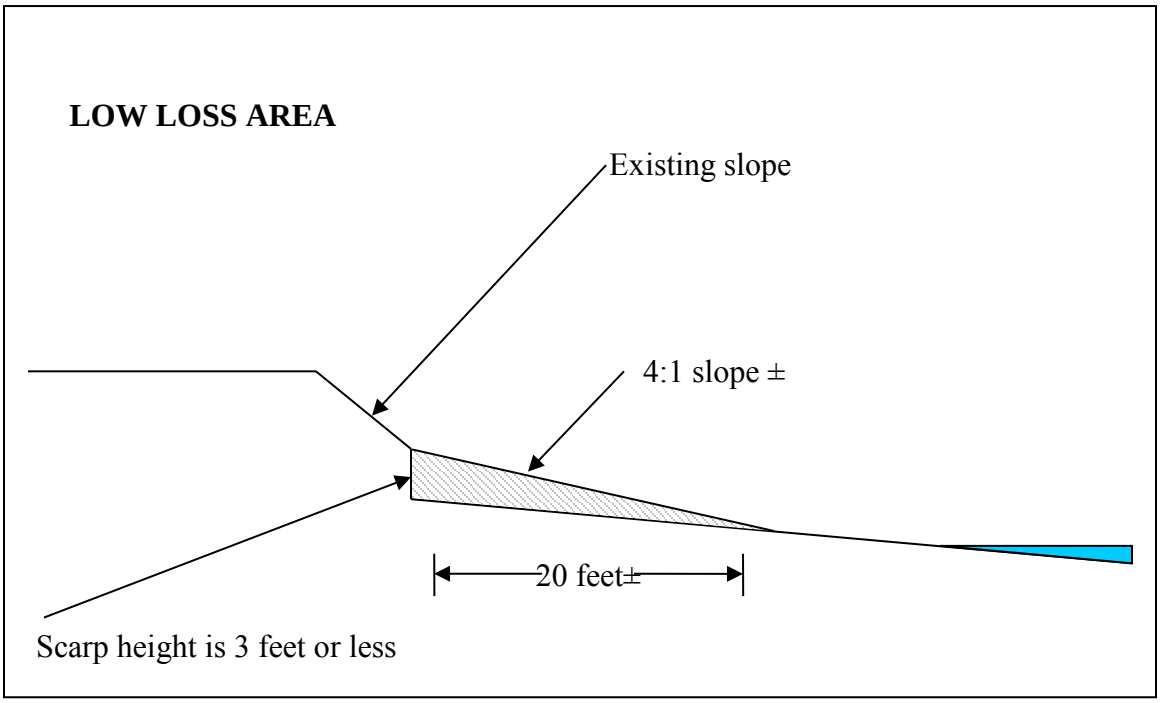

Figure 14. Recommended slope on a low erosion beach for sand placement projects that include the creation of a dune.

A6. Predator-proof trash receptacles shall be installed and maintained during construction at all beach access points used for the project construction to minimize the potential for attracting predators of sea turtles and beach mice (**Appendix F**). The Corps shall provide predator-proof trash receptacles for the construction workers. The Corps shall brief workers on the importance of not littering and keeping the project area trash and debris free.

A7. A meeting between representatives of the Corps (including the Corps project manager and/or the managing contractor), the Service, the FWC, the FWC Marine Turtle Permit Holder, and other species surveyors, as appropriate, shall be held prior to the commencement of work on projects. At least 10 business days advance notice shall be provided prior to conducting this meeting. The meeting will provide an opportunity for explanation and/or clarification of the sea turtle and beach mouse protection measures as well as additional guidelines when construction occurs during the sea turtle nesting season, and will include the following

a. Staging locations, storing equipment including fuel stations
b. Coordination with the Marine Turtle Permit Holder on nesting surveys and any nighttime work
c. Pipeline placement (between 5 to 10 feet from dune)
d. Minimizing driving
e. Egg relocation- permit holder and location (must be approved by FWC)
f. Free-roaming cat observation (for projects in or near beach mouse habitat)
g. Follow up lighting surveys - dates and inspector
h. Follow up coordination during construction and post construction
i. Coordination on construction lighting including dredge lighting and travel within and adjacent to the work area
j. Direction of the project including progression of sand placement along the beach
k. Late season nests present in project area (if any)
l. Plans for compaction monitoring or tilling
m. Plans for escarpment surveys

At the preconstruction meeting, the Corps shall also provide the Service with specific anticipated shoreline lengths and anticipated duration using the form on the following web link: http://www.fws.gov/northflorida/SeaTurtles/Docs/Corp%20of%20Engineers%20Sea%20Turtle%20Permit%20Information.pdf. Only the following information should be filled out: Corps Permit Number, FWS Log Number, Project Location, Construction Activity, Duration of Protect, and Actual Take (linear feet of beach). This form shall be emailed to the Service at seaturtle@fws.gov. This form is in addition to the annual report listed below.

Sea Turtle Protection

A8. Daily early morning surveys for sea turtle nests shall be required and continue throughout the season as outlined in **Tables 16 and 17 (Nesting Season Monitoring)** if construction

occurs during the nesting and hatching season. Any known nests recorded just prior to the beginning of Nesting Season Monitoring must be relocated if it will be impacted by the construction activity or marked and avoided if feasible.

Table 16. Beach Sand Placement and Sea Turtle Nest Monitoring/Relocation Windows, Brevard through Broward Counties, Coast of Florida.

Region	Nest Laying Season	Hatching Season Ends (Last day requiring prior monitoring/relocation)	Beach Placement Window	Early Season Relocation*	Late Season Relocation**	Nesting Season Monitoring (monitoring throughout season)
Brevard, Indian River, St. Lucie, and Broward Counties	25 Feb - 11 Nov	15 Jan	1 Nov - 30 Apr	1 Mar - 30 Apr In Brevard, Indian River, St. Lucie, & Broward counties nighttime surveys for leatherback sea turtles shall begin when the first leatherback crawl is recorded	65 days prior to Jan 15 (11 Nov) (or 65 days prior to start of construction **)	1 Mar - 11 Nov ***
Martin and Palm Beach Counties	12 Feb – 17 Nov	21 Jan	1 Nov - 30 Apr	1 Mar - 30 Apr In Martin and Palm Beach Counties, nighttime surveys for leatherback sea turtles shall begin when the first leatherback crawl is recorded	65 days prior to 21 Jan (17 Nov) (or 65 days prior to start of construction**)	1 Mar - 17 Nov***

** Relocation can only begin after FWC authorizes nest relocation in accordance with Florida Statute 379.2431 (1).
*** (For late season monitoring: 7 days without a nest, can stop monitoring once electronic mail concurrence is received from FWS or FWC).

Table 17. Beach Sand Placement and Sea Turtle Nest Monitoring/Relocation Windows, Outside of Brevard through Broward Counties, Coast of Florida.

Region	Nest Laying Season	Hatching Season Ends (Last day requiring prior monitoring/ relocation)	Beach Placement Window	Nesting Season Monitoring and Relocation (monitoring throughout season)
Nassau, Duval, Flagler, St. Johns, and Volusia Counties	2 Apr. – 24 Oct	28 Dec	All Year	15 Apr – 24 Oct ***
Miami-Dade County	11 Feb – 25 Sep	29 Nov	All Year	1 Mar – 25 Sep***
Gulf County (St. Joseph Peninsula State Park, St. Joseph peninsula, Cape San Blas) & Franklin County (St. George Isl)	1 May - 4 Sep	13 Nov	1 Oct - 31 May	1 May – 4 Sep***
All other beaches in Gulf and Franklin Counties, and Escambia, Santa Rosa, Okaloosa, Walton, and Bay Counties	2 May – 16 Sep	24 Nov	All Year	1 May - 16 Sep***
Sarasota and Charlotte Counties (Manasota Key)	24 Apr – 7 Sep	11 Nov	1 Nov - 30 Apr (except Venice beach)	15 Apr – 7 Sep***
All other beaches in Sarasota and Charlotte Counties	24 Apr – 12 Sep	16 Nov	All Year	15 Apr – 12 Sep***
Pinellas, Hillsborough, Manatee, Lee, Collier, and Monroe Counties	20 Apr – 19 Sep	23 Nov	All Year	15 Apr – 19 Sep***

*** (For late season monitoring: 7 days without a nest, can stop monitoring once electronic mail concurrence is received from FWS or FWC).

A9. If nests are constructed in the area of anticipated sand placement, the eggs shall be relocated to minimize sea turtle nest burial, crushing of eggs, or nest excavation as outlined in a through f. If nests are laid on the dune outside of the immediate sand placement area, the Corps must contact the Service to discuss whether relocation or mark and avoidance is required. Any known nests recorded just prior to the beginning of Nesting Season Monitoring must be relocated if it will be impacted by the construction activity or marked and avoided if feasible.

a. For sand placement projects in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties that occur during the earlier part of the nesting season (see Table 14) through April 30, daily early morning surveys shall begin March 1 and continue through the end of the beach placement window, with egg relocation continuing only until completion of fill placement. Eggs shall be relocated per the following requirements (i through iii below). For sand placement projects that occur during the period from November 1 through the end of hatching season (see Table 16), daily early morning sea turtle nesting surveys shall be conducted 65 days prior to project initiation and continue through November 11, and eggs shall be relocated per the requirements listed in (a)i through (a)iii. The Corps must contact the Service if there are any nests still incubating after November 30.

i. Nesting surveys and egg relocations will only be conducted by persons with prior experience and training in these activities and who are duly authorized to conduct such activities through a valid permit issued by FWC, pursuant to FAC 68E-1. Please contact FWC's Imperiled Species Management Section in Tequesta at mtp@myfwc.com for information on the permit holder in the project area. Relocation cannot begin until the Corps has a copy of the FWC permit authorizing relocation for construction purposes at that particular sand placement project. Nesting surveys shall be conducted daily between sunrise and 9 a.m. (this is for all time zones).

ii. Only those nests that may be affected by sand placement activities will be relocated. Nest relocation shall not occur upon completion of the project. Nests requiring relocation shall be moved no later than 9 a.m. the morning following deposition to a nearby self-release beach site in a secure setting where artificial lighting will not interfere with hatchling orientation. Relocated nests shall not be placed in organized groupings. Relocated nests shall be randomly staggered along the length and width of the beach in settings that are not expected to experience daily inundation by high tides or known to routinely experience severe erosion and egg loss, predation, or be subject to artificial lighting. Nest relocations in association with construction activities shall cease when construction activities no longer threaten nests.

iii. Nests deposited within areas where construction activities have ceased or will not occur for 65 days or nests laid in the nourished berm prior to tilling shall be marked and left in situ unless other factors threaten the success of the nest. The turtle permit holder shall install an on-beach marker at the nest site and a secondary marker at a point as far landward as possible to assure that future location of the nest will be possible should the on-beach marker be lost. No activity will occur within this area nor will any activities occur that could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and the nest has not been disturbed by the project activity.

Daytime surveys shall be conducted for leatherback sea turtle nests beginning March 1. Nighttime surveys for leatherback sea turtles shall begin when the first leatherback crawl is recorded within the project area through April 30 or until completion of the project (whichever is earliest). Nightly nesting surveys shall be conducted from 9 p.m. until 6 a.m. The project area shall be surveyed at 1-hour intervals (since leatherbacks require at least 1.5 hours to complete nesting, this will ensure all nesting leatherbacks are encountered) and eggs shall be relocated per the requirements listed in (a)i through (a)iii.

b. For sand placement projects in Nassau, Duval, St. Johns, Flagler, Volusia, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa and Escambia Counties that occur during the period of sea turtle nest laying (**see Table 17**), daily early morning (before 9 a.m.) surveys and egg relocation shall be conducted. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii (see nest relocation exceptions for Franklin, Gulf, Sarasota, and Charlotte Counties in A10.d. below).

c. For Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, and Escambia Counties, nesting surveys shall be initiated 70 days prior to sand placement activities (incubation periods are longer in these counties) or by nesting season monitoring (see Table 17) whichever is later. Nesting surveys shall continue through the end of nesting season monitoring (see Table 17) with relocation only through the end of fill placement. Hatching and emerging success monitoring will involve checking nests beyond the completion date of the daily early morning nesting surveys. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii (see nest relocation exceptions for Franklin and Gulf Counties in A10.d. below).

d. For St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas in Gulf County, St. George Island in Franklin County, and Manasota Key in Sarasota and Charlotte Counties, sand placement activities shall occur only during the Beach Placement Window indicated in Table 17 (except on Venice Beach), outside the period of peak sea turtle egg laying and egg hatching for this area. If nests are laid

in the early part of the nesting season monitoring during the beach placement window in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii.

e. For Pinellas, Hillsborough, Manatee, Sarasota, Charlotte, Lee, Collier, and Monroe Counties, nesting surveys shall be initiated 65 days prior to nourishment or dredged channel material placement activities or by the beginning of the nesting season monitoring indicated in Table 17 whichever is later. Nesting surveys shall continue through the end of nesting season monitoring (see Table 17), with egg relocation continuing only through the end of fill placement. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii (see nest relocation exceptions for Sarasota and Charlotte Counties in A10.d. above).

f. For Miami-Dade County, nesting surveys shall be initiated 65 days prior to nourishment or dredged channel material placement activities or by the beginning of the nesting season monitoring indicated in Table 17, whichever is later. Nesting surveys shall continue through the end of the nesting season monitoring and egg relocation shall continue through the end of sand placement. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii

g. For Volusia, Flagler, St. Johns, Duval, and Nassau Counties, nesting surveys shall be initiated 65 days prior to sand placement activities or by the beginning of the nesting season monitoring indicated in Table 17, whichever is later. Nesting surveys shall continue through the end of nesting season monitoring indicated in Table 17 and egg relocation shall continue through the end of sand placement. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii.

A10. Two surveys shall be conducted of all lighting visible from the beach placement area by the Applicant or Corps, using standard techniques for such a survey (**Appendix C**), in the year following construction. The first survey shall be conducted between May 1 and May 15 and a fill out FWS Sea Turtle Lighting Survey Form (**Appendix D**) and send electronically to seaturtle@fws.gov. The second survey shall be conducted between July 15 and August 1. A summary report of the surveys, including any actions taken, shall be submitted to the Service by December 31 of the year in which surveys are conducted. After the annual report is completed, a meeting shall be set up with the Applicant, county or municipality, FWC, Corps, and the Service to discuss the survey report, as well as any documented sea turtle disorientations in or adjacent to the project area. If the project is completed during the nesting season and prior to May 1, the Corps may conduct the lighting surveys during the year of construction.

A11. Daily nesting surveys shall be conducted for two nesting seasons following construction in accordance with **Table 18** and reported in accordance with **Table 20** by the Corps or the Applicant if placed material still remains on the beach. Post construction year-one surveys shall record the number of nests, nesting success, reproductive success, disorientations, and lost nests due to erosion and/or inundation. Post construction year-two surveys shall only need to record nest numbers, nesting success, and disorientations (**Table 20**). This information will be used to periodically assess the cumulative effects of these projects on sea turtle nesting and hatchling production and monitor suitability of post construction beaches for nesting.

Table 18. Post-Construction Sea Turtle Monitoring.

Region	Nest Laying Season	Years 1 and 2 Post-Construction Monitoring
Brevard, Indian River, St. Lucie, and Broward Counties Martin and Palm Beach Counties	25 Feb – 11 Nov 12 Feb – 17 Nov	Daily surveys: 1 Mar - 31 Oct (for late season: 15 days without a nests, can stop monitoring-email FWS and FWC to stop
Nassau, Duval, and St. Johns, Counties	2 Apr. – 24 Oct.	Daily surveys: 1 May – 30 Sep
Flagler and Volusia Counties	2 Apr. – 24 Oct.	Daily surveys: 15 Apr- 15 Oct
Miami-Dade County	11 Feb – 25 Sep	Daily surveys: 1 Apr – 30 Sep
Gulf County (St. Joseph Peninsula State Park, St. Joseph peninsula, Cape San Blas) and Franklin County (St. George Island) All other beaches in Gulf and Franklin Counties, and Escambia, Santa Rosa, Okaloosa, Walton, and Bay Counties	1 May – 4 Sep 2 May – 16 Sep	Daily surveys: 1 May – 31 Aug
Sarasota and Charlotte Counties (Manasota Key) All other beaches in Sarasota and Charlotte Counties Pinellas, Hillsborough, Manatee, Lee, Collier, and Monroe Counties	24 Apr – 7 Sep 24 Apr – 12 Sep 20 Apr – 19 Sep	Daily surveys: 15 Apr –15 Sep

A12. Sand compaction shall be monitored in the area of sand placement immediately after completion of the project and prior to the dates in **Table 19** for 3 subsequent years.

Table 19. Dates for Compaction Monitoring and Escarpment Surveys by County.

County where project occurs	Date
Brevard, Indian River, St. Lucie, Martin, Palm Beach, Broward, Miami-Dade, and Monroe	Work must be completed by Mar 1
Miami-Dade, Monroe	Work must be completed by April 1
Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf, Franklin, Volusia, Flagler, St. Johns, Duval, Nassau, Pinellas, Hillsborough, Manatee, Sarasota, Charlotte, Lee, Collier	Work must be completed by Apr 15

If tilling is needed, the area shall be tilled to a depth of 36 inches. Each pass of the tilling equipment shall be overlapped to allow more thorough and even tilling. All tilling activity shall be completed at least once prior to the nesting season. An electronic copy of the results of the compaction monitoring shall be submitted electronically to seaturtle@fws.gov prior to any tilling actions being taken or if a request not to till is made based on compaction results. The requirement for compaction monitoring can be eliminated if the decision is made to till regardless of post construction compaction levels. Additionally, out-year compaction monitoring and remediation are not required if placed material no longer remains on the dry beach.

(NOTE: If tilling occurs during shorebird nesting season (February 15-August 31), shorebirds surveys prior to tilling are required per the Migratory Bird Treaty Act. See Appendix E for shorebird conditions recommended by FWC.

a. Compaction sampling stations shall be located at 500-foot intervals along the sand placement template. One station shall be at the seaward edge of the dune/bulkhead line (when material is placed in this area), and one station shall be midway between the dune line and the high water line (normal wrack line).

b. At each station, the cone penetrometer shall be pushed to a depth of 6, 12, and 18 inches three times (three replicates at each depth). Material may be removed from the hole if necessary to ensure accurate readings of successive levels of sediment. The penetrometer may need to be reset between pushes, especially if sediment layering exists. Layers of highly compact material may lie over less compact layers. Replicates shall be located as close to each other as possible, without interacting with the previous hole or disturbed sediments. The three replicate compaction values for each depth shall be averaged to produce final values for each

depth at each station. Reports will include all 18 values for each transect line, and the final six averaged compaction values.

c. If the average value for any depth exceeds 500 pounds per square inch (psi) for any two or more adjacent stations, then that area shall be tilled immediately prior to the appropriate date listed in **Table 19**.

d. If values exceeding 500 psi are distributed throughout the project area but in no case do those values exist at two adjacent stations at the same depth, then consultation with the Service will be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling will not be required.

e. Tilling shall occur landward of the wrack line and avoid all vegetated areas 3 square feet or greater with a 3 square foot buffer around the vegetated areas.

A13. Visual weekly surveys for escarpments along the project area shall be made immediately after completion of the sand placement and within 30 days prior to the start dates for Nesting Season Monitoring in **Table 19** for 3 subsequent years if sand in the project area still remains on the dry beach.

Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet shall be leveled and the beach profile shall be reconfigured to minimize scarp formation by the dates listed in **Table 19**. Any escarpment removal shall be reported by location in the annual report. If the project is completed during the early part of the sea turtle nesting and hatching season (March 1 through April 30), escarpments may be required to be leveled immediately, while protecting nests that have been relocated or left in place. If during weekly escarpment surveys, it is found that subsequent reformation of escarpments interferes with sea turtle nesting or that they exceed 18 inches in height for a distance of 100 feet during the nesting and hatching season, the Service shall be contacted immediately to determine the appropriate action to be taken. If it is determined by the Service or FWC that that escarpment leveling is required during the nesting or hatching season the Service, in coordination with the FWC, will provide a brief written authorization within 5 days that describes methods to be used to reduce the likelihood of impacting existing nests. An annual summary of escarpment surveys and actions taken shall be sent electronically to seaturtle@fws.gov. A summary is required even when no action has been taken (**Table 3**).

A14. Staging areas for construction equipment shall be located off the beach during early (before April 30) and late (after November 1) nesting season for Brevard through Broward counties (see table 14) and peak nesting season (May 1 through October 31) for the remaining counties. Nighttime storage of construction equipment not in use shall be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes placed on the beach shall be located as far landward as

possible without compromising the integrity of the dune system. Pipes placed parallel to the dune shall be 5 to 10 feet away from the toe of the dune if the width of the beach allows. Temporary storage of pipes shall be off the beach to the maximum extent possible. If the pipes are stored on the beach, they shall be placed in a manner that will minimize the impact to nesting habitat and shall not compromise the integrity of the dune systems. If the pipes placed parallel to the dune cannot be placed between 5 to 10 feet away from the toe of the dune during nesting and hatching season, the Corps must reinitiate consultation with the Service as this represents adverse effects not addressed in this SPBO. If it will be necessary to extend construction pipes past a known shorebird nesting site or over-wintering area for piping plovers, then whenever possible those pipes shall be placed landward of the site before birds are active in that area. No pipe or sand shall be placed seaward of a shorebird nesting site during the shorebird nesting season.

A15. Direct lighting of the beach and nearshore waters shall be limited to the immediate construction area during early (before April 30) and late (after November 1) nesting season for Brevard through Broward counties (see Table 14) and peak nesting season (May 1 through October 31) for the remaining counties, and shall comply with safety requirements. A light management plan for the dredge and the work site shall be submitted for approval by the Service and FWC prior to the pre-construction meeting. In accordance with this plan, lighting on all equipment shall be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the water's surface and nesting beach while meeting all Coast Guard, Corps EM 385-1-1, and OSHA requirements. Light intensity of lighting equipment shall be reduced to the minimum standard required by OSHA for General Construction areas, in order not to misdirect sea turtles. Shields shall be affixed to the light housing on dredge and land-based lights and be large enough to block light from all lamps from being transmitted outside the construction area or to the adjacent sea turtle nesting beach in line-of-sight of the dredge (**Figure 15**).

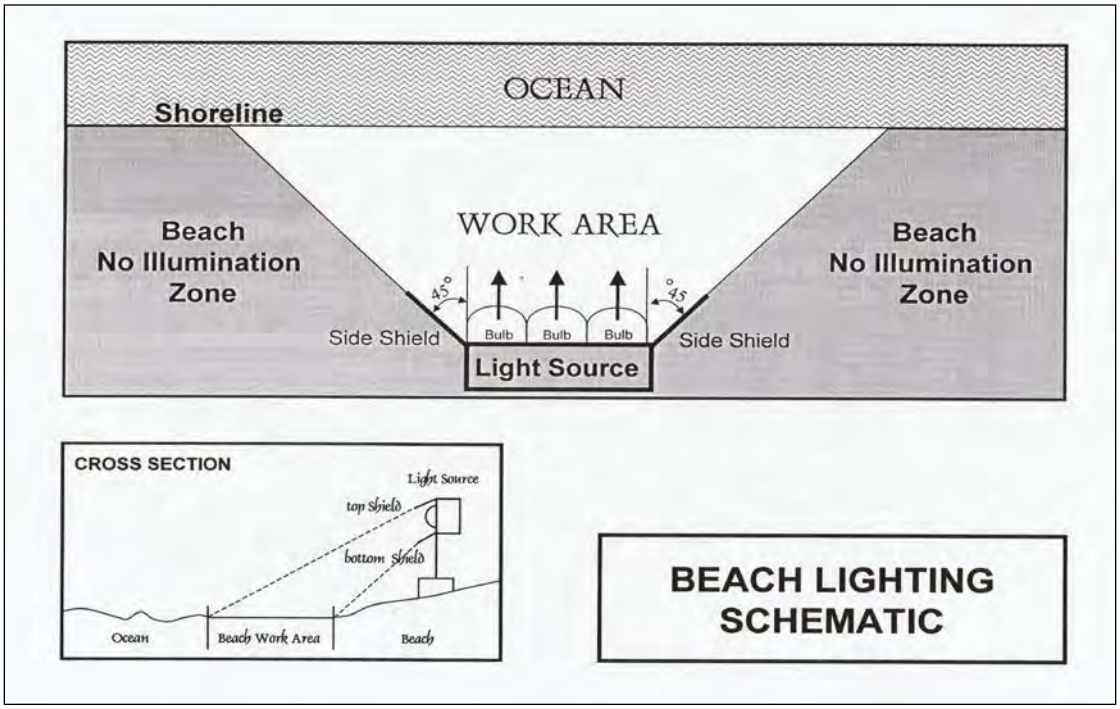

Figure 15. Beach lighting schematic.

A16. During the early (before April 30) and late (after November 1) nesting season for Brevard through Broward counties (see Table 14) and peak nesting season (May 1 through October 31) for the remaining counties, the Corps shall not extend the beach fill more than 500 feet (or other agreed upon length) along the shoreline between dusk and dawn of the following day until the daily nesting survey has been completed and the beach cleared for fill advancement. An exception to this may occur if there is a permitted sea turtle surveyor present on-site to ensure no nesting and hatching sea turtles are present within the extended work area. If the 500 feet is not feasible for the project, an agreed upon distance will be decided on during the preconstruction meeting. Once the beach has been cleared and the necessary nest relocations have been completed, the Corps will be allowed to proceed with the placement of fill during daylight hours until dusk at which time the 500-foot length (or other agreed upon length) limitation shall apply. If any nesting turtles are sighted on the beach within the immediate construction area, activities shall cease immediately until the turtle has returned to the water and the sea turtle permit holder responsible for nest monitoring has relocated the nest.

Dune Planting

A17. All vegetation planting shall be designed and conducted to minimize impacts to sea turtles and beach mice. Dune vegetation planting may occur during the sea turtle nesting season under the following conditions.

a. Daily early morning sea turtle nesting surveys (before 9 a.m.) shall be conducted during the Nest Laying period for all counties in Florida where sea turtle nesting occurs (see Tables 16 and 17). Nesting surveys shall only be conducted by personnel with prior experience and training in nesting surveys. Surveyors shall have a valid FWC permit. Nesting surveys shall be conducted daily between sunrise and 9 a.m. (all times). No dune planting activity shall occur until after the daily turtle survey and nest conservation and protection efforts have been completed. Hatching and emerging success monitoring will involve checking nests beyond the completion date of the daily early morning nesting surveys;

b. Any nests deposited in the dune planting area not requiring relocation for conservation purposes shall be left in place. The turtle permit holder shall install an on-beach marker at the nest site and a secondary marker at a point as far landward as possible to assure that future location of the nest will be possible should the on-beach marker be lost. A series of stakes and highly visible survey ribbon or string shall be installed to establish a 3-foot radius around the nest. No planting or other activity shall occur within this area nor will any activities be allowed that could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and the nest has not been disturbed by the planting activity;

c. If a nest is disturbed or uncovered during planting activity, the Corps, or the Applicant shall cease all work and immediately contact the project turtle permit holder. If a nest(s) cannot be safely avoided during planting, all activity within 10 feet of a nest shall be delayed until hatching and emerging success monitoring of the nest is completed;

d. All dune planting activities shall be conducted by hand and only during daylight hours;

e. All dune vegetation shall consist of coastal dune species native to the local area; (*i.e.*, native to coastal dunes in the respective county and grown from plant stock from that region of Florida). Vegetation shall be planted with an appropriate amount of fertilizer and antidesiccant material for the plant size;

f. No use of heavy equipment shall occur on the dunes or seaward for planting purposes. A lightweight (all-terrain type) vehicle, with tire pressures of 10 psi or less may be used for this purpose; and

g. Irrigation equipment, if needed, shall be authorized under a FDEP permit.

<u>Beach Mouse Protection</u>

A18. Beach mouse habitat shall be avoided when selecting sites for equipment, pipes, vehicle storage and staging to the maximum extent possible. Suitable beach mouse habitat

constitutes the primary dunes (characterized by sea oats and other grasses), secondary dunes (similar to primary dunes, but also frequently includes such plants as woody goldenrod, false rosemary), and interior or scrub dunes.

A19. Equipment placement or storage shall be excluded in the area between 5 to 10 feet seaward of the existing dune toe or 10 percent of the beach width (for projects occurring on narrow eroded beach segments) seaward of the dune toe in areas of occupied beach mouse habitat (**Figure 16**). The toe of the dune is where the slope breaks at the seaward foot of the dune. If the pipes placed parallel to the dune cannot be placed between 5 to 10 feet away from the toe of the dune as required during sea turtle nesting and hatching season, the Corps must reinitiate consultation with the Service as this represents adverse effects not addressed in this SPBO.

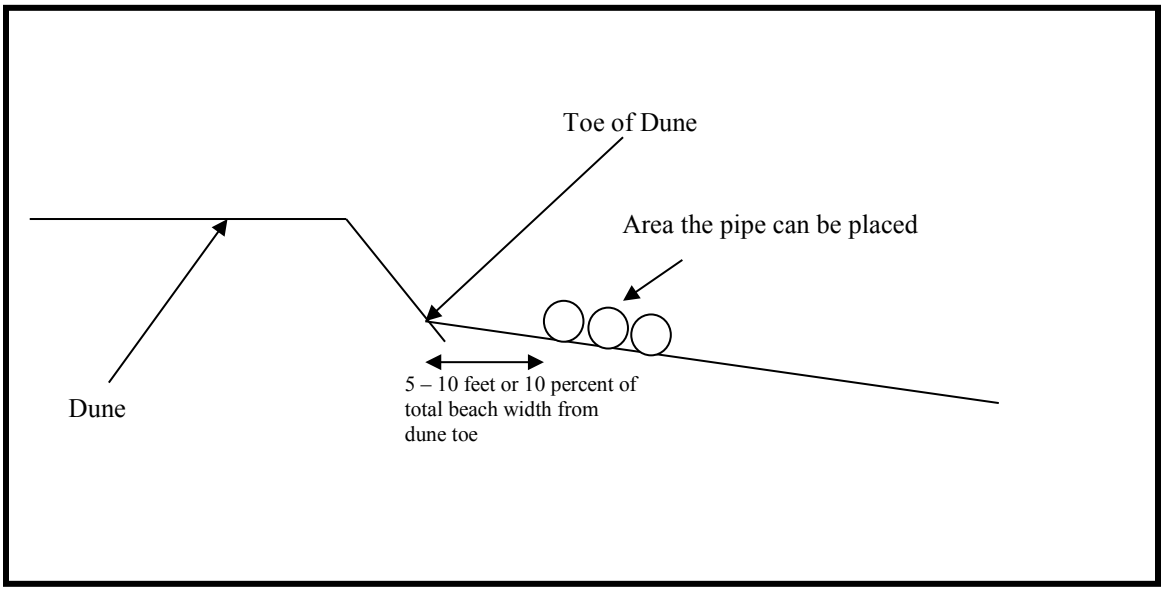

Figure 16. Equipment placement for projects occurring in beach mouse occupied habitat.

A20. 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 access corridors shall be fully restored to the 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.

A21. The location of new or expanded existing beach access corridors for vehicles and equipment within beach mouse habitat consisting of vegetated dunes shall be spaced no closer than every four miles. The distribution of access areas will result in the least

number of access areas within beach mouse habitat as possible and delineated by post and rope or other suitable material to ensure vehicles and equipment transport stay within the access corridor. The access corridors shall be (1) no more than 25 feet wide for vehicles and (2) no more than 50 feet wide for equipment. Expanded or new beach access points that impact vegetated dunes shall be restored within 3 months following project completion. Habitat restoration shall consist of restoring the dune to preconstruction conditions with planting of at least three species of appropriate native dune vegetation (*i.e.*, native to coastal dunes in the respective county and grown from plant stock from that region of Florida). Seedlings shall be at least one inch square with a 2.5-inch pot. Planting shall be on 18-inch centers throughout the created dune; however, 24-inch centers may be acceptable depending on the area to be planted. Vegetation shall be planted with an appropriate amount of fertilizer and antidesiccant material, as appropriate, for the plant size. No sand stabilizer material (coconut matting or other material) shall be used in the dune restoration. The plants may be watered without installing an irrigation system. In order for the restoration to be considered successful, 80 percent of the total planted vegetation shall be documented to survive six months following planting of vegetation. If the habitat restoration is unsuccessful, the area shall be replanted following coordination with the Service.

Reporting

A22. A report with the following shall be submitted to the Service electronically (seaturtle@fws.gov) by December 31 after completion of construction.

i. A summary of the information listed in Table 20 for construction

ii. A summary of the information listed in Table 21 for post-construction

Table 20. Information to include in the report following the project completion.

All projects	**Project location (include Florida DEP R-monuments and latitude and longitude coordinates)**
	Project description (include linear feet of beach, actual fill template, access points, and borrow areas)
	Dates of actual construction activities
	Names and qualifications of personnel involved in sea turtle nesting surveys and relocation activities (separate the nests surveys for nourished and non-nourished areas)
	Descriptions and locations of sites where nests were relocated
Beach mice	**Acreage of new or widened access areas affected in beach mouse habitat**
	Vegetation completed for new or widened access areas
	Success rate of vegetation of restoration

Table 21. Sea turtle monitoring following sand placement activity.

Date	Duration	Variable	Criterion
Nesting Success	Year of in season construction, two years post construction if placed sand remains on beach and variable does not meet criterion based on previous year	Number of nests and non-nesting events	40 percent or greater
Hatching success	Year of in season construction and one year post construction if placed sand remains on beach and variable does not meet success criterion based on previous year	Number of hatchlings by species to hatch from egg	60 percent or greater (a statistically valid number of loggerhead and green nests, and all leatherback nests)
Emergence Success	Year of in season construction and one year post construction if placed sand remains on beach and variable does not meet success criterion based on previous year	Number of hatchlings by species to emerge from nest onto beach	80 percent or greater (a statistically valid number of loggerhead and green nests, and all leatherback nests)
Disorientations	Year of in season construction and two years post construction if placed sand remains on the beach	Number of nests and individuals that misorient or disorient	http://myfwc.com/media/418153/Seaturtle_Guidelines_A_LDIR_Directions.pdf
Lighting Surveys	Two surveys the year following construction, one survey between May 1 and May 15 and second survey between July 15 and August 1	Number, location and photographs of lights visible from nourished berm, corrective actions and notifications made	Lighting survey and meeting resulting with plan for reduction in lights visible from nourished berm within one to two month period
Compaction	Three seasons following construction. Not required if the beach is tilled prior to nesting season each year placed sand remains on beach	Shear resistance	Less than 500 psi
Escarpment Surveys	Weekly during nesting season for three years each year placed sand remains on the beach	Number of scarps 18 inches or greater extending for more than 100 feet that persist for more than 2 weeks	Successful remediation of all persistent scarps as needed

If nesting and reproductive (hatching and emergence) success is less than the criteria in the table above, the Corps and the Service must discuss during the annual meeting to review additional conditions prior to the next sand placement on this beach.

A23. In the event a sea turtle nest is excavated during construction activities, the project turtle permit holder responsible for egg relocation for the project shall be notified immediately so the eggs can be moved to a suitable relocation site.

Upon locating a dead or injured sea turtle adult, hatchling, egg, or beach mouse that may have been harmed or destroyed as a direct or indirect result of the project, the Corps, Applicant shall be responsible for notifying FWC Wildlife Alert at 1-888-404-FWCC (3922) and the appropriate Service Field Office immediately (**Table 3**).

Care shall be taken in handling injured sea turtles, eggs or beach mice to ensure effective treatment or disposition, and in handling dead specimens to preserve biological materials in the best possible state for later analysis.

REASONABLE AND PRUDENT MEASURES for:

B. Projects that are navigation maintenance dredging with beach placement, swash zone placement, and submerged littoral zone placement (not including near shore placement for shore protection) shall include the following measures:

Historically, these sand placement events as a result of a navigation maintenance dredging project with no local sponsor are smaller scaled, conducted at closer time intervals, and the sand often does not remain on the beach for an extended period of time.

Post construction requirements are listed in Reasonable and Prudent Measures B10 and B11. These post construction requirements may be subject to congressional authorization and the allocation of funds. If the Corps or Applicant cannot fulfill these Reasonable and Prudent Measures, the Corps must reinitiate consultation.

B1. Conservation Measures included in the Corps' PBA that address protection of nesting sea turtles and beach mice shall be implemented in the Corps federally authorized project or regulated activity.

B2. Beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence and beach mouse burrow construction shall be used for sand placement.

B3. For dredged material placement on the beach, sand placement shall not occur during the period of peak sea turtle egg laying and egg hatching to reduce the possibility of sea turtle nest burial, crushing of eggs, or nest excavation. In Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties, dredged material placement shall not occur from May 1 through October 31. In St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas in Gulf County, St. George Island in Franklin County dredged material placement shall not occur from June 1 through September 30. On Manasota Key in Sarasota and Charlotte Counties, dredged material placement shall

not occur from May 1 through October 31 (except Venice Beach). In Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte (except Manasota Key), Sarasota (except Manasota Key), Manatee, Hillsborough, Pinellas, Franklin (except St. George Island), Gulf (except St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape Sand Blas), Bay, Walton, Okaloosa, Santa Rosa, and Escambia Counties, sand placement may occur during the sea turtle nesting season (**Table 16 and Table 17**).

B4. For dredged material placement in the swash zone or submerged littoral zone during the nesting season, sand placement will be conducted at or below MLLW line.

B5. All derelict concrete, metal, and coastal armoring geotextile material and other debris shall be removed from the beach prior to any dredged material placement to the maximum extent possible.

B6. The Corps shall continue to work with FDEP, FWC, and the Service to create a sea turtle friendly beach profile for placement of material during construction.

B7. Predator-proof trash receptacles shall be installed and maintained at all beach access points used for the project construction to minimize the potential for attracting predators of sea turtles and beach mice (**Appendix F**).

B8. A meeting between representatives of the Corps, Service, FWC, the permitted sea turtle surveyor, and other species surveyors, as appropriate, shall be held prior to the commencement of work on this project.

B9. If the beach nourishment project will be conducted during the sea turtle nesting season, surveys for nesting sea turtles must be conducted. Surveys for early and late nesting sea turtles shall be conducted where appropriate. If nests are constructed in the proposed area of sand placement, the eggs shall be relocated to minimize sea turtle nest burial, crushing of eggs, or nest excavation.

B10. Sand compaction shall be monitored and tilling shall be conducted if needed to reduce the likelihood of impacting sea turtle nesting and hatching activities. Not required for dredged material placement in the swash and littoral zone.

B11. Escarpment formation shall be monitored and leveling shall be conducted if needed to reduce the likelihood of impacting nesting and hatchling sea turtles. Not required for dredged material placement in the swash and littoral zone.

B12. Construction equipment and materials shall be stored in a manner that will minimize impacts to nesting and hatchling sea turtles and beach mice.

B13. Lighting associated with the project construction shall be minimized to reduce the possibility of disrupting and disorienting nesting and hatchling sea turtles and nocturnal activities of beach mice.

B14. During the sea turtle nesting season, the Corps shall not extend the beach fill more than 500 feet (or other agreed upon length if a FWC sea turtle permit holder is present) between dusk and the time of completion of the following day's nesting survey to reduce the impact to emerging sea turtles and burial of new nests.

B15. Beach mouse habitat shall be avoided when selecting sites for storage and staging of equipment to the maximum extent possible.

B16. Equipment and construction materials shall not be stored near the seaward dune toe in areas of occupied beach mouse habitat. This area is highly utilized by beach mice.

B17. Existing vegetated habitat at beach access points and along shoreline travel corridors shall be protected to the maximum extent possible to ensure vehicles and equipment transport stay within the access and travel corridors.

B18. Expanded or newly created beach access points shall be restored.

B19. A report describing the actions taken shall be submitted to the Service work for each year when the activity has occurred.

B20. The Service and the FWC shall be notified if a sea turtle adult, hatchling, or egg, or beach mouse is harmed or destroyed as a direct or indirect result of the project.

TERMS AND CONDITIONS for:

B. Projects that are navigation maintenance dredging with beach placement, swash zone placement, and submerged littoral zone placement of Corps civil works project shall include the following measures:

Historically, these sand placement events as a result of a navigation maintenance dredging project with no local sponsor are smaller scaled, conducted at closer time intervals, and the sand often does not remain on the beach for an extended period of time.

Post construction requirements are listed in Terms and Conditions B10 and B11. These post construction requirements may be subject to congressional authorization and the allocation of funds. If the Corps or Applicant cannot fulfill these Terms and Conditions, the Corps must reinitiate consultation.

All beaches

B1. Conservation Measures included in the Corps' PBA that address protection of nesting sea turtles and beach mice listed on pages 9 and 10 of the SPBO shall be implemented in the Corps federally authorized project or regulated activity.

B2. Beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill must be sand that is similar to a native beach in the vicinity of the site that has not been affected by prior sand placement activity. The fill material must be similar in both coloration and grain size distribution to that native beach. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system. Fill material shall comply with FDEP requirements pursuant to the Florida Administrative Code (FAC) subsection 62B-41.005(15). A Quality Control Plan shall be implemented pursuant to FAC Rule 62B-41.008(1)(k)4.b.

B3. Dredged material placement shall not occur during the period of peak sea turtle egg laying and egg hatching to reduce the possibility of sea turtle nest burial, crushing of eggs, or nest excavation.

a. Dredged material placement in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties shall occur only during the beach placement window indicated in Table 16. construction equipment or pipes may be placed and/or stored on the beach only during the beach placement window indicated in Table 16.

b. Dredged material placement projects in Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa and Escambia Counties may occur during the sea turtle nesting season except on publicly owned conservation lands such as state parks and areas where such work is prohibited by the managing agency or under applicable local land use codes (see exceptions in B3.c. below).

c. For higher density nesting beaches in Gulf and Franklin counties dredged material placement shall not occur during the main part of the nesting season June 1 through September 31. On Manasota Key in Sarasota and Charlotte Counties, dredged material placement shall not occur during the main part of the nesting season (May 1 through October 31). This timeframe does not include Venice Beach due to the low density nesting. These beaches include St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas in Gulf County, St. George Island in Franklin County, and Manasota Key in Sarasota and Charlotte Counties. See Table 17 for the Beach Placement Windows.

d. For dredged material placement in the swash zone (at or below the MHWL) or submerged littoral zone during the sea turtle nesting season (**Tables 16and 17**), the Corps shall contact the Service for coordination.

