Indian River County Purchasing Division
purchasing@ircgov.com

ADDENDUM NO. 1

Issue Date: November 2, 2020

Project Name: Sector 3 Beach & Dune Restoration Project

Bid Number: 2021012

Bid Opening Date: **November 13, 2020**

This addendum is being released to provide minutes and attendance for the prebid meeting. The information and documents contained in this addendum are hereby incorporated in the invitation to bid. **This addendum must be acknowledged where indicated on the bid form, or the bid will be declared non-responsive.**

Attachments:
Pre-bid Minutes
Sign In Sheets
USACE Permit SAJ-2007-01645
Summer Survey Data (attached separately as a Word Document)

Indian River Board of County Commissioners

1801 27th Street
Vero Beach, Florida 32960-3365

PRE-BID MEETING MINUTES
OCTOBER 29, 2020, 2:00 PM
INDIAN RIVER COUNTY ADMINISTRATION BUILDING
Room A1-303 Building A (Public Works)
SECTOR 3 BEACH AND DUNE RESTORATION PROJECT (*Phase 1*)
Project No. IRC-1925

This meeting will be recorded as part of the project records.

Project Name:	SECTOR 3 BEACH AND DUNE RESTORATION PROJECT (Phase 1)
Project Number:	IRC-1925
Bid Number:	2021012

INTRODUCTIONS / SIGN IN SHEET

Eric Charest started the meeting at 2:00 with an introduction of the project and a request for all in person attendees to sign in the attendance sheet, and for those attendees calling in to send a follow-up e-mail to coastal@ircgov.com with the name, affiliation and contact number so as to be recognized as attending the non-mandatory pre-bid.

This is a Pre-Bid Meeting: Attendance at this conference by all bidders is NOT MANDATORY. Everyone present during any part of the meeting please sign in. For those calling into this meeting please email your name, company, and phone number to coastal@ircgov.com.

PROJECT DESCRIPTION

Phase 1 of the project entails a re-nourishment of approx. 3.7 miles of the northern section of the County's Sector 3 Beach and Dune Restoration Project via placement of about 307,000 cubic yards of beach-compatible sand fill and about 200,700 native dune plants. Construction shall occur between R-Monuments R-20 and R-40. The length of the original project has been reduced into what is referred to as Phase 1. Sand fill is proposed to be obtained from either (a) the County's Offshore Borrow Area, or (b) an upland sand source pre-qualified by the County, and/or (c) an upland sand source separately approved by Florida Department of Environment Protection. To avoid adverse impacts to nesting sea turtles, construction is expected to be completed during the period from January 4, 2021 and April 30, 2021.

CONTRAT DETAILS

Bid Opening:	Friday, November 13, 2020 at 2:00 PM
Contract time:	116 days to substantial completion
	130 days to final completion

NOTE: All on-beach construction activities including sand placement and shaping shall be completed no later than April 30, 2021 due to permit requirements, the completion of all sand placement and shaping activities is necessary in order to achieve substantial completion of the project.

Liquidated Damages: $4,344 per day

Force Account:

- The Force Account line item is not to be bid upon and that the value is provided by the County. It is to be calculated in the final dollar amount for the bid using the provided value. The Force Account line item is intended for use by the County as a contingency fund for when unforeseen work or differing field conditions require a work change directive, or field work order, to be issued.

CONTACT BIDDING PROCESS

All communication concerning this bid shall be directed to Indian River County Purchasing Division at purchasing@ircgov.com.

PROJECT CONSULTANTS

APTIM Environmental & Infrastructure, Inc.
Nicole Sharp, P.E.

PERMITS

All permitting for the project has been completed by the County. The permits include:
Department of the Army Permit: SAJ-2007-01645

Nicole Sharp indicated that the USACOE Permit would be provided through an addendum to the bid packet as it was not available prior to bid announcement.

Florida Department of the Environmental Protection: 0285993-009-JC
FDEP Permit Modifications - TBD

PROJECT OVERVIEW DISCUSSION

- Review and comment with questions and clarification as soon as possible, no further comments 10 days prior to bid opening (Friday, November 13, 2020).
- Anticipated Bid Award in December.
- The Notice to Proceed tentative issuance is TDB
- Project must commence within 14 days of Notice to Proceed
- Contractor will need to comply with conditions and requirements of ALL permits.
- Work hours – IRC work hours are from 7 AM to 5 PM. Night time operations, work on weekend or holidays will need approval from IRC.

- If a Dredging operation is selected, it may necessitate 24 hours/day and 7days/week operations. Due to these types of operations some limitations may apply.

  Eric Charest expanded upon some of the restrictions that would still apply under a 24 hour a day, 7 day a week dredge project such as providing a project schedule to the County at the pre-construction conference for approval and coordination for compliance with local noise ordinances.

- Beach fill material – must come from a permitted source.

  Nicole Sharp stated that if a contractor chooses to use other non-permitted sand source, that they would be responsible for all costs associated with its permitting and use.

- Non-compliant fill material placed on beach must be removed at Contractor expense
- Driveway, business and road access shall be maintained at all times
- The Contractor will only be permitted to close the beach in the area where sand placement work is being immediately performed or where equipment is operating/staging. Contractor shall be required to phase their work in such a manner to minimize impacts to local businesses and residents and maintain existing beach access. Regular communication between the Contractor, County and Consultant will be necessary to ensure minimal closure times to sections of the beach being restored.
- Contractor shall be responsible for removing any construction related debris by the end of each work day
- Maintenance of Traffic:
  - Contractor shall submit a Maintenance of Traffic Plan to the Indian River County Traffic Division for approval
  - The Maintenance of Traffic Plan shall meet the FDOT index 600, January 2018 Edition and shall be signed and sealed by a Florida P.E.
- Late Season Sea Turtle Nesting and Nest Relocation:
  - Nests laid within the project are as of August 28, 2020 have been relocated to one of two locations (N or S of project area). Relocations will occur until nesting is complete.
  - Late Season Nest Monitoring will occur until all nesting is complete. Regular coordination with the County's Marine Turtle Permit Holder is necessary until all nest evaluations are complete.
- The Contractor is required to submit the Daily Reports by noon the following day.

<u>PROJECT TECHNICAL DISCUSSION – Nicole (APTIM)</u>

- Project Construction Schedule
- Project Construction Access and Staging Areas (Map and Plans)

- Project Specifications (Surveys, Outfalls, Buildings, Limit of Fill, Daily Report)

  Nicole Sharp noted that the template from the previous Sector 3 project remains the same, but due to Summer 2020 surveys being incorporated into the plans, that the Toe of Fill is subject to minor revisions which will be issued as an addendum to the Bid. These new surveys were used to determine the quantity of sand required for this R-20 to R-40 project area.
  Additionally, adverse impacts to the nearshore hardbottom due to gross negligence by the Contractor will require that expenses incurred to mitigate that action be borne by the Contractor.

- Project SOW (Bid Items)
- Sediment QA/QC Plan

  Nicole Sharp reiterated the need for bids to contain elements identified in the technical specifications, pointing specifically to all bidders needing to comply with Turbidity monitoring requirements.

PERMIT MODIFICATION (TBD)

- Upland Sand Sources (Sand RFQ)
- Beach Access and Staging Locations (Map and Plans)

QUESTIONS AND COMMENTS

The following responses are based upon questions that were verbally provided during the Pre-bid meeting discussion along with the formal County response to the questions:

Q – What specifically do the colors of the parcels represent on the County's easement map (www.ircgov.com/easements)?
A – The Green color represents easement granted and recorded. The Blue color represents the intent to sign an easement has been recognized and the County is in the process of verifying submitted information and recording where possible. The Yellow color represents no response received from the parcel owner. Red represents denial of easement.

Q – Where the easements are not granted, how does the contractor address that property?
A – The contractor cannot access property landward of the Mean High Water Line or the Erosion Control Line in areas where the County does not have an easement agreement in place. Those parcels will also not receive sand and the contractor will be required to slope the plan profile to the existing conditions at the boundaries of the parcel(s) not receiving sand. Should the successful contractor be a dredge contractor, the Contractor may not place pipe on private property where the County has not received and easement. All work shall be below the MHWL or Erosion Control Line at these locations (ECL is on plan views).

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1801 27th Street
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Q- The bid states that the construction window for substantial completion is from January 4, 2021 through April 30, 2021, but limited for truck haul operations from 7am to 5pm 5 days a week without approval from the County. This is a tight window and can we get an answer now on whether or not work on Saturdays will be allowed, and if so, will the County charge the Contractor for Inspector oversight on the Saturday work?
A - The County will allow for Saturday work for Truck Haul projects. If the Contractor remains on track for project completion by the substantial completion date, the fees associated with weekend inspector oversight will be borne by the County. Should the Contractor inefficiently use the 5 day work week and expect to catch up using Saturday work, then the inspector oversight fees will be passed on to the Contractor.

Q- The bid schedule reflects a price for sand delivered and placed being measured in Cubic Yards. As Truck Haul projects are measured in tons, can the bid schedule table be revised to reflect a line item for sand measured in tons?
A - No. The bid schedule remains as it is in the bid. The bidder will be responsible for converting the tonnage to Cubic Yards using information available to them in the technical specifications.

Q – How far beyond the Toe of Fill are surveys required to go?
A – Surveys shall extend a minimum of fifty (50) feet landward of the toe of fill and offshore to at least the -5 ft-NAVD contour. Please refer to TP-5.5 Offshore Borrow Area and TP-4.5 Upland Sand Sources.

Q – Will the County survey the completed areas for payment?
A – No, the Contractor is required to perform surveys for payment. The County may elect to perform additional surveys at the County's expense should discrepancies be discovered.

Q – Will the new information from the Summer Surveys be available electronically?
A - Yes – that information will be available in a bid addendum.

Q – Can the contractor leave equipment out on the beach overnight since we are out of sea turtle nesting season.
A – No. All equipment is to be removed from the beach at the end of each workday.

Q – Is Builders Risk Insurance required for this project?
A – No, Builders Risk Insurance is not required.

Q – What is the Engineer's Estimate of Cost for this project.
A – $12.5 Million.

Q – For the MOT requirements, can the contractor just submit a copy of the FDOT plans and a statement of complying with those plans?

A – Accessing the beach will be performed through County Parks, and no MOT is required for those activities. Accessing the parks is done through FDOT Roadway A1A, and the Contractor is required to meet compliance criteria for access activities in accordance with FDOT requirements.

Pre-bid ended at 14:40.