The Service shall be contacted for coordination, on a project-by-project basis, if sand placement is needed on publicly owned conservation lands and in these higher density nesting beaches in Gulf and Franklin Counties and on Manasota Key in Sarasota and Charlotte Counties during the above exclusionary period. The Service will determine whether work (1) may proceed in accordance with the Terms and Conditions; (2) proceed in accordance with the Terms and Conditions and other requirements as developed by the Service; or (3) would require that an individual emergency consultation be conducted.

B4. For dredged material placement in the swash zone or submerged littoral zone during the nesting and hatching season, sand placement will be conducted at or below the MLLW line. The swash zone is that region between the upper limit of wave run-up (approximately one-foot above MHW) and the lower limit of wave run-out (approximately one-foot below MLW). Material will not be placed so that it is exposed above the water during low tide during the nesting and hatching season. The Corps must consult with NMFS on impacts to hatchlings that emerge from those nests adjacent to the inwater construction area. The Service will discuss with the Corps and NMFS additional measures that could include caging nests close to the emergence date.

B5. All derelict concrete, metal, and coastal armoring geotextile material and other debris shall be removed from the beach prior to any dredged material placement to the maximum extent possible. If debris removal activities take place during the peak sea turtle nesting season (**Tables 16 and 17**), the work shall be conducted during daylight hours only and shall not commence until completion of the sea turtle nesting survey each day.

B6. The Corps shall continue to work with FDEP, FWC and the Service in conducting the second phase of testing on the sea turtle friendly profile during project construction. This includes exploring options to include a dune system in the project design for existing authorized projects and new non-federal projects and how the existing sand placement template may be modified.

B7. Predator-proof trash receptacles shall be installed and maintained during construction at all beach access points used for the project construction to minimize the potential for attracting predators of sea turtles and beach mice (**Appendix F**). The Corps shall provide predator-proof trash receptacles for the construction workers. All workers shall be briefed on the importance of not littering and keeping the project area trash and debris free.

B8. A meeting between representatives of the Corps, the Service, the FWC, the permitted sea turtle surveyor, and other species surveyors, as appropriate, shall be held prior to the commencement of work on projects. At least 10 business days advance notice shall be provided prior to conducting this meeting. The meeting will provide an opportunity for explanation and/or clarification of the sea turtle and beach mouse protection measures as well as additional guidelines when construction occurs during the sea turtle nesting season, such as storing equipment, minimizing driving, free-roaming cat observation, and reporting within the work area, as well as follow up meetings during construction (**Table 3**).

Sea Turtle Protection

B9. Daily early morning surveys for sea turtle nests shall be required as outlined in a through f. If nests are constructed in the area of sand proposed placement, the eggs shall be relocated to minimize sea turtle nest burial, crushing of eggs, or nest excavation (**Tables 614 and 17**).

a. For sand placement projects in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties that occur during earlier part of the nest laying season through April 30, daily early morning surveys shall be conducted for sea turtle nests shall begin with the start of the nesting season monitoring (see Table 16) and continue through the end of the beach placement window, with egg relocation continuing only until completion of fill placement. Eggs shall be relocated per the following requirements. For sand placement projects that occur during the period from November 1 through the end of hatching season (see Table 16), daily early morning sea turtle nesting surveys shall be conducted 65 days prior to project initiation and continue through the end of the nest laying season indicated in Table 16, and eggs shall be relocated per the requirements listed in (a)i through (a)iii.

i. Nesting surveys and egg relocations will only be conducted by persons with prior experience and training in these activities and who are duly authorized to conduct such activities through a valid permit issued by FWC, pursuant to FAC 68E-1. Please contact FWC's Imperiled Species Management Section in Tequesta at (561) 575-5407 for information on the permit holder in the project area. Nesting surveys shall be conducted daily between sunrise and 9 a.m. (this is for all time zones).

ii. Only those nests that may be affected by sand placement activities will be relocated. Nest relocation shall not occur upon completion of the project. Nests requiring relocation shall be moved no later than 9 a.m. the morning following deposition to a nearby self-release beach site in a secure setting where artificial lighting will not interfere with hatchling orientation. Relocated nests shall not be placed in organized groupings. Relocated nests shall be randomly staggered along the length and width of the beach in settings that are not expected to

experience daily inundation by high tides or known to routinely experience severe erosion and egg loss, or subject to artificial lighting. Nest relocations in association with construction activities shall cease when construction activities no longer threaten nests.

iii. Nests deposited within areas where construction activities have ceased or will not occur for 65 days or nests laid in the nourished area prior to tilling shall be marked and left in situ unless other factors threaten the success of the nest. The turtle permit holder shall install an on-beach marker at the nest site and a secondary marker at a point as far landward as possible to assure that future location of the nest will be possible should the on-beach marker be lost. No activity will occur within this area nor will any activities occur that could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and the nest has not been disturbed by the project activity.

During the period from March 1 through April 30, daytime surveys shall be conducted for leatherback sea turtle nests beginning March 1. Nighttime surveys for leatherback sea turtles shall begin when the first leatherback crawl is recorded within the project or adjacent beach area through April 30 or until completion of the project (whichever is earliest). Nightly nesting surveys shall be conducted from 9 p.m. until 6 a.m. The project area shall be surveyed at 1-hour intervals (since leatherbacks require at least 1.5 hours to complete nesting, this will ensure all nesting leatherbacks are encountered) and eggs shall be relocated per the requirements listed in (a)i through (a)iii.

b. For sand placement projects in Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa and Escambia Counties that occur during the nest laying period (**Table 17**), daily early morning (before 9 a.m.) surveys shall be conducted. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii (see nest relocation exceptions for Franklin, Gulf, Sarasota, and Charlotte Counties in B9.d. below).

c. For Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, and Escambia Counties, nesting surveys shall be initiated 70 days prior to sand placement activities (incubation periods are longer in these counties) or at the beginning of nesting season monitoring (see Table 17) whichever is later. Nesting surveys shall continue through the end of the nest laying season (see Table 17). Hatching and emerging success monitoring will involve checking nests beyond the completion date of the daily early morning nesting surveys. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii (see nest relocation exceptions for Franklin and Gulf Counties in B9.d. below).

d. For St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas in Gulf County, St. George Island in Franklin County sand placement activities shall occur only during the Beach Placement Window indicated in Table 17. For Manasota Key in Sarasota and Charlotte Counties (except Venice Beach), sand placement activities shall during the Beach Placement Window indicted in Table 15, the period of peak sea turtle egg laying and egg hatching for this area. If nests laid in the early part of the nest laying season during the beach placement window in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii below.

e. For Pinellas, Hillsborough, Manatee, Sarasota, Charlotte, Lee, Collier, and Monroe Counties, nesting surveys shall be initiated 65 days prior to nourishment or dredged channel material placement activities or by April 15, whichever is later. Nesting surveys shall continue through September 15. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii (see nest relocation exceptions for Sarasota and Charlotte Counties in B9.d. above).

f. For Miami-Dade County, nesting surveys shall be initiated 65 days prior to dredged material placement activities or by the beginning of the nesting season monitoring indicated in Table 17, whichever is later. Nesting surveys shall continue through the end of the nest laying season or the end of sand placement whichever comes first. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii.

g. For Volusia, Flagler, St. Johns, Duval, and Nassau Counties, nesting surveys shall be initiated 65 days prior to dredged material placement activities or by the beginning of nest laying season (**Table 17**) whichever is later. Nesting surveys shall continue through the nesting season monitoring period (**Table 15).** If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii.

B10. Sand compaction shall be monitored in the area of dredged material placement immediately after completion of the project and prior to the dates in **Table 19** for 3 subsequent years. Not required for dredged material placement in the swash and littoral zone.

If tilling is needed, the area shall be tilled to a depth of 36 inches. Each pass of the tilling equipment shall be overlapped to allow more thorough and even tilling. All tilling activity shall be completed at least once prior to the nesting season. An electronic copy of the results of the compaction monitoring shall be submitted seaturtle@fws.gov prior to any tilling actions being taken. The requirement for compaction monitoring can be eliminated if the decision is made to till regardless of post construction compaction

levels. Additionally, out-year compaction monitoring and remediation are not required if placed material no longer remains on the dry beach.(NOTE: If tilling occurs during shorebird nesting season (February 15-August 31), shorebirds surveys prior to tilling are required per the Migratory Bird Treaty Act (http://myfwc.com/docs/Conservation/FBCI_BNB_SeaTurtleMonitors.pdf)

a. Compaction sampling stations shall be located at 500-foot intervals along the sand placement template. One station shall be at the seaward edge of the dune/bulkhead line (when material is placed in this area), and one station shall be midway between the dune line and the high water line (normal wrack line).

b. At each station, the cone penetrometer shall be pushed to a depth of 6, 12, and 18 inches three times (three replicates). Material may be removed from the hole if necessary to ensure accurate readings of successive levels of sediment. The penetrometer may need to be reset between pushes, especially if sediment layering exists. Layers of highly compact material may lie over less compact layers. Replicates shall be located as close to each other as possible, without interacting with the previous hole or disturbed sediments. The three replicate compaction values for each depth shall be averaged to produce final values for each depth at each station. Reports will include all 18 values for each transect line, and the final six averaged compaction values.

c. If the average value for any depth exceeds 500 pounds per square inch (psi) for any two or more adjacent stations, then that area shall be tilled immediately prior to the appropriate date listed in **Table 19**.

d. If values exceeding 500 psi are distributed throughout the project area but in no case do those values exist at two adjacent stations at the same depth, then consultation with the Service will be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling will not be required.

e. Tilling shall occur landward of the wrack line and avoid all vegetated areas 3 square feet or greater with a 3 square foot buffer around the vegetated areas.

B11. Visual weekly surveys for escarpments along the project area shall be made immediately after completion of the dredged material placement and within 30 days prior to the start dates for Nesting Season Monitoring in **Table 19** for 3 subsequent years if sand in the project area still remains on the dry beach. Not required for dredged material placement in the swash and littoral zone.

Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet shall be leveled and the beach profile shall be reconfigured to minimize scarp formation by the dates listed above. Any escarpment removal shall be

reported by location. If the project is completed during the early part of the sea turtle nesting and hatching season (March 1 through April 30), escarpments may be required to be leveled immediately, while protecting nests that have been relocated or left in place. The Service shall be contacted immediately if subsequent reformation of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet occurs during the nesting and hatching season to determine the appropriate action to be taken. If it is determined by the Service, in coordination with the FWC, that escarpment leveling is required during the nesting or hatching season, the Service will provide a brief written authorization within 30 days that describes methods to be used to reduce the likelihood of impacting existing nests. An annual summary of escarpment surveys and actions taken shall be submitted electronic to seaturtle@fws.gov.

B12. If available, staging areas for construction equipment shall be located off the beach during early (before April 30) and late (after November 1) nesting season for Brevard through Broward counties (see Table 16) and peak nesting season (May 1 through October 31) for the remaining counties. Nighttime storage of construction equipment not in use shall be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes placed on the beach shall be located as far landward as possible without compromising the integrity of the dune system. Pipes placed parallel to the dune shall be 5 to 10 feet away from the toe of the dune if the width of the beach allows. Temporary storage of pipes shall be off the beach to the maximum extent possible. If the pipes are stored on the beach, they shall be placed in a manner that will minimize the impact to nesting habitat and shall not compromise the integrity of the dune systems. If the pipes that are placed parallel to the dune cannot be placed between 5 to 10 feet away from the toe of the dune during nesting and hatching season, the Corps must reinitiate consultation with the Service as this represents take that was not considered in the SPBO. If it will be necessary to extend construction pipes past a known shorebird nesting site or over-wintering area for piping plovers, then whenever possible those pipes shall be placed landward of the site before birds are active in that area. No pipe or sand shall be placed seaward of a shorebird nesting site during the shorebird nesting season.

B13. Direct lighting of the beach and nearshore waters shall be limited to the immediate construction area during early (before April 30) and late (after November 1) nesting season for Brevard through Broward counties (see Table 14) and peak nesting season (May 1 through October 31) for the remaining counties, and shall comply with safety requirements. Lighting on all equipment shall be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the water's surface and nesting beach while meeting all Coast Guard, Corps EM 385-1-1, and OSHA requirements. Light intensity of lighting equipment shall be reduced to the minimum standard required by OSHA for General Construction areas, in order not to misdirect sea turtles. Shields shall be affixed to the light housing and be large enough to

block light from all lamps from being transmitted outside the construction area and to the adjacent sea turtle nesting beach in line-of-sight of the dredge (**Figure 15**).

B14. During the period during early (before April 30) and late (after November 1) nesting season for Brevard through Broward counties (see Table 16) and peak nesting season (May 1 through October 31) for the remaining counties, the Corps shall not extend the beach fill more than 500 feet (or other agreed upon length if FWC sea turtle permit holder is present) along the shoreline between dusk and dawn of the following day until the daily nesting survey has been completed and the beach cleared for fill advancement. An exception to this may occur if there is a permitted sea turtle surveyor present on-site to ensure no nesting and hatching sea turtles are present within the extended work area. If the 500 feet is not feasible for the project, an agreed upon distance will be decided on during the preconstruction meeting. Once the beach has been cleared and the necessary nest relocations have been completed, the Corps will be allowed to proceed with the placement of fill during daylight hours until dusk at which time the 500-foot length (or other agreed upon length) limitation shall apply. If any nesting turtles are sighted on the beach within the immediate construction area, activities shall cease immediately until the turtle has returned to the water and the sea turtle permit holder responsible for nest monitoring has relocated the nest.

Beach Mouse Protection

B15. Beach mouse habitat shall be avoided when selecting sites for equipment, pipes, vehicle storage and staging, and beach travel corridors to the maximum extent possible. Suitable beach mouse habitat constitutes the primary dunes (characterized by sea oats and other grasses), secondary dunes (similar to primary dunes, but also frequently includes such plants as woody goldenrod, false rosemary), and interior or scrub dunes.

B16. Equipment placement or storage shall be excluded in the area between 5 to 10 feet seaward of the existing dune toe or 10 percent of the beach width (for projects occurring on narrow eroded beach segments) seaward of the dune toe in areas of occupied beach mouse habitat (**Figure 16**). The toe of the dune is where the slope breaks at the seaward foot of the dune.

B17. 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.

B18. The location of new or expanded existing beach access corridors for vehicles and equipment within beach mouse habitat consisting of vegetated dunes shall be no closer

than every four miles. The distribution of access areas will result in the least number of access areas within beach mouse habitat as possible and delineated by post and rope or other suitable material to ensure vehicles and equipment transport stay within the access corridor. The access corridors shall be (1) no more than 25 feet wide for vehicles and (2) no more than 50 feet wide for equipment. Expanded or new beach access points that impact vegetated dunes shall be restored within 3 months following project completion. Habitat restoration shall consist of restoring the dune to preconstruction conditions with planting of at least three species of appropriate native dune vegetation (*i.e.*, native to coastal dunes in the respective county and grown from plant stock from that region of Florida). Seedlings shall be at least 1 inch square with a 2.5-inch pot. Planting shall be on 18-inch centers throughout the created dune; however, 24-inch centers may be acceptable depending on the area to be planted. Vegetation shall be planted with an appropriate amount of fertilizer and antidesiccant material, as appropriate, for the plant size. No sand stabilizer material (coconut matting or other material) shall be used in the dune restoration. The plants may be watered without installing an irrigation system. In order for the restoration to be considered successful, 80 percent of the total planted vegetation shall be documented to survive six months following planting of vegetation. If the habitat restoration is unsuccessful, the area shall be replanted following coordination with the Service.

Reporting

B19. An excel sheet with the information listed in **Table 20** shall be submitted to the Service electronically seaturtle@fws.gov by December 31 of the year following construction. A report with the information from Terms and Conditions B10 and B11 shall be submitted to the Service by December 31 of the year for 3 years following construction.

B20. In the event a sea turtle nest is excavated during construction activities, the project turtle permit holder responsible for egg relocation for the project shall be notified immediately so the eggs can be moved to a suitable relocation site.

Upon locating a dead or injured sea turtle adult, hatchling, egg, or beach mouse that may have been harmed or destroyed as a direct or indirect result of the project, the Corps, Applicant shall be responsible for notifying FWC Wildlife Alert at 1-888-404-FWCC (3922) and the appropriate Service Field Office immediately (**Table 3**).

Care shall be taken in handling injured sea turtles, eggs or beach mice to ensure effective treatment or disposition, and in handling dead specimens to preserve biological materials in the best possible state for later analysis.

REASONABLE AND PRUDENT MEASURES for:

C. Projects that include groin or jetty repair or replacement within the existing footprint shall include the following measures:

In Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties:

C1. Groin or jetty repair or replacement projects shall not occur during the period of peak sea turtle egg laying and egg hatching (May 1 through October 31), to reduce the possibility of sea turtle nest burial, crushing of eggs, or nest excavation.

C2. Maintenance of groin or jetty projects conducted during the early (February 1 through April 30) and late sea turtle nesting season (November 1 through November 30) shall adhere to the following conditions:

a. Install a barrier around the perimeter of the groin or jetty repair or replacement work area sufficient to prevent adult and hatchling sea turtles from accessing the project site.

b. For projects conducted during the early and late sea turtle nesting season, construction equipment and materials shall be stored in a manner that will minimize impacts to sea turtles to the maximum extent possible.

c. For projects conducted during the early and late sea turtle nesting season, no work may occur at night.

In Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, and Escambia Counties:

C3. For maintenance of groin or jetty projects, conducted during the sea turtle nesting season.

a. Daily surveys shall be conducted by sea turtle permit holders. Nests laid adjacent to the work area shall be marked by flag and rope for avoidance.

b. A barrier shall be installed around the perimeter of the groin or jetty maintenance work area sufficient to prevent adult and hatchling sea turtles from accessing the project site.

c. Construction equipment and materials shall be stored in a manner that will minimize impacts to sea turtles and beach mice to the maximum extent possible.

d. No work shall occur at night.

In All Counties:

C4. If any safety lighting associated with the project is required, the Corps must coordinate with the Service. All safety lighting must be minimized to reduce the possibility of disrupting and disorienting nesting or hatchling sea turtles and nocturnal activities of beach mice. All lights shall be downward directed, full cut-off and fully shielded, and shall utilize long wavelength (greater than 590 nm) light sources.

C5. If entrapment of sea turtle hatchlings occurs in the groin or jetty system, the Corps shall meet with the Service to discuss a possible solution prior to the next nesting season.

C6. A report describing the projects conducted during the year and actions taken to implement the Reasonable and Prudent Measures and Terms and Conditions of this incidental take statement shall be submitted to the Service.

TERMS AND CONDITIONS for:

C. Projects that include groin or jetty repair or replacement within the existing footprint shall include the following conditions:

In Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties:

C1. Groin or jetty repair or replacement projects shall be started after October 31 and be completed before May 1.

C2. For groin or jetty repair or replacement projects conducted during the early (before April 30) and/or late (after November 1) sea turtle nesting season (see Table 16):

a. A barrier (e.g., hay bales, silt screens) sufficient to prevent adult and hatchling sea turtles from accessing the project site shall be installed in a 100-foot buffer around the perimeter of the project site. The barrier shall be placed parallel to shore, at mean high water (MHW), as close to the groin or jetty as feasible, particularly during the period from sunset to sunrise. The Corps must contact the Service if there are any existing nests within the 100-foot buffer area.

b. On-beach access to the construction site shall be restricted to the wet sand below MHW to the maximum extent possible. Travel corridors on the beach to the MHWL shall be delineated. If the project is conducted during the early (before April 30) and/or late (after November 1) sea turtle nesting season (see Table 16), daily morning surveys shall be conducted within the travel corridor. If nests are laid within the travel corridor, the travel corridor must be re-routed to avoid the nest. If re-routing is not possible, these nests shall be relocated per the requirements listed in A9 (a)i through (a)iii.

c. Staging areas for construction equipment shall be located off the beach to the maximum extent possible.

d. No construction shall be conducted at night.

e. Daily early morning surveys for sea turtle nests shall be required as outlined in e(i) and e (ii). All nests laid in the vicinity of the project area shall be marked for avoidance per the requirements specified below:

   i. Nesting surveys and nest marking will only be conducted by persons with prior experience and training in these activities and who are authorized to conduct such activities through a valid permit issued by FWC, pursuant to FAC 68E-1. Please contact FWC's Imperiled Species Management Section in Tequesta at mtp@myfwc.com for information on the permit holder in the project area. Nesting surveys shall be conducted daily between sunrise and 9 a.m. (this is for all time zones). The Corps shall not initiate work until daily notice has been received from the sea turtle permit holder that the morning survey has been completed. Surveys shall be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

   ii. Nests deposited within the project area and access areas shall be left in place and marked for avoidance unless other factors threaten the success of the nest (nest laid below debris line marking the typical high tide, erosion). The turtle permit holder shall install an on-beach marker at the nest site and a secondary marker at a point as far landward as possible to assure that future location of the nest will be possible should the on-beach marker be lost. The actual location of the clutch will be determined and nests will be marked. A series of stakes and highly visible survey ribbon or string shall be installed to establish a 10-foot radius around the nest. No activity shall occur within this area nor will any activity occur that could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and that the nest has not been disturbed by the project activity. Nest relocation is only allowed if nests laid within the travel corridor (beach access to MHWL) cannot be rerouted to avoid the nest.

In Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, and Escambia Counties:

C3. For groin or jetty repair or replacement projects conducted during the sea turtle nesting season (see Table 17):

a. Daily early morning surveys shall be conducted within the travel corridor.

b. A barrier (e.g., hay bales, silt screens) sufficient to prevent adult and hatchling sea turtles from accessing the project site shall be installed in a 100-foot buffer around the perimeter of the project site. The barrier shall be placed parallel to shore, at MHW, as close to the groin or jetty as feasible during the period from sunset to sunrise.

c. On-beach access to the construction site shall be restricted to the wet sand below MHW to the maximum extent possible. Travel corridors on the beach to the MHWL will be delineated. Nests laid within the travel corridor that would impede traffic will be relocated per the requirements listed in A9(a)i through (a)iii.. Nests laid in adjacent areas will be marked and avoided per the requirements listed in C(2)(e) i through iii. Staging areas for construction equipment shall be located off the beach to the maximum extent possible.

d. No nighttime construction may occur during the nesting season.

e. Material stockpiled on the beach shall only occur within the 200-foot barrier (100-foot area on either side). Construction activities shall not occur in any location prior to completion of the necessary sea turtle protection measures outlined below. If any nesting turtles are sighted on the beach, construction activities shall cease immediately until the turtle has returned to the water and the sea turtle permit holder responsible for nest monitoring has marked the nest. All activities shall avoid the marked nest areas.

C4. All nests laid adjacent to the project area shall be marked for avoidance per the following requirements:

a. Nesting surveys and nest marking will only be conducted by persons with prior experience and training in these activities and who are authorized to conduct such activities through a valid permit issued by FWC, pursuant to FAC 68E-1. Please contact FWC's Imperiled Species Management Section in Tequesta at mtp@myfwc.com for information on the permit holder in the project area. Nesting surveys shall be conducted daily between sunrise and 9 a.m. (this is for all time zones). The Corps shall not initiate work until daily notice has been received from the sea turtle permit holder that the morning survey has been completed. Surveys shall be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

i. Nests deposited within the project area and access areas shall be left in place and marked for avoidance unless other factors threaten the success of the nest (nest laid below debris line marking the typical high tide, erosion). The turtle permit holder shall install an on-beach marker at the nest site and a secondary marker at

a point as far landward as possible to assure that future location of the nest will be possible should the on-beach marker be lost. The actual location of the clutch will be determined and nests will be marked. A series of stakes and highly visible survey ribbon or string shall be installed to establish a 10-foot radius around the nest. No activity shall occur within this area nor will any activity occur that could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and that the nest has not been disturbed by the project activity. Nest relocation is only allowed if nests laid within the travel corridor (beach access to MHWL) cannot be rerouted to avoid the nest.

In All Counties:

C5. To the maximum extent possible within the travel corridor, all ruts shall be filled or leveled to the natural beach profile prior to completion of daily construction.

C6. Exterior lighting shall not be permanently installed in association with the project. Temporary lighting of the construction area during the sea turtle nesting season shall be reduced to the minimum standard required by OSHA for general construction areas. Lighting on all equipment including offshore equipment shall be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the water's surface and nesting beach while meeting all Coast Guard, Corps EM 385-1-1, and OSHA requirements. Light intensity of lighting equipment shall be reduced to the minimum standard required by OSHA for general construction areas, in order not to misdirect sea turtles. Shields shall be affixed to the light housing and be large enough to block light from all lamps from being transmitted outside the construction area and to the adjacent sea turtle nesting beach in line-of-sight of the dredge (**Figure 15**).

C7. If entrapment of sea turtle hatchlings occurs in the groin or jetty system during construction, the Corps shall contact the Service immediately.

C8. A report describing the work conducted during the year and actions taken to implement the Reasonable and Prudent Measures and Terms and Conditions of this incidental take statement shall be submitted to the Service electronically to seaturtle@fws.gov by December 31 of each year when the activity has occurred. This report will include the following information:

Table 22. Information to include in the report following the project completion.

All projects	Project location (include Florida DEP R-monuments and latitude and longitude coordinates)
	Project description
	Dates of actual construction activities
	Names and qualifications of personnel involved in sea turtle nesting surveys and mark and avoid activities
	Nesting survey, mark and avoid activities, and nest relocation results

The Service believes that incidental take will be limited to the 8.8 miles of shoreline per year within the northwest portion of Florida for the NGMRU (38 miles during an emergency year) and 18.9 miles of shoreline within the PFRU (64 miles during an emergency year) of beach that have been identified for sand placement. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no more than the following types of incidental take will result from the proposed action: (1) destruction of all nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the project areas; (2) destruction of all nests deposited during the period when a nest survey and egg relocation program is not required to be in place within the boundaries of the projects; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the sand placement areas or on adjacent beaches during and after sand placement or construction activities; (5) misdirection of nesting and hatchling turtles on beaches adjacent to the sand placement or construction area as a result of project lighting including the ambient lighting from dredges; (6) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and (7) destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Service. The amount or extent of incidental take for sea turtles will be considered exceeded if the project results in more than a 8.8 miles of shoreline per year within the northwest portion of Florida for the NGMRU (38 miles during an emergency year) and 18.9 miles of shoreline within the PFRU (64 miles during an emergency year) of sand on the of beach that have been identified for sand placement. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Corps must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and

threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. For sand placement projects in Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa and Escambia Counties, construction activities should be planned to take place outside the main part of the sea turtle nesting and hatching season (May 1 through October 31).
2. Work cooperatively with the Service, FWC, County or Municipality, to reduce sea turtle disorientations in the sand placement areas. After the annual report is completed, a meeting shall be set up with the Applicant, county or municipality, FWC, Corps, and the Service to discuss the survey report, as well as any documented sea turtle disorientations in or adjacent to the project area.
3. Work cooperatively with the Service to mimic the native beach berm elevation and beach slopes landward and seaward of the equilibrated berm crest. For all high density green turtle nesting beaches (http://ocean.floridamarine.org/SeaTurtleNesting/), the formation of a dune, either through direct creation or natural accretion, will be included in the project design. Prior to drafting the plans and specifications for a beach nourishment project, the Corps must meet with the Service, FWC, and FDEP to discuss the beach profile surveys, dune formation (specifically on high density green turtle nesting beaches), and the sea turtle monitoring reports from previous placement events.
4. If public driving is allowed on the project beach, and if the Corps has the authority, we recommend it exercise its discretionary authority to require the local sponsor or Applicant to have authorization from the Service for incidental take of sea turtles, their nests, and hatchlings and beach mice, as appropriate, due to such driving or provide written documentation from the Service that no incidental take authorization is required. If required, the incidental take authorization for driving on the beach should be obtained prior to any subsequent sand placement events.
5. Beach nourishment should not occur on publicly owned conservation lands during the sea turtle nesting season.
6. All created dunes should be planted with at least three species of appropriate native salt-resistant dune vegetation. Examples along the Atlantic coast include: bitter panicgrass, sea oats (grown from local genetic stock), beach morning-glory, or railroad vine. Examples along the Northwest Florida coast includes: bitter panicgrass, little bluestem (Schizachyrium scoparium), sea oats (grown from local genetic stock), beach morning-glory, or railroad vine. Examples along the Southwest Florida coast include: sea oats (grown from local genetic stock), bitter panicgrass, beach morning-glory, and railroad vine.
7. If the project area is within a local municipality that has not adopted a lighting ordinance, and lighting is shown to be an issue on a nourished beach, and if the Corps has the authority, we recommend it exercise its discretionary authority to require an ordinance be adopted prior to any subsequent sand placement event.

8. To increase public awareness about sea turtles and beach mice, informational signs should be placed at beach access points where appropriate. The signs should explain the importance of the beach to sea turtles and beach mice.
9. If the Corps has the authority, we recommend it exercise its discretionary authority to require predator control programs (including education of pet owners and cat colony supporters) should be implemented that target free-roaming cats.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. Reinitiation of formal consultation is also required ten years after the issuance of this SPBO. In instances where the amount or extent of incidental take is exceeded, any operations causing such take shall cease pending reinitiation.

The above findings and recommendations constitute the report of the Service. If you have any questions about this SPBO, please contact Ann Marie Lauritsen of this office at (904) 525-0661, Richard Zane of the Panama City Field Office at (850) 769-0552, or Jeffrey Howe of the South Florida Field Office at (772) 562-3909.

Sincerely,

for Larry Williams
State Supervisor

cc:
FWC, Lake City, Florida (Melissa Tucker)
FWC, Lake City, Florida (Nancy Douglass)
FWC, Lake City, Florida (Terry Doonan)
FWC, Panama City, Florida (John Himes)
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Service, Atlanta RO digital version in Word
Service, Panama City, Florida, (Patricia Kelly, Lisa Lehnhoff)
Service, St. Peteresburg, Florida (Ann Marie Lauritsen)
Service, Vero Beach, Florida (Jeffrey Howe)

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Appendix A

PREVIOUS FORMAL CONSULTATIONS/BIOLOGICAL OPINIONS WITHIN FLORIDA THAT HAVE BEEN ISSUED FOR ALL PROJECTS THAT HAD ADVERSE IMPACTS TO THE SEA TURTLES ON THE NESTING BEACH

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
STATEWIDE	Nassau, Duval, St. Johns, Flagler, Volusia, Brevard, Indian River, St. Lucie, Martin, Palm Beach, Broward, Monroe, Miami-Dade, Collier, Lee, Charlotte, Sarasota, Manatee, Pinellas, Pasco, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, Escambia	FEMA Emergency Beach Berm Repair	2007-F-0430		Repair of 5-year beach berms post-disaster	75 miles
JAX FIELD OFFICE						
1991	Brevard	Lighting at Cape Canaveral Air Force and Patrick Air Force Station	4-1-91-028	Lighting at both installations	Sea turtle lighting	75 disoriented loggerhead nests; 2 green turtles nests at CCAFS and 2 loggerhead nests at PAFB
1993	Brevard	Beach nourishment on Cape Canaveral	4-1-93-073C		Beach nourishment	2 miles
1995	Brevard	Inlet Bypass on Brevard County Beach at Cape Canaveral		R-1 to R-14	Inlet bypass	
1996	Brevard	Canaveral Port Authority Dredge and Beach Disposal		R-34 to R-38	Dredge and beach restoration	
1998	Brevard	Inlet bypass on Brevard County Beach at Cape Canaveral		R-1 to R-14		
2000	Brevard	Amended Lighting at Cape Canaveral Air Force and Patrick Air Force Station	00-0545	Lighting at both installations	Sea turtle lighting	2 percent hatchling and nesting female disorientations at each installation.
2001	Brevard	Brevard County Shore Protection Project (North Reach)		R-5 to R-12 and R-13 to R-54.5	Beach nourishment	9.4 miles
2001	Brevard	Patrick Air Force Base Beach Restoration		R-53 to R-70	Beach nourishment	

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
2002	Brevard	Brevard County Shore Protection Project (South Reach)		R-123.5 to R-139	Beach nourishment	3.02 miles
2002	Brevard	Brevard County Shore Protection Project (North Reach)		R-4 to R-20	Beach nourishment	
2002	Brevard	Permanent Sand Tightening of North Jetty at Canaveral Harbor	02-1090	North jetty at Canaveral Inlet	Sand tightening and extension of existing jetty	500 feet
2003	Brevard	Brevard County Shore Protection Project (South Reach)		R-118.3 to R-123.5		0.94 mile
2004	Brevard	Canaveral Harbor Federal Sand Bypass and Beach Placement	04-0077	R-14 to R-20	Inlet bypass and beach nourishment	18,600 linear feet
2005	Brevard	Brevard County Shore Protection Project (North and South Reach)	05-0443	R-5 to R-20 and R-21 to R-54.5 and R-118 to R-139	Beach nourishment	13.2 miles
2005	Brevard	Brevard County FEMA Berm and Dune Restoration	05-1054	R-75 to R-118	Dune repair	12 miles
2005	Brevard	Patrick Air Force Base Beach Restoration	05-0258	R-54.5 to R-75.3	Beach nourishment	
2005	Brevard	Sloped Geotexile Revetment Armoring Structures	05-0454	5 tubes along north and south Melbourne beach	Protec tube installation	4,600 linear feet
2006	Brevard	Brevard County FEMA Berm and Dune Restoration	41910-2006-F-0189	R-75 to R-118	Dune repair	12 miles
2006	Brevard	Amended Lighting at Cape Canaveral Air Force and Patrick Air Force Station	41910-2006-F-0841		Sea turtle lighting	3 percent hatchling and nesting female disorientations at each installation
15 Feb 2008	Brevard	Patrick Air Force Base Dune Restoration	41910-2008-F-0150	R-65 to R-70	Dune restoration	6,000 linear feet
25 Jan 2008	Brevard	Brevard County's Dune Restoration	41910-2008-F-0189	R-75 to R-118 and R-138 to R-202	Dune restoration	140,000 cy along 3,000 linear feet
2009	Brevard	Brevard County's Dune Restoration	41910-2009-F-0125	R 75.4 to R 118.3 and R-139 to R-213	Dune restoration	22 miles
2009	Brevard	Mid Reach		R-75 to R119	Beach berm repair (permanent)	40,748 linear feet
2009	Brevard	South Beach		R-139 to R-215	Beach berm repair (permanent)	70,385 linear feet

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
2009	Brevard	Patrick Air Force Base Dune Restoration and Beach Nourishment	41910-2009-F-0336	R-36 to R-75, R-53 to R-65	Sand placement	8,500 linear feet for dune restoration and 11,235 linear feet for beach nourishment.
2009	Brevard	Brevard Dune Restoration	41910-2009-F-0125	R-75.4 to R-118.3, R-139 to R-213	Dune restoration	Periodically on no more than 22 miles.
2009	Brevard	Mid Reach Shore Protection	41910-2008-F-0547	R-119 to R-75.4	Sand placement	7.7 linear miles
2009	Brevard	Canaveral Harbor Sand Bypass	41910-2008-F-0547	Canaveral Harbor	Sand bypass	18,600 linear no more than every 2 years
2009	Brevard	Kennedy Space Center Lighting	41910-2009-F-0306			3% of all hatchling disorientation events
2009	Brevard	South Beach Renourishment	41910-2009-F-0327			7.8 miles
1991	Duval	Duval County Beach Erosion Control		R-44 to R-52.5	Beach nourishment	9,000 linear feet
1996	Duval	Duval County Beach Erosion Control		R-47 to R-80	Beach nourishment	5 miles
2003	Duval	Duval County Beach Erosion Control		R-72 to R-80	Beach nourishment	
2005	Duval	Duval County Beach Erosion Control	05-1544	R-43 to R-53 and R-57 to R-80	Beach nourishment	5.7 miles
2010	Duval	Duval County Hurricane and Storm Damage Reduction	2010-CPA-0045	V-501 to R-80	Beach nourishment	52,800 linear feet
2005	Flagler	Road Stabilization from SR A1A	41910-2006-IE-0173		Seawall	140 linear feet
2009	Flager	State Road (SR) A1A Shoreline Stabilization	41910-2007-F-0495	200 feet south of South 28th Street to 980 feet south of Osprey Point Drive	Sand placement, revetments, and seawalls	5.2 miles = length of take; 3,000 linear feet of anticipated incidental take
2005	Hillsborough	Egmont Key Nourishment	05-1845	R-2 to R-10	Beach nourishment	8,000 linear feet
1993	Manatee	Anna Maria Island Beach Restoration		R-2 to R-36	Beach nourishment	4.7 miles
1997	Manatee	Dredge Material Disposal and Longboat Key Beach Restoration		R-48 to R-51	Dredge and beach nourishment	
2002	Manatee	Anna Maria Island Beach Restoration		R-7 to R-10 and R-12 to R-36	Beach nourishment	5.2 miles
2005	Manatee	Anna Maria Island Shore Protection Project	41910-2006-F-0079	R-7 to R-10	Beach nourishment	3,000 linear feet

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
2005	Manatee	Anna Maria Island Emergency Beach Restoration	05-1227	R-2 to R-41	Beach nourishment	4.2 miles
2005	Manatee	Town of Longboat Key Beach Renourishment	4-1-04-TR-4529	R-44.5 to R-46	Beach nourishment	0.34 mile
2007	Manatee	Longboat Key Groin Installation	41910-2007-F-0521		Groin installation	2,210 linear feet
2009	Manatee	Anna Maria Island Beach Nourishment	41910-2008-F-456	R-7 to R-10, R-35 +790 feet and R-41 +365 feet	Sand placement	8,000 linear feet
2010	Manatee	Longboat Key North End Nourishment	41910-2010-F-0301			4,015 linear feet of beach
1994	Nassau	South Amelia Island Beach Restoration		R-60 to R-78	Beach nourishment	
1997	Nassau	Dredging of Sawpit Creek Cut and Beach Disposal		R-73.5 to R-78	Dredge and beach nourishment	2,900 linear feet
2002	Nassau	South Amelia Island Beach Restoration		R-50 to R-80	Beach nourishment	3.4 miles
2002	Nassau	Fernandina Harbor Dredge and Beach Disposal		R-1 to R-9	Dredge and beach nourishment	8,000 linear feet
2004	Nassau	Nassau County Shore Protection Project at Amelia Island	05-1355	R-9 to R-33	Beach nourishment	3.6 miles
2005	Nassau	Nassau County Shore Protection Project at Amelia Island	05-1355	R-11 to R-34	Beach nourishment	4.3 miles
2005	Nassau	Dredging of Sawpit Creek Cut and Beach Disposal	41910-2006-F-0254	R-73.5 to R-78	Dredge and beach nourishment	2,900 linear feet
1988	Pinellas	Sand Key/Redington Beach Restoration		R-99 to R-107	Beach nourishment	
1990	Pinellas	Sand Key/Indian Rocks Beach Restoration		R-72 to R-85	Beach nourishment	
1991	Pinellas	Long Key Beach Restoration		R-144 to R-147	Beach nourishment	0.45 mile
1991	Pinellas	Johns Pass Dredge Material Disposal		R-127 to R-130	Dredge disposal and sand placement	
1992	Pinellas	Sand Key/Redington Beach Restoration		R-99 to R-107	Beach nourishment	
1992	Pinellas	Sand Key/Indian Shore Beach Restoration		R-85 to R-99	Beach nourishment	
1996	Pinellas	Treasure Island Beach Restoration		R-138 to R-142	Beach nourishment	2,500 linear feet
1996	Pinellas	Long Key Beach Restoration		R-144 to R-146	Beach nourishment	0.45 mile

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
1998	Pinellas	Sand Key/Belleair Beach Restoration		R-56 to R-66	Beach nourishment	
1999	Pinellas	Sand Key Beach Restoration		R-71 to R-107	Beach nourishment	
2000	Pinellas	Treasure Island Beach Restoration		R-136 to R-141	Beach nourishment	2.0 miles
2000	Pinellas	Terminal Groin at North End of Treasure Island			Groin construction	
2000	Pinellas	Long Key Beach Restoration		R-144 to R-145.6	Beach nourishment	2,800 linear feet
2000	Pinellas	Dredge Material Disposal and Honeymoon Island Beach Restoration		R-10 to R-12	Dredge disposal and sand placement	
2004	Pinellas	Treasure Island Beach Restoration	04-1247	R-136 to R-141	Beach nourishment	5,000 feet
2004	Pinellas	Long Key Beach Restoration	04-1247	R-144 to R-148	Beach nourishment	4,000 linear feet
2005	Pinellas	Sand Key Emergency Renourishment	05-0627	R-56 to R-66 and R-72 to R-106	Beach nourishment	8.6 miles
2006	Pinellas	Treasure Island, Sunset, Long Key, Pass a Grill Emergency Renourishment	41910-2006-F-0480	R-126 to R-146	Beach nourishment	9.5 miles
2006	Pinellas	Dredge Material Disposal and Mullet Key and Fort DeSoto Beach Restoration	41910-2006-F-0692	R-177 to R-179.5 and R-181 to R-183	Dredge disposal and sand placement	4,500 linear feet
2009	Pinellas	Treasure Island Beach Nourishment	41910-2009-F-0250	R-136 to R-141, R-144 to R-148	Sand placement	11,375 linear feet
1997	St. Johns	Maintenance Dredging of Matanzas Inlet and Sand Placement at Summer Haven	98-171D	R-197 to R-209		
2001	St. Johns	Maintenance Dredging of Matanzas Inlet and Sand Placement at Summer Haven	98-171D			
2002	St. Johns	St. Johns County Shore Protection Project at St. Augustine		R-137 to R-152	Beach nourishment	2.5 miles
2003	St. Johns	St. Johns County Shore Protection Project at St. Augustine		R-132 to R-152	Beach nourishment	3.8 miles