October 29, 2020

Sector 3 Beach and Dune Restoration Project (Phase 1)

Pre-Bid Meeting

Sign - In Sheet

Name	Company	Contact Info
JOE RUTKOWSKI	MVM, INC	315.271-6216
RAY LUKE	SIBONEY	561-722.0857
GEOFF CORLETT	XGD SYSTEMS	772 286-6822
BILL ENCK	STEWART MATERIALS	772-360-8711
MICK ELLISON	KSM ENGINEERING	772-589-0712
Tommy King	Rio-Bak	561-718-8211
Bernie Eastman	Eastman Aes	561 719-9146
Tim Clay	Phillips + Jordan, Inc.	flestimate@pandj.com 904-545-3309
Nick Stewart	Stewart Materials	772-971-1500
Lauren Lee	SDR	407-433.4655
Beau Tyson	BI Disaster	407-460-0395
Henry Elmore	BI Disaster	407.460.0610
Sean Kemnuir	Eastman	954.328.0808
Quintin Bergman	IRC	x1648
Molly Minopeter	IRC	x1651
ERIC CHAREST	IRC	x1569

October 29, 2020

Sector 3 Beach and Dune Restoration Project (Phase 1)

Pre-Bid Meeting

Sign - In Sheet

Name	Company	Contact Info
Bill Yoder	Ranger Const. Ind.	772-464-6460 bill.yoder@rangerconstruction.com
Nicole Sharp	APTIM	561-361-3150 nicole.sharp@aptim.com

October 29, 2020

Sector 3 Beach and Dune Restoration Project (Phase 1)

Pre-Bid Meeting

Sign - In Sheet

Name	Company	Contact Info
Tom Pierro	Coastal Protection Engineering	tpierro@coastalprotectioneng.com
Annie Otto	CARDNO	annette.otto@cardno.com
Chrissy Hensel	Earth Balance	chensel@earthbalance.com
Stacy Buck	Coastal Protection Engineering	sbuck@coastalprotectioneng.com
Alex Lopez	Ceres Environmental	alejandro.lopez@ceresenv.com
Mark Sirchio	Rio-Bak	mark@rio-bak.com
James Austin	APTIM	james.austin@aptim.com

DEPARTMENT OF THE ARMY
COCOA PERMITS SECTION
400 HIGH POINT DRIVE, SUITE 600
COCOA, FLORIDA 32926

October 9, 2020

CESAJ-RD-NC
North Permits Branch
Cocoa Permits Section
SAJ-2019-00635 (SP-BJC)

Indian River County, Public Works
Attn: Mr. Richard Szpyrka
1801 27th Street, Building A
Vero Beach, Florida 32960

To Whom It May Concern:

The U.S. Army Corps of Engineers (Corps) has completed the review and evaluation of your Department of the Army permit application, number SAJ-2007-01645. Our regulations require that you have an opportunity to review the terms and conditions prior to final signature by the Department of the Army. Enclosed is an unsigned Department of the Army permit instrument (permit).

Please read carefully the Special Conditions beginning on page 2 of the permit. These were developed to apply specifically to your project. Water Quality Certification is also required prior to issuance of a permit. The Corps has received a copy of the State of Florida certification for your project. In accordance with General Condition 5 of the permit, any special conditions of the Water Quality Certification have been attached to the Department of the Army permit.

Instructions for Objecting to Permit Terms and Conditions: This letter contains an initial proffered permit for your proposed project. If you object to certain terms and conditions contained within the permit, you may request that the permit be modified. Enclosed you will find a Notification of Administrative Appeal Options and Process fact sheet and Request for Appeal (RFA) form. If you choose to object to certain terms and conditions of the permit, you must follow the directions provided in Section 1, Part A and submit the completed RFA form to the letterhead address.

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria under 33 CFR Part 331.5, and that it has been received by the District office within 60 days of the date of the RFA. Should you decide to submit an RFA form, it must be received at the letterhead address by **December 8, 2020.**

Instructions for Accepting Terms and Conditions and Finalizing Your Permit: It is not necessary to submit an RFA form to the District office, if you do not object to the decision in this letter. In this case, the permit must be signed by the applicant in the space provided on the signature page of the permit. In the case of corporations, acceptance must be by an officer of that corporation authorized to sign on behalf of the corporation. The party responsible for assuring the work is done in accordance with the permit terms and conditions must sign the permit. Please type or print the name and title of the person signing below the signature and the date signed.

SIGN (PAGE 11) AND RETURN THE SIGNATURE PAGE DIGITALLY OR TO THE LETTERHEAD ADDRESS.

The permit will be signed by the District Engineer or his representative. It is important to note that the permit is not valid until the District Engineer or his representative signs it.

Thank you for your cooperation with our permit program. The Corps' Jacksonville District Regulatory Division is committed to improving service to our customers. We strive to perform our duty in a friendly and timely manner while working to preserve our environment. We invite you to complete our automated Customer Service Survey at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey. Please be aware this Internet address is case sensitive; and, you will need to enter it exactly as it appears above. Your input is appreciated – favorable or otherwise.

If you have any questions concerning this application, you may contact Brandon J. Conroy in writing at the letterhead address, by electronic mail at brandon.j.conroy@usace.army.mil, or by telephone at 321-504-3771 x11.

Sincerely,

For, Shawn H. Zinszer
Chief, Regulatory Division

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Indian River County Public Works		File Number: **SAJ-2007-01645**	Date: December 8, 2020
Attached is:			See Section below
X	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
	APPROVED JURISDICTIONAL DETERMINATION		D
	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/CECW/Pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.

- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision you may contact:	If you have questions regarding the appeal process you may contact:
Project Manager as noted in letter	Jason W. Steele Administrative Appeals Review Officer USACE – South Atlantic Division 60 Forsyth Street SW, Room 10M15 Atlanta, Georgia 30303-8801 (404) 562-5137

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Signature of appellant or agent.	Date:	Telephone number:

DEPARTMENT OF THE ARMY PERMIT

Permittee: Indian River County, Public Works
Attn: Mr. Richard Szpyrka
1801 27th Street, Building A
Vero Beach, Florida 32960

Permit No: SAJ-2007-01645 (SP-BJC)

Issuing Office: U.S. Army Engineer District, Jacksonville

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the U.S. Army Corps of Engineers (Corps) having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: The applicant seeks authorization for a 15-year permit to restore the Sector 3 beach. Approximately 461,700 cubic yards (cy) of in-place material is required to fill the design template based on the July 2018 beach condition. The proposed beach nourishment project includes sand nourishment in the form of a restored dune and a narrow berm feature that intersects the existing beach near the waterline. The proposed beach renourishment project extends along the same shoreline originally permitted, between FDEP reference monuments R-20 and R-55, which includes portions of North Beach, Orchid, Wabasso Beach, Indian River Shores, and unincorporated portions of Indian River County

The work described above is to be completed in accordance with the 32 pages of drawings [and 16 attachments] affixed at the end of this permit instrument.

Project Location: The project would affect waters of the United States associated with the Atlantic Ocean. The project site is located along the shoreline of the Atlantic Ocean beginning at Florida Department of Environmental Protection (FDEP) Range Monument (R) R-20, approximately at Seaview Boulevard, and extending south to R-55 at approximately 640 Ocean Road. The project limits are referred to as Sector 3. The project is located in Sections 1, 3, 6, 10, 14, 15, 23, 25, 26, and 36, Townships 31 and 32 South, Ranges 39 and 40 East, Indian River County, Florida.

Directions to site: From I-95 Southbound, take State Road 60 (20th Street) east approximately 13 miles, to Indian River Boulevard (A1A). Turn left and travel north on Indian River Boulevard for approximately 5.2 miles to southern terminus of Sector 3 (R-

55) located beachside at approximately 640 Ocean Road. For the northern terminus continue north on A1A approximately 6.6 miles until Seaview Boulevard on the east side of A1A.

Approximate Coordinates:
Start: Latitude 27.8115836°
Longitude -80.42233373°

End: Latitude 27.72468001°
Longitude -80.37893356°

Permit Conditions

General Conditions:

1. The time limit for completing the work authorized ends on **October 9, 2035**. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature and the mailing address of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this

permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

1. **Reporting Address:** The Permittee shall submit all reports, notifications, documentation and correspondence required by the general and special conditions of this permit to either (not both) of the following addresses:

   a. For electronic mail (preferred): SAJ-RD-Enforcement@usace.army.mil (not to exceed 15 MB).

   b. For standard mail: U.S. Army Corps of Engineers, Regulatory Division, Enforcement Section, P.O. Box 4970, Jacksonville, FL 32232-0019.

   The Permittee shall reference this permit number, SAJ-2007-01645 (SP-BJC), on all submittals.

2. The attached Specific Conditions of Water Quality Certification/Permit number 0285993-009-JC dated July 17, 2020, issued by the FDEP (Attachments 2-6), are hereby incorporated in this Department of the Army (DA) permit. The Permittee agrees that should the above referenced State permit be modified in any way the Permittee will apply to the Corps for a modification to this permit instrument.

3. **Commencement Notification:** Within 10 days from the date of initiating the authorized work, the Permittee shall provide to the Corps a written notification of the date of commencement of work authorized by this permit.

4. **Fill Material**: The Permittee shall use only clean, beach-compatible fill material for this project. The fill material shall be free from items such as trash, debris, construction materials, and soils contaminated with any toxic substance, in toxic amounts in accordance with Section 307 of the Clean Water Act. All beach fill material utilized shall comply with the FDEP-approved Sediment Quality Control/Quality Assurance Plans (Attachments 3 and 4). Sampling reports required by the plan shall be provided to the Corps Enforcement Section. If the beach fill material placed at the project site does not meet the specifications of

the Sediment Quality Control/Quality Assurance Plan and/or the specifications of the terms and conditions of the FWS Biological Opinion, the Corps and FWS shall be notified immediately and any necessary remediation efforts shall be coordinated with Corps Enforcement Section staff. To the extent the Sediment Quality Control/Quality Assurance Plan conflicts with the terms and conditions of the attached FWS Biological Opinion, the FWS Biological Opinion shall prevail.

5. **South Atlantic Regional Biological Opinion:** The authorized work is approved under the current National Marine Fisheries Service (NMFS) South Atlantic Regional Biological Opinion (SARBO) and its references, which can be viewed on the following website in the folder titled Information: https://www.fisheries.noaa.gov/content/endangered-species-act-section-7-biological-opinions-southeast

   Note – Please use an alternate browser in the event you have trouble opening the above website.

   The Permittee is responsible for obtaining and complying with the SARBO. If the Permittee is unable to view the SARBO at this website, the Permittee shall contact the Corps to receive a copy of the SARBO. The Permittee shall implement all reasonable and prudent measures identified in the SARBO. NMFS has issued the SARBO to the Corps for projects that limit the take of listed turtles, whales, sturgeon, sawfish, and any other species listed in the SARBO. Authorization under this permit is conditional upon compliance with all of the mandatory terms and conditions associated with the SARBO, which terms and conditions are incorporated by reference in this permit. The mandatory terms and conditions include adherence to the Project Design Criteria (PDC) applicable to the authorized project. The applicable PDCs are identified with a check mark in Attachment 7. Failure to comply with the terms and conditions associated with the SARBO, where a take of the listed species occurs, would constitute noncompliance with this permit. Failure to comply with this permit will be the basis for suspension and revocation of this permit and may be the basis for other enforcement action. NMFS has directed that this SARBO issued to the Corps serve as the formal consultation for all projects in the area covered by the SARBO; however, where the terms and conditions of the SARBO differ from the special conditions of this permit, the special conditions of this permit will take precedence as the more stringent condition.