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
2003	St. Johns	Maintenance Dredging of Matanzas Inlet and Sand Placement at Summer Haven	98-171D	R-197 to R-209	Beach nourishment	
2005	St. Johns	St. Johns County Shore Protection Project at St. Augustine	05-0446	R-137 to R-150	Beach nourishment	2.5 miles
2006	St. Johns		TE091980-0		Beach driving	41.1 linear miles
2007	St. Johns	Maintenance Dredging of Matanzas Inlet and Sand Placement at Summer Haven	41910-2007-F-0305	R-200 to R-208	Beach nourishment	4,000 linear feet
2009	St. Johns	Beach berm repair		R-201 to R-203, R-207 to R-208	Beach berm repair	7,000 linear feet
2009	St. Johns	Matanzas Inlet Maintenance Dredge and Summer Haven Sand Placement	41910-2009-F-0462	R-200 to R-208	Sand placement	8,000 linear feet
2009	St. Johns	St. Augustine Shore Protection Project	41910-2009-F-0444	600 feet north of R-137 and 600 feet south of R-151	Sand placement	15,280 linear feet
2010	St. Johns	St. Augustine Inlet Dredge and Sand Placement	41910-2010-F-0105			20,000 linear feet
2004	Volusia	Volusia County FEMA Berm	05-1074	R-40 to R-145 and R-161 to R-208	Beach nourishment	
2005	Volusia	Ponce de Leon Dredge and Beach Placement	05-0884	R-143 to R-145	Dredge and sand placement	3,000 linear feet
2005	Volusia		TE811813-11		Beach driving	50 miles
2006	Volusia	New Smyrna/Silver Sands Dune Restoration	05-1007	R-161 to R-175	Beach restoration	5.4 miles
2006	Volusia	Volusia County FEMA Berm	41910-2006-F-0831		Repair of right of way and beach placement	230 linear feet
2007	Volusia	Ponce de Leon Dredge and Beach Placement	41910-2007-F-0109	R-158 to R-175	Dredge and sand placement	3.2 miles
2009	Volusia	Ponce de Leon Inlet Maintenance Dredging and Sand Placement	41910-2009-F-0362	R-143 to R-145	Sand placement	8,000 linear feet
PANAMA CITY FIELD OFFICE						
8 April 1998	Bay	Panama City Beach Beach Nourishment	4-P-97-108	R-4.4 and R-93.2	Beach nourishment new project	16 miles
24 June 1998	Bay	Tyndall AFB Driving on the Beach	4-P-98-020	V-9 (virtual) to R-122	Driving on the beach for military missions	18 miles

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
31 July 1998	Bay	Lake Powell Emergency Opening	4-P-97-089	R- 0.5	Emergency outlet opening	1,500 feet
16 April 1999	Bay	Panama City Beach Beach Nourishment Amendment 1	4-P-97-108	R-0.5 to R-9	Beach nourishment completion	16 miles (no additional take provided from original)
9 March 2000	Bay	Panama City Beach Beach Nourishment Amendment 2	4-P-97-108	R-35 to R-71	Relief from tilling requirement beach nourishment	16 miles (no additional take provided from original)
10 April 2000	Bay	Panama City Beach Beach Nourishment Amendment 3	4-P-97-108	R-35 to R-71	Relief from tilling requirement beach nourishment	16 miles (no additional take provided from original)
18 December 2000	Bay	Panama City Beach Beach Nourishment Amendment 4	4-P-97-108	R-35 to R-71	Relief from tilling depth requirement and compaction testing sample numbers beach nourishment	16 miles (no additional take provided from original)
4 January 2001	Bay	East Pass Re-Opening	4-P-00-211	No R-monuments	Dredging of a closed inlet and dredged material placement on beach	2 miles
29 March 2001	Bay	Panama City Beach Beach Nourishment Amendment 5	4-P-97-108	R-35 to R-71	Relief from tilling depth requirement beach nourishment	16 miles (no additional take provided from original)
7 Sept 2001	Bay	City of Mexico Beach Sand Bypass System	4-P-01-178	Mexico Beach canal	Dredging and spoil disposal	3,700 feet 2.0 acres
14 January 2005	Bay	Panama City Beach Beach Nourishment Amendment 5	4-P-97-108	R-4.4 and R-93.2	Post hurricane restoration	16 miles (no additional take provided from original)
2006	Bay	Tyndall Air Force Base INRMP	4-P-05-240	V-9 (virtual) to R-122	Integrated Natural Resources Management Plan	18 miles
26 March 2006	Bay	Mexico Beach Canal Sand By Pass Amendment 1	4-P-05-281 2007-F-0205	R-127 to R-129	By pass system improvements	5,000 feet
24 May 2007	Bay	Panama City Beach Beach Nourishment Amendment 6	4-P-97-108 2007-TA-0127	R-4.5 to R-30 and R-76 to R-88	New work and post hurricane restoration	31,500 feet of 16 miles total no additional take provided
25 October 2007	Bay	Panama City Beach Nourishment Amendment 8	2008-F-0004	2008 project: R-74 to R-91; Entire project: R-0.5 to R-91	Beach nourishment	17.9 miles
29 Feb 2008	Bay	Panama City Harbor (revised BO)	2008-F-0168	R-97	Navigation channel maintenance dredging and beach placement of dredged material.	500 ft of beachfront at St. Andrew State Park

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
8 June 2009	Bay	Panama City Harbor Navigation Channel Amendment 1	2009-F-0175	R-92 to R-97	Maintenance navigation channel dredging and dredged material placement	0.85 mile
2009	Bay	City of Mexico Beach		R-128.5 to R-138.2	Beach berm repair (emergency)	9,393 linear feet
06 Jan 2010	Bay	Lake Powell Outlet Emergency Opening	2009-F-0226	R-0-A and R-1	Emergency opening of the outlet to the Gulf of Mexico	2,400 feet
7 August 2000	Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf, Franklin	Destin Dome OCS Offshore Oil and Gas Drilling	4-P-00-003	Gulf of Mexico federal waters	Oil and gas offshore exploration	Formal consultation with no take
3 June 2002	Escambia	Pensacola Beach Beach Nourishment	4-P-02-056	R-108 to R-143	Beach nourishment	8.3 miles Loggerhead 14 nests Green 1 nest Leatherback < 1 nest Kemp's ridley <1 nest
9 June 2009	Escambia	Perdido Key Beach Nourishment	2008-F-0059	R-1 to R-34	New beach nourishment	6.5 miles
9 Sept 2010	Escambia	Pensacola Navigation Channel	2009-F-0205; using statewide programmatic 41910-2010-F-0547	R-32 to R-64	Navigation channel maintenance and dredge material disposal	6.3 miles
11 Jan 2010	Escambia	FEMA Perdido Key Upland Berm	Using statewide programmatic 41910-2010-F-0547	R-21.5 to R-31.5	Post Tropical Storm Gustav berm	2.0 miles
8 April 2005	Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf	FEMA Beach Berms Post Hurricane Ivan Emergency Coordination (consultation incomplete)		UK	Emergency beach berms	Walton 20 miles Okaloosa 4.2 miles Mexico Bch 1 mile Panama City Bch UK St Joseph peninsula UK Perdido Key UK Navarre UK
10 May 2004	Franklin	Alligator Point Beach Nourishment	4-P-02-163	R-207 to R-210	Beach nourishment	2,500 feet Loggerhead,: 2 nests, green 1 nest; leatherback 1 nest
17 May 2007	Gulf	St. Joseph Peninsula Beach Nourishment	4-P-07-056 2007-F-0220	R-67 to R-105.5	Beach nourishment	7.5 miles
31 Jan 2008	Gulf	St. Joseph Peninsula Beach Nourishment; Amendment 2	2008-F-0161	R-67 to R-105.5	Beach nourishment – change from work in 2 to 1 season.	7.5 miles; no increase in IT.
2009	Gulf	St. Joseph Peninsula Beach		R-95.3 to R-105.5	Beach berm repair (emergency)	10,300 linear feet

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25 April 2001	Okaloosa	Eglin AFB Porous Groin within Season	4-P-00-207	Eglin AFB Test Sites 1 and 3	Experimental porous groin system	
18 June 2002	Okaloosa	Eglin 737 Sensor Test Site 13-A SRI	4-P-02-088	V-507	Military testing	0.01 acre 0.12 mile
2009	Okaloosa	City of Destin		R-17.37 to R-19	Beach berm repair (emergency)	1,260 linear feet
23 Dec 2009	Okaloosa	East Pass at Destin Navigation Channel	2009-F-0096	R-17 to R-25.5	Navigational channel maintenance	1.7 miles
21 March 2003	Okaloosa Santa Rosa	Eglin Marine Expeditionary Unit Training	4-P-03-052	V-621 to V-501	Military marine training	
9 October 2003	Okaloosa Santa Rosa	Eglin AFB U.S. Army Ranger Los Banos	4-P-03-289	V-502 to V-533	Military army training	7 miles
25 February 2004	Okaloosa, Santa Rosa	Eglin AFB Advance Skills Training	4-P-03-264	R-502 to R-534	Military training	7 miles 70 acres
4 June 2004	Okaloosa Santa Rosa	Eglin AFB Airborne Littoral Reconnaissance Test	4-P-04-225	V-501 to V-514	Military naval testing	0.5 mile 15.2 acres
1 December 2005	Okaloosa Santa Rosa	Eglin Air Force Base Military Mission & Training Santa Rosa Island Programmatic	4-P-05-242	V-621 to V-501	Military missions	17 miles
6 December 2007	Okaloosa Santa Rosa	Eglin AFB Airborne Littoral Reconnaissance Test	2008-F-0056	V-501 to V-514 Test Site A-15	Military naval testing	0.7 acre
3 June 2008	Okaloosa Santa Rosa	Eglin AFB Beach and Dune Restoration	2008-F-0139	V-551 to V-609 excluding non-AF lands and V-512 to V-518	Beach nourishment including dune restoration (new)	5.0 miles
28 August 2008	Okaloosa, Santa Rosa	Eglin Air Force Base Armoring Santa Rosa Island Test Sites A-3, A-6, A-13B	2008-F-061	Test Sites A-3, A-6, A-13B	Storm protection at air force facilities, Santa Rosa island	0.57 miles
21 April 2009	Okaloosa, Santa Rosa	East Pass Destin Navigation Channel	2009-F-0295	V-619.5 to V-621 and R-17	Maintenance navigation channel dredging and dredged material placement	1.6 miles
28 Dec 2009	Okaloosa, Santa Rosa	Eglin Air Force Base protection of Test Sites A-3, A-13, and A-13b	2008-F-061 amendment 1	V-608 and V-512	Sand placement 100% proposed at sites A-3 and 50% of proposed between sites A-13b and A-13.	A-3, = 7,000 feet; between A-13b and A-13.5=5,500-7,000 feet

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
28 Dec 2009	Okaloosa, Santa Rosa	Eglin Air Force Base	2008-F-039 amendment 1	V-608 and V-512	Sand placement 100% proposed at sites A-3 and 50% of proposed between sites A-13b and A-13.	A-3, = 7,000 feet; between A-13b and A-13.5=5,500-7,000 feet
26 March 2002	Santa Rosa, Okaloosa, Gulf	Eglin AFB INRMP		V-621 to V-501	Integrated natural resources management program	17 miles
19 July 2005	Santa Rosa	Navarre Beach Nourishment Emergency Coordination (consultation incomplete)	4-P-04-244	R-192.5 to R-213.5	Emergency beach nourishment	4.1 miles
24 Aug 2006	Santa Rosa	Navarre Beach Restoration Amendment 1	4-P-04-244 2007-F-0139		Walkover construction associated with beach nourishment	4.1 miles (no additional take provided from original)
30 Aug 2006	Santa Rosa	Navarre Beach Restoration Amendment 1	4-P-04-244 2007-F-0139		Walkover construction associated with beach nourishment	4.1 miles (no additional take provided from original)
29 Nov 2006	Santa Rosa	Navarre Beach Restoration Amendment 1	4-P-04-244 2007-F-0139		Walkover construction associated with beach nourishment	4.1 miles (no additional take provided from original)
28 August 2008	Santa Rosa	Eglin AFB SRI Armoring at Test Sites	2008-F-0061	V-608, V-551, and V-512	Bulkheads around test sites A-3, A-6, and A-13B	0.57 mile
7 Dec 2006	Santa Rosa	Navarre Beach Restoration Amendment 1	4-P-04-244 2007-F-0139		Walkover construction associated with beach nourishment	4.1 miles (no additional take provided from original)
9 October 2009	Santa Rosa	Navarre Beach Restoration Amendment 7	2010-F-0036	R-192 to R-194	Emergency beach restoration	1,800 feet
30 April 2004	Walton, Okaloosa	Walton County-Destin Beach Nourishment	4-P-01-149	R-39 (Okaloosa Co.) to R-21.93 (Walton Co.)	New beach nourishment	6.7 miles Loggerhead: 11 nests; green 1 nests; leatherback & Kemp's ridley: < 1 nests
8 May 2006	Walton	Western Lake Emergency Opening	4-P-01-105	R-72 to R-73	Emergency outlet opening	0.5 miles 3.0 acres
26 October 2007	Walton	Eastern Lake Emergency Opening	2007-F-0627	R-94 to R-95	Emergency opening of coastal dune lake to GOM	0.5 mile

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
9 November 2007	Walton	Alligator Lake Emergency Opening	2007-F-0031	R-68 to R-70	Emergency opening of coastal dune lake to GOM	0.5 mile
2 October 2008	Walton	Walton County Beach Nourishment Phase 2	2008-F-060	R-41 to R-67, R-78 to R-98, R-105.5 to R-127	Beach nourishment (new)	13.5 miles
SOUTH FLORIDA FIELD OFFICE						3,390 feet
11 March 2003	Broward	Broward County Shore Protection Project	4-1-99-F-506		Port Everglades dredging and beach nourishment	
4 Dec 2003	Broward	Diplomat Beach Nourishment	4-1-00-F-743		Nourishment and 200 feet of riprap	
25 Aug 2004	Broward	Fishermen's Pier	4-1-04-F-8366		Pier repair	14,910 square feet
18 June 2007	Broward	Hillsboro Inlet Maintenance Dredging and Sand Placement	41420-2006-FA-0896	315 feet of the Inlet and 500 feet of shoreline at R-25.	Inlet dredging and sand nourishment	500 feet
10 Dec 2007	Broward	Town of Hillsboro Beach Pressure Equalizing Modules (PEMs) Pilot Project	41420-2007-F-0859	300 feet north of R-7 to 100 feet south of R-12 1 mile of shoreline	Pilot project to investigate the effectiveness of the PEMs	1 mile
7 Mar 2008	Broward	Broward County Glass Cullet Pilot Project	41420-2007-FA-0599	Centered at R-103	Pilot project to examine the effectiveness of glass cullet as potential beach fill supplement material for shoreline stabilization.	333 feet
28 April 2008	Broward	Town of Hillsboro Truck Haul Beach Nourishment Project	41420-2008-FA-0187	330 feet north and 100 feet south of R-7	Temporary beach nourishment	0.08 mile (430 feet)
3 Sept 2008	Broward	Hillsboro Inlet Maintenance Dredging and Sand Placement	41420-2006-FA-0896	500 feet south of R-25	Inlet dredging and sand placement. This is an amended BO in regard to the original BO completed on 18 June 2007.	500 feet
28 May 2010	Broward	Port Everglades Jetty Repair	41420-2010-CPA-0144	South Jetty	Repair of the south jetty.	0.15 mile

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18 June 2010	Broward	Hillsboro Beach Sand Placement	41420-2008-FA-0187	R-5 +300 to R-12 +450 feet	Beach nourishment	1.35 miles
23 March 2005	Charlotte	Manasota Key Groin Construction	4-1-04-F-8338	R-19 to R-20	Stump Pass dredging (material placed on beach); and groin construction	1,000 feet
29 March 2006	Charlotte	Stump Pass Dredging and Beach Nourishment	4-1-04-F-8338	R-16.5 to R-18	Stump Pass dredging and beach nourishment	1,500 feet
26 April 2010	Charlotte	Stump Pass Dredging and Sand Placement	41420-2008-FA-0425	R-14.4 to R-20 R-22 to R-23 R-29 to R-39	Stump Pass dredging and sand placement	3.5 miles
3 April 2003	Collier	Keewaydin Island Limited Partnership T-Groin Project	4-02-F-1099	R-90 to R-91	Gordon Pass – maintenance dredge; nourish the section of beach where groins are to be constructed; construct three t-groins	1,000 feet
14 March 2005	Collier	Hideaway Beach	4-1-04-F-6342	H-1 to H-5 and H-9 to H-12	Beach nourishment and t-groin construction	1.4 miles
20 Sept 2005	Collier	Collier County Beach Re-Nourishment Project	4-1-04-TR-8709	Segments within R-22 and R-79	Beach nourishment	13.4 miles
14 Nov 2005	Collier	South Marco Island Beach Re-Nourishment	4-1-04-TR-11752	R-144 to G-2	Beach nourishment	0.83 mile
28 August 2008	Collier	Doctor's Pass North Jetty Repair	41420-2008-FA-0432	R-57 plus 500 feet south	Removing the existing 240 feet of existing jetty and constructing a new jetty within generally the same footprint.	0.25 mile
27 October 2009	Collier	Hideaway Beach Erosion Control	41420-2008-FA-0935	H-4 to H-9	Sand placement and construction of six T-head groins.	0.47 mile
18 August 2010	Collier	Gordon Pass Erosion Control Project – Phase 2 (T-head groins)	41420-2008-FA-0765	R-91 to R-92	Construction of two T-head groins.	0.19 mile
28 Oct 2010	Collier	Collier County Truck Haul Sand Placement (Park Shore & Naples Beach)	41420-2010-F-0225	R-45 +600 feet to R-46 +400 feet; R-58A -500 feet to R-58	A truck haul sand placement project	0.37 mile

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
12 Oct 2004	Indian River	Issuance of Permits to Homeowners for Emergency Coastal Armoring	10(a)(1)(B) permit			3,196 feet
28 Feb 2005	Indian River	Indian River County Beach Nourishment - Sectors 3 and 5	4-1-05-F-10922	Gaps between R-21 and R-107	Dune restoration and beach nourishment	5.90 miles dunes 0.8 mile beach
22 Nov 2005	Indian River	Indian River County Beach Nourishment – Sector 7	4-1-05-TR-9179	R-97 to R-108	Beach nourishment	2.2 miles
31 Oct 2006	Indian River	Indian River County Beach Nourishment – Sectors 1 and 2	41420-2006-FA-1491	R-3.5 to R-12	Dune enhancement and beach nourishment	1.62 miles
10 Sept 2007	Indian River	Sebastian Inlet Channel and Sand Trap Dredging, Sectors 1 and 2 Beach Nourishment	41420-2007-F-0864	R-3 to R-12	Sand trap dredging and beach nourishment	1.61 miles
10 October 2008	Indian River	Baytree and Marbrisa Condominium Dune Restoration	41420-2008-FA-0007	200 feet south of R-46 to 200 feet south of R-48	Dune restoration/enhancement	0.38 mile
16 October 2009	Indian River	City of Vero Beach, Outfall Pipe Installation	41420-2009-FA-0255	220 feet north and 930 feet south of R-83	Outfall pipe installation	0.22 mile
2 December 2009	Indian River	Indian River County Beach Nourishment Sector 3	41420-2007-F-0839	Phase 1 = R-32 to R-55 Phase 2 = R-20 to R-32	Beach and dune nourishment	Phase 1 = ~4.4 miles Phase 2 = ~2.3 miles
24 July 2002	Lee	Gasparilla Island Beach Nourishment	4-01-F-765	R-10 to R-26.5 R-25, R-25.5, R-26	Beach nourishment; breakwater construction; and two t-head groins	3.2 miles
19 June 2003	Lee	Bonita Beach Re-nourishment	4-1-02-F-1736		Beach nourishment	3,922 feet
4 March 2005	Lee	Sanibel and Captiva Island Beach Nourishment	4-1-04-F-9180	R-83 to R-109 and R-110 to R-118	Beach nourishment	6.0 miles
14 March 2007	Lee	Gasparilla Island Beach Nourishment (BO amendment)	41420-2007-FA-0509	South of R-26A	Beach nourishment	
27 August 2007	Lee	North Captiva Island Beach Nourishment	41420-2007-FA-1023	R-81 and 208 feet south of R-81A	Beach nourishment	0.23 mile
5 August 2009	Lee	Matanzas Pass Reopening	41420-2009-FA-0132	North end of Estero Island	Channel dredging	0.14 mile

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
21 March 2008	Lee	Blind Pass Reopening	41420-2006-FA-1549	R-109 to R-114	Reopening Blind Pass and then nourishing the shoreline between R-112 and R-114.	0.95 mile
7 Dec 2009	Lee	Sanibel Island Sand Placement	41420-2009-FA-0066	R-174A to Bay 1A	Beach nourishment	0.25 mile
15 Sept 2010	Lee	Big Hickory Island Sand Placement and Groin Construction	41420-2010-CPA-0100	R-222.3 to R-223.8	Beach nourishment and groin construction	0.47 mile
31 Jan 2002	Martin	Jupiter Island	4-1-05-TR-13281	R-75 to R-117	Beach nourishment	6.5 miles
5 Jan 2005	Martin	Martin County Shore Protection Project	4-1-05-F-10476	R-1 to R-25.6	Beach nourishment	4.1 miles
2 Dec 2005	Martin	Jupiter Island Modification	4-1-05-TR-13281	R-76 to R-84 and R-87 to R-11	Beach nourishment	5 miles
2 Feb 2007	Martin	Sailfish Point Marina Channel Dredging and Beach Nourishment	41420-2007-FA-0196	R-36 to R-39	Channel dredging and beach nourishment	0.66 mile
6 October 2009	Martin	Bathtub Beach Park Sand Placement	41420-2009-FA-0110	R-34.5 to R-36	Beach nourishment	0.24 mile
8 June 2010	Martin	Martin County Beach Erosion Control Project	41420-2009-FA-0190	R-1 to R-25	Beach nourishment	~ 4 miles
23 Sept 2005	Miami-Dade	Bal-Harbour T-Groin Reconstruction	4-1-05-12842	R-27 to R-31.5	Groin removal and reconstruction	0.85 mile
11 Oct 2005	Miami-Dade	Bakers Haulover AIW Maintenance Dredging	4-1-04-TR-8700	R-28 to R-32	Dredging and beach nourishment	0.85 mile
7 June 2006	Miami-Dade	Miami-Dade Beach Nourishment	41420-2006-FA-0028	3 segments within R-48.7 and R-61	Beach nourishment	3,716 feet
25 July 2007	Miami-Dade	Miami Beach Nourishment	41420-2006-F-0028	R-67 to R-70	BO modification to June 7, 2006 BO	3,000 feet
5 Nov 2008	Miami-Dade	Baker's Haulover Dredging and Sand Placement	41420-2008-FA-0729	R-28 to R-32	BO modification to the October 11, 2005 BO. Dredging and sand placement events will be biannual.	4,000 feet
12 Nov 2008	Miami-Dade	DERM Truck Haul Sand Placement	41420-2008-FA-0776	R-27 to R-29 R-7 to R-12 R-43 to R-44+500 feet	Beach nourishment	1.78 miles
25 Nov 2009	Miami-Dade	DERM 27th Street Sand Placement	41420-2009-FA-0045	R-60 to R-61	Beach nourishment	0.19 mile
17 Dec 2009	Miami-Dade	32nd and 63rd Streets Sand Placement	41420-2009-FA-0415	R-37.75 to R-46.25 R-53.7 to R-55.5 R-60 to R-61	Sand placement	2.14 miles

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
31 March 2010	Miami-Dade	55th Street Sand Placement	41420-2009-FA-0046	R-48.7 to R-50.7	Sand placement	0.38 mile
30 April 2010	Miami-Dade	44th Street Sand Placement	41420-2009-FA-0047	R-53.7 to R-55.5	Sand placement	0.34 mile
25 June 2010	Miami-Dade	Bal Harbour Sand Placement	41420-2009-FA-0593	R-29 to R-32	Sand Placement – truck haul	0.60 mile
28 June 2010	Miami-Dade	Sunny Isles BeachSand Placement	41420-2009-FA-0594	R-12 to R-15)	Sand Placement – truck haul	0.58 mile
30 July 2010	Miami-Dade	Miami Beach sand placement	41420-2009-FA-0595	R-45 to R-48 +700 feet	Sand Placement – truck haul	0.78 mile
13 Sept 2010	Miami-Dade	Miami Beach sand placement	41420-2009-FA-0527	R-43 to R-44 + 500 feet	Sand Placement – truck haul	0.26 mile
8 October 2010	Miami-Dade	Sunny Isles Beach Sand Placement	41420-2009-FA-0526	R-7 to R-12	Sand Placement – truck haul	0.95 mile
8 October 2010	Miami-Dade	Bal Harbour Sand Placement	41420-2009-FA-0525	R-27 to R-29	Sand Placement – truck haul	0.38 mile
2009	Monroe	Reclaimed sand placement and sand cleaning (seaweed removal)	41420-2010-F-0006	No R-monuments	Sand placement and cleaning	1,462 linear feet
2009	Monroe	City of Key West (South Beach)	41420-2010-F-0013	No R-monuments	Beach repair (emergency)	235 linear feet
2009	Monroe	City of Key West (Rest Beach)	41420-2010-F-0014	No R-monuments	Beach repair (emergency)	640 linear feet
2009	Monroe	City of Marathon, Sombrero Beach	41420-2010-F-0001	No R-monuments	Beach repair (emergency)	1,380 linear feet
5 March 2010	Monroe	City of Key West – Simonton Beach	41420-2010-FC-0412	Approximately 350 feet ENE of V-416 (latitude 24.562, longitude -81.8054	Emergency beach repair	95 linear feet
5 March 2010	Monroe	City of Key West – Dog Beach	41420-2010-FC-0413	Between V-414 and V-413 (latitude 24.5473, longitude -81.7929	Emergency beach repair	35 linear feet
13 May 2010	Monroe	City of Key West, Smathers Beach	41420-2008-FA-0185	No R-monuments	Sand placement	0.57 mile
27 March 2003	Palm Beach	Palm Beach Harbor M & O	4-1-03-F-139	200 feet south of the south jetty	Jetty sand tightening	200 feet
16 March 2004	Palm Beach	Boca Raton Inlet Sand Bypassing	4-1-04-F-4688	200 feet south of R-223	Inlet sand bypassing and beach nourishment	500 feet
11 Feb 2005	Palm Beach	Palm Beach Shoreline Protection Project - Delray Segment	4-1-05-F-10767	R-175 to R-188	Beach restoration	2.7 miles

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
24 Feb 2005	Palm Beach	Palm Beach Shoreline Protection Project - Ocean Ridge Section	4-1-05-F-10787	R-153 to R-159	Beach nourishment	1.12 miles
11 April 2005	Palm Beach	South Lake Worth Inlet Sand Transfer Plant Reconstruction and Bypassing	4-1-04-F-8640	135 feet south of R-151, to 275 feet south of R-152	STP reconstruction and bypassing	900 feet
5 Dec 2005	Palm Beach	Mid-Town Beach Nourishment Project (Reach 3 & 4)	4-1-00-F-742	R-90.4 to R-101.4	Beach nourishment	2.4 miles
23 Dec 2005	Palm Beach	Palm Beach Harbor M & O	4-1-05-TR-13258	R-76 to R-79	Dredging and beach nourishment	3,450 feet
23 Feb 2006	Palm Beach	Boca Raton Central Beach Nourishment Project	4-1-01-F-1795	R-216 to R-222	Dredge shoal fronting Boca Raton Inlet and beach nourishment	1.3 miles
23 Feb 2006	Palm Beach	Boca Raton South Beach Nourishment Project	41420-2008-FA-0777 Old database number 41-01-F-652	R-223.3 to R-227.9	Dredge shoal fronting Boca Raton Inlet and beach nourishment	Approx. 1 mile
28 April 2006	Palm Beach	Palm Beach Nourishment Project – Reach 8	41420-2006-F-0018	R-125 to R-134	Beach nourishment	2.17 miles
31 July 2006	Palm Beach	Sea Dunes Condominium Seawall	41420-2006-FA-1108		Seawall construction	0.03 acre
15 Dec 2006	Palm Beach	North Ocean Boulevard Rock Revetment	41420-2006-FA-1490	290 feet north of R-84; 1,150 feet south of R-85	Rock revetment construction	0.34 mile
5 Feb 2007	Palm Beach	Palm Beach Sand Transfer Plant Reconstruction	41420-2006-FA-1447	R-76 to R-79	Sand transfer plant reconstruction and discharge pipe extension	0.57 mile
28 March 2007	Palm Beach	Lake Worth Inlet Jetty Repair	41420-2007-FA-0221	200 feet north of R-75 and 200 feet south of R-76	Jetty repair	400 feet
25 May 2007	Palm Beach	Singer Island and South Palm Beach Emergency Dune Restoration	41420-2007-FA-1001	385' south of R-137 to 500' north of R-136; 500'south of R-60 to 850' south of R-65	Dune Restoration	6,135 feet
25 May 2007	Palm Beach	Jupiter Island ICWW Maintenance Dredging and Beach Nourishment	41420-2006-FA-1582	16,000 feet (130,000 cy) of the ICWW dredged; material placed between R-13 and R-19.	Channel dredging and beach nourishment	1.04 miles
20 July 2007	Palm Beach	North Boca Raton Beach Nourishment	41420-2007-FA-0477	T-205 to 181 feet south of R-212	Beach nourishment	1.45 miles

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
9 Nov 2007	Palm Beach	Jupiter Inlet and channel dredging	41420-2006-FA-1582	R-13 to R-17	Dune restoration	~ 4,000 linear feet
14 Nov 2007	Palm Beach	Jupiter Inlet Sand Trap Dredging and Sand Placement	41420-2007-FA-0600	Maintenance dredging of the inlet; beach compatible placed R-13 to R-19	Inlet dredging and beach nourishment	1.02 miles
28 Nov 2007	Palm Beach	Modification to a Sheet Pile and Rubble-Mound T-Head Groin System	41420-2007-FA-0574	500 feet north of R-94 south to R-95	T-groin repair, extension, construction	0.4 mile
5 Feb 2008	Palm Beach	Reach 8 Dune Restoration	41420-2006-F-0018	R-125 to 350 feet south of R-134	Dune restoration	2.17 miles
9 Sept 2008	Palm Beach	Juno Beach Sand Placement	41420-2008-FA-0081	R-26 to R-38	Sand placement	2.45 miles
4 Nov 2008	Palm Beach	Palm Beach Harbor M&O and Sand Placement	41420-2008-FA-0524	R-76 to R-79	Biannual Inlet dredging and sand placement events.	3,450 feet
2009	Palm Beach	Beach berm repair	41420-2010-F-0008	R-60 to R-68	Beach berm repair (permanent work)	6,880 linear feet
2009	Palm Beach	Beach berm repair	41420-2010-F-0009	R-135 to R-138	Beach berm repair (permanent work)	3,590 linear feet
2009	Palm Beach	Beach berm repair	41420-2010-F0010	R-137 to R-138	Beach berm repair (emergency)	125 linear feet
21 June 2010	Palm Beach	Mid-Town Reaches 3 & 4 Sand Placement	41420-2006-F-0011-R001	R-95 to R-100	Beach nourishment	0.95 mile
2 July 2010	Palm Beach	Phipps Ocean Park Reaches 7&8	41420-2010-CPA-0110	R-116 to R-125	Sand Placement	3.4 miles
3 Sept 2010	Palm Beach	Singer Island Breakwater	41420-2008-FA-0019	R-60.5 to R-66	Segmented, submerged breakwater	1.1 miles
19 June 2003	St. Lucie	Fort Pierce Shoreline Protection	4-1-03-F-1867 41420-2006-FA-1575	R-33.8 to R-41	Beach nourishment; berm expansion; and six t-head groins	1.3 miles
9 March 2006	St. Lucie	Blind Creek Restoration and South St. Lucie Emergency Berm Remediation Project	41420-2006-FA-0075	R-98 to R-115 R-88 to R-90	Wetland restoration and beach nourishment	3.6 miles
27 June 2008	St. Lucie	Fort Pierce Shoreline Protection Project	41420-2006-FA-1575	R-34 to R-41	Beach nourishment, berm expansion, and six t-head groins	1.3 miles
25 Aug 2004	Sarasota and Manatee	Longboat Key Beach Nourishment	4-1-04-F-4529	R-46A to R-29.5	Beach nourishment	9.45 miles
4 Oct 2005	Sarasota and Manatee	Longboat Key Beach Nourishment Project – BO Amendment	4-1-04-TR-4529	R-44 to R-44.5 and R-46A to R-44.5	Beach nourishment	0.47 mile

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
20 Oct 2005	Sarasota	South Siesta Key	4-1-05-TR-12691	R-67 to R-77 plus 200 feet	Beach nourishment	2.1 miles
7 Dec 2007 (original BO) 28 July 08 (BO mod)	Sarasota	Lido Key Beach Fill Placement Project	41420-2007-F-0841	R-35.5 to R-44.2 2.27 miles	Beach nourishment with 425,000 cy of fill material.	2.27 miles
13 August 2008	Sarasota	Longboat Key Permeable Adjustable Groins	41420-2007-FA-0205	R-13 to R-13.5	Construction of two permeable adjustable groins.	0.09 mile project area 0.43 mile action area
2009	Sarasota		41420-2010-F-0003	R-77 to midpoint between R-77 and R-76	Beach restoration	700 linear feet
2009	Sarasota	Longboat Key Beach	41420-2010-F-0007	R-13 to R-14 Sarasota County; R-44 to R-5, and R-48.5 to R-49.5 Manatee County	Beach berm repair	951, 1,197, and 1,142 linear feet, respectively

Appendix B

NMFS Consultations

CONSULTATION ACTIVITY	TYPE OF ACTION	DATE SIGNED	ACTION AREA	INCIDENTAL TAKE STATEMENT (ANTICIPATED TAKE)									
				Loggerhead (NWAO & NP DPS)		Green Turtle		Leatherback		Hawksbill		Kemp's Ridley Olive Ridley	
				Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
Non-Fishery Consultations													
North Carolina DENR Inshore Gillnet-Incidental Take Permit	Section 10(a)(1)(B)	9/6/13	North Carolina Inshore Waters	1-yr Estimate									
						330	165					98	49
				1-yr Observed									
				24		18		8		8		12	
Removal of Offshore Structures in the Gulf of Mexico Outer Continental Shelf	Oil & Gas	8/28/2006	Gulf of Mexico	6-yr Estimate									
				15*	0	3*	0	3*	0	3*	0	3*	0
Sinking Exercises (SINKEX) in the Western North Atlantic Ocean	Military	9/22/2006	Western North Atlantic Ocean	1-yr Estimate									
				ITS - We do not have information to determine an amount of take. Survey data for the SINKEX location is extremely limited and the densities or abundance of sea turtles within the area is not known. Therefore, we anticipate the extent of take would be within the water column that would be affected by the shock and pressure waves above levels of 12 psi and 182 dB re 1 μ Pa2-sec in the greatest 1/3 octave band. For the largest underwater detonations, the extent includes the volume within 2 nmi of the detonation. Thus, the extent of take includes the "exclusion zone" of the SINKEX.									
Issuance of multiple permits to conduct scientific research on Atlantic sturgeon pursuant to section 10 (a)(1) of the Endangered Species Act of 1973	Section 10(a)(1)(A) for Sturgeon Research	4/2/2012	U.S. Atlantic Coast (from ME to FL)	Anticipated take for the entire research permit (5 years)									
				4*	0	4*	0	4*	0	4*	0	4*	0
National Science Foundation - Marine Seismic Survey in the Central Pacific Ocean	Seismic	11/23/2011	Central Pacific Ocean	Anticipated take for the entire project period									
				ITS - We do not have information to determine an amount of take. Harassment of these sea turtles is expected to occur at received levels of seismic sounds above 166 dB re 1 μPa. Because density estimates of sea turtles in the survey area are unknown, we estimate take as the number of turtles exposed to seismic operations above 166 dB re 1 μPa during the proposed activities. These turtles could be of all ages and life stages in the survey area.									
Navy - Conduct of training in the Virginia Capes, Cherry Point and Jacksonville Range Complexes June 2011 to June 2012	Navy Activities	6/1/2011	Central Pacific Ocean	Anticipated take for the entire project period									
				485	9	311*	3*	20	1	311*	3*	557	5

Appendix C

ASSESSMENTS: DISCERNING PROBLEMS CAUSED BY ARTIFICIAL LIGHTING

LIGHTING INSPECTIONS

WHAT ARE LIGHTING INSPECTIONS?

During a lighting inspection, a complete census is made of the number, types, locations, and custodians of artificial light sources that emit light visible from the beach. The goal of lighting inspections is to locate lighting problems and to identify the property owner, manager, caretaker, or tenant who can modify the lighting or turn it off.

WHICH LIGHTS CAUSE PROBLEMS?

Although the attributes that can make a light source harmful to sea turtles are complex, a simple rule has proven to be useful in identifying problem lighting under a variety of conditions:

An artificial light source is likely to cause problems for sea turtles if light from the source can be seen by an observer standing anywhere on the nesting beach.

If light can be seen by an observer on the beach, then the light is reaching the beach and can affect sea turtles. If any glowing portion of a luminaire (including the lamp, globe, or reflector) is directly visible from the beach, then this source is likely to be a problem for sea turtles. But light may also reach the beach indirectly by reflecting off buildings or trees that are visible from the beach. Bright or numerous sources, especially those directed upward, will illuminate sea mist and low clouds, creating a distinct glow visible from the beach. This "urban skyglow" is common over brightly lighted areas. Although some indirect lighting may be perceived as nonpoint-source light pollution, contributing light sources can be readily identified and include sources that are poorly directed or are directed upward. Indirect lighting can originate far from the beach. Although most of the light that sea turtles can detect can also be seen by humans, observers should realize that some sources, particularly those emitting near-ultraviolet and violet light (e.g., bug-zapper lights, white electric-discharge lighting) will appear brighter to sea turtles than to humans. A human is also considerably taller than a hatchling; however, an observer on the dry beach who crouches to the level of a hatchling may miss some lighting that will affect turtles. Because of the way that some lights are partially hidden by the dune, a standing observer is more likely to see light that is visible to hatchlings and nesting turtles in the swash zone.

HOW SHOULD LIGHTING INSPECTIONS BE CONDUCTED?

Lighting inspections to identify problem light sources may be conducted either under the purview of a lighting ordinance or independently. In either case, goals and methods should be similar.

GATHER BACKGROUND INFORMATION

Before walking the beach in search of lighting, it is important to identify the boundaries of the area to be inspected. For inspections that are part of lighting ordinance enforcement efforts, the jurisdictional boundaries of the sponsoring local government should be determined. It will help to have a list that includes the name, owner, and address of each property within inspection area so that custodians of problem lighting can be identified. Plat maps or aerial photographs will help surveyors orient themselves on heavily developed beaches.

PRELIMINARY DAYTIME INSPECTIONS

An advantage to conducting lighting inspections during the day is that surveyors will be better able to judge their exact location than they would be able to at night. Preliminary daytime inspections are especially important on beaches that have restricted access at night. Property owners are also more likely to be available during the day than at night to discuss strategies for dealing with problem lighting at their sites.

A disadvantage to daytime inspections is that fixtures that are not directly visible from the beach will be difficult to identify as problems. Moreover, some light sources that can be seen from the beach in daylight may be kept off at night and thus present no problems. For these reasons, daytime inspections are not a substitute for nighttime inspections. Descriptions of light sources identified during daytime inspections should be detailed enough so that anyone can locate the lighting. In addition to a general description of each luminaire (e.g., HPS floodlight directed seaward at top northeast corner of the building at 123 Ocean Street), photographs or sketches of the lighting may be necessary. Descriptions should also include an assessment of how the specific lighting problem can be resolved (e.g., needs turning off; should be redirected 90° to the east). These detailed descriptions will show property owners exactly which luminaries need what remedy.

NIGHTTIME INSPECTIONS

A nighttime survey shall be conducted of all lighting visible from the beach placement area by the FWC permit holder, using standard techniques for such a survey. During the nighttime lighting surveys, the surveyor shall walk the length of the beach placement area looking for light from artificial sources. During the nighttime lighting surveys, a complete census shall be made of the number, types, locations, and custodians of artificial light sources that emit light visible from the beach. Because problem lighting will be most visible on the darkest nights, lighting inspections are to be conducted when there is no moon visible. Descriptions of light sources identified during the survey should be detailed enough so that anyone can locate the lighting. In addition to a general description of each luminaire (e.g., HPS floodlight directed seaward at top northeast corner of the building at 123 Ocean Street), photographs or sketches of the lighting may be necessary. Descriptions should also include an assessment of how the specific lighting problem can be resolved (e.g., needs turning off; should be redirected 90° to the east, etc.). A summary report of the survey shall be submitted to the Corps, FWC, and the Service.

Surveyors orienting themselves on the beach at night will benefit from notes made during daytime surveys. During nighttime lighting inspections, a surveyor walks the length of the nesting beach looking for light from artificial sources. There are two general categories of artificial lighting that observers are likely to detect:

1. **Direct lighting**. A luminaire is considered to be direct lighting if some glowing element of the luminaire (e.g., the globe, lamp [bulb], reflector) is visible to an observer on the beach. A source not visible from one location may be visible from another farther down the beach. When direct lighting is observed, notes should be made of the number, lamp type (discernable by color; style

of fixture), mounting (pole, porch, *etc.*), and location (street address, apartment number, or pole identification number) of the luminaire(s). If exact locations of problem sources were not determined during preliminary daytime surveys, this should be done during daylight soon after the nighttime survey. Photographing light sources (using long exposure times) is often helpful.

2. **Indirect lighting**. A luminaire is considered to be indirect lighting if it is not visible from the beach but illuminates an object (e.g., building, wall, tree) that is visible from the beach. Any object on the dune that appears to glow is probably being lighted by an indirect source. When possible, notes should be made of the number, lamp type, fixture style, and mounting of an indirect-lighting source. Minimally, notes should be taken that would allow a surveyor to find the lighting during a follow-up daytime inspection (for instance, which building wall is illuminated and from what angle?).

WHEN SHOULD LIGHTING INSPECTIONS BE CONDUCTED?

Because problem lighting will be most visible on the darkest nights, lighting inspections are ideally conducted when there is no moon visible. Except for a few nights near the time of the full moon, each night of the month has periods when there is no moon visible. Early-evening lighting inspections (probably the time of night most convenient for inspectors) are best conducted during the period of two to 14 days following the full moon. Although most lighting problems will be visible on moonlit nights, some problems, especially those involving indirect lighting, will be difficult to detect on bright nights.

A set of daytime and nighttime lighting inspections before the nesting season and a minimum of three additional nighttime inspections during the nesting-hatching season are recommended. The first set of day and night inspections should take place just before nesting begins. The hope is that managers, tenants, and owners made aware of lighting problems will alter or replace lights before they can affect sea turtles. A follow-up nighttime lighting inspection should be made approximately two weeks after the first inspection so that remaining problems can be identified. During the nesting-hatching season, lighting problems that seemed to have been remedied may reappear because owners have been forgetful or because ownership has changed. For this reason, two midseason lighting inspections are recommended. The first of these should take place approximately two months after the beginning of the nesting season, which is about when hatchlings begin to emerge from nests. To verify that lighting problems have been resolved, another follow-up inspection should be conducted approximately one week after the first midseason inspection.