6. **Incidental Take Statement:** This permit does not authorize the Permittee to take an endangered species, in particular sea turtles, sturgeon, whales, or any other endangered species listed in the SARBO. The SARBO includes an

Incidental Take Statement (ITS) issued to the Corps. The Permittee understands and agrees that, even where it is in full compliance with the terms and conditions of the SARBO ITS and this permit, incidental take by the Permittee or other hopper dredging operations within the area covered by the SARBO may result in suspension or modification of this permit by the Corps. The amount of incidental take that will trigger suspension, and the need for any such suspension, shall be determined at the discretion of the Corps. The Permittee understands and agrees on behalf of itself, its agents, contractors, and other representatives, no claim, legal action in equity or for damages, adjustment, or other entitlement against the Corps shall arise as a result of such suspension or related action.

7. **Project timing**: The USACE and/or BOEM will determine project timing and necessary minimization measures to reduce the risk of take of ESA-listed species through the Risk Based Adaptive Management process outlined in Section 2.9.2.2 of the 2020 SARBO and Appendix J. Additional timing requirements apply within the range of certain species, as outlined in the North Atlantic Right Whale Conservation Plan (Appendix F) and sturgeon PDCs (Appendix E).

8. **Dredging Quality Management (DQM):** Dredging and dredged material disposal and monitoring of dredging projects using the Dredging Quality Management (DQM) system shall be implemented for this permit. The Permittee shall ensure that each hopper dredge assigned to the work authorized by this permit is equipped with DQM, previously known as 'Silent Inspector', for hopper dredge monitoring. The Permittee's DQM system must have been certified by the DQM Support Team within one calendar year prior to the initiation of the dredging/disposal. Questions regarding certification should be addressed to the DQM Support Center at 877-840-8024. Additional information about the DQM System can be found at https://dqm.usace.army.mil/. The Permittee is responsible for insuring that the DQM system is operational throughout the dredging and disposal project and that project data are submitted to the DQM National Support Center in accordance with the specifications provided at the aforementioned website. The data collected by the DQM system shall, upon request, be made available to the Regulatory Division of the U.S. Army Corps of Engineers - Jacksonville District.

9. **Biological Monitoring Plan**: The Permittee shall comply with the attached biological monitoring plan (Attachment 5). The biological monitoring reports shall be submitted to the Corps Enforcement Section within 60 days of survey completion. To the extent the biological monitoring plan conflicts with the terms

and conditions of the FWS Biological Opinion AND/OR the NMFS 2020 SARBO, the FWS and NMFS Biological Opinions shall prevail.

10. **Deflector Device Submittal:** The Permittee shall ensure drawings of the proposed sea turtle deflector device and the completed "Hopper Dredge Deflector Device Checklist" form (Attachment 10) and all required documentation are submitted to the Corps at least 30 days prior to initiating the authorized work to the addresses listed in the **Reporting Special Condition.** No dredging shall be performed by a hopper dredge without the inclusion of an approved, rigid, sea turtle deflector device. The Permittee shall not commence hopper dredging until approval of the sea turtle deflector device has been granted by the Corps. A copy of the approved drawings, calculations, and signed "Hopper Dredge Deflector Device Checklist" form shall be available on the vessel during dredging operations.

11. **Hopper Dredging Pre-Dredging Inspection Submittal**: The Permittee shall submit the completed "Hopper Dredge Pre-Dredge Inspection Checklist" form (Attachment 11) to the Corps, at least 5 days prior to initiating the authorized work. This checklist can be accessed at:

    https://dqm.usace.army.mil/odess/

    Note – Please use a different browser if experiencing trouble opening the above link.

12. **Statewide Programmatic Biological Opinion (SPBO):** The Permittee provided information to the U. S. Fish and Wildlife Service (FWS) during consultation for loggerhead sea turtle, leatherback sea turtle, green sea turtle, hawksbill sea turtle, Kemp's Ridley sea turtle, West Indian manatee, southeastern beach mouse. The Permittee has reviewed the Reasonable and Prudent Measures, Terms and Conditions of the SPBO dated March 13, 2015, and agreed to follow the measures included to minimize impacts to the above-mentioned species. The FWS provided concurrence the maintenance dredging activities and sand placement activities are consistent with the SPBO provide the Permittee follows the term and conditions contained herein (Attachment 12).

13. **Programmatic Piping Plover Biological Opinion (P^{3}BO)**: The Permittee provided information to the U. S. Fish and Wildlife Service (FWS) during consultation for piping plover and red knot. The Permittee has reviewed the Conservation Measures of the P^{3}BO dated May 22, 2013, and agreed to follow the measures included to minimize impacts to the above-mentioned species.

The FWS provided concurrence the maintenance dredging activities and sand placement activities are consistent with the P³BO provide the Permittee follows the term and conditions contained herein (Attachment 13).

14. Manatee Protection: The permittee shall comply with the “Standard Manatee Conditions for In-Water Work – 2011” (attachment 14).

15. Sea Turtle and Smalltooth Sawfish Conditions: The Permittee shall comply with National Marine Fisheries Service's “Sea Turtle and Smalltooth Sawfish Construction Conditions” dated March 23, 2006, (Attachment 15).