WHO SHOULD CONDUCT LIGHTING INSPECTIONS?

Although no specific authority is required to conduct lighting inspections, property managers, tenants, and owners are more likely to be receptive if the individual making recommendations represent a recognized conservation group, research consultant, or government agency. When local ordinances regulate beach lighting, local government code-enforcement agents should conduct lighting inspections and contact the public about resolving problems.

WHAT SHOULD BE DONE WITH INFORMATION FROM LIGHTING INSPECTIONS?

Although lighting surveys serve as a way for conservationists to assess the extent of lighting problems on a particular nesting beach, the principal goal of those conducting lighting inspections should be to ensure that lighting problems are resolved. To resolve lighting problems, property managers, tenants, and owners should be give the information they need to make proper alterations to light sources. This information should include details on the location and description of problem lights, as well as on how the lighting problem can be solved. One should also be prepared to discuss the details of how lighting affects sea turtles. Understanding the nature of the problem will motivate people more than simply being told what to do.

Appendix D
Sea Turtle Lighting Survey Form

Lighting Survey Form

The lighting survey must be conducted to include a landward view from the seaward most extent of the beach profile. The survey must occur after 9 p.m. The survey must follow standard techniques for such a survey and include the number and type of visible lights, location of lights and photo documentation.

Date: _____

Contact information of person conducting the lighting survey: _____

_____

Location (name of beach): _____

Lighting ordinance (applicable County or Municipality): _____

Compliance Officer name and contact information: _____

Survey start time: _____

Survey end time: _____

Survey start location (include address or GPS location):_____

_____

_____

Survey end location (include address or GPS location): _____

_____

Date summarizing report sent to the following: marineturtle@myfwc.com, JCPCompliance@dep.state.fl.us, and seaturtle@fws.gov:_____

County or Municipality contact information for follow up meeting with the FWS and FWC:

_____

For each light visible from the nesting beach provide the following information:

Location of light (include cross street and nearest beach access)	GPS location of light	Description of light (type and location)	Photo take (YES/ NO)	Notification letter with recommendations sent? (YES/NO)

Location of light (include cross street and nearest beach access)	GPS location of light	Description of light (type and location)	Photo take (YES/ NO)	Notification letter with recommendations sent? (YES/NO)

Appendix E

Nesting Seabird and Shorebird Protection Conditions

a. Selection of Bird Monitors. The Permittee or designated representative ("Permittee") shall hire one or more Bird Monitors, depending on the size of the area to be affected, who shall monitor shorebird and seabird (shorebird) activity before, during, and after construction. Bird Monitors shall have proven seabird and shorebird identification skills and avian survey experience. Before hiring any Bird Monitors, the Representative shall provide a list of candidate Bird Monitors with (1) their contact information and (2) a summary of their qualifications, including bird identification skills and avian survey experience, to the FWC Regional Species Conservation Biologist (see the attached FWC contact information exhibit) and copied to JCPCompliance@dep.state.fl.us for FWC approval before the Permittee hires the Bird Monitor(s).

b. The Bird Monitor(s) shall review and become familiar with the general information on the FWC's Florida Shorebird Database (FSD) website (www.FLShorebirdDatabase.org). They shall use the data-collection protocol and implement data-entry procedures as outlined in that website. An outline of data to be collected, including downloadable field data sheets, is available on the website.

c. Breeding season varies by species. Most species have completed the breeding cycle by September 1, but flightless young may be present through September. The following dates are based on the best available information regarding ranges and habitat use by species for this project: February 15 – September 1.

   Surveys during the breeding season shall begin on the first day of the breeding season or 10 days before any site work begins, whichever is later. Surveys shall be conducted through August 31 or until all breeding activity has concluded, whichever is later.

d. During the breeding season, the Bird Monitor(s) shall survey all potential beach-nesting bird habitats that may be affected by construction or pre-construction activities. The Bird Monitor(s) shall establish one or more shorebird survey routes in the FSD website to cover these areas.

e. During the pre-construction and construction phases of the project, the Bird Monitor(s) shall complete surveys on a daily basis to detect breeding activity and the presence of flightless chicks before (1) equipment is moved to the area, (2) vehicles are operated in the area, or (3) any other activities occur that have the potential to disrupt breeding behavior or cause harm to the birds or their eggs or young. Once construction is completed and all personnel and equipment have been removed from the beach, surveys may be conducted at weekly intervals.

f. The Bird Monitor(s) shall survey the project area by walking and looking for evidence of (1) shorebirds exhibiting breeding behavior, (2) shorebird chicks, or (3) shorebird juveniles, as outlined in the FSD's Breeding Bird Protocol for Shorebirds and Seabirds. The Bird Monitor(s) shall use binoculars for these surveys.

g. If an ATV or other vehicle is needed to cover large project areas, operators shall adhere to the FWC's Best Management Practices for Operating Vehicles on the Beach (http://myfwc.com/conservation/you-conserve/wildlife/beach-driving/). Specifically, the vehicle shall be operated at a speed under 6 mph and only on beaches at or below the high-tide line. The Bird Monitor(s) shall stop at no greater than 200-meter intervals to look for breeding activity.

h. Once the Bird Monitor(s) confirms that birds are breeding, as evidenced by the presence of a scrape, eggs, or young, the Bird Monitor(s) shall notify the FWC Regional Species Conservation Biologist (see the attached FWC contact information exhibit) within 24 hours. The Bird Monitor(s) shall report all breeding activity to the FSD website within one week of data collection.

Seabird and Shorebird Buffer Zones and Travel Corridors

The Bird Monitor(s) shall establish a disturbance-free buffer zone around any location within the project area where shorebirds have been engaged in breeding behavior, including territory defense. The FWC considers a 300-foot-wide buffer to be adequate based on published studies; however, a smaller, site-specific buffer may be established if approved by the FWC Regional Species Conservation Biologist (see the attached FWC contact information exhibit). All sources of human disturbance (including pedestrians, pets, and vehicles) shall be prohibited in the buffer zone.

a. The Bird Monitor(s) shall keep breeding sites under sufficient surveillance to determine if birds appear agitated or disturbed by construction or other activities in adjacent areas. If birds do appear to be agitated or disturbed by these activities, then the Bird Monitor(s) shall widen of the buffer zone immediately to a sufficient size to protect breeding birds.

b. The Bird Monitor(s) shall ensure that reasonable and traditional pedestrian access is not blocked in situations where breeding birds will tolerate pedestrian traffic. This is generally the case with lateral movement of beach-goers walking parallel to the beach at or below the highest tide line. Pedestrian traffic may also be tolerated when breeding was initiated within 300 feet of an established beach access pathway. The Bird Monitor(s) shall work with the FWC Regional Species Conservation Biologist to determine if pedestrian access can be accommodated without compromising nesting success.

c. The Bird Monitor(s) shall ensure that the perimeters of designated buffer zones are marked with posts, twine, and signs stating "Do Not Enter, Important Nesting Area" or similar language. The signs shall include the name and a phone number of the entity responsible for posting. Posts shall not be higher than 3 feet once installed. "Symbolic fencing" (i.e., twine, string, or rope) shall be placed between all posts and be clearly visible to pedestrians. In areas where marine turtles nest, the ropes shall be at least 2.5 feet above the ground. If pedestrian pathways are approved by the FWC Regional Species Conservation Biologist within the 300-foot buffer zone, these shall be clearly marked. The Bird Monitor(s) shall ensure that the posting is maintained in good repair until breeding is completed or terminated. Although solitary nesters may leave the buffer zone with their chicks, the posted area continues to provide a potential refuge for the family until breeding is complete. Breeding is not considered to be completed until all chicks have fledged.

d. The Bird Monitor(s) shall ensure that no construction activities, pedestrians, moving vehicles, or stockpiled equipment are allowed within the buffer area.

e. The Bird Monitor(s) shall designate and mark travel corridors outside the buffer areas so as not to cause disturbance to breeding birds. Heavy equipment, other vehicles, or pedestrians may go past breeding areas in these corridors. However, other activities such as stopping or turning heavy equipment and vehicles shall be prohibited within the designated travel corridors adjacent to the breeding site.

f. When flightless chicks are present on the beach, the Bird Monitor(s) shall accompany any moving vehicles or equipment to ensure that no chicks are in the path of the moving vehicle and no tracks are left that could trap flightless chicks.

g. The FWC recommends that the Bird Monitor(s) ensure that some activity in the travel corridor is maintained on a daily basis in order to discourage birds from nesting within the travel corridor. These activities shall not be allowed to disturb shorebirds nesting on site or interfere with marine turtle nesting, especially if the corridors are established before construction has started.

h. *Notification.* If the Bird Monitor(s) find that shorebirds are breeding within the project area, he or she shall ensure that an informational bulletin board is placed and maintained in the construction staging area. This bulletin board shall display the location map of the construction site, depict the location(s) of the bird breeding areas, and include a clearly visible warning stating: "NESTING BIRDS ARE PROTECTED BY LAW INCLUDING THE FLORIDA ENDANGERED AND THREATENED SPECIES ACT AND THE STATE AND FEDERAL MIGRATORY BIRD ACTS".

Post-construction Conditions, Monitoring and Reporting

i. Shorebird: If beach cleaning will occur on the nourished beach, a minimum of 30 percent of the biotic material within the wrack line shall be left on the beach post-cleaning at the strand line in a natural configuration to ensure that the nourished beach re-establishes its function as foraging habitat for shorebirds. This shall occur for as long as the placed sand remains on the beach.

Appendix F

EXAMPLES OF PREDATOR PROOF TRASH RECEPTACLES

Example of predator proof trash receptacle at Gulf Islands National Seashore. Lid must be tight fitting and made of material heavy enough to stop animals such as raccoons.

Example of trash receptacle anchored into the ground so it is not easily turned over.

Example of predator proof trash receptacle at Perdido Key State Park. Metal trash can is stored inside. Cover must be tight fitting and made of material heavy enough to stop animals such as raccoons.

Example of trash receptacle must be secured or heavy enough so it is not easily turned over.

ESSENTIAL FISH HABITAT CONSULTATION

DEPARTMENT OF ARMY REGIONAL GENERAL PERMIT SAJ-93

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
POST OFFICE BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

APR 15 2016

Regulatory Division
SAJ-2005-00972 (RGP-TKW)

Dr. Roy E. Crabtree, Ph.D.
Regional Administrator
Southeast Regional Office
NOAA, National Marine Fisheries Service (NMFS)
263 13th Avenue South
St. Petersburg, Florida 33701

Dear Dr. Crabtree:

I am writing to engage your assistance in resolving an issue concerning the Jacksonville District Regulatory Division's re-evaluation of Regional General Permit SAJ-93 (RGP SAJ-93) which would authorize the Florida Inland Navigation District (FIND) to maintenance dredge the Intracoastal Waterway (IWW), a federal navigation project. By letter dated April 4, 2016, the Assistant Regional Administrator for Fisheries, Ms. Virginia M. Fay, requested continued coordination between the Jacksonville District and Habitat Conservation Division on the issues pertaining to NMFS' Essential Fish Habitat Conservation Recommendations (EFH CRs) 1 and 2, provided on May 5, 2015. The two EFH CRs pertain to NMFS' practice of recommending one-time compensatory mitigation for all maintenance dredging activities impacting seagrass, where avoidance is not practicable and the area has not been dredged since the 2002 EFH regulations were published.

On the enclosed letter dated March 18, 2016, my staff provided a detailed response to all of NMFS' EFH CRs as well as its general recommendation for avoiding, minimizing impacts to, and mitigating seagrass within the federal channel. This response included a description of additional special conditions aimed at addressing potential impacts on EFH. The Corps is committed to science and evidence-based decision-making. As such, we provided NMFS a Draft Programmatic Essential Fish Habitat Assessment (PEFHA) for RGP SAJ-93 on April 27, 2015, and a Final PEFHA on August 17, 2015, which determined that mitigation is not warranted. My staff has concluded that maintenance dredging of the IWW would have "minimal adverse effects" on seagrass because dredging projects are limited in scope and duration and negligible when considering the "small" impact to seagrass within an existing federal channel as compared to the extensive seagrass beds outside the channel in natural areas. Substantial documentation and best available data were incorporated into the PEFHA and multiple revisions were made to the terms and conditions of RGP SAJ-93 including incorporation of comments from NMFS received in October 2015, addressing the EFH CRs. To date NMFS has not provided a scientific rationale for disagreeing with the Corps' conclusions and analyses.

In addition, our South Atlantic Division Civil Works Policy dated March 4, 2010, which was cited in NMFS' recent letter, supports the conclusion that mitigation is not required for maintenance dredging of the IWW. Because the IWW is a navigation channel that continues to be maintained at or near authorized dimensions, our policy does not require mitigation for

maintenance dredging. The Corps and FIND have a robust monitoring program that includes condition surveys, annual inspections, reliance on information from the public as well as development of five-year and annual work plans to ensure the channel is maintained at or near authorized dimensions to ensure safe navigation. Finally, there is ample precedent that mitigation for maintenance dredging of an existing federal project has not been required in the past.

To further address NMFS' concerns, my staff now proposes an additional special condition. Where impacts to seagrass are proposed within the navigation channel, this additional condition would require prior to construction, FIND provide information on whether the navigation channel within the project area has been maintained at or near authorized dimensions and a seagrass survey. The Corps will evaluate whether there are substantially changed physical conditions that support and sustain significant ecological resources and will address on a case-by-case basis whether compensatory mitigation is required.

My staff has requested a list of dates when your team is available for the additional coordination requested by your office. So that our efforts going forward can be most productive, we request clarification with regard to NMFS' expectations concerning additional coordination. Because the Corps has completed its consultation obligations in accordance with the Magnuson-Stevens Act and its implementing regulations, we plan to move forward with a permit decision for RGP SAJ-93. See generally 67 Fed. Reg. 2343, 2368-2369 (January 17, 2002). We believe the enclosed special conditions proposed for the permit would appropriately address NMFS' recommendations and not preclude any outcome of our additional coordination.

If you have any questions concerning this letter, please feel free to contact me or you may contact my Regulatory Chief, Mr. Donald Kinard at (904) 232-2255 or via email at donald.w.kinard@usace.army.mil.

Sincerely,

Jason A. Kirk, P.E.
Colonel, U. S. Army
District Commander

Enclosures

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
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April 4, 2016 F/SER4:DD/JK

Colonel Jason A. Kirk, Commander
U.S. Army Corps of Engineers, Jacksonville District
ATTN: Tori White
PO Box 4970
Jackonville, Florida 32232-8176

Dear Colonel Kirk:

NOAA's National Marine Fisheries Service (NMFS) has reviewed the additional information provided by your staff's letter dated March 18, 2016, regarding public notice SAJ-2005-00972. The U.S. Army Corps of Engineers (USACE) Jacksonville District proposes to re-issue Regional General Permit (RGP) SAJ-93 to authorize the Florida Inland Navigation District (FIND) to maintenance dredge the inland federal navigation channel (collectively referred to as Intracoastal Waterway or IWW) and to dispose of dredged material within existing dredged material management areas (DMMAs), self-contained upland sites, or on certain beaches which currently receive dredged material. The letter and its attachments transmit the Jacksonville District's reply to conservation recommendations NMFS provided by letter dated May 5, 2015, to protect and conserve essential fish habitat (EFH). In our letter, NMFS recommended:

1. When impacts to previously mitigated seagrass would occur, the RGP SAJ-93 require FIND to provide the NMFS with information precisely defining dredge locations, projected volumes, and construction schedule and documenting the seagrass mitigation has met performance standards established by the Jacksonville District.
2. RGP SAJ-93 require FIND to conduct pre-dredging and post-dredging surveys with a buffer distance of no less than 100 feet from dredging locations to allow verification that no indirect impacts to seagrass are occurring from the dredging.
3. RGP SAJ-93 require a buffer of no less than 100 feet between dredging and seagrass habitats.
4. RGP SAJ-93 include a special condition requiring compensatory mitigation in the case that indirect impacts are documented through comparison of post-dredging surveys and pre-dredging surveys.
5. RGP SAJ-93 stipulate the methods, reporting requirements, and time of year for the seagrass surveys. The language included in special condition 10 of the existing RGP (quoted above) is sufficient.
6. RGP SAJ-93 require FIND to annually provide a list of all dredging actions performed under the RGP. The NMFS requests the list include a map or station numbers defining actual areas where dredging occurred and a summary of seagrass surveys conducted. NMFS requests the surveys be sent to nmfs.ser.monitoringreportshc@noaa.gov.

In the August 17, 2015, EFH Assessment for RGP SAJ-93 the USACE correctly identified adverse impacts to several types and areas of habitat identified and described as EFH by the

South Atlantic Fishery Management Council (SAFMC) and NMFS Highly Migratory Species Division including: subtidal/intertidal non-vegetated flats; unconsolidated bottom; estuarine water column; estuarine and marine submerged aquatic vegetation (seagrasses and macroalgae). Additionally, adverse impacts were identified for EFH habitat areas of particular concern (EFH-HAPC) identified by the SAFMC including: high salinity bays, estuaries, and seagrass habitat; coastal inlets; state designated nursery areas (e.g., Aquatic Preserves); and, ocean high salinity surf zones.

The NMFS' has primarily expressed concern with uncompensated adverse impacts to seagrass habitat resulting from periodic maintenance of the IWW. Throughout 2015, the USACE and NMFS have participated in a series of meetings and discussions to address our recommendations as well as to expand the utility of RGP SAJ-93 within the state of Florida. Additionally, several meetings discussed and explored the possibility of a programmatic consultation and permittee-responsible mitigation including establishment of seagrass mitigation banks or in-lieu fee programs to provide efficient and effective mechanisms to ensure compensation is provided consistent with the Compensatory Mitigation Rule issued by the USACE and the Environmental Protection Agency in 2008. Further, on several occasions USACE and NMFS staff met in the field to jointly ground-truth side-scan sonar data collected on various reaches of the IWW to identify seagrass habitat. The USACE has provided a modified RGP SAJ-93 in response to these discussions and our EFH conservation recommendations.

In response to our first two recommendations:

1. When impacts to previously mitigated seagrass would occur, the RGP SAJ-93 require FIND to provide the NMFS with information precisely defining dredge locations, projected volumes, and construction schedule and documenting the seagrass mitigation has met performance standards established by the Jacksonville District.

2. RGP SAJ-93 require FIND to conduct pre-dredging and post-dredging surveys with a buffer distance of no less than 100 feet from dredging locations to allow verification that no indirect impacts to seagrass are occurring from the dredging.

The NMFS does not agree with the USACE contention that because it was Congressionally authorized and constructed prior to enactment of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) and the National Environmental Policy Act (NEPA) the IWW is thereby precluded from any mitigation requirements.

The NMFS has primary federal responsibility for the conservation, management, and development of living marine resources and for the protection of certain marine mammals and endangered species under numerous federal laws. The agency also has responsibilities to the U.S. commercial and marine recreational fishing industries, including fishermen, and to the states and the general public. These responsibilities are inherent in NMFS' core mandates to ensure the productivity and sustainability of fisheries and fishing communities through science-based decision-making and compliance with regulations, and to recover and conserve protected resources. NMFS is vitally concerned about the habitats that support living marine resources

since the well-being of these resources and the fishing industry depends upon healthy and productive habitats.

The 1996 amendments to the MSFCMA established a requirement to identify and protect important marine and anadromous fisheries habitat. In enacting these amendments, Congress found "A national program for the conservation and management of the fishery resources of the United States is necessary to prevent overfishing, to rebuild overfished stocks, to insure conservation, to facilitate long-term protection of essential fish habitats, and to realize the full potential of the Nation's fishery resources."[1] and "One of the greatest long-term threats to the viability of commercial and recreational fisheries is the continuing loss of marine, estuarine, and other aquatic habitats. Habitat considerations should receive increased attention for the conservation and management of fishery resources of the United States."[2]

The SAFMC identifies seagrass as EFH for several species, including spiny lobster, white grunt, gray snapper, mutton snapper, and goliath grouper and further identifies it as being an EFH-HAPC. To be considered an EFH-HAPC, a habitat must provide important ecological function, be sensitive to human-induced environmental degradation, be subject to stress from development activities, or be a rare habitat type. Because seagrass habitat is extremely valuable to managed fisheries, conservation is strongly favored as the best management practice for this habitat.

In defining "cumulative impact" NEPA's implementing regulations require federal agencies to consider "the impact on the environment which results 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."[3] Further, number 32 of NEPA's Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations[4] compels agencies to "carefully reexamine" ongoing programs if there are circumstances or information relevant to environmental concerns.

The NMFS also does not agree with the assertion that we did not initiate consultation on in-channel resources for the eight projects identified in your response. For example, the most recent is the Port Everglades Expansion project and the 1.08 acres of seagrass located within the federal channel. In our April 17, 2015, letter NMFS requested the USACE mitigate for the damage or provide as-built drawing from previous maintenance dredging activities to confirm the dredging took place in areas known to not support seagrass. We are available to review the administrative record with the USACE to demonstrate the NMFS's consistent recommendations to mitigate for seagrass, regardless of the positioning within or outside a federally authorized project. Additionally, the NMFS recommends a careful approach to making permit decisions based on monitoring surveys as it is well-known that seagrass beds naturally expand and contract over time, as described in Virnstein et al. (2009).[5] Further, many of the seagrass species known to occur in Florida exhibit a seasonal pattern of growth and distribution and have moveable seed

[1] 16 U.S.C. 1801(a)(6)
[2] 16 U.S.C. 1801(a)(9)
[3] 40 CFR 1508.7
[4] 46 FR 18026
[5] Virnstein, R.W., Hayek, L.C., and Morris, L.J. 2009. Pulsating Patches: A model for the spatial and temporal dynamics of the threatened seagrass species *Halophia johnsonii*. Marine Ecology Progress Series 385:97-109.

banks as a life history strategy. We are also available to review the monitoring surveys for the projects the USACE concludes resulted in a net benefit of seagrass.

In response to the third recommendation:

3. RGP SAJ-93 require a buffer of no less than 100 feet between dredging and seagrass habitats.

the USACE reported difficulty in complying with this condition during the previous five-year period resulting in only six dredging events with three requiring modified dredge footprints. The USACE further indicates FIND chose to avoid dredging areas in those three project areas. It is unclear to the NMFS why individual permits were not sought whereby the anticipated impacts to seagrass habitat could be quantified and mitigated in accordance with EFH Conservation Recommendations provided by NMFS.

Subsequent coordination between the USACE and NMFS since the public notice, as noted above, has resulted in further refinement of the RGP SAJ-93 special conditions to address turbidity concerns where dredge material has a higher fine content and to address a buffer of less than 25 feet for projects with minimal risk of turbidity such as near the coastal inlets where sand is hydraulically dredged. Where minimum buffers as established in RGP SAJ-93 cannot be met, the following special conditions require a 10-day coordination with NMFS prior to verification of a project under the RGP and satisfy the EFH goals of the MSFCMA:

11. If the pre-construction survey identifies seagrass adjacent to the federal channel or other construction areas, the project may proceed under this permit when the activity includes hydraulic dredging of predominant sandy or coarser sediments (no more than 10% of the material passes a #230 sieve) and seagrass can be avoided and a minimum 25-foot buffer maintained between seagrass and all dredging activities.

12. If the pre-construction survey identifies seagrass within 25 feet of proposed dredging activities (e.g., design limits of federal channel/area to be dredged, pipeline areas, anchor drop zones, etc.) or within 100 feet of the design limits of the federal channel/area to be dredged and the activity includes mechanical dredging and/or removal of fine sediments (material passing a #230 sieve) the Corps will coordinate with National Marine Fisheries Service (NMFS) Habitat Conservation Division (HCD) for a 10-day review period prior to verification under this permit.

In response to the final three recommendations:

4. RGP SAJ-93 include a special condition requiring compensatory mitigation in the case that indirect impacts are documented through comparison of post-dredging surveys and pre-dredging surveys.

5. RGP SAJ-93 stipulate the methods, reporting requirements, and time of year for the seagrass surveys. The language included in special condition 10 of the existing RGP (quoted above) is sufficient.

6. RGP SAJ-93 require FIND to annually provide a list of all dredging actions performed under the RGP. The NMFS requests the list include a map or station numbers defining actual areas where dredging occurred and a summary of seagrass surveys conducted. NMFS requests the surveys be sent to: nmfs.ser.monitoringreportshc@noaa.gov.

The USACE has included the following special conditions for RGP SAJ-93 which satisfy the EFH goals of the MSFCMA:

10. For maintenance dredging of the IWW from Dunlawton Bridge in Volusia County to Miami-Dade County, pre-construction and post-construction seagrass surveys are required, as follows:

    a. For projects where the sidescan sonar or the GIS data indicate seagrass is present within 100 feet from the design edge of the federal channel and within the scope of the project including anchor drop zones, pipeline corridors, temporary mooring piles, vessel turnaround areas, construction staging areas, anchor zones, and vessel ingress/egress areas.
    b. The pre-construction survey will clearly identify the limits of all seagrass beds in their entirety and the seagrass polygons will be illustrated on the project construction plans (plan view and cross sections). The size, species identified, estimate of percent coverage, and estimate of percent species abundance shall be provided. The pre-construction survey shall be conducted during the period June 1 through September 30. All surveys within the range of Johnson's Seagrass shall fully adhere to the Recommendations for Sampling Halophila johnsonii at a Project Site as provided in Appendix III of the Johnson's Seagrass Recovery Plan available at http://sero.nmfs.noaa.gov/protected_resources/johnsons_seagrass/documents/recoveryplan.pdf.

14. Direct impacts to seagrass located outside of the design limits of the federal channel are not authorized by this permit. FIND shall not anchor, place pipeline, or stage equipment in a manner that will cause any damage to seagrass. Unauthorized impacts to seagrass shall require remediation and may be subject to further compensatory mitigation requirements. Divers shall visit all anchor locations that were positioned within the perimeter of a seagrass bed within 14 days following completion of construction of each maintenance dredging event to investigate potential damage to seagrass.

16. Anchor or pipeline damage to seagrass, hardbottom, or wetlands shall be reported to the Corps within 48 hours of discovery of impact. If the post-construction survey or project monitoring reveals that unintentional impacts to seagrass, hardbottom, or wetlands have occurred as a result of project-related activities (e.g., anchoring impacts, pipeline impacts, sedimentation and/or burial impacts, side slope sloughing, propeller wash, etc.), the Permittee shall coordinate with the Corps to quantify the impact, assess the ecological functional losses, and provide an in-kind compensatory mitigation plan within 30 days of discovery of impact to the Corps for review, coordination with NMFS, and approval.

26. The Permittee shall provide an annual report to the Corps in March of each year including a list of all verifications under this permit, total quantity of material dredged, GIS coverage of all cuts/shoals dredged, construction schedule and results of all required mitigation and monitoring including pre and post seagrass surveys with supporting GIS data, miles of shoreline where dredged material was placed on the beach.

Seagrass losses are well documented in Florida[6,7] and it is for this as well as the reasons identified herein the NMFS maintains that if an area has not been dredged since the 2002 EFH regulations were published and that area is found to contain seagrass habitat, we recommend that impacts to seagrass be avoided then minimized (when practicable) before recommending compensatory mitigation. We recommend this compensatory mitigation only once for each seagrass area impacted by maintenance dredging since implementation of the 2002 EFH regulations. We do not seek mitigation for subsequent maintenance dredging activities that impact seagrass at the same sites. We believe this is consistent with the of the South Atlantic Division's (SAD) August 31, 2007, Memorandum for Commander which advised "...if any authorized navigation channel is not maintained over an extended period of time, such that substantially changed physical conditions evolve that eventually support and sustain significant ecological resources, mitigation requirements associated with restoring authorized channel dimensions at some future date will be addressed on a case-by-case basis with SAD and HQUSACE staff."[8]

An effective EFH consultation process is vital to ensuring Federal actions are consistent with the MSFCMA resource management goals and sustainable economic development. The USACE and NMFS have met several times to discuss how RGP SAJ-93 could be reissued with conditions for providing adequate compensatory mitigation at the Snook Islands Natural Area to offset seagrass impacts. NMFS requests the Jacksonville District continue these discussions before making a final permit decision.

In accordance with the intentions of 50 CFR 600.920(k)(2), and in accordance with the SAD memorandum referenced above, we request continued coordination between the Jacksonville District and Habitat Conservation Division on the issues pertaining to our EFH Conservation Recommendations 1 and 2.

Sincerely,

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

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[6] Morrison, G. 2003. Florida Seagrass Manager's Toolkit. Florida Fish and Wildlife Conservation Commission. St. Petersburg, FL. 95 pp.

[7] Erftemeijer, P., and Lewis, R. 2006. Environmental impacts of dredging on seagrasses: A review. Marine Pollution Bulletin 52: 1553-1572.

[8] Wilbert Paynes Chief, Planning and Policy Community of Practice. August 31, 2007. Memorandum for Commander, Jacksonville District.

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DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
PO BOX 4970
JACKSONVILLE, FLORIDA 32232-8176

REPLY TO ATTENTION OF

March 18, 2016

Regulatory Division
SAJ-2005-00972 (RGP-TKW)

Ms. Virginia M. Fay
Assistant Regional Administrator
Southeast Regional Office, Habitat Conservation
NOAA, National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, FL 33701

Dear Ms. Fay:

We have received your preliminary Essential Fish Habitat (EFH) Conservation Recommendations provided by letter dated May 5, 2015**,** responding to our request for consultation on re-evaluation of Regional General Permit SAJ-93 (RGP SAJ-93) which authorizes the Florida Inland Navigation District (FIND) to maintenance dredge the inland federal navigation channel and to dispose of dredged material within existing dredged material management areas (DMMAs), self-contained upland sites, or on certain beaches which currently receive dredged material. SAJ-93 includes the following inland federal navigation channels located within the counties of Nassau, Duval, St. Johns, Flagler, Volusia, Brevard, Indian River, St. Lucie, Martin, Palm Beach, Broward, and Miami-Dade and within FIND's area of responsibility:

- Atlantic Intracoastal Waterway (AIWW) from the Florida State line south to the St. Johns River,
- Intracoastal Waterway (IWW) on the east coast of Florida, from the St. Johns River south to Miami,
- Okeechobee Waterway (OWW), from its intersection with the IWW to the western Palm Beach County line in Lake Okeechobee.

The Corps has reviewed and considered the concerns and recommendations presented by the National Marine Fisheries Service (NMFS) in its letter, and has prepared the responses below, as required under the Magnuson-Stevens Fisheries Conservation and Management Act (MSA; 50 CFR § 600.920(k). Additionally, we are enclosing the latest version of RGP SAJ-93 when includes some of your suggested edits received on November 17, 2015, as well an updated spreadsheet of the past and reasonably foreseeable dredging projects, and two survey reports located subsequent to our preparation of the DVDs of supporting documents and reports previously provided to your office. The aforementioned inland federal navigation channels are referred to in this letter collectively as "IWW".

1. *When impacts to previously mitigation seagrass would occur, the RGP SAJ-93 require FIND to provide the NMFS with information precisely defining dredge location, projected volumes, and construction schedule and documenting the seagrass mitigation has met performance standards established by the Jacksonville District.*

2. *RGP SAJ-93 require FIND to conduct pre-dredging and post-dredging surveys with a buffer distance of no less than 10 feet from dredging locations to allow verification that no direct impacts to seagrass are occurring from the dredging.*

To date, neither FIND nor the Corps has provided compensatory mitigation for seagrass within the IWW impacted by a maintenance dredging project. In order to reestablish and maintain the full function of the congressionally authorized federal navigation projects, the Corps and FIND must conduct maintenance dredging. Construction of the original Federally-authorized projects occurred prior to the enactment of the MSA and National Environmental Policy Act, whereby the environmental impacts associated with the authorized construction and maintenance were “grandfathered in,” precluding the requirement to mitigate for past environmental damages, i.e., establishes a baseline.

The federally maintained channels are to be regarded as transportation infrastructure, much like highways or airfields. Regular maintenance dredging is required to maintain the function of channels, when newly returned to their intended design state, i.e., returned to whatever habitat value is present as result of their original authorized construction (baseline condition). Where seagrass opportunistically colonizes the channel between maintenance dredging events, any increase in habitat value is considered temporary and will be lost during the next dredging cycle necessary to maintain authorized project depths. Maintenance dredging restores the authorized depth in the interest of the public and required for public safety and as a matter of principle, compensatory mitigation should not be required for seagrass that colonizes as a result of natural shoaling, storm events, climatic factors, etc. The authorized depth of the IWW should be recognized as the “baseline condition” as it is an existing federal navigation channel authorized by Congress for public interest prior to MSA. In fact it is recognized in this context by NMFS in the Federal Register / Vol. 65, No. 66 / Wednesday, April 5, 2000 / Rules and Regulations 65 FR 17786 “*Designated Critical Habitat: Critical Habitat for Johnson’s Seagrass*, excludes the IWW channel from critical habitat designation since the “maintenance activities are ongoing and associated with a disturbed area”.

Ample precedent exists to support a position that mitigation for maintenance dredging of an existing federal project is not required. Examples include:

- Port Everglades Expansion. 2015 (ROD 2016). No mitigation for in-channel habitat. Corps/NMFS did not even initiate consultation on in-channel resources.
- Palm Beach Harbor Operation and Maintenance (O&M), Florida. 2015. No mitigation for in-channel habitat. Corps/NMFS did not even initiate consultation on in-channel resources.
- Port of Miami, Florida. Expanded 2014-2015. No mitigation for in-channel habitat. Mitigation for habitat in the expanded footprint.
- Indian River Intracoastal Waterway O&M, Florida 2014. No mitigation for in-channel habitat. Corps/NMFS did not even initiate consultation on in-channel resources.
- Jupiter Atlantic Intracoastal Waterway O&M. 2007. No mitigation for *Halophila* seagrass in the channel.
- Key West O&M, Florida 2007. No mitigation for in-channel habitat.
- Port Everglades O&M, Florida 2004 (FONSI 2005). No mitigation for in-channel habitat, seagrass or hardbottom/coral resources immediately adjacent to the entrance channel. Dredging has occurred twice (2005 and 2012-2013) since FONSI completed.
- San Juan Harbor, Puerto Rico. Expanded 2001. No mitigation for in-channel habitat. Seagrass (*Halophila*) mitigation for habitat in the expanded footprint.

The Corps is committed to evidence-based decision-making and as such provided NMFS a Draft Programmatic Essential Fish Habitat Assessment (PEFHA) on April 27, 2015, to engage with NMFS on a programmatic consultation under MSA for maintenance dredging of the IWW and to inform re-evaluation of RGP SAJ-93. Following a meeting with NMFS on May 16, 2015, substantial changes were made to the PEFHA and to the terms and conditions of RGP SAJ-93, at the request of NMFS. A Final PEFHA and revised Draft RGP SAJ-93 were provided to NMFS on August 17, 2015, including a spreadsheet of all reasonably foreseeable dredging projects with dredge location, projected volume, and construction schedule (by year). The PEFHA concluded "no substantial adverse impact" on EFH. On August 19, 2015, the Corps further concluded maintenance dredging of the IWW would have “minimal adverse effects” on EFH as dredging projects are limited in scope and duration and negligible in considering the "small" impact to seagrass within an existing “disturbed” federal channel compared to the extensive seagrass beds outside the channel in natural, undisturbed areas.

To the extent required by the relevant regulations, best available data was incorporated into the PEFHA. The Corps relied on three types of seagrass sources to inform conclusions regarding the extent of seagrass within the IWW: the Florida Fish and Wildlife Research Institute's (FWRI) GIS data, diver surveys, and side scan sonar. The FWRI data set which is comprised of primarily aerial sources was used to provide a large geographic extent to compare the extent of seagrass adjacent to the federal channel. This dataset represents a snapshot in time although the Indian River Lagoon dataset shows trends over multiple years of surveys. As this data set is largely aerial, it was assumed it might under-represent seagrass within the channel (compared to diver surveys) because of the deeper water and less density of seagrass within the channel but it covers the entire channel length, so is good for providing context of the total seagrass. Diver surveys are highest resolution but are limited to the location of dredging and impose delay to do the pre survey work for an event. The side scan sonar offers an in-between source as it provides better resolution than aerial interpretation with the tradeoff of less detail than diver survey but much greater geographic extent. Another benefit of the side scan sonar is the data was collected during the seagrass growing season over the same year period. To determine the confidence of the side scan sonar as a reliable survey method for predicting seagrass within the geographic and comprehensive scale of the IWW, the Corps' Engineering Research Design Center is analyzing the data and constructing a confusion matrix. The confusion matrix will identify false positives, false negatives, and accurate results in order to predict the confidence level of the side scan sonar based on ground truthing, underwater video, and diver surveys. It should be noted that ground truthing that took place in Broward and Miami-Dade Counties in July and August 2015, with a member of your staff, was not conducted randomly but rather intentionally focused on areas where the side scan sonar seagrass polylines did not align with the FWRI GIS and/or diver seagrass survey results. Subsequent to the side scan sonar, we also collected underwater video in October 2015, across certain transects of the IWW in Volusia and St. Lucie Counties to verify side scan polylines. The confusion matrix will be shared with NMFS upon its completion.

Within the range of seagrass, from Ponce de Leon Inlet south (Volusia Cut V-22) through its terminus in Biscayne Bay (Miami-Dade Cut DA-22) there is approximately 250 miles of IWW federal channel encompassing an area of approximately 4,088 acres, including wideners. The area of the federal channel does not represent a substantial contribution to seagrass habitat considering the expansive natural water bodies including the Mosquito Lagoon, Banana River, Indian River Lagoon, Lake Worth Lagoon, and Biscayne Bay. Based on the FWRI GIS data layer, seagrass encompasses approximately 1,027,363 acres with minimal seagrass within the actual design limits of the federal channel, i.e., approximately 29 acres as identified by the FWRI GIS data and approximately 20 acres as identified by the side scan sonar; this represents 0.0029 percent or 0.0019 percent, respectively, of the total amount of

seagrass. It should be noted the side scan acreage figure includes 0.57 acre north of State Road 838 in Broward County which ground truthing in July 2015, identified as a "false positive" as no seagrass was present in the federal channel.

During telephone conversations on October 23, 2015, and February 23, 2016, NMFS requested the Corps provide specific information on the acreage of seagrass impacted within the IWW as a result of past maintenance dredging and the projected loss as a result of future projects. This information is included on the enclosed spreadsheet. Pre-dredging surveys of projects within the range of seagrass show seagrass predominantly in the channel only in the vicinity of coastal inlets where high shoaling facilitates seagrass growth. The spreadsheet identifies "losses" of seagrass from the channel by comparing pre and post-dredge surveys but also identifies "gains" of seagrass as a result of colonization within the channel between dredge events. It should be noted that even though we recognize the authorized channel depth as the baseline condition, and therefore could surmise that any seagrass in the channel is a "gain" following the original construction, the spreadsheet only identifies a "gain" following a maintenance dredge event. Pre and post-dredging surveys from 1999 through 2014 show "gains" of 12.78 acres and "losses" of 9.05 acres of seagrass with no "net loss". This is due to the ability of seagrass to recolonize after dredging events. For example, pre-dredging surveys for Baker's Haulover between 2006 and 2010 surveys show a net increase of 7.8 acres of seagrass within the channel. Using the pre 2010 (7.85 acres) survey and the post 2010 (2.90 acres) survey, there was a loss in the federal channel of 4.95 acres of seagrass for the 2010 dredging event. When comparing the post 2010 survey (2.90 acres) and post 2013 survey (7.05 acres), however, there is a gain of 4.05 acres which was dredged during the 2014 event.

Similar results are apparent at Jupiter. A comparison of pre and post-dredging surveys for the 2008, 2011, and 2013 dredging events show a gain and subsequent loss of 0.10 acre, 0.67 acre, and 0.703 acre of seagrass, respectively, within the channel demonstrating seagrass recolonizes after dredging (or colonizes on new shoals) with no net loss. No other IWW maintenance dredging projects have resulted in the removal of seagrass within the IWW channel. Additionally, seagrass was not observed in the IWW channel in Cut P-50 near South Lake Worth Inlet in 2002, 2007, 2008, or 2012 surveys. Following the dredging event in 2012, however, the post 2013 survey showed a gain of 0.125 acre of seagrass in the channel.

The *South Lake Worth Inlet Cumulative Report of Seagrass Monitoring Conducted During 2001, 2002, 2003, and 2004* showed no long-term adverse effects of maintenance dredging on seagrass and as discussed in the PEFHA, further corroborates that seagrass coverage on an annual basis is highly variable and dependent on many factors including water quality, water clarity, weather, varying survey conditions, etc. Natural coastal processes contributes to shifting shoals and varying locations, density, and distribution of seagrass. Not surprisingly, the *South Lake*

Worth Inlet Submerged Aquatic Vegetation Status Report prepared in 2012, showed loss of any seagrass as a result of maintenance dredging is short-term as seagrass quickly recolonizes following dredging and more importantly, the longer-term threat to seagrass is a result of shifting sands and deposition on the flood shoal from natural coastal processes. Both of these reports are enclosed.

The projects previously identified for 2015 are anticipated to result in loss of 6.03 acres of seagrass in the IWW. Approximately 5.3 acres of seagrass was observed in Cuts P-35 to P-36 near Lake Worth Inlet during the 2011 pre-dredging survey, however, compensatory mitigation has been provided at Snook Island Natural Areas as this removal is associated with channel widening and deepening. Dredging has been completed and a post-dredging survey will be performed with any re-colonization of seagrass noted as a “gain”. The St. Lucie maintenance dredging and Broward deepening projects which were originally anticipated to commence in 2015 will remove 0.97 acre and 0.03 acre of seagrass, respectively based on pre surveys provided with the permit application. Broward deepening is scheduled to commence in May 2016, and St. Lucie in summer 2016. Underwater video collected across IWW transects in St. Lucie in October 2015 indicates seagrass may not be as extensive as it was during the 2014 pre-dredging survey. This is not surprising as this area is highly dynamic due to tidal currents and the proximate flood shoal. Additionally, although out-of-kind for seagrass, FIND did complete compensatory mitigation for impacts to EFH associated with the Broward deepening project. Following completion of both of these projects seagrass that recolonizes will be designated as a “gain”. No other foreseeable dredging projects through 2020 are anticipated to impact seagrass in the federal channel. The minimal amount of seagrass present within the design width of the authorized federal navigation channel which is essentially the area of direct impact from maintenance dredging when compared to the extensive seagrass beds present within the adjacent natural water bodies and the ability of seagrass to recolonize after dredging events supports our conclusion that maintenance dredging of the IWW including any seagrass within the channel has “minimal adverse effect” on EFH for federally managed species. Based on our data, this minimal effect is short term with no net loss of seagrass.

RGP SAJ-93 requires FIND provide the Corps an annual report of all projects verified including total quantity of material dredged, dredge location, construction schedule, and results of any required mitigation and monitoring including miles of shoreline where dredged material was placed on the beach. See special condition number 26.

3. *RGP SAJ-93 require a buffer of no less than 100 feet between dredging and seagrass habitats.*

The prior RGP SAJ-93 required a minimum buffer of 100 feet between dredging and seagrass habitat. Although seagrass is generally absent from the federal navigation channel, it is present in close proximity to the channel including some side slopes.

Meeting this minimum buffer requirement proved difficult resulting in little utility of the RGP with only six verifications over the five-year period. Three of those projects required a modified dredge footprint in order to meet the 100-foot minimum buffer. As the Corps' oldest and primary mission is safe navigation, modifying a dredge footprint to leave a shoal in the federal channel and not dredging the entire width of a navigation channel is an unsafe practice. For safety reasons and to ensure the IWW is unobstructed for commercial and recreation vessel traffic, the Corps and FIND prefer dredging be performed for the entire width of the channel from design edge to design edge including channel wideners. With a well maintained navigation channel, vessels are more likely to stay within the deeper channel limits and outside of the shallows where seagrass is more prevalent, thereby protecting seagrass resources.

Since avoiding seagrass within the design limits of the federal channel is unwise, the revised draft RGP-93 circulated by public notice on March 31, 2015, proposed a reduction in buffer from 100 feet to 25 feet which would fall within the side slopes he federal channel where sloughing and sedimentation are most likely to occur. Following discussions with NMFS on May 16, 2015, further refinement of the special conditions was made to address turbidity concerns where dredge material has a higher fine content and to address a buffer of less than 25 feet for projects with minimal risk of turbidity such as near the coastal inlets where sand is hydraulically dredged. Pre and post-dredging surveys show seagrass within these areas quickly recolonizes following the dredging event; and loss of seagrass documented in post-dredging surveys has not always been attributed to the dredging project. Where minimum buffers as established in RGP SAJ-93 cannot be met, a 10-day coordination with NMFS will be required prior to verification of a project under the RGP. See special condition numbers 11 and 12.

Despite all measures that can and will be taken to reduce impacts, any dredging activity will always generate a certain irreducible amount of turbidity and sedimentation. It is the Corps and FIND's experienced view that impacts to the marine environment from the necessary dredging are best minimized by maximizing use of hydraulic dredges and limiting the duration of the dredging activity, and therefore the duration of the turbidity and other effects in a given area. FIND will employ all best management practices available to minimize impacts. See special condition number 5.

4. *RGP SAJ-93 include a special condition requiring compensatory mitigation in the case that indirect impacts are documented through comparison of post-dredging surveys and pre-dredging surveys.*

RGP SAJ-93 does not authorize direct impacts to seagrass outside the federal navigation channel. The Corps and FIND have been successful in utilizing pre-construction surveys to avoid seagrass impacts associated with pipelines, booster pumps, anchors, etc. Compensatory mitigation will be required for any of the following

activities that result in adverse impacts to seagrass outside the federal channel: unauthorized dredging beyond prescribed project limits, scouring of adjacent resources as a result of dredging/prop dredging/vessel damage, inadvertent barge disposal on seagrass or other aquatic resources, pipeline failures, dredged material containment failures, and anchoring or pipeline placement outside the channel. See special condition numbers 14 and 16.

5. R*GP SAJ-93 stipulate the methods, reporting requirements, and time of year for seagrass surveys. The language included in special condition 10 of the existing RGP is sufficient.*

This language has been added to RGP SAJ-93. See special condition numbers 10.a and 10.b.

6. *RGP SAJ-93 require FIND to annually provide a list of all dredging actions performed under the RGP. The NMFS requests the list include a map of station numbers defining actual areas where dredging occurred and a summary of seagrass surveys conducted. NMFS requests the surveys be send to nmfs.ser.monitoringreportshe@noaa.gov.*

This language has been added to RGP SAJ-93. See special condition number 26.

Based on the findings of the Final PEFHA including the two DVDs of supporting documents, the terms and conditions of the revised RGP SAJ-93, and the information contained in this letter, the Corps is satisfied that the consultation procedures outlined in 50 CFR Section 600.920 of the regulation to implement the EFH provisions of the Magnuson-Stevens Act have been met and intends to issue permit number SAJ-2005-00972 for re-authorization of RGP SAJ-93 on or about 10 days after the date of this letter. If you have any questions, please contact Tori White at 904-232-1658 or by email at tori.white@usace.army.mil.

Sincerely,

Tori K White

for Donald W. Kinard
Chief, Regulatory Division

Enclosures:
RGP SAJ-93 revised March 2016
FIND Dredging History and Projections Spreadsheet revised March 2016

South Lake Worth Inlet Cumulative Report of Seagrass Monitoring Conducted During 2001, 2002, 2003, and 2004 prepared by and for Palm Beach County Environmental Resources Management
South Lake Worth Inlet Submerged Aquatic Vegetation Status Report prepared by Applied Technology and Management for Palm Beach County Environmental Resource Management in January 2012

Copies Furnished (electronically):

NMFS, Mr. Pace Wilber, pace.wilber@noaa.gov
NMFS, Ms. Jocelyn Karazsia, jocelyn.karazsia@noaa.gov.

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

August 17, 2015

REPLY TO ATTENTION OF

Regulatory Division

Ms. Virginia Faye
Assistant Regional Administrator
Habitat Conservation Division
National Marine Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

Dear Ms. Faye:

Thank you for meeting with us on May 15, 2015, to discuss our Draft Essential Fish Habitat Assessment (DEFHA) for maintenance dredging of the federal navigation channel within the area of responsibility of the Florida Inland Navigation District (FIND) which was provided to you April 27, 2015. During the meeting we also discussed re-evaluation of Regional General Permit 93 (RGP-93) which was circulated by public notice on March 31, 2015. In lieu of working both actions, you and your staff recommended working together on a revised RGP-93 to address FIND's needs.

To that end, a revised Draft RGP-93 was provided to you on May 29, 2015. The revised RGP-93 would cover the majority of the dredging performed by FIND, including dredging projects with the potential to impact seagrass present within the design limits of the federal navigation channel. The revised RGP-93 includes project design criteria and special conditions to minimize impacts to seagrass and other essential fish habitat (EFH) and habitat areas of particular concern (HAPC), a requirement for mitigation where adverse impacts are substantial, and a tier-2 coordination.

Additionally you and your staff provided feedback on the DEFHA, particularly with regard to additional EFH and HAPC within the proposed action area that had not been addressed and requested the table of past and present dredging projects be reviewed and updated to include past EFH consultations and identification of projects that would qualify for the current RGP-93 and RGP-93 as proposed for modification and reissuance. Enclosed is a Final Essential Fish Habitat Assessment to support programmatic consultation under the Magnuson Stevens Fishery Conservation Management Act (MSFCMA) for RGP-93 as proposed for modification and reissuance. As discussed during the meeting the Jacksonville District requests that this EFHA also be used to inform consultation under MSFCMA for maintenance dredging projects within the proposed action area that are conducted by the Corps and we understand

that this would require PDCs and special conditions of the RGP being incorporated into contract specifications.

Additionally we are enclosing a DVD addendum with pertinent GIS data including GIS layers providing the start and end stations of past dredging (i.e., shoal locations) (dredging (stations within the cuts), EFH and HAPC within the proposed action area (with extracts related to coastal inlets and aquatic preserves), additional seagrass surveys for individual projects, and bathymetric surveys for the southern portion of the IWW and the side scan sonar for Broward and Miami-Dade.

If you have any questions concerning this request for programmatic consultation, please contact Ms. Tori White at 904-923-6626, or by email at tori.white@usace.army.mil. If you have questions regarding the DVD addendum please contact Mr. Bob Barron at 904-232-2203 or by email robert.b.barron@usace.army.mil.

Sincerely,

Donald W. Kinard
Chief, Regulatory Section

Enclosures:
EFH Assessment
RGP-93
DVD addendum

Copy Furnished with Enclosures:
Jocelyn Karazsia, NMFS, 400 North Congress Ave, Suite 120, West Palm Beach, Florida 33401
Pace Wilber, NMFS, PO Box 12559, Charleston, South Carolina 29422-2559
David Dale, NMFS, 263 13th Avenue South, St. Petersburg, Florida 33701
Mark Crosley, FIND, 1314 Marcinski Road, Jupiter, Florida 33477-9498

PROGRAMMATIC ESSENTIAL FISH HABITAT ASSESSMENT FOR REGIONAL GENERAL PERMIT SAJ-93 FOR FLORIDA INLAND NAVIGATION DISTRICT MAINTENANCE DREDGING OF THE FEDERAL NAVIGATION CHANNEL

August 17, 2015

I. Introduction

This Essential Fish Habitat Assessment (EFHA) is being provided to meet consultation provisions under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) for re-evaluation of Regional General Permit SAJ-93 (RGP-93). General permits are developed for activities that are similar in nature with minimal individual and cumulative impact and/or to reduce regulatory duplication. RGP-93 was issued February 16, 2011 and will expire on February 16, 2016. Due to the stringent permit conditions particularly with regard to avoidance and minimization of impacts to seagrass and since beach placement was not included as a disposal option for dredged material RGP-93 has only been used 6 times to date.

RGP-93 includes the following inland federal navigation channels located within the counties of Nassau, Duval, St. Johns, Flagler, Volusia, Brevard, Indian River, St. Lucie, Martin, Palm Beach, Broward, and Miami-Dade within the Florida Inland Navigation District's (FIND) area of responsibility (AOR):

- Atlantic Intracoastal Waterway (AIWW) from the Florida State line south to the St. Johns River,
- Intracoastal Waterway (IWW) on the east coast of Florida, from the St. Johns River south to Miami,
- Okeechobee Waterway (OWW), from its intersection with the IWW to the western Palm Beach County line in Lake Okeechobee,

One of the U.S. Army Corps of Engineers' (Corps) primary missions is ensuring safe and efficient movement of interstate goods and commerce, consistent and predictable vessel movement and navigation, and accommodation of water-based recreation with minimal impact on the environment. To achieve this mission, dredging is required to maintain authorized channel depths at U.S. harbors and inland waterways. Overall, the Corps operates and maintains 25,000 miles of navigable channels and dredges nearly 300 million cubic yards of material each year to keep the nation's waterways navigable. The Jacksonville District operates and maintains 900 miles of inland navigable waterways.

The Regulatory Division of the Corps began in 1890 with the responsibility of protecting and maintaining the nation's navigable waterways. All work through, over, and under navigable waters of the United States which includes maintenance dredging of the aforementioned federal channels by the FIND requires a permit from the Corps pursuant to Section 10 of the Rivers and Harbors of Act of 1899 (33 U.S.C. §403) (RHA). As a result of changing public need and evolving policy via new laws and court decisions protection has been extended to all waters including wetlands. Discharge of dredged or fill material into waters of United States requires a permit from the Corps pursuant to Section 404 of the Clean Water Act (33 U.S. C. §1344) (CWA).

The mission of FIND is to perform the functions of the "local sponsor" of the AIWW, IWW, and OWW projects in Florida, state/federal navigation projects. In this capacity FIND provides all lands required for the navigation project including rights-of-way and lands for the management of dredged materials removed from the waterway channel during dredging activities. Due to shortfalls in federal funding for navigation projects, FIND also functions as "permit applicant" in conducting dredging activities under a Department of the Army permit ahead of, or in lieu of, federal funding. Since 1985 FIND has spent over $100 million to manage dredged material from the AWW, IWW, and OWW in an environmentally sensitive manner. Additionally, because of the shortfall of federal funding for IWW operation and maintenance, FIND has been assisting the Corps by maintenance dredging areas of federal channel at their own cost.

Maintenance dredging may be authorized by the Jacksonville District Regulatory Program under Section 10 of the RHA or carried out/funded by the Jacksonville District Civil Works Program under the Water Resource Development Act. Although this EFHA is being provided to inform a decision on the re-evaluation of RGP-93 under the Regulatory Program, the Corps would like to use this EFHA and subsequent consultation to meet MSFCMA requirements for dredging performed by the Corps under the Civil Works Program. Under this scenario, the permit specific conditions would be included in the contract specifications for any Civil Works Program dredging contract.

II. Background.

Portions of the AIWW, IWW, and OWW channel locations have been in existence since the 1880's under visions of Hamilton Disston and John Westcott. Mr. Westcott formed the Florida Coast Line Canal and Transportation Company (Company) in 1881 to build a canal from the mouth of the St. Johns River to Biscayne Bay. In 1883 a portion of the IWW was initially constructed by connecting the Matanzas River with the Indian River. Following a resolution filed with the Secretary of State on June 27, 1882, by the Company, the scope of the project was extended through Lake Worth with the waters of Biscayne Bay. By the same resolution the charter was construed to contemplate a canal allowing the passage of vessels drawing three feet of water or less.

By Chapter 3995, Acts of 1889, the Legislature declared that canals and waterways of the Company should not be less than 50-feet wide and not less than 5-feet deep at mean low water, for the entire distance between the St. Johns River and Biscayne Bay. This work was finally completed in 1912.

There were two channel expansion projects that occurred between 1927 through 1935 and from 1943 through 1965. The RHA, approved January 21, 1927, authorized the establishment and maintenance of an inland waterway in general 75-feet wide and 8-feet deep at mean low water, following the coastal route from Jacksonville, Florida, and subject to the conditions that the local interests: (a) acquire the necessary rights-of-way and the privately owned waterway known as Florida East Coast Canal and transfer them free of cost to the United States, and (b) furnish suitable areas for deposit of dredged materials in connection with the work and its subsequent maintenance. The FIND was created by the Florida Legislature at its Session in 1927, by Chapter 12026 to perform the conditions imposed upon local interests by Congress.

An amendment of the RHA approved July 3, 1930, by Senate Document 71, 71st Congress, 2nd Session, increased the width of the waterway from 75 feet to 100 feet. By 1943 FIND had acquired and conveyed rights of way and disposal areas to the United States to such an extent that the AIWW was deepened and improved from the St. Mary's River to the St. Johns River near Jacksonville to a depth of 12 feet and a width of 125 feet. Subsequent authorization was received to expand the waterway to its present dimensions of 10 feet deep by 125 feet wide from Fort Pierce to Miami; House Document 740, 79th Congress, 2nd Session, later modified by the Chief of Engineers report dated July 22, 1960.

By 1965 the United States had completed the project from Jacksonville to Fort Pierce, Florida, to the authorized depth of 12 feet and the project width of 125 feet. From Fort Pierce to Miami, Florida, the project has been completed to a depth of 10 feet for the full project width of 125 feet.

Hamilton Disston was the first to set up extensive drainage operations in south Florida to promote development and agriculture including deepening of the Caloosahatchee River and connecting it with Lake Okeechobee. The OWW was initially authorized in 1910 and completed in 1937. The entire OWW is 154 miles long and extends from the Atlantic Ocean at Stuart, to the Gulf of Mexico at Ft. Meyers. The waterway runs through Lake Okeechobee and consists of the Caloosahatchee River to the west of the lake and the St. Lucie Canal east of the lake. Maintained depth ranges from 8 feet to 10 feet. Included in the project are navigation locks at W.P. Franklin, Ortona, Moore Haven, Port Mayaca, and St. Lucie. Each lock provides recreational facilities for public use year round. The waterway serves both navigation as well as flood control since release of excess water from Lake Okeechobee can be made into the St. Lucie Canal and the

Caloosahatchee River. The OWW is a popular and heavily used waterway during normal times. It is primarily used for recreation, but it is also used for commercial navigation, including tug/barge combinations and commercial fishing vessels.

In 1995 the Florida Legislature reviewed the functions of FIND for the final time and found that the "District should be continued indefinitely". Included in this legislation was a provision designating FIND as the "local navigation sponsor" for the Okeechobee Waterway in Martin County.

III. Summary of Financial Benefits of the Federal Channel.

The AIWW, IWW, and OWW along the east coast of Florida are important parts of the main AIWW system which reaches northward to Trenton, New York City, and Boston. Commercial vessels such as tugboats, barges, and fishing vessels and recreational vessels (both transient and local) share the waterway. Large numbers of yachts travel the waterway between the populous upper east coast of the United States and the vacation areas of south Florida.

These waterways in Florida are a critical part of Florida's eastern-shore economy and annually transport over 500,000 recreational vessels; provide $12 billion in economic output, which includes $3 billion in personal wages and 66,843 jobs; generate $540 million in tax revenues and increase property values by $19.4 billion (FIND, 2011). The summary of economic benefit of the federal navigation channels within FIND's AOR is shown in Table 1. Studies have shown that these economic benefits generated by the waterways would be reduced by 45% to 50% if the federal navigation channels are not properly maintained.

The current authorized channel depth of the IWW within the tri-county area of Palm Beach, Broward and Miami-Dade where the mega yacht industry provides a significant economic impact is 10 feet plus 2 feet of allowable over depth. A significant portion of the mega yachts in the world fleet are draft constrained by the inconsistent depths within IWW, therefore preventing them from utilizing repair/construction facilities in the area. This inability to guarantee sufficient depths within the waterway to access the repair/construction facilities is resulting in a loss of regional and national income. The term "mega yacht" refers to the size classification applied to yachts with overall lengths of 80 feet or more; however, roughly 13 percent of all mega yachts have lengths in excess of 148 feet. Some of these mega yachts are the size of small cargo ships, 250 feet plus in length.

- There are an estimated 5,000 mega yachts in the world fleet.
- Since 1997 there has been a 75 percent increase in the annual new construction rate of mega yachts.
- Mega motor yachts with lengths over 100 feet make up 44 percent of the fleet.

- Mega sail yachts with lengths over 80-100 feet make up 21 percent of the fleet.
- Since 1997, the worldwide fleet of mega yachts has grown by one third.
- An estimate 24 percent of mega yachts constructed are U.S. built.
- The average length of newly constructed vessels is estimated to be 133 feet which require 10 feet of draft under keel.

Table 1. Summary of Economic Benefits of Federal Navigation Channels within FIND's AOR.

Geographic Area	Business Sales (Millions of Dollars)	Personal Income (Millions of Dollars)	Employment (Jobs)	Tax Revenues (Millions of Dollars)
State	$11,861.85	$3,023.21	66,843	$540.35
District	$11,200.42	$2,847.93	62,625	$507.40
Twelve County Total	$10,365.33	$2,375.15	53,543	$470.81
Nassau County	$47.57	$10.79	335	$2.47
Duval County	$1,285.13	$300.17	6,169	$46.11
St. Johns County	$180.87	$41.33	1,090	$7.74
Flagler County	$215.87	$47.78	1,226	$6.14
Volusia County	$235.43	$53.36	1,466	$11.16
Brevard County	$580.23	$122.26	3,652	$21.52
Indian River County	$44.11	$10.12	242	$2.78
St. Lucie County	$186.03	$45.60	1,184	$8.27
Martin County	$639.87	$156.47	3,750	$28.02
Palm Beach County	$1,259.88	$297.50	5,879	$53.32
Broward County	$4,481.42	$995.48	21,455	$229.24
Miami-Dade County	$1,208.94	$294.31	7,094	$54.03

At least 3 mega yacht/sail yacht companies are directly impacted by draft restrictions along the IWW in the tri-county area: Rybovich, Florida Marine, and Derecktor Yachts. Draft restrictions prevent vessels from accessing their facilities via the IWW which results in a loss of revenue, wages and state tax revenue.

Several studies have been done over the years that address economic impacts to South Florida that these facilities provide.

- Approximately 1,500 mega yachts utilize south Florida each year.
- $580 million economic impact to the tri-county region has been directly attributed to the mega yacht industry.
- Mega yachts account for 69 percent of income at tri-county boatyards.
- 5,200 jobs can be contributed to the mega yacht facilities in the tri-county area.
- Major repairs to mega yachts are done every three to four years.
- Approximately 40 percent of mega yachts are U.S. based and 60 percent foreign based.
- Based on lack of access to repair/construction yards, more of the yachts are staying in Europe for repairs and not utilizing facilities on the east coast of Florida.

- Some of the mega yachts have drafts greater than the 10-foot Federal channel. These mega yachts are utilizing the extreme high tide and minimal under keel clearance when transiting into repair yards.
- Minimum drafts are needed to operate safely.

Approximately 100 repair jobs are lost each year between the facilities due to insufficient drafts, even at high tide. Most reaches along the IWW in the tri-county area have 8 foot of draft currently available whereas predominant power and sail vessels within the area require drafts of 7 feet to 12 feet and up. The total economic impact to the general marine industry is $4 billion including $9.7 million in lost wages (21,111 jobs). If the federal navigation channels were more aggressively maintained to ensure authorized depths with 2 feet over dredge, economic benefits would increase.

IV. Description of the Proposed Action.

The proposed action is described in the revised draft RGP-93 dated August 17, 2015 (enclosed) and includes maintenance dredging of accumulated sediments within the inland federal navigation channels along the east coast of Florida as shown in Table 2. Dredged material would be disposed of within Dredged Material Management Areas (DMMAs), upland areas, or existing beach placement sites as identified in Table 3.

Table 2. Authorized Federal Navigation Channels within the Scope of the Proposed Action.

Federal Channel	Limits	Design Depth (feet)	Design Width (feet)	Approximate Side Slopes (Design DepthX3) (feet)
Atlantic Intracoastal Waterway	Florida State line to St. Johns River	12	125	36
Intracoastal Waterway	St. Johns River to Ft. Pierce.	12	125	36
Intracoastal Waterway	Ft. Pierce to Miami	10	125	30
Okeechobee Waterway	IWW (at St. Lucie Inlet) to St. Lucie Lock and Dam	8	80	24
Okeechobee Waterway	St. Lucie Lock to Clewiston (Route 1)	8	100	24
Okeechobee Waterway	St. Lucie Lock to Clewiston (Route 2)	6	80	18

The total combined length of the AIWW, IWW and OWW channels is 467.5 miles. The summary of each channel length and general location are provided below:

AIWW (Florida State Line to Jacksonville)	21.9 miles
IWW Jacksonville to Miami	349.0 miles
OWW from IWW through St Lucie Lock to Port Mayaca Lock	39.1 miles
Port Mayaca Lock along Rim Canal to Palm Beach County Line	34.2 miles
Port Mayaca Lock across the lake to Palm Beach County Line	23.3 miles

The area within the OWW from the IWW to the St Lucie Lock structure is considered tidal, and is approximately 15 miles in length. The OWW west of the St Lucie Lock and terminating at the Palm Beach/Hendry County line is approximately 24.1 miles and is not tidally influenced.

The AIWW, IWW, and OWW are segmented into operational “reaches” in order to properly manage dredged material. Within each county, reaches are delineated based on historic shoaling patterns, sediment quality, projected material storage requirements, material handling and pumping distance constraints, area demographics, and site availability. Within each reach, “cuts” are delineated based on turns in the channels. Dredging within the federal channel is normally accomplished with a hydraulic pipeline cutterhead suction dredge although a clamshell or small hopper dredge can perform the work, albeit less efficiently. Since dredging does not typically result in a smooth and even channel bottom, a drag bar, chain, or other item may be dragged along the bottom to smooth down high spots and fill in low areas. This technique reduces the need for additional dredging to remove high spots that may have been missed by dredge equipment. Periodic maintenance dredging occurs routinely within some reaches/cuts and other reaches/cuts have not been maintained in decades or since being dredged originally to the authorized depth. In most cases dredging occurs by cut unless the only area in need of dredging is a shoal; this is often the case around coastal inlets.

Dredged material may be disposed of within existing DMMAs, upland areas, or placed on beaches. Extensive areas of exposed hardbottom occurs in the nearshore from Indian River County south. Nearshore hardbottom reefs serve as settlement habitats for immigrating sub-adults and fish and invertebrates or as intermediate nursery habitats for juveniles emigrating out of nearby inlets (Vare, 1991). Due to the presence of and need to avoid impacts to nearshore hardbottom habitats, nearshore placement is not included within the proposed action even though nearshore placement has been previously authorized at St. Augustine and Ponce de Leon Inlets and is currently being considered near Hillsboro Inlet.

Table 3. Maintenance Dredging Projects with Beach Disposal Areas

YEAR	REACHES	LOCATION	BEACH	FDEP RANGE MONUMENS
2011	M-ll	Crossroads	Martin Co.	R-59 to R-80
2013	P-lV	Ocean Ridge	Palm Beach Co.	R-13 to R-17
2016	SJ-V	Matanzas	St. Johns Co.	R-205 to 208
2017	SJ-III	St Augustine Inlet Intersection	St. Johns Co.	R-84 to 94 R-109 to 117 R-132 to 152
2017	V-IV	Volusia/Ponce & MSA Offload	Volusia Co.	R-161 to 189
2017	P-I	Jupiter	Palm Beach Co.	R-13 to 17
2019	N-II	Sawpit	Nassau Co.	R-75 to 78
2019	MD-II	Baker's Haulover	Miami-Dade Co.	R-28 to R-32
2019	SJ-V	Matanzas	St. Johns Co.	R-205 to 208
2020	P-I	Jupiter	Palm Beach Co.	R-13 to 17

Pursuant to F.A.C. 62B-41.007, the Florida Department of Environmental Protection "sand rule" subsection 62-B-41.005(15), sandy sediment derived from maintenance of coastal navigation channels shall be deemed suitable for beach placement with up to 10% fine material passing the #230 sieve. Typically sediments in the AIWW and IWW proximate to tidally influenced inlets consist of beach quality sand. Where sediments consist of significant amounts of fines and organic rich material further removed from inlets, disposal includes DMMAs and other upland sites.

Table 4 shows maintenance dredging projects implemented since 1999 under Civil Works and Regulatory Programs and includes information on the specific cut or shoal where the dredging occurred where this information is available, as well as disposal methods. (See enclosed DVD addendum for GIS information showing dredging that has occurred within specific cut.) Between1999 and 2014 there were 33 maintenance dredging events by either FIND or USACE, resulting in over 7 million cubic yards of dredged material from the federal channels. Of the past maintenance dredge events, 18 were within the range of seagrass (Miami-Dade County north to Ponce Inlet in Volusia County).

Table 4. Past and Projected Maintenance Dredging Projects within the Proposed Action Area.

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	DMMA	Entity	Dredging Frequency (Years)
Dredging History (1999 to 2014)								
1999	SJ-V	SJ-59 to SJ-61	Cut SJ59 / STA 20+00	Cut SJ61 / STA 30+00	Matanzas	Bch	USACE	3
2000	N-II	N-21 to N-27-C	Cut 21 / 5+00	Cut 22 / 9+00	Sawpit	Bch	USACE	5
			Cut 23 / 23+00	Cut 27 / 23+00		DU-2		
2001	BV-I	BV-1 to BV-9	Cut BV-1 / STA 0+00	Cut BV-9 / STA 43+00	Brevard, Haulover Canal	BV-2C	USACE	
2001	P-IV	P-50	CUT P-50 / STA 15+00	CUT P-50 / STA 30+00	Palm Beach		FIND / PBC	
2003	M-II	M-5 and OWW Cut-1	Cut M-4 / STA 22+00	Cut M-6 / STA 6+00	Crossroads	Bch	USACE	3
			OWW Cut 1 / STA 0+00	OWW Cut 1 / STA 14+00				
2003	P-I	P-1 to P-4			Jupiter	Bch	USACE	3
2003	SJ-V; F-I	SJ-2 to SJ-5; F-2			Matanzas	Bch	USACE	3
2005	V-V	V-36 to V-40	Cut V-36 / STA 17+00	Cut V-37 / STA 4+00	Volusia S New Smyrna	Bch	USACE	5
			Cut V-37 / STA 16+00	Cut V-38 / STA 25+00				
			Cut V-38 / STA 38+00	Cut V-38 / STA 43+00				
			Cut V-38 / STA 55+00	Cut V-38 / STA 60+00				
			Cut V-38 / STA 74+00	Cut V-40 / STA 31+87.9				
2005	SJ-I / II	SJ-5 toSJ-9, DU-7 – DU-9	Cut SJ-5 / STA 80+00	Cut SJ-9 / STA 84+46.7	Palm Valley S	SJ-14	USACE	10
			Cut DU-7 / STA 21+00	Cut DU-8 / STA 2+00				
			Cut DU-8 / STA 12+97.18	Cut DU-9 / STA 4+00				

Table 4. Past and Projected Maintenance Dredging Projects within the Proposed Action Area.

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	DMMA	Entity	Dredging Frequency (Years)
2005	SJ-III	SJ-29A			St Augustine Inlet Intersection	Bch	USACE	5
2005	M-II	M-5 and OWW Cut-1			Crossroads	M-5	USACE	3
2005	DA-II	DA-9			Baker's Haulover	Bch	USACE	4
2006	N-II	Cut 11 to 27-A	Cut 11 / STA 0+00	Cut 12 / STA 7+00	Sawpit	Bch	USACE	5
			Cut 12 / STA 22+00	Cut 19 / STA 2+00				
			Cut 19 / STA 27+00	Cut 22 / STA 7+00				
			Cut 23 / STA 27+00	Cut 26A / STA 2+00		DU-2		
			Cut 27 / STA 5+00	Cut 27 / STA 14+00				
			Cut 27 / STA 61+00	Cut 27 / STA 67+00				
			Cut 27A / STA 8+00	Cut 27A / STA 20+00				
2007	SJ-V	SJ-59 to SJ-61	Cut SJ-59 / STA 20+00	Cut SJ-61 / STA 13+00	Matanzas	Bch	USACE	3
2008	P-I	P-1 to P-3	Cut P-1 / STA 65+00	Cut P-1 / STA 78+00	Jupiter	Bch	USACE	3
			Cut P-3 / STA 3+00	Cut P-3 / STA 11+5192				
		P-4	Cut P-4 / STA 0+00	Cut P-4 / STA 7+00				
2008	P-IV	P-50	CUT P-50 / STA 15+00	CUT P-50 / STA 30+00	Palm Beach	MSA 617C / Bch (Ocean Ridge)	FIND/ PBC	
2010	SJ-I	SJ-2 to SJ-5	Cut SJ-2 / STA 23+00	STA SJ-5 / STA 80+00	Palm Valley N	DU-9	USACE	

Table 4. Past and Projected Maintenance Dredging Projects within the Proposed Action Area.

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	DMMA	Entity	Dredging Frequency (Years)
2010	M-II	M-4-M-5 and OWW Cut-1	Cut M-4 / STA 22+00	Cut M-5 / STA 3+00	Crossroads	M-5	USACE	3
			Cut M-5 / STA 17+00	Cut M-5 / STA 35+00				
			Cut M-5 / STA 45+00	Cut M-5 / STA 61+73.96				
			OWW Cut-1 / STA 2+50	OWW Cut 1 / STA 11+00				
2010	P-I	P-2	CUT P-2 / STA 17+50	CUT P-2 / STA 26+12.63	Jupiter	Bch	FIND	3
		P-3	CUT P-3 STA 0+00	Cut P-3 / STA 11+5192				
		P-4	Cut P-4 / STA 0+00	CUT P-4 / STA 17+00				
2010	DA-II	DA-9	Cut DA-9 / STA 23+00	Cut DA-9 / STA 55+00	Baker's Haulover	Bch	USACE	4
2010	P-III	P-37	Cut P-37 / STA 53+00	Cut P-37 / STA 68+00	Palm Beach	MSA 617C	FIND	
		P-38	Cut P-38 / STA 15+00	Cut P-38 / STA 66+75				
2011	SJ-V;F-I	SJ-59 to SJ-61; F-2	Cut SJ-60 / STA 4+00	Cut SJ-61 / STA 13+00	Matanzas	Bch	USACE	3
			Cut F-2 / STA 5+50	Cut F-2 / STA 33+00				
2012	SJ-III	SJ-28 toSJ-30			St Augustine Inlet Intersection	Bch	USACE	5
2013	N-II	24, 25, 26, 26A, 27, SB, AMA-B, 27A, AMA-A, 27C	Cut SJ-20 / 5+00	Cut SJ-61 / 13+00	Sawpit	Bch	USACE	5
			Cut F-2 / 5+50	Cut F-2 / 33+00		DU-2		
2013	M-II	M-4 to M-6,	CUT M-4 / STA 21+64	CUT M-6 / STA 4+31	Crossroads	M-5	FIND	3

Table 4. Past and Projected Maintenance Dredging Projects within the Proposed Action Area.

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	DMMA	Entity	Dredging Frequency (Years)
		OWW Cut 1	OWW-1 / STA 0+00	OWW-1 / STA 13+82				
2013	V-IV	V-22 to V-28	CUT V-22 / STA 64+00	CUT V-28 / STA 19+17.6	Volusia / Ponce	MSA 434	USACE/ FIND	4
2013	P-IV	P-50	CUT P-50 / 12+00	CUT P-50 / 32+00	Palm Beach / Ocean Ridge	MSA 617C & Bch (Ocean Ridge)	FIND	
2013	P-III	P-37	CUT P-37 / STA 54+50	CUT P-37 / STA 66+75	Palm Beach	MSA 617C	FIND	
		P-38	CUT P-38 / STA 26+25	CUT P-38 / STA 31+02.04				
2013	P-III	P-31	CUT P-31 / STA 8+00	CUT P-31 / STA 14+00				
2013	Route 1 & 2	R1-1, R1-2, R2-1, R2-2, R2-3	R1-1 / STA 0+00	R1-2 / STA 42+00	Martin	Temp. DMMA (east of lock) and disposal at Lake Point Restoration Site	FIND	
			R2-1 / STA 0+00	R2-3 / STA 33+02.96				
2013	SL-1	SL-3	CUT SL-3N / STA 7+00	CUT SL-3N / STA 10+00	St. Lucie	City of Ft. Pierce Marina	FIND	
2014	P-I	P-1	Cut P-1 / STA 11+50	Cut P-1 / STA 30+00	Jupiter	Bch	USACE	3
			Cut P-1 / STA 66+00	Cut P-1 / STA 81+20.77				
		P-2,P3,P4	Cut P-2 / STA 23+00	Cut P-4 / STA 11+00				

Table 4. Past and Projected Maintenance Dredging Projects within the Proposed Action Area.

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	DMMA	Entity	Dredging Frequency (Years)
2014	MD-II	DA-9	Cut DA-9 / STA 23+36	Cut DA-9 / STA 56+26	Baker's Haulover	Bch	USACE	4
Dredging Projection (2015 to 2020)								
2015	IR-I	IR-1 to IR-6	CUT IR-1 / STA 0+00	CUT IR-2 / STA 130+00	Indian River Rch 1	IR-2	USACE	10
			CUT IR-3 / STA 7+00	CUT IR-3 / STA 40+00				
			CUT IR-4 / STA 5+00	CUT IR-4 / STA 18+00				
			CUT IR-5 / STA 0+00	CUT IR-5 / STA 5+00				
			CUT IR-5 / STA 9+00	CUT IR-5 / STA 26+00				
			CUT IR-5 / STA 31+00	CUT IR-5 / STA 35+49.73				
			CUT IR-6 / STA 0+00	CUT IR-5 / STA 14+40				
2015	SL-I	SL -2 to SL-3N, SL3S	CUT SL-2 / STA 11+00	CUT SL-2 / STA 16+00	St Lucie Rch I Ft Pierce	SL-2	FIND	
			CUT SL-2 / STA 25+00	CUT SL-2 / STA 53+00				
			CUT SL-3N / STA 8+50	CUT SL-3N / STA 12+00				
			CUT SL-3S / STA 2+50	CUT SL-3S / STA 4+50				
		SL-5	CUT SL-5 / STA 7+00	CUT SL-5 / STA 74+00				
2015	P-III	PB-35 to PB-36	CUT PB-35 / STA 0+00	CUT PB-36 / STA 9+00	Palm Beach Deepening	Peanut Island	FIND	
2015	BW-III	BW-36 to WB-49	CUT BW-36 / STA 0+00	CUT BW-49 / STA 26+50	Broward Deepening	Port Everglades	FIND	
2016	BW-III	BW-1 to BW-21			Broward Rch I, North County	Nearshore	USACE	

Table 4. Past and Projected Maintenance Dredging Projects within the Proposed Action Area.

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	DMMA	Entity	Dredging Frequency (Years)
2016	M-II	M-4 to M-6, OWW Cut 1			Crossroads	M-5	FIND	3
2016	N-II	N-34 to N-27			Nassau Rch I , North County	NA-1	FIND	
2016	SJ-V	SJ-59 toSJ-61; F-2			Matanzas	Bch	USACE	3
2017	O-III / IV				OWW Rch III & IV, Palm City	O-7	USACE/ FIND	
2017	SJ-III	SJ-28 to SJ-30			St Augustine Inlet Intersection	Bch	USACE	5
2017	V-IV	V-22 to V-40			Volusia / Ponce & MSA Offload	Bch	FIND	4
2017	P-I	P-1 to P-3			Jupiter	Bch	USACE	3
		P-4						
2018	P-III / IV	P-31 to P-50			Palm Beach / Ocean Ridge	MSA 617C & Bch	FIND	5
2018	SL-II	SL-6 to M-1			St Lucie Rch II, South of Ft. Pierce	M-8	USACE/ FIND	
2018	F-I	F-2 to F-11			Flagler Rch I, South of Marineland	FL-3	USACE/ FIND	
2018	BV-III	BV-1, BV-3, BV 6 to BV-9			Brevard, Haulover Canal	BV-2C	USACE/ FIND	10
		BV-2, BV-4, BV-5						

Table 4. Past and Projected Maintenance Dredging Projects within the Proposed Action Area.

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	DMMA	Entity	Dredging Frequency (Years)
2019	N-II	SJ-21 to SJ-27C			Sawpit	Bch & DU-2	USACE	5
2019	DA-II	DA-9			Baker's Haulover	Bch	USACE	4
2019	SJ-V	SJ-59 toSJ-61; F-2			Matanzas	Bch	USACE	3
2019	M-II	M-4 to M-6, OWW Cut 1			Crossroads w / Add, ICWW N&S	M-5	FIND	3
2020	V-IV				Volusia / Ponce	MSA 434	FIND	4
2020	P-I	P-1 to P-3			Jupiter	Bch	USACE	3
		P-4						
2020	BV-II	BV-7 to BV-15			Brevard Rch II Mims	BV-4B	USACE/ FIND	

Table 5 provides dates for past EFH consultations with NMFS under MSFCMA including projects that qualified for RGP-93 for the dredge projects listed in Table 4. Where a project-specific EFH consultation was not required, the date shown is the National Environmental Policy Act (NEPA) compliance date. Where FIND is identified as the dredging "Entity" on the spreadsheet, the Regulatory Division was responsible for the environmental compliance including EFH consultation. Where USACE is identified as "Entity", the Planning Division was responsible for environmental compliance. It should be noted that Sawpit and Baker's Haulover have not had an EFH consultation since NOAA issued implementing regulations for EFH. This is based on NMFS agreement that for maintenance dredging activities especially those involving federal navigation channels, an EFH consultation will normally not be conducted for each event, rather consultation will be incorporated into the Jacksonville's District's NEPA document (See letter from Andreas Mager, Jr. to Col Joe Miller dated May 3, 1999, and incorporated herein by reference). Since the project design parameters have not changed, the NEPA documents for Sawpit and Baker's Haulover have not been updated.