16. As-Built Certification: Within 60 days of completion of the work authorized by this permit, the Permittee shall submit as-built drawings of the authorized work and a completed “As-Built Certification By Professional Engineer” form (Attachment 16) to the Corps. The as-built drawings shall be signed and sealed by a registered professional engineer and include the following:

a. A plan view drawing of the location of the authorized work footprint, as shown on the permit drawings, with transparent overlay of the work as constructed in the same scale as the permit drawings on 8½-inch by 11-inch sheets. The plan view drawing should show all "earth disturbance," including wetland impacts and water management structures.

b. A list of any deviations between the work authorized by this permit and the work as constructed. In the event that the completed work deviates, in any manner, from the authorized work, describe on the attached “As-Built Certification By Professional Engineer” form the deviations between the work authorized by this permit and the work as constructed. Clearly indicate on the as-built drawings any deviations that have been listed. Please note that the depiction and/or description of any deviations on the drawings and/or “As-Built Certification By Professional Engineer” form does not constitute approval of any deviations by the Corps.

c. Include the Department of the Army permit number on all sheets submitted.

d. Include pre- and post-construction aerial photographs of the project site if available

17. Cultural Resources/Historic Properties:

a. No structure or work shall adversely affect impact or disturb properties listed in the *National Register of Historic Places* (NRHP) or those eligible for inclusion in the NRHP.

b. If during the ground disturbing activities and construction work within the permit area, there are archaeological/cultural materials encountered which were not the subject of a previous cultural resources assessment survey (and which shall include, but not be limited to: pottery, modified shell, flora, fauna, human remains, ceramics, stone tools or metal implements, dugout canoes, evidence of structures or any other physical remains that could be associated with Native American cultures or early colonial or American settlement), the Permittee shall immediately stop all work and ground-disturbing activities within a 100-meter diameter of the discovery and notify the Corps within the same business day (8 hours). The Corps shall then notify the Florida State Historic Preservation Officer (SHPO) and the appropriate Tribal Historic Preservation Officer(s) (THPO(s)) to assess the significance of the discovery and devise appropriate actions.

c. Additional cultural resources assessments may be required of the permit area in the case of unanticipated discoveries as referenced in accordance with the above Special Condition ; and if deemed necessary by the SHPO, THPO(s), or Corps, in accordance with 36 CFR 800 or 33 CFR 325, Appendix C (5). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume on non-federal lands without written authorization from the SHPO for finds under his or her jurisdiction, and from the Corps.

d. In the unlikely event that unmarked human remains are identified on non-federal lands, they will be treated in accordance with Section 872.05 Florida Statutes. All work and ground disturbing activities within a 100-meter diameter of the unmarked human remains shall immediately cease and the Permittee shall immediately notify the medical examiner, Corps, and State Archeologist within the same business day (8-hours). The Corps shall then notify the appropriate SHPO and THPO(s). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume without written authorization from the State Archeologist and from the Corps.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

(X) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403)

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344)

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413)

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, State, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal projects.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision: This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (see 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions: General Condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

______________________________________ ____________________
(PERMITTEE) (DATE)

____
(PERMITTEE NAME-PRINTED)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

______________________________________ ____________________
(DISTRICT ENGINEER) (DATE)
Andrew D. Kelly Jr.
Colonel, U.S. Army
District Commander

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

______________________________________ ____________________
(TRANSFEREE-SIGNATURE) (DATE)

____
(NAME-PRINTED)

____
(ADDRESS)

____
(CITY, STATE, AND ZIP CODE)

Attachments to Department of the Army Permit Number SAJ-2007-01645

1. PERMIT DRAWINGS: 32 pages, dated February, March, April 2019, and February 2020.

2. WATER QUALITY CERTIFICATION: Specific Conditions of the permit/certification in accordance with General Condition number 5 on page 2 of this DA permit.

3. Upland Sediment QA/QC Plan

4. Offshore Sediment QA/QC Plan

5. Biological Monitoring Plan

6. Physical Monitoring Plan

7. SARBO PDC Checklist

8. SARBO Pre/Post Construction Reporting Form

9. SARBO ESA Take Reporting Form

10. Hopper Dredge Deflector Device Checklist

11. Hopper Dredge Pre-Dredge Inspection Checklist

12. USFWS Biological Opinion – SPBO. 193 pages

13. USFWS Biological Opinion – P3BO. 64 pages

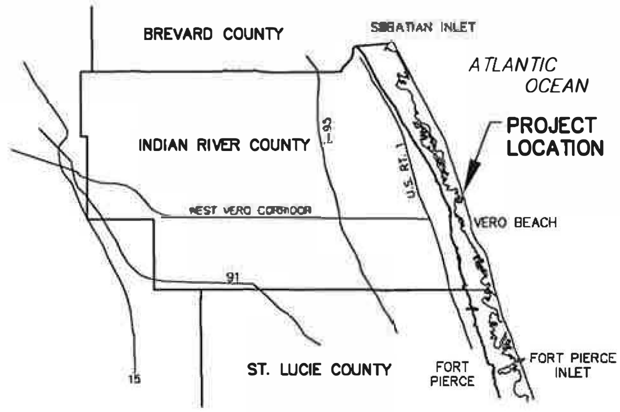
14. Standard Manatee Conditions for In-Water Work - 2011: 2 pages