Table 5. EFH Consultations and RGP-93 Thresholds for Past and Projected Maintenance Dredging Projects within the Proposed Action Area

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	Department of the Army Number	EFH Consult	Would Meet RGP		
								w/ 100' Buffer	w/ 100' Buffer	w/ 25' Buffer
									w/ Bch Dis	w/ Bch Dis
Dredging History (1999 to 2014)										
1999	SJ-V	SJ-59 to SJ-61	Cut SJ59 / STA 20+00	Cut SJ61 / STA 30+00	Matanzas			N	Y	Y
2000	N-II	N-21 to N-27-C	Cut 21 / 5+00	Cut 22 / 9+00	Sawpit		22-Jun-96	N	Y	Y
			Cut 23 / 23+00	Cut 27 / 23+00						
2001	BV-I	BV-1 to BV-9	Cut BV-1 / STA 0+00	Cut BV-9 / STA 43+00	Brevard, Haulover Canal			N	N	Y
2001	P-IV	P-50	CUT P-50 / STA 15+00	CUT P-50 / STA 30+00	Palm Beach	SAJ-2000-02301	23-Mar-01	N	N	N
2003	M-II	M-5 and OWW Cut-1	Cut M-4 / STA 22+00	Cut M-6 / STA 6+00	Crossroads	SAJ-1996-02289	18-Feb-03	N	N	N
			OWW Cut 1 / STA 0+00	OWW Cut 1 / STA 14+00						
2003	P-I	P-1 to P-4			Jupiter			N		
2003	SJ-V; F-I	SJ-2 to SJ-5; F-2			Matanzas			N	Y	Y
2005	V-V	V-36 to V-40	Cut V-36 / STA 17+00	Cut V-37 / STA 4+00	Volusia S New Smyrna			N	Y	Y
			Cut V-37 / STA 16+00	Cut V-38 / STA 25+00						
			Cut V-38 / STA 38+00	Cut V-38 / STA 43+00						
			Cut V-38 / STA 55+00	Cut V-38 / STA 60+00						
			Cut V-38 / STA 74+00	Cut V-40 / STA 31+87.9						
2005	SJ-I / II	SJ-5 toSJ-9, DU-7 – DU-9	Cut SJ-5 / STA 80+00	Cut SJ-9 / STA 84+46.7	Palm Valley S		4-Aug-04	Y	Y	Y
			Cut DU-7 / STA 21+00	Cut DU-8 / STA 2+00						

Table 5. EFH Consultations and RGP-93 Thresholds for Past and Projected Maintenance Dredging Projects within the Proposed Action Area

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	Department of the Army Number	EFH Consult	Would Meet RGP		
								w/ 100' Buffer	w/ 100' Buffer	w/ 25' Buffer
									w/ Bch Dis	w/ Bch Dis
			Cut DU-8 / STA 12+97.18	Cut DU-9 / STA 4+00						
2005	SJ-III	SJ-29A			St Augustine Inlet Intersection			N	Y	Y
2005	M-II	M-5 and OWW Cut-1			Crossroads					
2005	DA-II	DA-9			Baker's Haulover		4-Aug-97	N	N	N
2006	N-II	Cut 11 to 27-A	Cut 11 / STA 0+00	Cut 12 / STA 7+00	Sawpit			N	Y	Y
			Cut 12 / STA 22+00	Cut 19 / STA 2+00						
			Cut 19 / STA 27+00	Cut 22 / STA 7+00						
			Cut 23 / STA 27+00	Cut 26A / STA 2+00				Y	Y	Y
			Cut 27 / STA 5+00	Cut 27 / STA 14+00						
			Cut 27 / STA 61+00	Cut 27 / STA 67+00						
			Cut 27A / STA 8+00	Cut 27A / STA 20+00						
2007	SJ-V	SJ-59 to SJ-61	Cut SJ-59 / STA 20+00	Cut SJ-61 / STA 13+00	Matanzas			N	Y	Y
2008	P-I	P-1 to P-3	Cut P-1 / STA 65+00	Cut P-1 / STA 78+00	Jupiter		9-Nov-07	N	N	N
			Cut P-3 / STA 3+00	Cut P-3 / STA 11+5192						
		P-4	Cut P-4 / STA 0+00	Cut P-4 / STA 7+00				N	Y	Y

Table 5. EFH Consultations and RGP-93 Thresholds for Past and Projected Maintenance Dredging Projects within the Proposed Action Area

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	Department of the Army Number	EFH Consult	Would Meet RGP		
								w/ 100' Buffer	w/ 100' Buffer	w/ 25' Buffer
									w/ Bch Dis	w/ Bch Dis
2008	P-IV	P-50	CUT P-50 / STA 15+00	CUT P-50 / STA 30+00	Palm Beach	SAJ-2000-02301	23-Mar-01	N	N	N
2010	SJ-I	SJ-2 to SJ-5	Cut SJ-2 / STA 23+00	STA SJ-5 / STA 80+00	Palm Valley N		4-Aug-04	Y	Y	Y
2010	M-II	M-4-M-5 and OWW Cut-1	Cut M-4 / STA 22+00	Cut M-5 / STA 3+00	Crossroads					
			Cut M-5 / STA 17+00	Cut M-5 / STA 35+00						
			Cut M-5 / STA 45+00	Cut M-5 / STA 61+73.96						
			OWW Cut-1 / STA 2+50	OWW Cut 1 / STA 11+00						
2010	P-I	P-2	CUT P-2 / STA 17+50	CUT P-2 / STA 26+12.63	Jupiter	SAJ-2008-00533	3-Mar-08	N	N	N
		P-3	CUT P-3 STA 0+00	Cut P-3 / STA 11+5192				N	Y	Y
		P-4	Cut P-4 / STA 0+00	CUT P-4 / STA 17+00				N	N	Y
2010	DA-II	DA-9	Cut DA-9 / STA 23+00	Cut DA-9 / STA 55+00	Baker's Haulover			N	N	N
2010	P-III	P-37	Cut P-37 / STA 53+00	Cut P-37 / STA 68+00	Palm Beach	SAJ-2009-04126	18-Feb-10	N	N	Y
		P-38	Cut P-38 / STA 15+00	Cut P-38 / STA 66+75						
2011	SJ-V;F-I	SJ-59 to SJ-61; F-2	Cut SJ-60 / STA 4+00	Cut SJ-61 / STA 13+00	Matanzas		14-Jan-10	N	Y	Y
			Cut F-2 / STA 5+50	Cut F-2 / STA 33+00						
2012	SJ-III	SJ-28 toSJ-30			St Augustine Inlet Intersection		10-May-10	N	Y	Y

Table 5. EFH Consultations and RGP-93 Thresholds for Past and Projected Maintenance Dredging Projects within the Proposed Action Area

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	Department of the Army Number	EFH Consult	Would Meet RGP		
								w/ 100' Buffer	w/ 100' Buffer	w/ 25' Buffer
									w/ Bch Dis	w/ Bch Dis
2013	N-II	24, 25, 26, 26A, 27, SB, AMA-B, 27A, AMA-A, 27C	Cut SJ-20 / 5+00	Cut SJ-61 / 13+00	Sawpit			N	Y	Y
			Cut F-2 / 5+50	Cut F-2 / 33+00				Y	Y	Y
2013	M-II	M-4 to M-6, OWW Cut 1	CUT M-4 / STA 21+64	CUT M-6 / STA 4+31	Crossroads	SAJ-2009-03015	12-Sep-11	N	N	Y
			OWW-1 / STA 0+00	OWW-1 / STA 13+82						
2013	V-IV	V-22 to V-28	CUT V-22 / STA 64+00	CUT V-28 / STA 19+17.6	Volusia / Ponce	SAJ-2012-02660	RGP-93	Y	Y	Y
2013	P-IV	P-50	CUT P-50 / 12+00	CUT P-50 / 32+00	Palm Beach / Ocean Ridge	SAJ-2000-02301	28-Aug-12	N	N	N
2013	P-III	P-37	CUT P-37 / STA 54+50	CUT P-37 / STA 66+75	Palm Beach	SAJ-2009-04126	RGP-93	Y	Y	Y
		P-38	CUT P-38 / STA 26+25	CUT P-38 / STA 31+02.04						
2013	P-III	P-31	CUT P-31 / STA 8+00	CUT P-31 / STA 14+00	Palm Beach	SAJ-2012-02469	RGP-93	N	N	Y
2013	Route 1 & 2	R1-1, R1-2, R2-1, R2-2, R2-3	R1-1 / STA 0+00	R1-2 / STA 42+00	Martin	SAJ-2011-02659	RGP-93	Y	Y	Y
			R2-1 / STA 0+00	R2-3 / STA 33+02.96						
2013	SL-1	SL-3	CUT SL-3N / STA 7+00	CUT SL-3N / STA 10+00	St. Lucie	SAJ-2013-00633	RGP-93	Y	Y	Y
2014	P-I	P-1	Cut P-1 / STA 11+50	Cut P-1 / STA 30+00	Jupiter			N	N	N
			Cut P-1 / STA 66+00	Cut P-1 / STA 81+20.77						

Table 5. EFH Consultations and RGP-93 Thresholds for Past and Projected Maintenance Dredging Projects within the Proposed Action Area

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	Department of the Army Number	EFH Consult	Would Meet RGP		
								w/ 100' Buffer	w/ 100' Buffer	w/ 25' Buffer
									w/ Bch Dis	w/ Bch Dis
		P-2,P3,P4	Cut P-2 / STA 23+00	Cut P-4 / STA 11+00				N	N	Y
2014	MD-II	DA-9	Cut DA-9 / STA 23+36	Cut DA-9 / STA 56+26	Baker's Haulover			N	N	N
Dredging Projection (2015 to 2020)										
2015	IR-I	IR-1 to IR-6	CUT IR-1 / STA 0+00	CUT IR-2 / STA 130+00	Indian River Rch 1		3-Jul-14	Y	Y	Y
			CUT IR-3 / STA 7+00	CUT IR-3 / STA 40+00						
			CUT IR-4 / STA 5+00	CUT IR-4 / STA 18+00						
			CUT IR-5 / STA 0+00	CUT IR-5 / STA 5+00						
			CUT IR-5 / STA 9+00	CUT IR-5 / STA 26+00						
			CUT IR-5 / STA 31+00	CUT IR-5 / STA 35+49.73						
			CUT IR-6 / STA 0+00	CUT IR-5 / STA 14+40						
2015	SL-I	SL -2 to SL-3N, SL3S	CUT SL-2 / STA 11+00	CUT SL-2 / STA 16+00	St Lucie Rch I Ft Pierce	SAJ-2014-03657		Y	Y	Y
			CUT SL-2 / STA 25+00	CUT SL-2 / STA 53+00						
			CUT SL-3N / STA 8+50	CUT SL-3N / STA 12+00						
			CUT SL-3S / STA 2+50	CUT SL-3S / STA 4+50						
		SL-5	CUT SL-5 / STA 7+00	CUT SL-5 / STA 74+00				N	N	N
2015	P-III	PB-35 to PB-36	CUT PB-35 / STA 0+00	CUT PB-36 / STA 9+00	Palm Beach Deepening	SAJ-2012-01719	20-Aug-14	N / A	N / A	N / A

Table 5. EFH Consultations and RGP-93 Thresholds for Past and Projected Maintenance Dredging Projects within the Proposed Action Area

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	Department of the Army Number	EFH Consult	Would Meet RGP		
								w/ 100' Buffer	w/ 100' Buffer	w/ 25' Buffer
									w/ Bch Dis	w/ Bch Dis
2015	BW-III	BW-36 to WB-49	CUT BW-36 / STA 0+00	CUT BW-49 / STA 26+50	Broward Deepening	SAJ-2009-03523	12-Apr-10	N / A	N / A	N / A
2016	BW-III	BW-1 to BW-21			Broward Rch I, North County			N	N	N
2016	M-II	M-4 to M-6, OWW Cut 1			Crossroads			N	N	Y
2016	N-II	N-34 to N-27			Nassau Rch I , North County			Y	Y	Y
2016	SJ-V	SJ-59 toSJ-61; F-2			Matanzas			N	Y	Y
2017	O-III / IV				OWW Rch III & IV, Palm City			Y	Y	Y
2017	SJ-III	SJ-28 to SJ-30			St Augustine Inlet Intersectio n			N	Y	Y
2017	V-IV	V-22 to V-40			Volusia / Ponce & MSA Offload			N	Y	Y
2017	P-I	P-1 to P-3			Jupiter			N	N	N
		P-4						N	Y	Y
2018	P-III / IV	P-31 to P-50			Palm Beach / Ocean Ridge			N	N	N

Table 5. EFH Consultations and RGP-93 Thresholds for Past and Projected Maintenance Dredging Projects within the Proposed Action Area

Year	Reaches	Cuts	From Cut / Station	To Cut / Station	Location	Department of the Army Number	EFH Consult	Would Meet RGP		
								w/ 100' Buffer	w/ 100' Buffer	w/ 25' Buffer
									w/ Bch Dis	w/ Bch Dis
2018	SL-II	SL-6 to M-1			St Lucie Rch II, South of Ft. Pierce			Y	Y	Y
2018	F-I	F-2 to F-11			Flagler Rch I, South of Marineland			Y	Y	Y
2018	BV-III	BV-1, BV-3, BV 6 to BV-9			Brevard, Haulover Canal			Y	Y	Y
		BV-2, BV-4, BV-5						N	N	Y
2019	N-II	SJ-21 to SJ-27C			Sawpit			N	Y	Y
2019	DA-II	DA-9			Baker's Haulover			N	Y	Y
2019	SJ-V	SJ-59 toSJ-61; F-2			Matanzas			N	Y	Y
2019	M-II	M-4 to M-6, OWW Cut 1			Crossroads w / Add, ICWW N&S			N	Y	Y
2020	V-IV				Volusia / Ponce			Y	Y	Y
2020	P-I	P-1 to P-3			Jupiter			N	N	N
		P-4						N	Y	Y
2020	BV-II	BV-7 to BV-15			Brevard Rch II Mims			Y	Y	Y

From February 2011 to date, the Corps has verified six projects (SAJ 2009-04126, SAJ 2011-02659, SAJ-2012-02469, SAJ 2012-02660, SAJ-2013-00633, and SAJ-2014-

03657) under RGP SAJ-93 and project specific EFH consultations were not required. Two projects verified were in areas with no documented seagrass: SAJ 2011-2659 which included maintenance dredging in the OWW and SAJ 2012-02660 which included maintenance dredging in the IWW in Volusia County. Three projects were verified under RGP-93 but required modified dredge footprints in order to meet the project design criteria (PDC) of a 100-foot buffer between dredging and seagrass: SAJ-2009-04126, SAJ-2012-02469, and SAJ-2014-03657. SAJ-2014-03657 for St. Lucie Reach I recently verified in July 2015 and is not yet constructed. Cut SL-5 of the project area is currently under review by the Regulatory Division for permit compliance as it is suspected that the City of Ft. Pierce's storm protection island system (SAJ-1993-41787) contributed to shoaling and subsequent seagrass colonization in this portion of the IWW. This area of the IWW has not been maintenance dredged since its original construction to the authorized depth in the 1960's and there is no record of the federal channel in this area supporting seagrass prior to the recent shoaling event.

As the Corps' oldest and primary mission is safe navigation, modifying a dredge footprint to leave a shoal in the federal channel or not dredging the entire design width of the channel is an unsafe practice. For safety reasons and to ensure the federal navigation channel is unobstructed for commercial and recreation vessel traffic, the Corps and FIND prefer dredging be performed for the entire width of the navigation channel from design edge to design edge including channel wideners. With a well maintained navigation channel, vessels are more likely to stay within the channel limits and outside of the shallows where seagrass is more prevalent, thereby protecting the resources. Since avoiding seagrass within the design limits of the federal channel is unwise, the revised draft RGP-93 would authorize impacts to seagrass within the design limits of the federal channel.

A few of the past dredging projects permitted by the Corps required an individual permit and project specific EFH consultation. Crossroads did not qualify for RGP-93 due to beach placement and proximity of seagrass to the dredge areas. The P-50 project includes beach placement and the dredging has been performed by Palm Beach County (PBC) who is not authorized under RGP-93 which only applies to FIND. It is plausible that this section of the IWW could be dredged by FIND in the future if PBC is unable to complete the work; therefore, it is included in this EFHA.

The forecast of anticipated dredging projects through 2020 is also shown in Table 4. Maintenance dredging activities in response to unanticipated acts, such as shoaling, storms, etc. cannot be projected and are intended to be covered in the scope of RGP-93. FIND recently completed hydrographic surveys of the IWW (see original DVD for south reaches and see DVD addendum for north reaches) and a preliminary review of

the survey data indicates no additional projects not already included in the table are likely to be implemented.

In the next five years there are 23 anticipated projects totaling over 4 million cubic yards of dredged material. This includes the recently completed dredging project in Indian River Reach I and two deepening projects previously authorized by Department of the Army Permit: Broward IWW deepening and Palm Beach IWW deepening which have not yet commenced. Four anticipated projects: Broward Reach I, St. Lucie Reach I, St Lucie Reach II, and Brevard Reach II Mims are within the range of seagrass and maintenance dredging has not occurred since 1999. The total estimated volume of dredged material for these projects is 650,000 cubic yards. Six anticipated projects: Baker's Haulover, Palm Beach P-31, Palm Beach P-50, Jupiter, Crossroads, and Brevard/Haulover Canal are within the range of seagrass, routinely maintenance dredged, and would be maintenance dredged within the next five years. These projects would have an estimated volume of 870,000 cubic yards of dredged material. The proposed dredging in these areas is not anticipated to result in significant adverse impacts to seagrass since the resources, when present, have continued to re-colonize and persist even though cyclical impacts have occurred. There are four anticipated projects that are maintenance dredged on a routine cycle and outside the range of seagrass: Sawpit, St. Augustine, Matanzas, and Volusia/Ponce with an anticipated volume of 1.8 million cubic yards of dredged material.

As requested by NMFS, Table 5 shows those past and projected projects which met/would meet the criteria for RGP-93 as existing, as existing with beach placement included as a disposal option, and as proposed with the buffer between seagrass and dredging reduced from 100 feet to 25 feet. The source data for the projections is shown on the full table enclosed on the DVD addendum. Projects outside the range of seagrass that do not meet the current RGP-93 are disqualified because the existing RGP-93 does authorize beach placement for disposal of dredged material. All of the planned dredging projects outside the range of seagrass would qualify for the proposed RGP-93 due to expansion of disposal options to include beach placement.

The other major constraint that limited the number of verifications or required a modified dredge footprint in order to meet RGP-93 is the 100-foot buffer between seagrass and dredging. Although seagrass is generally not common within the federal channel, it is common adjacent to the channel in shallow water from Ponce de Leon Inlet in Volusia County south to the terminus in Miami-Dade County. The projections with regard to RPG-93 are based on a dredging footprint that includes the entire width of the navigation channel and not a modified dredge footprint.

RGP-93 as circulated by public notice on March 31, 2015, proposed a reduction in buffer from 100 feet to 25 feet which would fall within the channel side slopes where

sloughing and sedimentation are most likely to occur. Even with this reduction in buffer, four routine maintenance dredging projects: Crossroads, Jupiter (Cuts P-1 to P-4), Palm Beach Cut P-50, and Baker's Haulover would not qualify for RGP-93 as they are proximate to coastal inlets where shoaling frequently occurs with subsequent colonization by pioneer seagrass species within or very close to the channel. These projects, however, would qualify for RGP-93 as revised May 29, 2015, since all four of these areas have been maintenance dredged since NMFS published implementing regulations for MSFCMA in 2002; EFH consultations have been completed for Crossroads, Jupiter, and Palm Beach Cut P-50; pre and post-construction surveys show seagrass within these areas quickly recolonizes following the dredging event; and loss of seagrass documented in post-construction surveys has not always been attributed to the dredging project. One additional dredging project, Broward Reach I would not qualify for the revised RGP (25-foot buffer and beach placement) due to proximity of seagrass to the federal channel as noted in the 2015 Broward side scan sonar maps and groundtruthing on July 1, 2015, and since nearshore placement is included for disposal of dredged material.

Because of the number of projects that would be disqualified from RGP-93 with the 25-foot buffer and since NMFS requested working with the Corps on a RGP that would meet the needs of a FIND rather than a stand-alone programmatic EFH consultation, the Corps revised the conditions of RGP-93 on August 17, 2015 to address concerns voiced by NMFS during the meeting on May 15, 2015. For example, the revised RGP-93 would authorize impacts to seagrass within the design limits of the federal channel, includes a minimum buffer of 25 feet between dredging and seagrass for activities involving hydraulic dredging of coarse sediments, and includes a minimum 100-foot buffer for activities involving mechanical dredging and/or fine sediments. The revised RGP includes a 10-day coordination with NMFS where these conditions cannot be met. The Corps is hopeful that this effort will be successful and SAJ-2014-03657 for St. Lucie Reach I will be verified under a re-issued RGP that would allow maintenance dredging of seagrass present in the navigation channel of Cut SL-5.

RGP-93 includes other activities associated with maintenance dredging such as use of pipelines, booster pumps, and associated dredged material transfer mechanisms and work vessels. Pipelines may be submerged or floating, typically constructed of steel with connecting steel collars. Sizes range from 14-inch to 18-inch diameter. Dredging may also require strategically locating booster pumps to extend pipeline disposal. Work vessels include dredge vessel, booster pump/small barges scows/barges, crew transport/work vessels including spudding, anchoring, staging, stockpile areas, loading/unloading, vessel movement. The current RGP-93 includes a buffer of 50 feet between these other associated construction activities and seagrass. The proposed RGP-93 also reduces this buffer to 25 feet. Although common practice for dredging

under the Civil Works Program is to monitor anchor zone/pipeline route impacts and if seagrass does not recover within 1 year require compensatory mitigation, the Corps and FIND have been successful in utilizing pre-construction surveys to avoid seagrass impacts associated with pipelines, booster pumps, anchors, etc.

Special conditions have been added to RGP-93 to ensure no impacts to seagrass, hardbottom including coral, or wetlands as a result of these other associated activities. Where inadvertent impacts are identified as a result of post-construction monitoring, mitigation may be required. If avoidance is not possible based on a pre-construction survey, FIND may develop a mitigation plan which the Corps would coordinate with NMFS prior to verification of the project under the RGP.

V. Analysis of the Potential Adverse Effects of the Proposed Action on EFH and Federally Managed Species.

Pursuant to the MSFCMA of 1996, waters and substrate within the proposed action area have been identified as Essential Fish Habitat (EFH) by the South Atlantic Fishery Management Council (SAFMC). EFH is defined as those waters and substrate necessary for fish to spawn, breed, feed, or grow to maturity. Habitat Areas of Particular Concern (HAPC) are described as subsets of EFH which are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. In general HAPC include high value intertidal and estuarine habitats, offshore areas of high habitat value or vertical relief, and habitats used for migration, spawning, and rearing of fish and shellfish. EFH and HAPC for federal fishery management plans (FMP) within the range of the proposed action as identified by the SAFMC are shown in Table 6.

Table 6. EFH/HAPC within the Range of the Proposed Action Area as Identified by the SAFMC

Habitat	Category of EFH	FMP
Tidal freshwater wetlands (palustrine)	EFH	Penaeid and Rock Shrimp
Estuarine and marine emergent wetlands (e.g., intertidal marshes)	EFH	Penaeid and Rock Shrimp Snapper Grouper
Tidal palustrine forested	EFH	Penaeid and Rock Shrimp
Estuarine scrub/shrub (mangrove fringe)	EFH	Penaeid and Rock Shrimp Snapper Grouper Spiny Lobster
Mangroves and mangrove fringe	HAPC	Snapper Grouper
Estuarine and marine submerged aquatic vegetation (SAV) which includes macro algae and seagrass	EFH	Penaeid and Rock Shrimp Snapper Grouper Spiny Lobster

Table 6. EFH/HAPC within the Range of the Proposed Action Area as Identified by the SAFMC

Habitat	Category of EFH	FMP
Seagrass	HAPC	Snapper Grouper
Subtidal and intertidal non-vegetated flats	EFH	Penaeid and Rock Shrimp
Oyster reefs and shell banks	EFH/HAPC	Snapper Grouper
Live hardbottom (including coral & coral reef)	EFH/HAPC HAPC HAPC	Snapper Grouper Spiny Lobster Coral and Coral Reef
Unconsolidated bottom	EFH	Snapper Grouper Spiny Lobster
Ocean high salinity surf zones	EFH	Coastal Migratory Pelagics
All interconnecting water bodies as described in the Habitat Plan	EFH	Penaeid and Rock Shrimp
Estuarine water column	EFH	Snapper Grouper
High salinity bays, estuaries, and seagrass habitat	EFH	Cobia (Coastal Migratory Pelagic)
Shallow subtidal bottom	EFH	Spiny Lobster
Coastal Inlets	HAPC	Penaeid Shrimp Snapper Grouper Coastal Migratory Pelagics
State designated nursery areas (e.g., Aquatic Preserves)	EFH EFH/HAPC EFH/HAPC	Coastal Migratory Pelagics Penaeid Shrimp Snapper Grouper

Portions of the AIWW and IWW were constructed through connecting natural waterbodies extending from the St. Johns River south by way of the Matanzas, Halifax, Indian River, Lake Worth, New River, and ending at Biscayne Bay. Where natural water did not exist the navigation channel was excavated through upland areas including Palm Valley in St. Johns County, the area from Matanzas Inlet south to the Halifax River between St. Augustine and Daytona Beach, Haulover between Mosquito Lagoon and Indian River Lagoon (IRL) at present day Titusville, and the area between the IRL and Lake Worth Lagoon (LWL) at Jupiter. The area between Palm Beach and Broward County which is narrow with a width of approximately 200 feet was dug through low-lying marshes. In general, a shift in estuarine habitats occurs and progressively increases southward from the AIWW at the Florida/Georgia border to the IWW in Brevard County, where tidal marsh becomes less pervasive, seagrass becomes more prevalent and mangrove dominated/fringed shorelines dominate.

The AIWW, IWW, and OWW east of the St. Lucie Lock can primarily be characterized as unconsolidated bottom and estuarine water column. The OWW is routinely exposed

to freshwater discharges from Lake Okeechobee and is generally not considered within the range of seagrass since water clarity prohibits seagrass colonization within the channel. West or lakeward of the St. Lucie Lock, the OWW is considered freshwater and no EFH is present. Survey information available to date and discussed later in this EFHA indicates IWW is primarily depauperate of seagrass. It is not uncommon for seagrass to be present in close proximity to the channel including side slopes particularly near coastal inlets where water qualify and clarity are generally better.

1. EFH/HAPC within the proposed action area that would not be impacted by the proposed action.

The AIWW and IWW federal channel comprises a fraction of the actual waterbodies. Tidal freshwater wetlands, estuarine and marine emergent wetlands, tidal palustrine forested wetlands, estuarine scrub/shrub, mangroves and mangrove fringe, and oyster reefs are present well outside the channel limits and anchor drop points. Pipelines are normally floated and only weighted to the bottom when traversing an area where there is vessel traffic or vessel ingress/egress. Pipeline anchors are set in areas devoid of seagrass and oyster reefs and pipelines are floated through marsh. The following DMMAs are located adjacent to salt marsh or mangrove wetlands and pipe could potentially be floated through the marsh/mangrove depending on where is dredging is taking place: NA-1, DU-6, DU-8, FL-3, MSA-434, SL-2, and M-8, depending on where dredging is taking place. EFH consultations were completed for the construction and use of DMMAs during evaluation of the DA permit applications or Civil Works Planning Process and incorporated herein by reference.

Shallow subtidal habitat is defined as less than 1 meter mean low water. Shoals which develop in the federal channel are typically dredged before reaching depths of less than 7 feet mean low water so this habitat is not present within the proposed action area. No information is available on the specific habitat requirements or description of interconnecting waterbodies EFH for penaeid and rock shrimp. The Corps opines the federal navigation channel is not an interconnecting waterbody but rather this specific EFH is intended to cover natural waterbodies and tidal creeks which connect habitats used by shrimp.

Coral reefs are not anticipated within the proposed action area; however, corals may be present adjacent to the channel and proximate to coastal inlets in Palm Beach, Broward, and Miami Dade Counties. Along portions of the IWW where dredging through limerock was necessary to meet authorized depths, construction of the channel resulted in creation of ledges which form the channel wall. These ledges have a 1-foot to 3-foot relief and provide habitat for a variety of fish and other marine organisms including sessile invertebrates such as corals and sponges. Stony corals observed on the ledges in southern Palm Beach, Broward and Miami Dade Counties were

hermatypic shallow water species and octocorals. These ledges are not anticipated to be impacted by maintenance dredging.

Areas of hard bottom are scattered throughout the continental shelf along the east coast of Florida at 0-4 meter depths. These areas have been termed “live bottoms” because they generally support a diversity of sessile invertebrates such as corals and sponges. Hardbottom habitat is present adjacent to the beach placement sites at Crossroads and Jupiter. These two beach placement sites are existing disposal sites for beach quality material with project specific EFH consultations which are incorporated herein by reference. The closest hardbottom in the nearshore north of Bakers inlet is 1,200 feet from the shoreline and there is a hardbottom feature south of the inlet within 550 feet of the shoreline. Beach placement at Baker’s Haulover is not anticipated to impact these hardbottom features. Upon updating the NEPA document for Baker’s Haulover the Corps will assess affects to these hardbottom features as a result of continued beach placement.

Because maintenance dredging is limited to the federal navigation channel; other dredging-related construction activities such as pipeline placement would be required to avoid aquatic resources; and dredged material would be disposed of at approved DMMAs, upland sites, or existing beach placement sites, the following habitats will not be impacted:

- Tidal freshwater (palustrine) wetlands
- Estuarine and marine emergent wetlands (e.g., intertidal marshes)
- Tidal palustrine forested
- Shallow subtidal bottom
- Estuarine shrub/scrub (mangroves and mangrove fringe)
- Oyster reefs and shell banks
- Live hardbottom including coral and coral reefs
- All interconnecting waterbodies as described in the Habitat Plan

The Corps believes the proposed action will have no direct or indirect effects on these aforementioned habitats as they are not likely to be present within the federal channel or impacted via maintenance dredging and FIND will be required to avoid impacts to these habitats where adjacent to the channel during pipe placement, anchoring, and other associated dredging/construction activities. If impacts cannot be avoided the Corps would initiate EFH consultation under the MSFCMA on a project specific basis; therefore, these habitats are not analyzed in this EFHA

2. EFH/HAPC within the proposed action area that could potentially be impacted by the proposed action.

Maintenance dredging of the federal channel and associated activities including anchoring, pipeline placement, and disposal could potentially impact the following EFH/HAPC:

- Subtidal/intertidal non-vegetated flats
- Unconsolidated bottom
- Estuarine water column
- Estuarine and marine submerged aquatic vegetation (SAV) which includes macro algae and seagrass
- High salinity bays, estuaries, and seagrass habitat
- Coastal inlets
- State designated nursery areas (e.g., Aquatic Preserves)
- Ocean high salinity surf zones

a. Subtidal/intertidal non-vegetated flats. Intertidal flats are unvegetated bottoms of estuaries and sounds that lie between the high and low tide lines. The substrate of intertidal flats is typically coarser and sandy near inlets and becomes finer and muddier with distance from inlets and reduced wave energy. Conditions on intertidal flats are physically stressful for marine organisms due to salinity, temperature, and exposure fluctuations with each tidal cycle. Intertidal flats are usually classified as unvegetated although there is an extremely productive microalgal community occupying the surface sediments. Intertidal flats provide habitat for a large and diverse community of infauna and epifauna, which in turn may become prey for transient fish species utilizing the intertidal flat (SAFMC, 2009). Sediment provides a buffer for changes in temperature and salinity for benthic infauna.

Intertidal flats are not present within the federal navigation channel and would not be impacted by maintenance dredging; however intertidal flats can be located between the channel and the shoreline. Pipelines are normally floated and only weighted where vessel access is needed. Pipes may lay on the sediment surface of intertidal flats en route to the following DMMAs: NA-1, DU-2, DU-3, DU-6, DU-8, DU-9, SJ-1, FL-3, V-26, MSA-434 and M-5 depending on where dredging is taking place.

b. Unconsolidated bottom. The substrate at the bottom of the AIWW, IWW, and OWW is primarily considered unconsolidated sediment that lacks vegetation. Unconsolidated sediments consist of sand, silty sand, mud, flocculent, silt or other accumulated materials. Typically, in the AIWW and IWW near inlets, sandy material is abundant where there is tidal exchange with the ocean. Within the channel further away from inlets and proximate to flood control canals, the system dynamics are less energized and finer sediments are common. The OWW has accumulations of silt and flocculent materials but the underlying substrate is typically mineral sand or other material including unconsolidated bottom. Although unconsolidated bottom habitat

lacks visible structural features, microscopic plants may occur at the sediment surface. Macro invertebrate in-faunal species are common in and under, the benthic surface and may include burrowing animals; the dominant taxa of macro-infauna are usually polychaetes, crustaceans, mollusks, and echinoderms (Peterson and Peterson, 1979; Alongi, 1990).

Species present can contribute to the habitat through processes such as bioturbation, enhancing water flow through sediments, and tube building. Soft bottom habitat provides important ecological services to coastal ecosystems by serving as a storage reservoir of chemicals and microbes (Peterson and Lubchenco, 1997). Generally, it is expected there is biogeochemical processing and recycling within soft bottom habitats. These areas can also be expected to filter, trap and reprocess watershed-derived natural and human-induced nutrients and toxic substances. The forage value of soft bottom habitats results from organic matter transported to, and produced, on soft bottom and the abundant, diverse invertebrate fauna. The resulting fishery functions provide important services for generalized carnivores within the group of EFH managed species, as well as their prey species, that rely on the benthic invertebrates utilizing the soft bottom. For example, adult white grunts (*Haemulon plumieri)* which are a federally managed fishery species as well as important food source for species managed within the snapper-grouper complex, are generalized carnivores that feed mainly on benthic invertebrates (Bowman et al, 2000; Potts and Manooch, 2001). The high forage value of soft bottom habitat results from the high concentrations of organic matter transported to and produced on soft bottom and the numerically abundant, diverse invertebrate fauna associated with this habitat. The forage value of soft bottom habitat varies with position in the landscape, proximity to physical disturbance (such as dredging and wave scour) and chemical disturbances (such as stormwater runoff and low concentrations of dissolved oxygen) can be overriding factors (Pearson and Rosenberg 1978; Diaz and Rosenberg 1995)" NOAA (2011).

c. Estuarine water column. This habitat traditionally comprises four salinity categories: oligohaline (< 8 ppt), mesohaline (8-18 ppt), and polyhaline waters (18-30 ppt) with some euryhaline water (>30 ppt) around inlets. Alternatively, a three-tier salinity classification is presented by Schreiber and Gill (1995) in their prototype document developing approaches for identifying and assessing important fish habitats: tidal fresh (0-0.5 ppt), mixing (0.5-25 ppt), and seawater (>25 ppt).

Saline environments have moving boundaries but are generally maintained by sea water transported through inlets by tide and wind mixing with fresh water supplied by land runoff. Particulate materials settle from these mixing waters and accumulate as bottom sediments. Coarser-grained sediments, saline waters, and migrating organisms are introduced from the ocean, while finer grained sediments, nutrients, organic matter,

and fresh water are input from rivers and tidal creeks. The seawater component stabilizes the system, with its abundant supply of inorganic chemicals and its relatively conservative temperatures. Closer to the sea, rapid changes in variables such as temperature are moderate compared to shallow upstream waters. Without periodic additions of sea water, seasonal thermal extremes would reduce the biological capacity of the water column as well as reduce the recruitment of fauna from the ocean. While nearby wetlands contain some assimilative capacity abating nutrient enrichment, fresh water inflow and tidal flushing are primarily important for circulation and removal of nutrients and wastes from the estuary.

The water column is composed of horizontal and vertical components. Horizontally, salinity gradients (decreasing landward) strongly influence the distribution of biota, both directly (physiologically) and indirectly (e.g., emergent vegetation distribution). Horizontal gradients of nutrients, decreasing seaward, affect primarily the distribution of phytoplankton and, secondarily, organisms utilizing this primary productivity. Vertically, the water column may be stratified by salinity (fresh water runoff overlaying heavier salt water), oxygen content (lower values at the bottom associated with high biological oxygen demand due to inadequate vertical mixing), and nutrients, pesticides, industrial wastes, and pathogens (build up to abnormal levels near the bottom from lack of vertical mixing).

Estuarine water column is a habitat used for foraging, spawning, and migration by both managed species and organisms consumed by managed species. The water column provides habitat for phytoplankton to carry out the processes of primary productivity. Zooplankton utilize the water column for habitat thus creating the foundation of the ocean food web and ecosystem. Some benthic invertebrates filter the water column to collect food particles that are suspended in the water. Higher vertebrates (fishes, marine mammals and sea turtles) use the water column for foraging, migration and breeding.

Many marine-spawning species utilize the estuarine water column as larvae if they are physiologically, thermally, and salinity adapted. Organisms utilize the exported production from other estuarine habitats such as marshes, seagrass beds, shell reefs, even though they don’t physically occupy these structured environments. Water column is the medium of transport for nutrients and migrating organisms between river systems and the open ocean.

d. Estuarine and marine SAV which includes macroalgae and seagrass. Macroalgae and seagrass are key shallow water biota in estuarine and marine and in temperate and tropical environments. Seagrass can easily be confused with marine macroalgae. While seagrass are vascular plants meaning they have a network of xylem and phloem that transport nutrients and dissolved gases throughout the plant, macroalgae are relatively simple and unspecialized with no vascular system. Seagrass reproduce via

flowers, fruits, and seeds and have separate sexes while macroalgae reproduce via spores. Seagrass have roots, leaves, and underground stems or rhizomes that hold plants in place and extract nutrients from the sediment and water. Most macroalgae have holdfast anchors that attach to a hard surface (benthic algae) but macroalgae can also be unattached (drift algae). Macroalgae extract nutrients from the water via diffusion. Drift algae can originate as benthic algae or as epiphytes growing on seagrass blades. Communities of drift algae often develop in sheltered portion of lagoons and bays where nutrient concentrations and sunlight are high. Abundance of drift algae depends on availability and transport mechanisms, i.e., waves, currents, and tides (Biber, 2007). Like seagrass, macroalgae provide habitat for invertebrates and fishes and support coastal food webs. Numerous crustaceans use drift macroalgae as a refuge for larval forms to move from the open ocean to nearshore juvenile habitats.

Within the proposed action area benthic and drift macroalgae are common in south Florida whereas drift macroalgae is more commonly observed in the central portion of the proposed action area than benthic macroalgae. Genera commonly found in south Florida include *Ulva*, *Spirogyra*, *Acetabularia*, *Hypnea*, *Oscillatoria*, *Codium*, *Gracilaria*, *Enteromorpha*, *Ectocarpus*, *Caulerpa*, *Laurencia*, *Cladophora*, *Penicillus*, *Halimeda, Polysiphonia, Sargassum, Chaetomorpha, Dasycladus,* and *Udtea.* Macroalgae often co-occur with seagrass and provide similar ecological services. In Palm Beach and Broward Counties, *Caulerpa* spp. is the dominant macroalgae found with seagrass adjacent to the channel; however, *Ulva* and *Dasycladus* can also be found. In Palm Beach County *Laurencia* has been observed in clear water near coastal inlets and on rocky bottom and is a common drift macroalgae in Biscayne Bay. Common macroalgae genera in central Florida (i.e., Brevard County and northern IRL) include *Ararddhiella, Solieria, Dasya, Hydropuntia, Spyridia, Bryothamnion, Digenea*, *Achanthophora, Ulva, Acetabularia*, *Hypnea*, *Gracilaria*, *Enteromorpha*, *Ectocarpus*, *Caulerpa*, *Laurencia*, *Cladophora*, and *Chaetomorpha.* There is some evidence that *Laurencia* is preferred by spiny lobster.

Estuarine and marine seagrass occur in the low intertidal and subtidal zones and may exhibit a wide range of habitat forms, from very sparse sprigs to extensive collections of isolated patches to unbroken continuous beds. A seagrass bed is defined by the presence of either above ground vegetation, its associated root and rhizome system (with living meristem), or the presence of a seed bank in the sediments, as well as the sediment upon which the plant grows or in which the seed back resides. There are seven species of seagrass in Florida's shallow coastal areas: turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), shoal grass (*Halodule wrightii*), widgeon grass (*Ruppia maritima*), star grass (*Halophila engelmannii*), paddle grass (*Halophila decipiens*), and Johnson's seagrass (*Halophila johnsonii*), a federally listed threatened plant. High concentrations of seagrass along Florida's east coast are primarily found in estuaries and bays including Mosquito Lagoon, Banana River, Indian River Lagoon, Lake Worth Lagoon, and Biscayne Bay. In 2010, seagrass in these estuaries covered about 241,000 acres; an additional 159,000 acres of seagrass occur on the Atlantic side of Key Biscayne (Yarbro and Carlson 2011). Florida Bay, located

between the Florida Keys and the Everglades, also has an abundance of seagrass (145,000 acres), and seagrass in the Florida Keys National Marine Sanctuary, west and south of the Florida Keys, comprise 856,000 acres. Large-scale losses (47,000 acres) of seagrass have occurred in the Banana River since 2011. Seagrass acreage in the southern Indian River Lagoon, Florida Bay and Biscayne Bay are likely stable, but trends in acreage of beds on the ocean side of south Florida are unclear because current estimates date to 1992.

Seagrass is one of the most productive estuarine/marine ecosystems which provides food, shelter, and nursery areas for many species (Thayer et. al, 1984). Seagrass beds in Florida are utilized by many managed species including penaeid shrimp, spiny lobster *(Panulirus argus),* and species within the estuarine-dependent snapper and grouper complex. Seagrass beds provide substrates and environmental conditions which are essential to the feeding, spawning and growth of several managed species. Seagrass beds are complex ecosystems that provide primary productivity, structural complexity, modification of energy regimes, sediment and shoreline stabilization, and nutrient cycling. Seagrass functions are briefly described below.

Seagrass provides four important sources of primary organic matter: 1) their own tissues, 2) dissolved organic matter released from their tissues during metabolism, 3) the epiphytic microscopic and macroscopic plants that attach to the surfaces of the seagrass leaves, and 4) the plants that live on the sediments among the seagrass shoots. Some fishery organisms consume seagrass directly, but the majority of the secondary fishery production in the meadows begins with the consumption of epiphyte communities, benthic algae and the utilization of organic detritus. Thus, the food webs supported by seagrass primary production are complex and include many intermediate steps involving microorganisms, meiofauna, small invertebrates such as isopods, amphipods as well as the thousands of species of macroinfauna and epifauna in the sediments, on the sediment surface, and in the water column.

Leaf canopies formed by seagrass range in size from just a few centimeters to more than one meter. Where several species co-occur, the three dimensional canopy may take on multiple layers and forms, with long (1.25 meter) cylindrical stems and blade surfaces (*S. filiforme)* combined with relatively shorter strap-shaped leaves (*T. testudinum* or *H. wrightii*). No matter what species are present, the existence of leaf surfaces provides structures for attachment of smaller organisms and space between shoots for shelter from predators and adverse environmental conditions. The leaf area in a seagrass bed may effectively increase the colonizeable substrate per square meter by an order of magnitude compared to an unvegetated substrate. While at the same time, the leaves and stems create a large volume of water column sheltered within the canopy and partially obscured by self-shading of the leaves. Within the canopy there is an enormous physio-chemical microenvironment structured and maintained by the seagrass. This structural influence extends into the sediments where the roots and rhizomes stabilize the substrate and form a large pool organic biomass and a matrix for meiofauna and macrofauna (Kenworthy and Thayer 1984). The leaf surfaces and the collective structure of the canopy provide frictional drag forces which slow water motion

and reduces wave turbulence. This process promotes the deposition of particles in the meadows, including but not restricted to inorganic sediments, dead organic matter and living organisms. The addition of all of these materials enhances the productivity, stability, and biodiversity of coastal systems with seagrass. By promoting sediment deposition and stabilization, coastal habitats coupled to seagrass beds by water movement receive both direct and indirect benefits.

The high rates of primary production and particle deposition make seagrass beds important sources and sinks of nutrients. During active periods of growth the constant and high rate of leaf turnover and epiphyte growth provides nutrients for herbivores and a mechanism for nutrient export and retention. Temporary and permanent retention of nutrients within seagrass beds is encouraged by particle deposition and burial as well as the formation of organic matter in the sediments by the roots and rhizomes. Seagrass are sensitive to the availability and abundance of nutrients in their surrounding environment and often retain nutrient signatures representing environmental conditions they have experienced, both spatially and temporally (Fourqurean et al. 1992). The variation in tissue nutrient composition is an important factor in fishery utilization of seagrass derived organic matter.

Food and shelter afforded by seagrass result in a complex and dynamic system that provides a primary nursery habitat for various organisms that are important both ecologically and to commercial and recreational fisheries. Organic matter produced by seagrass is transferred to secondary consumers through three pathways: herbivores that consume living plant matter; detritivores that exploit dead matter; and microorganisms that use seagrass-derived particulate and dissolved organic compounds (Thayer et. al, 1984). The living leaves of these submerged plants also provide a substrate for the attachment of detritus and epiphytic organisms, including bacteria, fungi, meiofauna, micro- and macroalgae, and macroinvertebrates. Within the seagrass system, phytoplankton are present in the water column, and macroalgae and microalgae are associated with the sediment. No less important is the protection afforded by the variety of living spaces in the tangled leaf canopy of the grass bed itself, and this is especially critical to the juvenile stages of many important fish. In addition to biological benefits, seagrass also cycle nutrients and heavy metals in the water and sediments, and dissipate wave energy (which reduces shoreline erosion and sediment re-suspension).

Fish may associate with seagrass beds in several ways. Resident species typically breed and carry out much of their life history within the meadow (e.g., gobiids and syngnathids). Seasonal residents typically breed elsewhere, but predictably utilize seagrass during a portion of their life cycle, most often as a juvenile nursery ground (e.g., sparids and lutjanids). Transient species can be categorized as those that feed or otherwise utilize seagrass only for a portion of their daily activity, but in a systematic or predictable manner (e.g., haemulids). Densities of invertebrate organisms are many times greater in seagrass beds than in bare sand habitat. Additionally, some species such as sea urchins, herbivorous fish, green sea turtle (*Chelonia mydas*) and West Indian manatee (*Trichechus manatus*) forage on seagrass.

Several processes contribute to decreases in water clarity in estuarine and coastal regions which impacts seagrass coverage. Heightened nutrient inputs from coastal watersheds due to development and agriculture fuel the growth of phytoplankton, which in turn reduce light available to benthic vegetation. Higher nutrient levels may also increase the biomass of epiphytes on seagrass blades, reducing the light available for photosynthesis. Groundwater enriched by septic systems also may infiltrate the sediments, water column, and near-shore seagrass beds with the same effect. Increases in the turbidity of overlying waters, resulting from sediment in runoff, dredging, channelization, boat traffic, and re-suspension of bottom sediments, also may reduce the amount of light available to seagrass. Changes in the timing and volume of river runoff due to climate change may also result in reduced light availability to coastal seagrass. For example, increased and prolonged runoff from highly polluted/colored rivers, especially during spring and summer, appear to reduce light levels in the IRL and jeopardize the survival of seagrass. With excessive water column productivity, lowered dissolved oxygen concentrations may result and are detrimental to invertebrate and vertebrate grazers. Loss of these grazers may result in overgrowth by epiphytes and loss of food for predators.

Large areas of Florida where seagrass was once abundant have experienced significant losses since the mid-twentieth century. In some areas, seagrass occurs at a fraction of historical areas. One of these depleted areas is LWL in Palm Beach County where freshwater releases, dredge and fill activities, sewage disposal, and stormwater runoff have almost eliminated this resource. Freshwater releases from the C-51 Canal and high rain events in 2013, and contributing change in salinity from these releases caused seagrass to die off in much of the LWL. Historically, north Biscayne Bay lost most of its seagrass from urbanization and small losses continue. The IRL lost many seagrass beds due to stormwater runoff directly and indirectly (via phytoplankton blooms) from reduced water clarity. Recent gains in the northern IRL, due to concerted efforts to reduce nutrient and particle inputs, improved seagrass acreage and brought a few locations close to historical levels; however, 47,000 acres of seagrass have recently disappeared due to a massive and recurring phytoplankton bloom. Many seagrass beds in Florida have been scarred from boat propellers disrupting the physical integrity of the beds.

The Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute has a GIS data set representing a compilation of statewide seagrass data from various source agencies and scales (see original DVD). The data were mapped from sources ranging in date from 1987 to 2010. Seagrass data comprising this compilation came from aerial photographic interpretation and/or from field observations. The data layer shows seagrass may be present at its most northern extent just south of Ponce de Leon Inlet. Seagrass is abundant from Brevard County south through Miami-Dade County. The data layer shows seagrass polygons for the greatest extent along the margins of the natural waterbodies i.e., lagoons and estuaries and not typically within the IWW federal channel. It is recognized that portions of the IWW were dug over a hundred years ago through historic waterbodies where seagrass were likely present at

the time (i.e., IRL). Other portions of the IWW were dug through uplands or low lying marsh (i.e., Martin and Broward Counties) providing a waterbody where seagrass has been able to colonize particularly within the side slopes and right-of-way adjacent to the 125-wide federal navigation channel. Construction of the IWW through Palm Beach County contributed to the conversion of Lake Worth from a freshwater lake to an estuary with seagrass. Additionally, dredging is often conducive to colonization by seagrass due to removal of fines.

Where the channel is positioned close to shallow areas, or where the channel is shallow, discontinuous seagrass is observed in a few isolated areas, such as Indian River, St Lucie, Martin and Broward Counties. In the vicinity of the coastal inlets where water clarity is very good, the distribution and abundance of seagrass is increased. Inlets are the most dynamic coastal areas and sediment transport which causes shoaling and natural burial of seagrass can also result in potential colonization by pioneer seagrass species; these areas are generally on an active maintenance dredging cycle.

Results of seagrass surveys performed by FIND or the Corps for specific past maintenance dredging projects are described below by County from north to south within the proposed action area. These reports are included on the original DVD and enclosed DVD addendum.

Indian River County, Reach I-VI: Based on the December 4-11, 2014, pre-construction seagrass report, two seagrass beds were identified within the project area. The sparse beds were comprised of *H. decipiens* and *H. johnsonii*. One bed was located within 100-ft of shore in the area of the pipeline corridor and the other adjacent to the channel in the anchor zone of Cut IR-2. No seagrass was observed within the design limits of the federal navigation channel. Although it is recognized the seagrass survey was not performed during the optimal growing season, the results including sparse, discontinuous seagrass beds in the shallows adjacent to the channel were similar to results observed by the same contractor in September 2011. Water clarity in this reach is a limiting factor for seagrass in deeper water areas of the federal channel and side slopes. Additionally, this area of the IRL is still recovering from the phytoplankton bloom that caused massive die offs of seagrass in 2011. This dredging project was completed in June 2015. As the pre-survey was used to identify anchor drop zones and NMFS did not provide any EFH conservation recommendations, a post-construction survey was not required.

St Lucie County: A seagrass survey was performed in 2014 for the St. Lucie Reach I dredging project and seagrass was observed within Cut SL-5. The project has not been dredged within the last 58 years. As mentioned earlier, the City of Fort Pierce (City) Marina spoil islands (SAJ-1993-41787) is anticipated to have caused shoaling in this area of the IWW which likely contributed to seagrass colonization. The Regulatory Division is currently reviewing the City's post-construction monitoring report for permit compliance. In July 2015, the St. Lucie Reach I dredging project was verified under

RGP-93 with a modified dredge footprint to meet the project design criteria of the RGP. The project has not commenced.

St. Lucie County, SL-3N at Ft. Pierce, SAJ-2013-00633: The permit area which is approximately 500 north of the southern causeway bridge in Ft. Pierce was last dredged in 1972. The area is high energy and shoaling occurs due to the proximity of the Ft. Pierce Inlet. A pre-construction seagrass survey on August 9, 2011, from the southern causeway bridge to the intersection with the Ft. Pierce Inlet identified no seagrass or benthic resources within the federal channel or within 100 feet on either side of the channel.

Martin County, Crossroads, SAJ-199602289: The area is the confluence of the IWW and OWW near St. Lucie Inlet which has been dredged on an average three-year basis since 1963. High current velocities associated with the inlet possibly destabilize sediments near the channel and account for the restricted distribution of seagrass within this highly dynamic area. Based on a survey conducted in August and September 2002, two patches of seagrass totaling 0.11 acre (*H. wrightii, H. johnsonii*, and *S. filiforme*) were located within 50 feet of the federal channel. These isolated patches had low densities as compared to nearby beds in shallow waters. The January 2014 post-construction report concluded an 11% reduction of seagrass outside the dredge area compared to the pre-construction survey. The majority of the seagrass coverage was unchanged from pre-construction to post-construction. The report stated there were no visible effects of dredging (e.g. anchor holes, pipeline placement, etc.) documented during the October 2013 survey. It is presumed that the summer 2013 releases from Lake Okeechobee's nutrient rich fresh water via the St. Lucie Canal to the St. Lucie River decreased salinity and increased bluegreen algal growth and production. The reduction in seagrass is likely attributable to these area-wide adverse influences and not from dredging.

Martin County, Okeechobee Waterway, SAJ-2011-02659: A pre-construction survey in 2011 revealed no seagrass present in this portion of the Okeechobee Waterway.

Palm Beach County, IWW in the vicinity of Jupiter Inlet, SAJ-2008-00533: A high occurrence of seagrass exists at the northern end of the project area (Cut P-1) and drops sharply in quantity at the southern end (Cut P-5 to P-9). A post-dredging seagrass survey was conducted in February 2011 to document changes in seagrass communities related to maintenance dredging near Jupiter Inlet in Palm Beach County. Comparisons were made to the September 2010 pre-dredging survey, collected along the same transects using the same methodology. Seagrass coverage decreased by 0.67-acre between the September 2010 pre-construction surveys and February 2011 post-construction surveys. No direct impacts from the dredging were documented during the time of survey. The documented changes in seagrass cover were attributed to colder water temperatures and lower light availability associated with seasonal changes.

A seagrass and benthic survey was performed June 25-27, 2014, to determine any changes to seagrass habitat as a result of dredging in Cuts P-1 through P-4. Changes in seagrass coverage were concentrated in Cut P-1 north within the dredge limits of the federal channel. Approximately 0.703 acre of seagrass was lost within the dredge limits with another 0.474 acre lost outside the dredge limits along the eastern buffer zone. The source of the seagrass decline outside the channel boundaries could not be positively identified by the contractor preparing the report. The report states there was some variation in percent cover and frequency of occurrence of observed seagrass in areas where overall seagrass coverage remained stable and that variation was likely due to natural seasonal growth patterns and unobserved external environmental influences not associated with the dredging operation. This is further corroborated by local knowledge of the area as depicted in Figure 1 below which shows an area of documented seagrass loss along transect 9 from the post-dredging report.

Figure 1. Recreational Use of Sandbar along the Federal Channel in Jupiter.

Palm Beach County, Cut P-31, SAJ-2012-02469: A pre-construction seagrass survey performed August 30-31, 2011 for two areas within Cut P-31 in Northern Palm Beach County identified mixed beds of *H. decipiens, H. johnsonii*, and *H. wrightii* along both sides of the channel in the extreme shallows at one site and a bed of *H. decipiens* along the western side of the channel at another site. No seagrass was observed within the federal channel.

Palm Beach County, Cut P-37, Flagler Memorial Bridge, Lake Worth, Mile Marker 1021, SAJ-2009-04126: A pre-construction seagrass survey performed in August 2012, identified two hand size patches of *H. johnsonii* within the IWW in the northern limit of the project. No other seagrass was observed within the channel or adjacent to the channel.

Palm Beach County, Cut P-50, SAJ-2000-02301: Seagrass monitoring reports from 2001, 2002, and 2003, showed seagrass coverage for the project area increased after dredging likely due to seasonal and climatic factors and better water clarity. Seagrass beds on the west side of the IWW channel expanded waterward while beds on the east side of the channel remained constant; no impacts to seagrass were recorded as a result of the IWW dredging. The same species were present in the 2007 pre-construction survey with no seagrass observed in the federal channel. The post-construction report for 2008 showed an increase of seagrass adjacent to the IWW and the post-construction report for 2015 documented expansion of seagrass along the west side of the channel and changes to other beds likely as a result of survey being conducted out of season and shifting sands in the project area. Species adjacent to the IWW as documented in all reports included *H. decipiens, H. johnsonii,* and *H. wrightii*.

Palm Beach County, Port of Palm Beach deepening project, SAJ-2012-01719: The seagrass survey for this project showed 0.15 acre of hardbottom habitat (exposed limerock, boulders, and rubble containing macroalgae and sponges) and 5.82 acres of seagrass within the proposed dredge area including 4.46 acres within the design edges of the federal channel and 1.36 acres adjacent to the federal channel within existing and/or proposed side slopes. Seagrass beds were dominated by *H. decipiens* with some *H. johnsonii* and *H. wrightii*. The proximity to the Lake Worth Inlet and inflows from the Gulf Stream Current make this area unusual as it contains very good water clarity and water quality. Therefore, it is not anticipated that seagrass coverage would be similar within other areas of the federal channel.

Broward County, IWW Deepening, SAJ-2009-03523: The 2008 seagrass survey included in the permit application showed *H. johnsonii* and *H. wrightii* present in mixed and mono-specific beds along the margins of the federal channel. The project was authorized with a requirement to include a 10-foot buffer between dredging and seagrass and has not yet been constructed. A pre-construction survey was performed in July and August 2014 for the IWW from 17th Street Causeway Bridge north of Port Everglades to a point approximately 4,000 feet north of Las Olas Boulevard Bridge. The report noted existing depths ranged from 10 feet to 26 feet. Generally *H. decipiens* was found up to depths of 16 feet while *H. johnsonii* was most abundant in shallow water along the margin of the IWW to depths of 8 feet. The limits of the survey did not include the actual federal channel, however, in many cases seagrass beds were well landward of the edge of the channel.

Broward County, Port Everglades: Seagrass surveys were conducted in 1999, 2000, 2006, and 2009 for the Port Everglades project which included a portion of the IWW.

No seagrass were observed within the federal channel. Species present adjacent to the channel included *H. wrightii, H. decipiens*, and *H. johnsonii*. The 2009 report showed an overall decrease in seagrass coverage in the northern area of the project and an expansion of seagrass in the southern area of the project.

Broward County, Dania Cutoff Canal, SAJ-2007-06237: Based on the conclusions of the Post-Construction Seagrass Survey Deepening Dredging of the Dania Cutoff Canal July 2013, the surveys between 2011 and 2013 revealed a change in seagrass species distribution, frequency of occurrence, abundance, and density, but no change in the total estimated acreage of seagrass.

Miami-Dade County, Baker's Haulover: Pre and post-construction surveys were conducted at Baker's Haulover for the 2006, 2011, and 2014 dredging events. An April 2004, benthic survey showed the flood shoal devoid of seagrass with sparse seagrass adjacent to the channel and dredge area. This is consistent with the 2006 pre-construction survey which shows varying communities of seagrass including *H. wrightii*, *Halophila* spp., *T. testudinum,* and *S. filiforme* adjacent to the channel. The 2006 post-construction survey did not reveal any changes to seagrass communities adjacent to the dredge area. The 2008 survey showed changes in seagrass as a result of the dynamics of the area. Overall, seagrass coverage increased near the federal channel adjacent to the inlet including one area where seagrass extended into the channel from the southwest area of the project primarily containing *T. testudinum*. Seagrass losses were noted on the eastern side of the channel due to flood shoal expansion and burial.

The pre-construction survey for 2010 showed a sparse bed of *H. decipiens* in the northern portion of the project spanning the federal channel and the large bed comprised primarily of *T. testudinum* in the southwest portion of the project extending into the channel having recolonized from the 2008 event. Overall, seagrass coverage was lower in the post-construction survey for 2010 based on removal of seagrass within the design edges of channel that would have been dredged, loss of seagrass in the northern region due to flood shoal migration, and seasonal declines as the post-construction survey was conducted out of season.

Comparison of pre and post-construction surveys for the 2014 dredging event showed no discernible impacts to seagrass as a result of dredging. It was noted that the frequency of occurrence of seagrass was consistent during the pre and post-construction surveys, indicating that the occurrence of the seagrass did not change between the samplings, but the amount (density) did vary. This is also consistent with the consideration of seasonal variation of the densities and biomass. Therefore, the differences between the pre and post-construction seagrass assessments are consistent with documented seasonal variations of shoot density and biomass (canopy). These variations resulted from the relative timing of the pre-construction (high density/biomass period) and post-construction (low density/biomass period) surveys, and no data (qualitative or quantitative) indicated impacts to the seagrass community associated with the dredging activities.

As demonstrated by these project reports, seagrass is variable, generally not present in the federal channel, and can move around both seasonally and annually; seagrass persistence and coverage is affected by many factors; and seagrass is able to recolonize following a dredging event. Opportunistic seagrass growth occurs when sedimentation/shoaling occurs and the vertical position within the water column provides enough light penetration. Seagrass may be present in deeper waters where the water clarity is good. The distribution and density of seagrass where it occurs in the channel is highly-dependent on the dynamics within the surrounding waterbody.

The Corps is in the process of utilizing side scan sonar to map seagrass and other EFH that might be present within and adjacent to the federal navigation channels. Data for Broward County was collected May 12-13, 2015 and certain locations were field verified by the Corps, NMFS, and FIND on July 1, 2015 (NMFS draft field report for July 1, 2015 incorporated herein by reference). Although the side scan sonar maps showed a few areas with potential seagrass adjacent to the channel and one location where seagrass was mapped extensively in the channel (north of State Road 838), the field verification did not identify any seagrass within the channel. Additional side scan sonar data was collected for certain locations in Broward County where the original side scan sonar did not show seagrass; however, seagrass was verified to be present during a diver survey and during the groundtruthing. The re-survey collected on July 8, 2015, showed seagrass present indicating the variability between data may likely be the result of the initial data being collected prior to June 1. The re-survey for the area north of State Road 838 still showed potential seagrass in the channel. In an effort to distinguish between macroalgae and seagrass, FIND is currently contracting this area for a diver survey. Seagrass species predominantly present adjacent to the channel in Broward County included mainly sparse *Halophila* spp. with *H. wrightii* observed in a couple locations.

Side scan sonar data was collected for Miami-Dade County on July 7, 2015, and groundtruthed on August 6, 2015. The side scan sonar showed “potential seagrass” or “potential sparse seagrass” adjacent to the channel for most of the length of the IWW and generally absent from the channel. Baker’s Haulover was the only area in Miami-Dade County where diver seagrass surveys adjacent to the channel were used to compare results and validate the accuracy of the side scan sonar. The groundtruthing verified consistency between the Baker’s Haulover surveys and the side scan sonar. It is unclear if sparse seagrass was observed in the actual channel or side slopes at Baker’s Haulover due to the swift tidal currents. Groundtruthing showed that one area mapped as “potential sparse seagrass” in the vicinity of central Biscayne Bay contained only macroalgae and another area marked the same contained a high concentration of fine sediments and no seagrass or macroalgae. High resolution data has been requested for these areas. Side scan sonar will be collected for all areas within the

range of seagrass (southern terminus of the IWW in Miami-Dade County north to Ponce Inlet in Volusia County) by September 30, 2015. Based on available information to date, seagrass is primarily absent within the federal channel.

e. High salinity bays, estuaries, and seagrass habitat. Within the proposed action area high salinity bays include Biscayne Bay, and estuaries include the St. Johns River, IRL, and LWL. Estuaries are dynamic areas where freshwater mixes with saltwater from the ocean and bays do not necessarily have a freshwater input; however, the terms estuary, bay, and lagoon are often used interchangeably. The Final Habitat Plan for the South Atlantic Region dated October 1998 identifies the St. Johns River, the IRL, and Biscayne Bay as EFH for juvenile cobia (*Rachycentron canadum*) and shows their relative abundance related to high salinities.

The St. Johns River is the longest river in Florida. At 310 miles long it winds through and/or borders twelve counties, and is one of only a few rivers that flow north. The only portion of the St. Johns River within the proposed action area is the confluence of the St. Johns River at the intersection of the AIWW and IWW. The estuarine portion of the St. Johns River, or lower St. Johns River begins at the Atlantic Ocean to upstream of Palatka at the Ocklawaha River. The St. Johns River is tidal over the lower 31 miles from the ocean to the City of Jacksonville where flood tide acts as a shallow progressive. Saline water mixes with freshwater from the drainage throughout the lower St. Johns River basin which includes an area of 16 counties. The upstream extent of salinity varies as a result of the amount of freshwater discharge, volume of ocean water, and wind. Due the slow movement of the river and a mild slope averaging 0.1 foot drop per mile, tidal effects can reach 106 miles upstream to Lake George in Volusia County, particularly during drought periods.

The IRL is a diverse, shallow water estuary stretching across 40 percent of Florida's east coast including a large section of the IWW and spanning 156 miles from Ponce de Leon Inlet in Volusia County to the southern boundary of Martin County. The IRL consists of three distinct and hydraulically connected waterbodies: the Indian River, the Banana River, and Mosquito Lagoon. Haulover Canal, a manmade portion of the IWW, provides the only connection between the Indian River and Mosquito Lagoon. As estimated 4,300 plants and animals have been documented from the IRL making it the most diverse estuary in North America (SJRWMD, 2000). The maximal extent and distribution of seagrass within the proposed action area is within the IRL since the waterbody is wide, has favorable water quality and transparency, and is a relatively shallow system. Seawater enters the IRL through several inlets to the Atlantic Ocean during flood tide. Freshwater enters the IRL from several streams, canals, precipitation, and groundwater and either evaporates or exists on an ebb tide. Variations in salinity as result of evaporation and precipitation are more pronounced in areas where there is

no freshwater input such as Banana River and less pronounced in areas with freshwater inputs which is the primary factor (Sumner and Belaineh, 2005). Damaging pulse freshwater discharges from the St. Johns River Marsh and Lake Okeechobee have disrupted salinities, degraded shellfish habitat, and contributed to pollutant loading including suspended solids, nitrogen, and phosphorus which has fostered algal growth and destroyed seagrass.

The LWL is located in Palm Beach County, running approximately 20 miles parallel to the coast from North Palm Beach to Ocean Ridge. This estuary is separated from the Atlantic Ocean by barrier islands. Historically, the water body was fresh water with no permanent connections to the ocean except during storms when ephemeral inlets were created. Several attempts were made in the late 1800s to create navigable inlets and when the East Coast Canal Company completed dredging of the IWW at the north end of LWL to Jupiter Inlet, freshwater discharges increased via the Loxahatchee River. In the early 1900's the IWW was completed from the south end of LWL to Biscayne Bay. By 1915 the Port of Palm Beach created a permanent inlet at the Lake Worth Inlet and by 1917, the South Lake Worth Inlet was created to improve flushing. The creation of the West Palm Beach Canal and spillway in 1925 resulted in additional freshwater inflows. LWL has suffered from environmental degradation due primarily to development, accumulation of pollutants, and poor water quality. Seagrass beds in the LWL cover about 1,700 acres (PBC, 2015). Salinity varies within the LWL as a result of current water management practices and damaging pulse freshwater releases through C-17, C-51, and C-16. Coupled with suspended sediments, this has resulted in reductions in seagrass distribution within LWL.

Biscayne Bay is a shallow bay surrounded by developed and undeveloped lands in Miami-Dade County. It is about 40 miles long and 2-10 miles wide and forms part of the IWW. Biscayne Bay has undergone changes due to development. Since 1890 over 20 percent of the northern bay has been filled for artificial islands and causeways leading to degradation of water quality and destruction of seagrass habitat. Southern Biscayne Bay, including Card Sound and Barnes Sound, has been relatively isolated and is less impacted by development yet average salinity and salinity variability has steadily increased. These trends could be a result of rising sea level. In the central Bay, salinity ranges from estuarine to marine. North of Black Point and Chicken Key have a history of fluctuating salinity with evidence of increasing salinity over the last 20 to 30 years (USGS, 2004).

f. Coastal inlets. Coastal inlets are HAPCs for a variety of managed species because of the unique role they play as migratory corridors connecting ocean and estuarine waters that serve as spawning and nursery areas for shrimp, mackerels, and other fish species (Hettler and Chester, 1990; Lindeman et al, 2000; Faunce and

Serafy, 2007; Serafy et al, 2007). Movement of larval and juvenile fish and shrimp through inlets varies greatly with some species migrating nocturnally and within portions of the tidal stream, phases of the lunar cycle, or interaction of these factors (Forward et al, 1999). The major point is that migration through inlets rarely is a passive process and instead reflects behaviors of the migrants. Most larval and juvenile fish that utilize inlets to access their inshore nurseries respond to a variety of environmental factors once they reach the inlet (Boehlert and Mundy, 1988). Inlets serve as migratory corridors for larvae entering nursery areas and for sub-adults leaving nursery areas for further maturation and spawning; there is no alternative location for this ingress and egress. Some Inlets connect spawning and nursery habitats such as those which connect the Atlantic Ocean to a state designated nursery area (discussed in paragraph g below) such as Matanzas making the inlet an important landscape feature for larval and juvenile shrimp and fish.

From north to south along the east coast of Florida from the AIWW at the Georgia/Florida border to the terminus of the IWW in Miami-Dade County there are 18 coastal inlets: St. Mary's, Nassau, Ft. George, St. Johns, St. Augustine, Matanzas, Ponce de Leon, Sebastian, Ft. Pierce, St. Lucie, Jupiter, Lake Worth, Boynton, Boca Raton, Hillsboro, Port Everglades, Baker's Haulover, and Government Cut. Coastal inlets are designated as EFH/HAPC by amendments to the fishery management plans. Although not specifically mentioned in the amendments, the Corps is aware that NMFS includes the area from ebb shoal to flood shoal in the definition of coastal inlets. Although the FIND does not have the authority to dredge coastal inlets, flood shoals do exist within portions of the AIWW and IWW and are routinely dredged to maintain authorized channel depths. Flood shoals are highly dynamic as a result of sediment transport and require dredging on a frequent basis. Hydrodynamics, inlet morphology, and longshore sediment transport vary along the coast of Florida resulting in varying degrees of flood shoaling and dredging frequency within the navigation channel.

Coastal inlets within the proposed action area where tidal currents and hydrodynamics result in flood shoals forming with the AIWW or OWW which require frequent maintenance dredging include Nassau (Sawpit), St. Augustine, Matanzas, Ponce de Leon, St. Lucie Inlet (Crossroads), Jupiter, and Baker's Haulover. Dredging frequency for these areas is identified in Table 4.

Sawpit refers to the AIWW at Sawpit Creek a tributary on the south side of the Nassau Sound where the Nassau River meets the Atlantic Ocean. This is a natural inlet with no structures or inlet management plan. Maintenance dredging occurred in 1982 in this stretch of the AIWW and since 1996 the AIWW at Sawpit Creek has been routinely maintenance dredged. The most recent maintenance dredge event was in 2013.

St. Augustine Inlet is an improved tidal inlet connecting the San Sebastian River and IWW 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. A relatively high rate of shoaling within the IWW and St. Augustine Inlet necessitates frequent maintenance dredging. Last dredged in 2013, the most recent survey documents minimum depths from the project channel are -2.1 ft. causing navigation problems for commercial and recreational vessels which are forced outside the authorized channel in search of deeper water, waiting for high tides, or prop dredging (USACE, 2015).

Matanzas Inlet lies 2.5 miles north of the St. Johns County/Flagler County line. Maintenance dredging has occurred frequently in this area since the IWW was dredged to the present project depth of -12 ft. MLW in 1951. The high rate of shoaling within the IWW near Matanzas Inlet necessitates frequent maintenance dredging typically over a three-year cycle. The high maintenance requirement exists because this portion of the IWW is close to an active, sandy inlet that has no management program. It is not uncommon for shoaling to result in channel depths of less than 6.5 ft. causing navigation problems for commercial and larger recreational vessels. Access to the Atlantic Ocean from the IWW via Matanzas Inlet is not possible for most vessels and it is listed as unnavigable on NOAA chart 11486 (15th Ed. Jul. 03).

The Ponce de Leon Inlet was authorized as a federal navigation project in 1965. Work was completed in 1972 for a navigation channel of -12 ft. MLLW (currently authorized at -15 ft. MLLW) stabilized by rock jetties. The federal navigation project includes a northward channel and southward channel which connect to the IWW. Maintenance of the inlet and a portion of the IWW has occurred regularly since initial construction due to the high rate of shoal buildup within the inlet channel and IWW. The most recent maintenance dredge effort was in 2012. Shoal material is expected to be removed every two to four years to maintain authorized depths within the inlet entrance channel, inlet throat, channels leading to the IWW, and portions of the IWW. Due to frequent dredging, shoal materials are newly deposited in the channel through normal coastal processes and shoal sediments are typically beach quality. Historically, Ponce de Leon Inlet functioned as a natural passage through barrier islands separating the Atlantic Ocean from the Halifax and Indian Rivers. Build-up of the ebb shoal created obstacles to safe navigation which lead to authorization of the federal navigation project.

The St. Lucie Inlet connects the Atlantic Ocean to several waterways in Martin County, including the Indian River Lagoon, the St. Lucie River (OWW), the Hobe Sound Narrows and the IWW. Crossroads refers to the confluence of the IWW and OWW at the inlet. . The St. Lucie Inlet was first opened by local interests in 1892. Federal construction of the navigation channel first occurred in 1948 with authorization of an expanded federal

navigation project in 1982 including an impoundment basin. The impoundment basin serves to capture sand and sediments that would otherwise end up in the navigation channel. Even with the impoundment basin high current velocities result in shoaling and routine dredging on an average three to five-year cycle since the 1960s, and 1930s, respectively for the IWW and OWW.

Jupiter Inlet is located at the north end of Palm Beach County and was a natural waterway connecting the Loxahatchee River with the Atlantic Ocean. Historically the inlet was kept open by flow from the Loxahatchee River, Lake Worth Creek, and Jupiter Sound but construction of the IWW, Lake Worth Inlet, and modification of the St. Lucie Inlet in 1985 reduced flow resulting in periodic closure of the inlet. The IWW is 0.5 mile inside the entrance to the inlet and shallow sandbars frequently build up from the Jupiter Inlet lighthouse through the mouth of the inlet to the junction of the IWW. Maintenance dredging of the federal navigation channel in the vicinity of the Jupiter Inlet occurs every two to four years due to the Inlet's highly dynamic shoaling conditions. From 1983 to February 2000, the reported controlling depth was 4 feet over the bar to the IWW (NOAA Navigation Charts, 2006). Since 1947, Jupiter Inlet has remained open with active dredging.

Baker's Haulover Inlet was constructed in 1925 to serve recreational boaters and provide better flushing of Biscayne Bay. It is the only inlet in northern Biscayne Bay and is subject to strong tidal exchange and currents with subsequent high rate of sediment movement, deposition, and re-distribution. After being closed by a hurricane in 1926, several modifications have been made to stabilize the inlet interrupting longshore sediment transport and affecting adjacent beaches. The inlet is 400 feet wide, 14 feet deep, and connects the Atlantic Ocean with the IWW in the upper portions of Biscayne Bay through a barrier island in Miami-Dade County. This inlet is characterized by high current velocities which have scoured the channel to bedrock. Sediment entering the inlet, largely because of the dominant southerly littoral drift is carried inside to form a large flood tidal shoal which spills over into the IWW and requires frequent maintenance dredging in order to maintain navigability.

Coastal inlets are an important landscape feature for larval crustaceans and fish because they connect spawning and nursery habitats and ocean waters. Many species spawn offshore. October is the typical month when abundance of larval and juvenile stages of many fish species in the vicinity of inlets transition from high to low before high levels resume in the spring. Systematic dredging of coastal inlets may result in unanticipated changes in habitat quality, including increasing concentration of suspended sediments that can clog gills in young, less mobile fish and invertebrates, and thereby increase their mortality rate. The extent of negative effects is dependent on the life history stages of the species present and duration of exposure to high

concentrations of suspended sediments. Dredging of inlets including their ebb and flood tide shoals may also result in anticipated cues used by migrants to the estuary. Species that orient to cues associated with sea bottom may be affected by a deepened channel. Channel dredging may change flow of longshore currents.

g. State designated nursery areas i.e., aquatic preserves. There are 41 aquatic preserves within the state of Florida that allow for protection of bird rookeries, fish nurseries, freshwater springs, salt marshes, seagrass meadows, and mangrove forests. Along the east coast of Florida encompassing portions of the AIWW and IWW are the following aquatic preserves: Nassau River - St. Johns River Marshes Aquatic Preserve, Guana River Marsh Aquatic Preserve, Tomoka Marsh Aquatic Preserve, Mosquito Lagoon Aquatic Preserve, Indian River Lagoon Aquatic Preserve, Loxahatchee River - Lake Worth Creek Aquatic Preserve, and Biscayne Bay Aquatic Preserve. It should be noted that the AIWW and IWW were excavated to their authorized depths prior to designation of all of the aquatic preserves which encompass a portion of the federal navigation channel.

Nassau River - St. Johns River Marshes Aquatic Preserve encompasses over 69,000 acres in Nassau and Duval Counties along the AIWW and St. Mary's, St. Johns, and Nassau Rivers. It was designated as an aquatic preserve in 1969 to protect the Nassau Sound area including the vast salt marsh estuary and numerous interconnecting tidal creeks, rivers, and channels with some small tree islands.

About 12 miles of the IWW in St. Johns County runs through the Guana River Marsh Aquatic Preserve, an area of 40,000 acres designated in 1985. The preserve is unique in that it encompasses 12,000 acres of uplands, 25,000 acres of ocean, and includes Guana Lake (Lake Ponte Vedra), a large artificial freshwater to brackish lagoon.

The Tomoka Marsh Aquatic Preserve is an estuarine area of about 8,000 acres designated in 1969 largely to protect the important waterbodies used by the West Indian manatee. The preserve includes portions of the Halifax River, Smith Creek, Bulow Creek, Tomoka River, Tomoka Basin, and a 1,100 acre mosquito impoundment. About 10 miles of the IWW in Flagler and Volusia counties were dug through areas of Halifax River and Smith Creek which fall within the preserve boundaries.

The IRL is a diverse, shallow water estuary stretching across 40 percent of Florida's east coast and the IWW and spanning 156 miles from Ponce de Leon Inlet in Volusia County to the southern boundary of Martin County. The IRL is an extensive ecosystem that includes a wide shallow lagoon with tidal creeks and flats bordered by mangroves and salt marshes. The open waters of the lagoon include seagrass, macroalgae, oyster reefs, clam beds, spoil islands, and bare sandy areas. An estimated 4,300 plants and animals have been documented from the IRL making it the most diverse estuary in

North America (SJRWMD, 2000). The IRL Aquatic Preserve was designated in 1969 and includes three components: a northern component from Malabar to Vero Beach, a middle component from Vero Beach to Ft. Pierce, and a southern component from Jensen Beach to Jupiter Inlet. The northern component was designated in 1969 and includes 28 miles and 28,000 acres of submerged lands in Brevard and Indian River Counties including portions of Turkey Creek and St. Sebastian River. The middle component is 12 miles long and includes 11,000 acres of submerged lands in Indian River and St. Lucie Counties. The southern component includes 22,000 acres of submerged lands in St. Lucie, Martin, and Palm Beach Counties.

The Loxahatchee River - Lake Worth Creek Aquatic Preserve was designated in 1970 and includes 9,000 acres of submerged lands. It is a small dynamic estuary where freshwater from the Loxahatchee River and Lake Worth Creek empty into the IRL and Atlantic Ocean at Jupiter Inlet. With stabilization of the Jupiter Inlet, the lower Loxahatchee changed from a freshwater marsh system to a tidally influenced estuarine system. The Loxahatchee River cuts through the Atlantic Coastal Ridge, which separates the Eastern Flatwoods to the west from the Atlantic Ocean to the east. The C-18 canal system drains the Loxahatchee Slough and glades to the west and drains into the Southwest Fork. Urban development has affected the health of the preserve causing depleted dissolved oxygen levels as a result of leaching of pollutants from septic tanks. Additionally, the C-18 canal causes massive amounts of freshwater to drain into the river basin and forces saltwater into the North Fork of the river, thereby altering the historical natural communities.

Biscayne Bay Aquatic Preserve was designated in 1974 due to its unusual and sensitive habitat for seagrass, manatees and good water quality since that time Miami-Dade County has responsibility for overseeing actions to enhance and protect the bay. The preserve runs the length of the bay from the Oleta River to Card Sound near Key Largo and encompasses 63,000 acres of submerged lands. Biscayne Bay is a unique waterbody along the southeast Atlantic shoreline of the United States which formed between 5,000 and 2,400 years ago as sea level rose. Biscayne Bay provides habitat for a wide variety of juvenile and adult species as well as several federally listed species, including the West Indian manatee, the smalltooth sawfish (*Pristis pectinata*), the American crocodile (*Crocodylus acutus*), and Johnson's seagrass.

h. Ocean high salinity surf zones. The surf zone is the shallow subtidal area of breaking waves seaward of the intertidal beach. Within the surf zone longshore sandbars frequently develop and shift seasonally in response to wave energy. Polychaetes, isopods, mollusks, echinoderms, amphipods, and other crustaceans occur in the surf zone. The surf zone is an important migratory path for larval, juvenile, and adult fish. Beneficial use of dredged material is common where maintenance dredging

takes place in close proximity to inlets and dredged material is beach quality. Beach placement involves placing dredged material along the mean high water line. Material is pushed along a longitudinal berm and discharged between the berm and the upland. The material is moved by equipment to above and below the mean high water line depending on the beach profile and amount of material. Severity of impacts from beach placement varies depending on amount and textural compatibility of material, placement frequency, and time of year the disposal occurs.

3. Federally managed fisheries potentially present in proposed action area.

In Table 7 below, the Corps has identified federally managed fisheries potentially present within the proposed action area which utilize EFH and HAPC during a period of their life cycle. Only EFH and HAPC occurring within the proposed action area is listed in Table 7. Although only EFH and HAPC designated by the SAFMC are listed in Table 6 and analyzed in Section IV.2, Table 7 includes species managed by SAFMC as well as other species that fall under MSFCMA and managed by other federal agencies or councils with the potential to be present within the proposed action area. EFH for these other managed species although not specifically listed in Table 6 is addressed in the section 2 above where EFH/HAPC designated by the SAFMC is discussed.

Table 7. Federally Managed Fisheries Potentially Present within the Proposed Action Area

Species	Life Stage	EFH	HAPC
Species Managed by the South Atlantic Fishery Management Council			
Shrimp FMP			
Brown shrimp (*Farfantepenaeus aztecus)*	A, J, L	SAV inc seagrass (J, L); unconsolidated bottom (A, J, L); subtidal & intertidal flats (A, J, L)	coastal inlets (A, L); aquatic preserves (A, J, L)
Pink shrimp (Farfantepenaeus duorarum)	A, J, L	SAV inc seagrass (J, L); unconsolidated bottom (A, J, L); subtidal & intertidal flats (A, J, L)	coastal inlets (A, L); aquatic preserves (A, J, L)
White shrimp (*Litopenaeus setiferus)*	A, J, L	SAV inc seagrass (J, L); unconsolidated bottom (A, J, L); subtidal & intertidal flats (A, J, L)	coastal inlets (A,L); aquatic preserves (A,J,L)
Spiny Lobster FMP			
Spiny lobster *(Panulirus argus)*	A, J, L	Unconsolidated bottom (A, J); shallow subtidal bottom (A, J); SAV inc seagrass (A, J); estuarine water column (L)	
Snapper-Grouper FMP			
Gray snapper (*Lutjanus griseus)*	A, J, L	Unconsolidated bottom (A, J, L); estuarine water column (A, J, L)	seagrass (J); coastal inlets (A, J,

Table 7. Federally Managed Fisheries Potentially Present within the Proposed Action Area

Species	Life Stage	EFH	HAPC
			L); aquatic preserves (J)
Mutton snapper (*Lutjanus analis)*	J	Unconsolidated bottom; estuarine water column	seagrass; coastal inlets; aquatic preserves
Lane snapper (*Lutjanus synagris)*	A, J, L	Unconsolidated bottom (A, J, L); estuarine water column (A, J, L)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Yellowtail snapper (*Ocyurus chysurus)*	J	Unconsolidated bottom; estuarine water column	seagrass; coastal inlets; aquatic preserves
Dog snapper (*Lutjanus jocu)*	J	Unconsolidated bottom; estuarine water column	seagrass; coastal inlets; aquatic preserves
Schoolmaster (*Lutjanus apodus)*	A, J	Unconsolidated bottom (A, J); estuarine water column (A, J)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Blue striped grunt (*Haemulon sciurus)*	A, J, L	Unconsolidated bottom (A, J, L); estuarine water column (A, J, L)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
French grunt (*Haemulon flavolineatum)*	A, J, L	Unconsolidated bottom (A, J, L); estuarine water column (A, J, L)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
White grunt (*Haemulon plumieri)*	A, J, L	Unconsolidated bottom (A, J); estuarine water column (A, J, L)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Smallmouth grunt (Haemulon chrysargeryum)	A, J, L	Unconsolidated bottom (A, J); estuarine water column (A, J, L)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Red grunt (*Epinephelus morio)*	A, J, L	Unconsolidated bottom (A, J, L); estuarine water column (A, J, L)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)

Table 7. Federally Managed Fisheries Potentially Present within the Proposed Action Area

Species	Life Stage	EFH	HAPC
Gag grouper (*Mycteroperca microlepis)*	A, J, L	Unconsolidated bottom (A, J, L); estuarine water column (A, J, L)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Nassau grouper (*Epinephelus striatus)*	A, J, L	Unconsolidated bottom (A, J, L); estuarine water column (A, J, L)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Yellowfin grouper (*Mycteroperca venenosa)*	A, J, L	Unconsolidated bottom (A, J, L); estuarine water column (A, J, L)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Goliath grouper *Epinephelus itajara*	J	Unconsolidated bottom; estuarine water column	seagrass; coastal inlets; aquatic preserves
Red grouper (*Epinephelus morio)*	A, J, L	Unconsolidated bottom (A, J, L); estuarine water column (A, J, L)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Snowy grouper (*Epinephelus niveatus)*	A, J, L	Unconsolidated bottom (A, J, L); estuarine water column (A, J, L)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Sheepshead (*Archosargus probatocephalus)*	A, J. L	Unconsolidated bottom (A, J); estuarine water column (A, J, L)	seagrass (J, L); coastal inlets (A, J, L); aquatic preserves (J, L)
Hogfish (*Lachnolaimus maximum)*	A, J, L	unconsolidated bottom (J); seagrass (J)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Black drum *(Pogonias cromis)*	A, J, L	unconsolidated bottom (A,J); seagrass (A,J)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Jack Crevalle (*Caranx hippos)*	A, J, L	Unconsolidated bottom (A, J, L)	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Gray triggerfish *(Balistes capriscus)*	A, J, L	Unconsolidated bottom; estuarine water column	seagrass (J); coastal inlets (A, J,

Table 7. Federally Managed Fisheries Potentially Present within the Proposed Action Area

Species	Life Stage	EFH	HAPC
			L); aquatic preserves (J)
Atlantic spadefish *(Chaetodipterus faber)*	A, J, L	Unconsolidated bottom; estuarine water column	seagrass (J); coastal inlets (A, J, L); aquatic preserves (J)
Black sea bass (*Centropristis striata)*	J	Unconsolidated bottom; estuarine water column	seagrass; coastal inlets; aquatic preserves
Coastal Migratory Pelagics FMP			
Cobia (Rachycentron canadum)	A, J, L	Ocean high salinity surf zones; high salinity bays, estuaries, and seagrass; aquatic preserves	Coastal inlets
Spanish mackerel (*Scomberomorus maculatus*)	J	ocean high salinity surf zones; aquatic preserves	Coastal inlets
Species Managed by the Mid-Atlantic Fishery Management Council			
Bluefish (*Pomatomus saltatrix)*	A, J	St. Johns River estuary	
High Migratory Species Managed by NMFS			
Atlantic Sharks			
Bull shark *Carcharhinus leucas*	J	Inlets, estuaries	
Lemon shark (*Negaprion brevirostris*)	J	Inlets, estuaries	
Bonnethead shark (*Sphyrna tiburo*)	A, J	Inlets, estuaries, & shallow coastal waters	
Nurse shark (*Ginglymostoma cirratum*)	A, J	Shoreline	
Scalloped hammerhead shark (*Sphyrna lewini*)	J	Shoreline	
Dusky shark (*Carcharhinus obscurus*)	J	Inlets, estuaries	

Table 7. Federally Managed Fisheries Potentially Present within the Proposed Action Area

Species	Life Stage	EFH	HAPC
Tiger shark (*Galeocerdo cuvieri*)	J	Shore	
Atlantic sharpnose shark (*Rhizoprionodon terraenovae*)	J	Bays	

a. Penaeid shrimp. Penaid shrimp within the proposed action area include white shrimp, pink shrimp, and brown shrimp. Important nursery areas for post larvae and juvenile penaeid shrimp include salt marsh dominated by *Spartina alterniflora* and seagrass beds. Brown shrimp occur offshore and migrate into estuaries as post-larvae primarily at night during the period January to November with peak migration occurring February through April. Once in the estuary, brown shrimp seek soft silty/muddy substrate including both vegetated and unvegetated shallow water habitats. The density of post larvae and juveniles is highest in marsh and SAV including seagrass (Howe et. al., 1999; Howe and Wallace, 2000). Emigration by sub adults out of the estuary takes place May through August.

Pink shrimp are the most prevalent in Florida waters; as such the commercial fishery is most important economically to the state. In north Florida white shrimp spawn inshore near inlets in March through November. Post-larval shrimp move into the estuaries during spring and late fall where they occupy nursery areas which offer abundant food, substrate, and shelter from predators. Pink shrimp emigrate out of the estuary at two to six months.

White shrimp spawn along the south Atlantic coast from March to November and enter Florida estuaries in April through early May. Juvenile white shrimp tend to migrate further upstream then brown or pink shrimp. White shrimp generally prefer muddy substrate, pink shrimp sandy and shell substrates, and brown shrimp can be found on all substrates. Brown and pink shrimp typically bury in the substrate at night and are more active during the day. Juvenile and adult penaeid shrimp are omnivorous bottom feeders that feed on a variety of invertebrates and various organic debris.

b. Spiny lobster. The spiny lobster occupies various habitats during its life cycle. Larvae occur in the open ocean and post-larvae and juveniles occupy shallow coastal waters of bays and lagoons including seagrass, macroalgae, and mangroves. Adults move toward deeper water in reef and rubble areas. Juvenile and adult lobster are

nocturnal feeders that prey upon crustaceans and mollusks and are capable of moving great distances. During daylight they take shelter in communal dens or holes. Lobster are preyed upon by members of the snapper-grouper complex.

c. Snapper-grouper complex. The snapper-grouper complex consists of 73-species of demersal tropical and subtropical species including snapper, sea bass and grouper, porgy, tilefish, grunts, triggerfish, wrasse, and jacks. Species generally occupy the same type of habitat and are estuarine dependent, i.e., juveniles commonly occur in inshore waters, primarily seagrass beds, but also tidal creeks, mangroves, estuaries, and bays. Adults are more common offshore in deeper waters and on reefs although adults of many species may also be found within estuaries and inlets. Seagrass is a HAPC for juvenile grouper, snapper, and grunts. Juvenile grouper feed on other fish, crabs, shrimp, lobster, and cephalopods. Juvenile snapper feed primarily on plankton. Sheepshead inhabit bays and estuaries and are commonly found around pilings where they feed on crabs, other benthic crustaceans, and mollusks. Gray triggerfish inhabit bays, harbors, and lagoons. Adult spadefish are found in shallow coastal waters and juveniles are found in estuaries where they feed on benthic invertebrates.

d. Coastal migratory pelagics. Coastal migratory pelagic species within the proposed action area include Spanish mackerel and cobia. Spawning occurs offshore to inshore areas of high turbidity and low salinity and juveniles will enter estuaries where they feed on small fish and invertebrates including penaeid shrimp. Spanish mackerel frequently enter tidal estuaries, bays, and lagoons and will often swim in schools close to the beach. Juvenile cobia spawn offshore and larvae enter estuaries of low salinity (15 ppt to 20 ppt) as soon they are mobile. Cobia feed primarily on demersal organisms, especially crustaceans such as crab.

e. Bluefish. Bluefish are a coastal migratory pelagic species which occupies large bays and estuaries as well as the continental shelf along the east coast of the United States from Maine to Florida. Spawning occurs offshore and juveniles migrate inshore to estuaries and bays where they consume small fish. In general juveniles occur in south Atlantic estuaries March through December and adults are primarily found in the open ocean but can also be found in large bays and estuaries particularly during May through January. Bluefish feed throughout the water column on a large variety of fish and squid.

f. Atlantic sharks. Many Atlantic sharks utilize bays, estuaries, and shallow coastal waters as nursery areas due to the abundant food sources i.e., small fish and crustaceans. Most sharks captured in Florida waters are juveniles. While sharks utilize the water column, specific benthic habitat types have not been identified for most shark species. Juvenile bonnethead sharks appear to have an affinity for seagrass habitat but also frequent sandy and muddy bottoms. Bull sharks are common in bays and

estuaries and often enter freshwater. Lemon sharks are common in shallow coastal waters particularly around coral reefs and may have a preference for mangroves although this is not well documented in literature.

g. Corals. Corals can be characterized as deepwater species, shallow water species, stony corals, octocorals, hermatypic, and ahermatypic. Hardbottom habitats in the nearshore can support coral species but generally lack coral diversity and density. Hardbottom may include some hermatypic corals; biota usually include a thin veneer of live corals, often covering a rock outcrop or a relic reef, and associated benthos (e.g., sponges, tunicates, holothurians) in an assemblage with low relief. Corals that often colonize the low relief ledges which form portions of the IWW channel wall in southern Palm Beach (Boca Raton and Delray Beach areas), Broward, and Miami-Dade Counties are stony corals including hermatypic shallow water species and octocorals.

VI. Conclusion Regarding the Effects of the Action on EFH and HAPC.

Maintenance of the AIWW between Norfolk, Virginia and St. Johns River, Florida was authorized by House Document 618, 75th Congress, 3rd Session dated June 20, 1938. Maintenance of the IWW from Jacksonville to Miami, Florida was authorized by House Document 740, 79th Congress, 2nd Session, modified by Chief of Engineers July 22, 1960. Since the initial excavation, sediments have periodically accumulated reducing the navigable capacity of the federal channel. The navigation channel is used by large, deep draft ocean going vessels. Although it is recognized that portions of the AIWW, IWW, and OWW were dug through natural areas, other portions were dug through uplands by connecting natural water bodies and creating aquatic habitat utilized today by federally managed fisheries. Construction of the federal channel and its associated environmental impact took place 50 to 100 years ago prior to NEPA or MSFCMA; however, it must be recognized the federal project is existing and impacts are associated with maintenance of the existing federal project as authorized by Congress for public interest. It should also be noted that the Federal Register / Vol. 65, No. 66 / Wednesday, April 5, 2000 / Rules and Regulations 65 FR 17786 *Designated Critical Habitat: Critical Habitat for Johnson's Seagrass*, excludes the IWW channel from critical habitat designation since the "maintenance activities are ongoing and associated with a disturbed area". The design width of the federal channel which is essentially the area of direct impact from maintenance dredging encompasses a mere fraction of the entire waterbody present throughout the east coast of Florida and adjacent to the proposed action area.

The most obvious direct impact of the proposed action on managed species within all habitats is the potential for mortality or injury through dredging. Species within any habitats and life stages are at risk and may be temporarily displaced but would return upon cessation of dredging. Motile species are able to move to similar, nearby habitats

not impacted by dredging activities. Although some benthic prey will be lost during dredging, recovery will occur and foraging can occur in adjacent areas not impacted by dredging. Effects for each habitat potentially impacted by the proposed action are described below.

1. Intertidal flats. Intertidal flats are not located within the federal channel and will not be impacted by dredging. In rare occasions, disposal pipe may lay on top of an intertidal flat en route to a DMMA. Pipelines are normally floated and only weighted where vessel access is needed. Pipes may lay on the sediment surface of intertidal flats en route to the following DMMAs: NA-1, DU-6, DU-8, FL-3, and MSA-434 depending on where dredging is taking place. Where pipe lays on the sediment surface, the only direct impact would be to organisms, primarily microscopic, on the surface area of contact with the pipe. Burrowing organisms and motile species would be temporarily displaced and would not be directly impacted. Dredge pipes are only 14-inch to 18-inch in diameter and pipes are only in place anywhere from three weeks to three months depending on the volume of dredge material. The Corps has determined the proposed action would not have a substantial adverse impact on intertidal flats EFH for federally managed species.

2. Unconsolidated bottom. Dredging to restore the authorized depth will not result in a net loss of unconsolidated bottom; however, short term losses of in-faunal organisms would result. Dredging would remove benthic organisms which provide a food source for managed species. The dredged areas would be expected to re-colonize with a similar array of organisms within one to three years. For reaches where routine periodic maintenance dredging occurs, the benthic organisms that are present consistently re-colonize after each dredging event. In areas where there is a longer dredging interval, the soft bottoms would progressively regain the fully anticipated suite of organisms prior to the next dredging event. Managed species would have to temporarily re-establish their foraging activities in other non-disturbed portions of the waterways. The total length and volume of dredging within the anticipated reaches are minimal, primarily limited to shoaling areas, and are not expected to represent a significant portion of the overall unconsolidated bottom habitat within the federal channel. Dredged habitats are expected to recover in terms of benthic biodiversity and population density within two years (Cutler and Mahadevan, 1982; Saloman et. al., 1982). The Corps has determined the proposed action would not have a substantial adverse impact on unconsolidated bottom EFH for federally managed species.

3. Estuarine Water Column. The water column is used by managed species and their prey for foraging, spawning, and migration. Water quality concerns are of particular importance in maintaining this habitat. The effects of dredging and associated activities may adversely affect the water column through short-term turbidity during construction;

although, best management practices would be implemented to ensure the effects do not result in unacceptable water quality impacts. Hydraulic dredges are used for most projects in order to minimize turbidity and to allow efficient dredge material transport and placement. Removal of sandy and coarse sediments would have minimal adverse effects. Turbidity would be monitored to remain within state standards. Turbidity changes as a result of dredging will only result in adverse effect when turbidity generated is greater than background turbidity levels (Erftemeijer and Lewis, 2006). Dredging impacts are also generally limited to a small area and over a short period of time. Maintenance dredging will remove accumulated silts, flocculent, and fine sediments reducing the likelihood of re-suspension of bottom sediments within the water column. Re-suspension of material through dredging of silts and fine sediments can interfere with concentrations of plankton in the water column thereby affecting foraging success and patterns of schooling fish. Reducing re-suspension by removal of silts and fines, however, would benefit overall water quality by improving water clarity and removing nutrients, and other pollutants. Removing accumulated sediments and re-establishing the authorized depth may provide minimal benefits to the overall system by increasing the flushing capacity and conveyance during tidal exchanges. The Corps has determined the proposed action would not have a substantial adverse impact on estuarine water column.

4. SAV including Seagrass. Many factors affect macroalgae and seagrass coverage. Within the proposed action area there are benthic and drift macroalgae which often seasonal patterns of abundance and moved via wind and currents. Macrolgae removed via dredging would likely return as hydrodynamic setting of an area is likely the critical featuring controlling algal retention and accumulation (Bell and Hall, 1997). Extensive field research at the global level indicates that water clarity and the availability of adequate sunlight are key habitat requirements for seagrass (Duarte, 1991; Fourqurean and Zieman, 1991; Johansson, 1991; Batiuk and others, 1992; Dennison and others, 1993; Onuf, 1994; Dixon and Leverone, 1997; Short and Coles, 2001). Water quality and water clarity are considered among the most critical factors in the maintenance of healthy seagrass habitat. Suspended solids and high nutrient concentrations as a result of watershed practices have an impact on water column transparency which can determine seagrass coverage. The accumulated effect of freshwater discharges from inland areas and from non-tidal input sources, as well as rainfall events that discharge directly into tidal waters affect the abundance of sediments and turbidity within the water column. As turbidity increases, light penetration decreases. The combination of duration and intensity of the turbidity event, among other factors, will have varying results in the severity of adverse effects and seagrass persistence. Other natural factors, such as tidal range also affect seagrass coverage.

Physical removal of seagrass and burial due to sloughing are direct effects of dredging on seagrass. Dredging and disposal of dredged material can also lead to decreases in water clarity and increases in turbidity and rates of sedimentation which indirectly

affects seagrass. Dredging is often no more impactive than other activities such as boating traffic, bottom fishing, water management practices, natural coastal processes including sediment transport, and storms; additionally, dredging can provide an indirect benefit to seagrass through reducing turbidity by removing accumulated fine sediments that can be re-suspended through these other activities. Removal of fine sediments can result in an increase in light penetration for seagrass and a corresponding decrease in sedimentation on seagrass beds which ultimately enhances growth (Erftemeijer and Lewis, 2006). Post-construction seagrass surveys have documented that even when proximate to a dredging project, reductions in seagrass coverage may be the result of other natural, climatic factors or recreational activities and not the result of the dredging activity.

Halophila spp. and *H. wrightii* are known for their ability to grow in low light conditions and are more likely to persist in deeper areas such as at the bottom of the IWW channel where favorable conditions exist. These pioneer species are ephemeral and can disappear altogether during winter months (Deis, 2000). Monitoring indicates high spatial and temporal variation in *H. johnsonii* (Virnstein et.al, 1997). Following a natural die off or anthropogenic loss, fast growing, pioneer species such as *Halophila* spp. and *H. wrightii* can quickly recolonize. Factors limiting their colonization that may be associated with dredged material will be siltation, light (but only for prolonged periods of time and in carbonate sediments that turn the water ‘milky’ a surprising amount of light still gets through) and subsequent sediment instability including bioturbation (Fonseca, 2015).

The bottom of the federal navigation channel is generally beyond the limits of seagrass colonization, except for areas near ocean inlets that provide clear water and tidal exchange, or where shoaling has occurred. Based on seagrass data compiled by SJRWMD and FFWCC, project seagrass surveys, and side scan sonar collected to date, very minor inclusions of seagrass are present within the channel. Slower growing, climax species such as *T. testudinum* have not been documented in the channel. Where seagrass has been observed in the channel, observed species include *Halophila* spp. and *H. wrightii*. Although maintenance dredging of the channel where seagrass is present would result in an adverse effect by direct physical removal, recolonization is highly likely. Areas not maintained as frequently may support seagrass where light penetration and water clarity is available. The loss and subsequent recovery of seagrass is part of the normal maintenance dredging cycle. In fact pre and post-construction surveys for areas of the IWW within the range of seagrass, proximate to coastal inlets, and periodically dredged due to frequent shoaling show re-colonization of seagrass after every cyclical dredging event.

In terms of resource thresholds and cumulative effects, the ability of managed species and seagrass to withstand impact is generally limited; however, within the actual federal navigation channel which is a disturbed area that has been in existence for many years, seagrass has been documented to recover and recolonize. Seagrass within the channel does not represent a substantial contribution to the habitat considering the extensive amount of seagrass present adjacent to the channel, particularly within natural water bodies such as the IRL and LWL. The federal channel including any seagrass habitat within it is subject to regular disturbance with a high level of boat activity, high current flow during tidal changes, shoaling, and seasonal changes in salinity especially during summer rains and as a result of water management practices.

Considering the paucity of seagrass within the federal channel; the species composition when present; the variability in seagrass coverage as a result of seasonal, climatic or anthropogenic factors; the ability to re-colonize following a dredge event, and the limited impact area relative to similar adjacent habitat; there are no anticipated cumulative effects as a result of maintenance dredging. The Corps believes infrequent maintenance dredging events are far apart in both space and time so that any adverse effects are fully dissipated before the next impact. Pipeline placement and anchoring within seagrass is prohibited under RGP-93. The Corps has determined the proposed action, including maintenance dredging of any seagrass within the federal navigation channel, will not have a substantial adverse impact on this EFH/HAPC for federally managed species.

5. High salinity bays, estuaries, and seagrass habitat. High salinity bays, estuaries, and seagrass habitat impacted as a result of the proposed action include the aforementioned habitats already discussed and analyzed: intertidal flats, unconsolidated bottom, estuarine water column, and SAV including seagrass. The Central & Southern Florida Project authorized by Congress in 1948 altered the seasonal delivery of freshwater to central and south Florida waterbodies including the IRL, LWL, and Biscayne Bay. The Comprehensive Everglades Restoration Plan will restore more natural freshwater releases which will lower salinity variability. Maintenance dredging of the federal navigation channel does not drive water management practices or alter or affect salinity. The Corps has determined the proposed action will not have a substantial adverse impact on this EFH for cobia.

6. Coastal inlets. As previously indicated the proposed action only involves maintenance dredging of flood shoals within the federal navigation channel of the AIWW and IWW. Federal navigation channels associated with inlets, ports, and harbors and ebb shoals are not included in this assessment. Flood shoals within the AIWW and IWW are primarily considered unconsolidated habitat comprised of beach quality sediments; however, seagrass can be found on flood shoals within the IWW in the

vicinity of the St. Lucie Inlet, Jupiter Inlet and Baker's Haulover Inlet. Post-construction surveys shows that seagrass within these areas quickly re-colonizes after each dredging event.

Migrating larvae and or juvenile fish could be subject to project related elevated turbidity and suspended sediment levels during that period. Turbidity could affect vision of marine life within the sediment plume as well as those marine organisms with gills but these effects would be temporary as they would be limited to the actual dredging and placement operations. Routine maintenance dredging may suppress re-colonization of certain benthic organisms and therefore could impact other trophic levels within the food chain. Dredging in close proximity to inlets where flood shoals encroach into the federal navigation channel is limited to about 30 days every 2 to 5 years; dredging at Baker's Haulover during the 2014 event was completed in less than two weeks. The Corps will consider implementing a time of year restriction for dredging in close proximity to coastal inlets. The Corps has determined the proposed action will not have a substantial adverse impact on coastal inlets HAPC for federally managed species.

7. State designated nursery areas i.e., aquatic preserves. Habitats within aquatic preserves that would be impacted by maintenance dredging include intertidal flats, unconsolidated bottom, estuarine water column, and seagrass. The conclusion for these habitats is discussed in the preceding paragraphs. The waters of aquatic preserves are designated "Outstanding Florida Waters" (OFW). Dredging would result in minor short-term temporary change in water quality. The waters considered part of the OFW designation would require a variance from the Florida Department of Environmental Protection to exceed existing turbidity standards and other requirements designated to protect environmental resources. Hydraulic dredges are used for most projects in order to minimize turbidity. Monitoring has shown that elevated turbidity levels return to acceptable levels within a short period, and no long-term impact to water quality is anticipated. The necessary turbidity monitoring would take place to ensure that State imposed turbidity levels are not exceeded. The actual width of the federal channel is only 125 feet wide; coupled with the associated areas necessary to accomplish dredging (i.e., anchor drop zones, pipeline placement, etc.) the proposed action area represent a small fraction of the actual areas designated under the preserves. Additionally the aquatic preserves were designated after the federal project was authorized and should be recognized as an existing feature within this EFH/HAPC that must be maintained for public interest. The Corps has determined the proposed action will not have a substantial adverse impact on aquatic preserves EFH/HAPC for federally managed species.

8. Ocean high salinity surf zones. The placement of dredged sands along the shoreline may have temporary effects on fauna within the surf zone through sedimentation and

turbidity. The direct impacts would be the burial of the natural substrate and potential for mortality and/or injury of individuals. Organisms living in the ocean high salinity surf zone have the ability to adapt due to substrate changes from normal coastal processes Dredged material placed on beaches is expected to be similar in composition to the existing beach sediment. Small portions of the placement areas are anticipated to be used during individual dredging events resulting in short-term turbidity impacts and beach placement has occurred on multiple occasions at the same locations. Studies have shown beach placement results in no long-term impacts with only minor short-term impacts (Cutler and Mahadevas, 1982; Gorzelany and Nelson, 1987). The Corps opines that placing material every 2 to 3 years over a short duration has less impact than one-time large placements and this practice is more protective of resources adjacent to beach placement sites such as nearshore hardbottoms in the vicinity of St. Lucie and Jupiter Inlets. The Corps has determined the proposed action, specifically disposal of beach quality dredged material on beaches, will not have a substantial adverse impact on ocean high salinity surf zones EFH for coastal migratory pelagics.

VII. Avoidance and Minimization.

The activities covered under the proposed action will occur with an emphasis on avoiding and minimizing effects on EFH through the following PDCs and special conditions:

1. Performing maintenance dredging only when necessary to maintain safe navigation conditions. This is typically when the channel elevation is less than -7 feet mean low water.
2. Development and use of pre-construction surveys and dredging plans and specifications that restrict the anchors, pipelines, and other equipment from disturbing seagrass beds adjacent to the channel. Available GIS information and side scan sonar currently being collected will be used to inform dredging plans and determine where pre-construction surveys are needed.
3. GPS technology will be employed by the dredging contractor to avoid impacts to seagrass and other aquatic resources adjacent to the federal channel.
4. Buoys may also be deployed as necessary to demarcate seagrass adjacent to the federal channel for avoidance.
5. Work vessels crossing seagrass beds shall have a minimum of eighteen inches of water below the hull.
6. Best management practices also utilization of turbidity barriers or silt fence or other measures to minimize turbidity.
7. Channels will be dredged to the authorized depths and widths.
8. Side slopes will not be dredged unless a hazard to navigation is present or reasonably anticipated.
9. Monitoring Requirements to be included as permit condition or written into contract specifications:

a. No pre or post-construction seagrass surveys shall be required within the design limits of the federal channel.
b. For projects within the range of seagrass and side scan sonar or other seagrass GIS data indicates seagrass is likely present:
    i. A pre-construction survey shall be required where seagrass is within 100-feet from the design edge of the channel and/or within the area where dredge pipeline would be placed. The survey shall utilize the standardized methods developed by the Johnson's seagrass recovery team.
    ii. The pre-construction survey will be used to identify areas for the dredging contractor to avoid such as with anchor drop points and pipelines.
    iii. If the pre-construction survey shows a 50-foot buffer can be maintained between all dredging activities and seagrass, no post-construction survey will be required.
    iv. If the 50-foot buffer cannot be maintained, a post-construction survey will be required to document any impacts to seagrass as a result of the dredging activity. The post-construction survey will be performed utilizing the same methodology as the pre-construction survey. Dredging of any seagrass within the design limits of the federal channel is expected and would not be monitored or assessed for mitigation.

10. If GIS data, pre-construction surveys, or side scan sonar identifies any of the EFH or HAPCs listed in section V, pages 28-29, to be within the scope of a maintenance dredging project, the Corps will consult with NMFS pursuant to the MSFCMA on an individual project basis prior to verification under RGP-93 unless the project can be designed to minimize impact on the EFH.
11. A 25-foot buffer will provided between the dredge footprint (including the associated pipelines and staging areas) and adjacent seagrass and other aquatic resources outside the federal channel and side slopes where sediments to be removed are sandy or where dredging is performed by hydraulic dredge
12. Where sediments are fine and/or dredging is performed by a mechanical dredge and seagrass are within 100-feet of the federal channel, the Corps will consult with NMFS prior to verification under RGP-93.
13. To avoid water quality degradation the projects will be required to comply with the 401 Water Quality Certification issued by the State of Florida in accordance with Section 401 of the Clean Water Act, 33 U.S.C. § 1341.
14. All dredged material will be disposed at an approved disposal site.
15. Dredged material may include beneficial re-use through dune restoration and beach placement, or as material for environmental restoration.
16. As-built certifications will be required to ensure the dredging occurred only in the authorized footprint.
17. The Corps will consider implementing a time-of-year dredging restriction in the proximity of coastal inlets, such as October 15 to January 31 for reducing fishery resource impacts when funding and scheduling allows.

VIII. Compensatory Mitigation.

EFH within the federal channel can mainly be characterized as unconsolidated bottom and estuarine water column. The same habitats occur throughout the proposed action area adjacent to the federal channel. The Corps opines that compensatory mitigation is not required for maintenance dredging of the federal navigation channel. The Corps will recommend compensatory mitigation when maintenance dredging will lead to substantial adverse impacts to EFH within the federal channel unless the impact was addressed satisfactorily under a previous compensatory mitigation action.

Based on available information concerning the distribution and abundance of seagrass resources within the federal navigation channel, the Corps believes maintenance dredging will not lead to substantial adverse impacts to seagrass and no mitigation is proposed for maintenance dredging even if seagrass is present within the channel. If the Corps determines the maintenance dredging of seagrass within the federal channel would result in substantial adverse impacts to EFH/HAPC due to the composition, abundance, and ecological contribution to managed fisheries, the Corps will consider requiring one-time compensatory mitigation. It simply cannot be overlooked that the federal channel is an existing public project authorized by Congress in 1927. The environmental impact occurred many years ago and the proposed action includes maintenance of the existing federal project.

Although constructed by dredging and connecting natural waterbodies, the channel is a disturbed area that was in existence prior to MSFCMA and NOAA's implementing regulations. Any requirements for one-time mitigation should also consider granting mitigation credit for EFH/HAPC created through construction of this federal project. The basic concept of "self-mitigation" is not unusual. Self-mitigation occurs when a project possesses environmental benefits that outweigh and override any adverse consequences of the project. The Council of Environmental Quality recognizes this concept, though not by name, when it explains that where sufficient mitigation is intrinsic to a proposal, an agency may conclude that the overall effects of a proposal are below the threshold for requiring an Environmental Impact Statement.

In areas of south Florida limerock exists around -8 NGVD. As a result, along some portions of the IWW where dredging through limerock was necessary to meet authorized depths, construction of the channel resulted in creation of ledges which form the channel wall. These ledges (1-foot to 3-foot relief) provide habitat for a variety of fish and other marine organisms including sessile invertebrates such as corals and sponges. Other areas were cut through upland connecting natural waterbodies and creating a variety of aquatic habitat including not only the 125-foot wide federal channel but adjacent areas which form the side slopes and within the government's right-of-way. Habitats created include unconsolidated bottom, estuarine water column, and shallow water areas where SAV and seagrass have successfully colonized.

Compensatory mitigation will be required for any of the following activities that result in adverse impacts to seagrass outside the federal channel: unauthorized dredging beyond prescribed project limits, scouring of adjacent resources as a result of dredging/prop dredging/vessel damage, inadvertent barge disposal on seagrass or other aquatic resources, pipeline failures, dredged material containment failures, and anchoring or pipeline placement outside the channel. Impacts to wetlands and natural hardbottom (coral and worm rock) are not included in RGP-93 and therefore not assessed in this EFHA. The Corps would require compensatory mitigation for any inadvertent impacts to these resources as a result of the proposed action.

In partnership with Palm Beach County, the FIND implemented the Snook Island Natural Area (SINA) as advanced compensatory mitigation for seagrass impacted through dredging activities. This site is located in the Lake Worth Lagoon in Palm Beach County and could be utilized to provide seagrass compensatory mitigation where one-time compensatory mitigation is necessary to offset significant adverse effects to EFH/HAPC or managed species. The SINA is a tidal system that has previously been documented to have a high success with the establishment of 45-acres of seagrass habitat. The Lake Worth Lagoon Management Plan dated 2014 and the Lake Worth Lagoon Fixed Transect Seagrass Monitoring Report dated 2013 provide long-term datasets to evaluate temporal trends and general patterns in seagrass cover. The reports show that seagrass coverage fluctuates in the Lake Worth Lagoon in response to large-scale environmental disturbances such as hurricanes and small-scale habitat factors, such as sediment characteristics. Over the last five years, the abundance and distribution of seagrass has varied, from being completely covered with seagrass to being nearly completely un-vegetated. The SINA site normally responds to regional environmental influences such as freshwater discharges, which also directly affects seagrass resources within the channel. However, because seagrass coverage and densities fluctuate widely in the Lake Worth Lagoon, it is expected that the disturbed nature of the channel resources and the variability of the seagrass presence at SINA are roughly proportional, and therefore mitigation provided by functional benefits from SINA are commensurate with the level of impact caused by dredging on fisheries.

Currently FIND has utilized 5.12 acres of seagrass mitigation at SINA for the Port of Palm Beach IWW deepening project and 26.11 acres remain and can be used as compensatory mitigation for substantial adverse impacts to seagrass. The 5.12 acre quantity was determined by a Habitat Equivalency Analysis (HEA) of the year by year fluctuation using the Uniform Mitigation Assessment Method (UMAM) Raw Scores at different years as the level of natural resource services. NMFS stated UMAM is not appropriate for establishing the level of services in HEA analysis. The Corps and NMFS are currently discussing what are the appropriate level of services as well as some other variables in the HEA calculations (e.g., providing credit for SINA constructed in advance

of the impacts). This will lead to an adjustment of the 5.12 acre figure (which could also be adjusted depending on results of upcoming monitoring reports) and establishing basis for future mitigation.

IX. NMFS and USACE Reporting Requirements.

1. Corps ensure PDCs are met for each action under the programmatic EFH consultation and submit to NMFS for 10-day review.
2. Corps provide annual report to NMFS of assessment, map of locations dredged, results of any monitoring required, etc.
3. Corps and FIND attend annual coordination meeting with NMFS on all actions under this programmatic EFH consultation.

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

May 5, 2015 F/SER47:JK/pw

(Sent via Electronic Mail)

Colonel Alan Dodd, Commander
U.S. Army Corps of Engineers, Jacksonville District
Palm Beach Gardens Permits Section
4400 PGA Boulevard, Suite 500
Palm Beach Gardens, Florida 33410

Attention: Susan R. Kaynor

Dear Colonel Dodd:

NOAA's National Marine Fisheries Service (NMFS) reviewed public notice SAJ-2005-00972, dated March 31, 2015. The Jacksonville District proposes to re-issue Regional General Permit (RGP) SAJ-93, which authorizes the Florida Inland Navigation District (FIND) to maintenance dredge within the federal channel of the Atlantic Intracoastal Waterway (AIWW) and the Intracoastal Waterway (ICW) in Nassau, Duval, St. Johns, Flagler, Volusia, Brevard, Indian River, St. Lucie, Martin, Palm Beach, Broward, and Miami-Dade Counties. RGP SAJ-93 would also include maintenance of the Okeechobee Waterway (OWW) in Martin County and Lake Okeechobee. The current version of RGP SAJ-93 was issued on February 16, 2011, and expires on February 16, 2016. If re-issued, the new RGP SAJ-93 also would have a five-year term. The Jacksonville District's initial determination is re-issuance of RGP SAJ-93 would not have a substantial adverse impact on essential fish habitat (EFH) or federally managed fishery species. As the nation's federal trustee for the conservation and management of marine, estuarine, and anadromous fishery resources, the following comments and recommendations are offered pursuant to authorities of the Fish and Wildlife Coordination Act and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

Consultation History

- November 23, 2005. The NMFS responded to a public notice the Jacksonville District issued on October 24, 2005, for an earlier version of RGP SAJ-93. The NMFS advised substantial impacts to seagrass would occur under RGP SAJ-93 and recommended the Jacksonville District not issue the RGP. The letter was sent in accordance with Part IV, Section 3(a) of the Memorandum of Agreement between the Department of Commerce and Department of the Army, dated August 11, 1992 (MOA).
- December 5, 2005. The NMFS affirmed the November 23, 2005, letter by sending a letter pursuant to Part IV, Section 3(b), of the MOA.
- May 10, 2006. The Jacksonville District and FIND hosted an interagency meeting in an effort to resolve objections made by the NMFS and other agencies. During the meeting, the NMFS recommended FIND establish mitigation procedures, which may include a mitigation bank, for seagrass to offset minor impacts to seagrass from maintaining the AIWW, ICW,

and OWW. Neither the Jacksonville District nor FIND formally responded to this recommendation.

- December 1, 2009. The Jacksonville District provided the NMFS with a revised RGP SAJ-93 to assess whether the proposed permit conditions would resolve the MOA objection. Notably, the draft permit did not authorize seagrass impacts.
- December 31, 2009. The NMFS affirmed its desire to resolve the impasse without further elevation under the terms of the MOA and provided detailed comments on the proposed permit conditions, including a recommendation for FIND to identify annually all dredging actions performed under the RGP with a map or station numbers defining where dredging occurred and a summary of all seagrass surveys conducted.
- September 1, 2010. The Jacksonville District provided the NMFS with an updated version of RGP SAJ-93.
- September 22, 2010. The NMFS acknowledged the updated version of RGP SAJ-93 reflected many changes NMFS requested, including conditions 2 through 11 and 14. However, the NMFS disagreed with the District's decision to require a buffer of only 100 feet between seagrass and dredging areas (NMFS had recommended 500 feet due to the mobility of fine material and the susceptibility of seagrass to sedimentation). The NMFS also restated its earlier request for RGP SAJ-93 to require FIND to identify annually all dredging actions performed under the RGP with a map or station numbers defining where dredging occurred and a summary of all seagrass surveys conducted. Lastly, the NMFS agreed with the Jacksonville District that sufficient progress had been made revising RGP SAJ-93 to withdraw the MOA elevation and that the remaining issues could be resolved under standard Magnuson-Stevens Act procedures.
- February 16, 2011. The Jacksonville District issued RGP SAJ-93 for a period of five years. The permit did not include the conditions described above regarding annual reporting and providing surveys to the NMFS.
- April 20, 2015. The Jacksonville District provided the NMFS with information on four dredging events authorized under the RGP SAJ-93 (Table 1). In November 2013, a FIND consultant provided as-built drawings to the NMFS for a fifth dredging event.

Table 1: Summary of dredging events authorized by RGP SAJ-93.

Reach/Cut	*Location*	*FIND Survey*	*NMFS Verification*[1]
Lake Worth	Palm Beach County	Not provided	Seagrass within 85 feet of the south terminus of the dredging in the northern reach
Parker Bridge Cut	Palm Beach County	Provided	No issues with verification
OWW R1-1, R1-2, R1-3, RC-1, and RC-2	Lake Okeechobee	Not needed for the reaches within the lake	Application indicates a reconnaissance survey was performed but does not describe efforts to look for seagrass
SL-3N	St Lucie County	Not provided	No seagrass within 300 feet of the dredging
V-22 to V-28	Volusia County	Post dredging survey provided	No seagrass within 1,500 feet of the dredging

EFH in the Project Area

The EFH summary the NMFS provided in the letter dated November 23, 2005, does not require augmenting for the proposed re-issuance of RGP SAJ-93 and is incorporated here by reference.

[1] Data from the Florida Wildlife Research Institute at *ocean.floridamarine.org/mrgis/Description_Layers_Marine.htm*.

Changes the Jacksonville District Proposes to RGP SAJ-93

The special permit conditions proposed for the re-issuance of RGP SAJ-93 are similar to those in the current RGP. The more significant differences are discussed below.

Special condition 9 now would authorize impacts to seagrass at locations were seagrass impacts have been successfully mitigated since 2002; under the 2011 RGP, no impacts to seagrass are allowed (i.e., an individual permit would be necessary). The NMFS agrees with this decision and has maintained since enactment of the EFH provisions of the Magnuson-Stevens Act that FIND need only mitigate for its impacts once provided the mitigation has met the performance standards established by the Jacksonville District. To ensure efficient operation of this permit condition, the NMFS requests notification each time this permit condition is applied and for the notifications to include information precisely defining dredge locations and documenting the mitigation has met the performance standards established.

Special condition 10 describes the required buffer distances between dredging activities and seagrass habitat and the requirement to survey the buffer area in the pre-dredging seagrass surveys. The 2011 version of RGP SAJ-93 required this buffer distance to be 100 feet and the current version reduces the buffer distance to 25 feet. Further, the condition states the pre-dredging survey may be limited to the federal channel and its side slopes and surveying for seagrass outside the side slopes is not required unless seagrass occurs within 25 feet of the dredging footprint or indirect effects are anticipated. The District also eliminated portions of the condition that recommend seagrass survey methods and time of year for surveying. The public notice provides no explanation for these changes.

Impacts to seagrass from dredging result from removal, burial, turbidity, and sedimentation (Erftemeijer and Lewis 2006). The purpose of a buffer is to protect nearby seagrass habitat from these disturbances. Several studies document deterioration of seagrass habitats due to excessive sedimentation. Sedimentation from dredging and natural sedimentation can differ in timing, duration, and intensity creating unusual, detrimental conditions (Clarke and Wilber 2000, Erftemeijer and Lewis 2006). The effects of sediment burial on seagrass is species specific and size-specific. Cabaca et al. (2008) show *Halophila* species (i.e., small seagrasses) can exhibit 50 percent shoot mortality with 2.0 centimeters of burial whereas *Syringodium filiforme* and *Thalassia testudinum* (large seagrasses) exhibit 50 percent shoot mortality with 4.5 and 5.0 centimeters of burial respectively. Assessing the effects of sedimentation on seagrass also requires knowledge of the temporal and spatial dynamics of the sediment plume to allow examination of exposure durations, and the public notice does not provide this level of detail.

If one focused only on removal of seagrass by a dredge, it may be reasonable to have buffers less than 100 feet and still be protective of this important fishery habitat. However, the sufficiency of a smaller buffer is questionable under a broader focus that includes burial, turbidity, and sedimentation, especially given the variability between dredging operations (Erftemeijer and Lewis 2006), which includes differences in dredging durations, sediment characteristics, and experience of dredge captains. Accordingly, the NMFS does not recommend reducing the spatial scope of the pre-project and post-project seagrass surveys needed to gauge the extent of turbidity and sedimentation impacts near dredging operations.

Special condition 11 has been modified from stating indirect impacts to seagrass and wetlands are prohibited to stating indirect impacts to coral and hardbottom habitat are prohibited. While the NMFS supports the decision to expressly prohibit impacts to hardbottom and corals, NMFS requests this condition still list seagrass and wetlands.

Special condition 12 has been modified to no longer require a pre-construction survey because this requirement is now in special condition 10, however, the requirement for a post-dredging survey is still in special condition 12. The NMFS recommends the new RGP SAJ-93 retain the language in the existing RGP on methods, reporting requirements, and time-of-year for the surveys:

> *The survey will clearly identify the limits of all SAV [submerged aquatic vegetation] beds in their entirety, and they will be illustrated on the engineering construction plans (plan view and cross sections). In addition, the size, species identified, estimate of percent coverage, and estimate of percent species abundance shall be provided. The pre-dredging survey shall be conducted prior to each dredging event/cycle and during the period June 1 through September 30. All surveys within the range of Johnson's Seagrass shall fully adhere to the attached Guidelines for Surveying Johnson's Seagrass as provided in the Johnson's Seagrass Recovery Plan and as developed by the Johnson's Seagrass Recovery Team. The most current acceptable survey methodology approved by the Corps and the NMFS will be used.*

EFH Conservation Recommendations

The NMFS concludes the proposed reissuance of RGP SAJ-93 would adversely impact EFH by impacting seagrass habitat, designated a Habitat Area of Particular Concern by the South Atlantic Fishery Management Council, with sedimentation and turbidity. Section 305(B)(4)(A) of the Magnuson-Stevens Act requires NMFS to provide EFH Conservation Recommendations for any federal action or permit which may result in adverse impacts to EFH. Therefore, NMFS recommends the following to ensure the conservation of EFH and associated fishery resources:

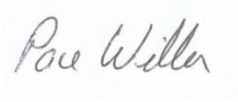
1. When impacts to previously mitigated seagrass would occur, the RGP SAJ-93 require FIND to provide the NMFS with information precisely defining dredge locations, projected volumes, and construction schedule and documenting the seagrass mitigation has met performance standards established by the Jacksonville District.
2. RGP SAJ-93 require FIND to conduct pre-dredging and post-dredging surveys with a buffer distance of no less than 100 feet from dredging locations to allow verification that no indirect impacts to seagrass are occurring from the dredging.
3. RGP SAJ-93 require a buffer of no less than 100 feet between dredging and seagrass habitats.
4. RGP SAJ-93 include a special condition requiring compensatory mitigation in the case that indirect impacts are documented through comparison of post-dredging surveys and pre-dredging surveys.
5. RGP SAJ-93 stipulate the methods, reporting requirements, and time of year for the seagrass surveys. The language included in special condition 10 of the existing RGP (quoted above) is sufficient.
6. RGP SAJ-93 require FIND to annually provide a list of all dredging actions performed under the RGP. The NMFS requests the list include a map or station numbers defining

actual areas where dredging occurred and a summary of seagrass surveys conducted. NMFS requests the surveys be sent to nmfs.ser.monitoringreportshc@noaa.gov.

Section 305(b)(4)(B) of the Magnuson-Stevens Act and implementing regulation at 50 CFR Section 600.920(k) require the Jacksonville District to provide a written response to this letter within 30 days of its receipt. If it is not possible to provide a substantive response within 30 days, in accordance with the "findings" with the Jacksonville District, an interim response should be provided to the NMFS. A detailed response then must be provided prior to final approval of the action. The detailed response must include a description of measures proposed by the Jacksonville District to avoid, mitigate, or offset the adverse impacts of the activity. If the response is inconsistent with the EFH conservation recommendations, the Jacksonville District must provide a substantive discussion justifying the reasons for not following the recommendations.

The NMFS appreciates the opportunity to provide these comments. Please direct related questions to the attention of Ms. Jocelyn Karazsia at our Palm Beach Office, 400 N Congress Ave, Suite 110, West Palm Beach, Florida 33401, at 561-249-1925, or at Jocelyn.Karazsia@noaa.gov.

Sincerely,



/ for

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

cc: COE, Susan.R.Kaynor@usace.army.mil
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