15. Sea Turtle and Smalltooth Sawfish Construction Conditions – 2006 :1 page

16. As-Built Certification Form: 2 pages

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
INDIAN RIVER COUNTY, FL

SAJ-2007-01645
Attachment 6

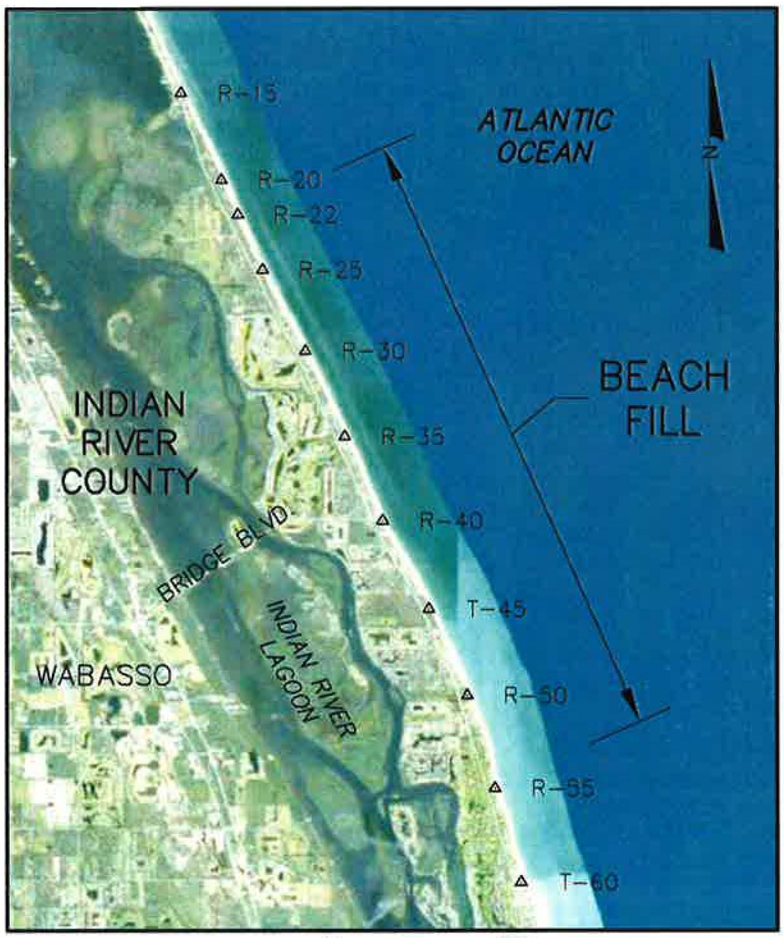


N.T.S.

INDEX TO SHEETS

PROJECT AREA

SECTION: 31S–3, 10, 14, 15, 23, 25, 26, 36, 32S–1, 6
TOWNSHIP: 31S, 32S
RANGE: 39E/40E
NORTHERN LIMIT: 27°48.70'N / 80°25.33'W
SOUTHERN LIMIT: 27°43.48'N / 80°22.73'W



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GRAPHIC SCALE IN FT

JORDON P. CHEIFET
LICENSE
No. 72876
STATE OF FLORIDA
PROFESSIONAL ENGINEER

NOT FOR CONSTRUCTION
FOR REGULATORY REVIEW ONLY

JORDON P. CHEIFET, P.E. No. 72876

2/27/19
DATE

REVISIONS		
DATE	BY	DESCRIPTION

INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT
COVER SHEET

Aptim Environmental & Infrastructure, LLC
2481 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
www.aptim.com
PH. (561) 391-8102
FAX (561) 391-9116
C.O.A. FL. #4028

DATE: 2/27/19
BY: GK
COMM NO.: 631235714
SHEET: 1 of 29

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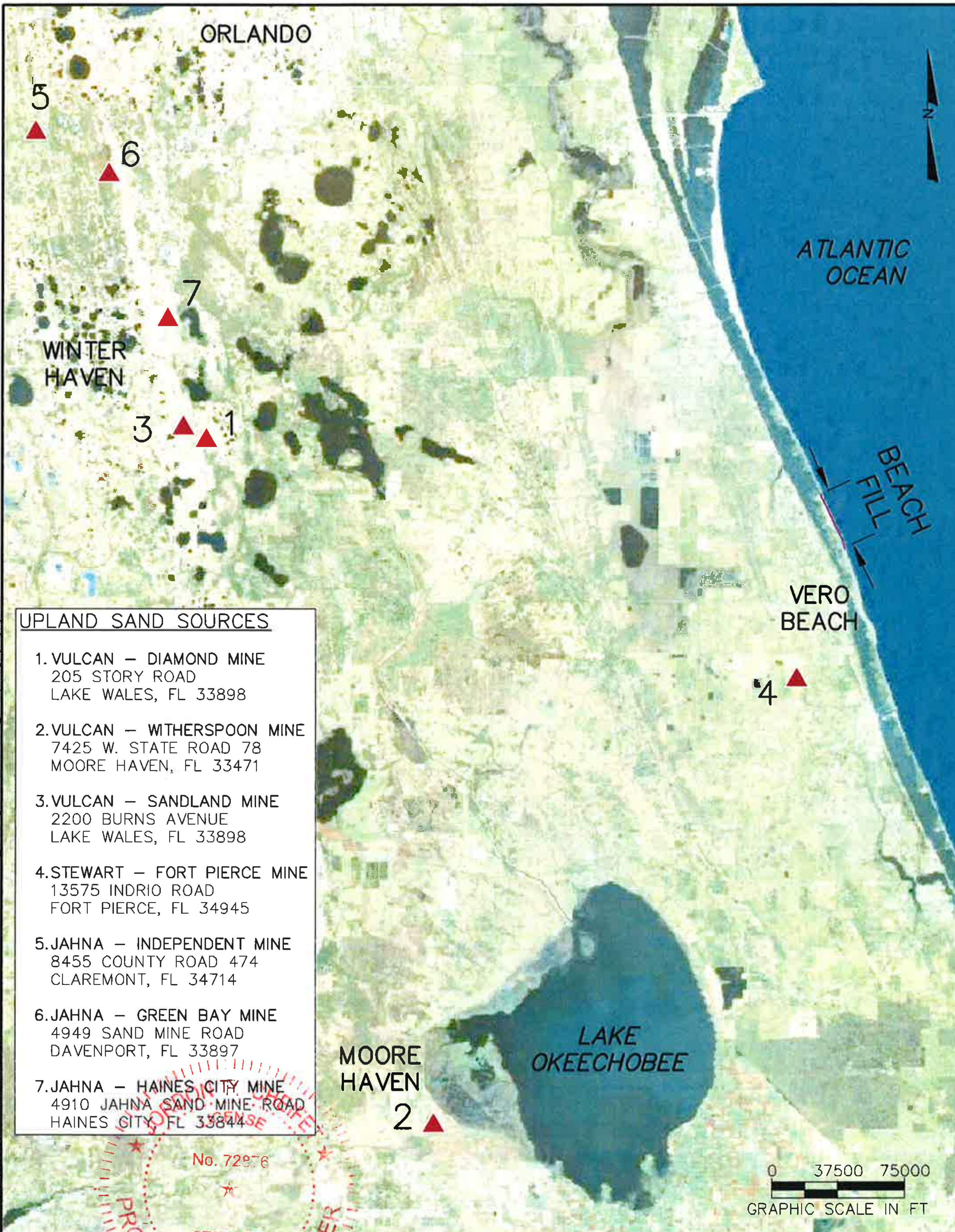

INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT
PROJECT OVERVIEW

Aptim Environmental & Infrastructure, LLC
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DATE: 2/27/19
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SHEET: 2 of 29

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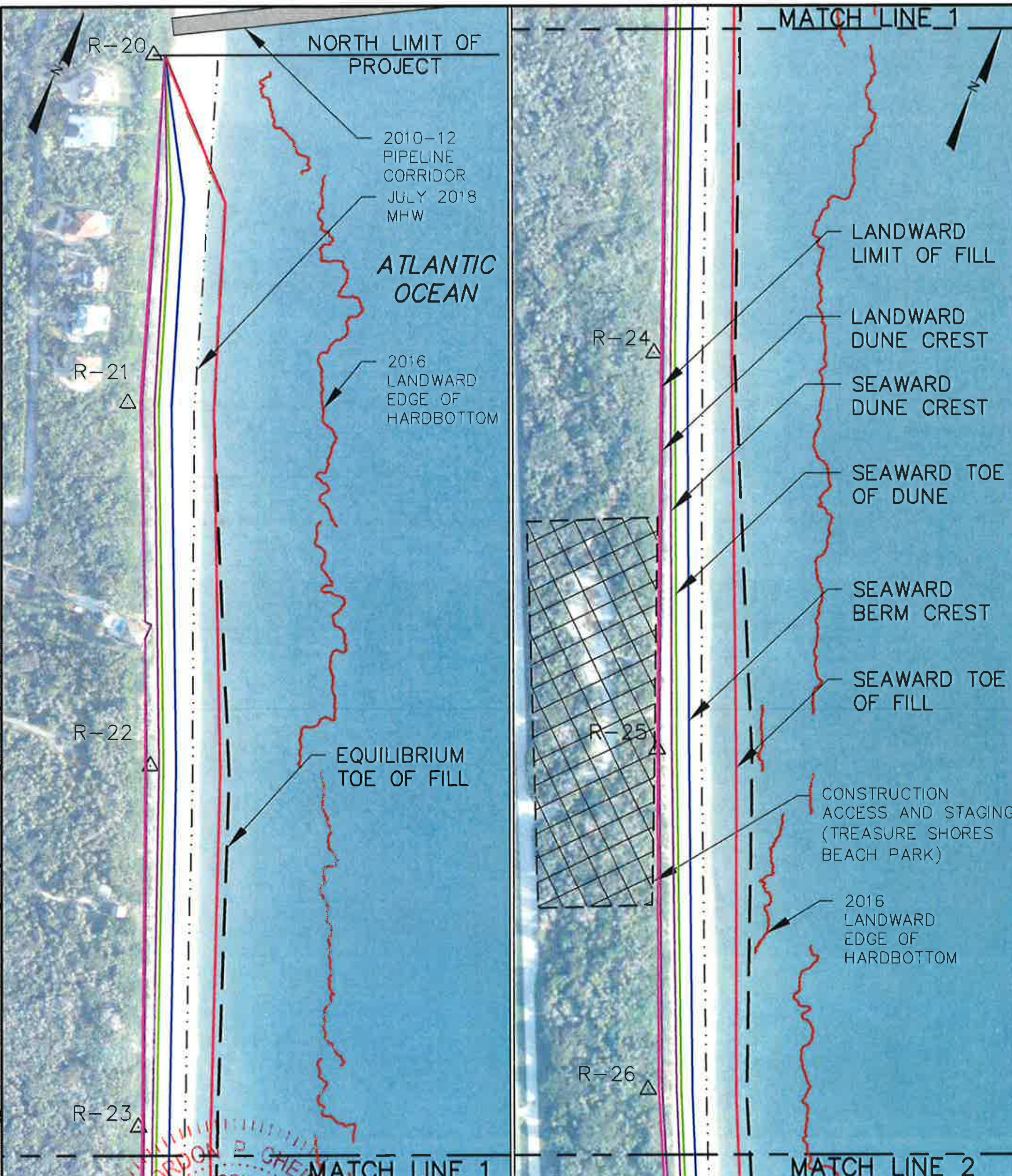

NOTES:

1. AERIAL PHOTOGRAPHY JULY 28, 2017.
2. LANDWARD EDGE OF HARDBOTTOM DELINEATED BY CSA OCEAN SCIENCES, INC. DATED JULY 2016.
3. COORDINATES ARE IN FEET REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).

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INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT
PLAN VIEW

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SHEET: 3 of 29

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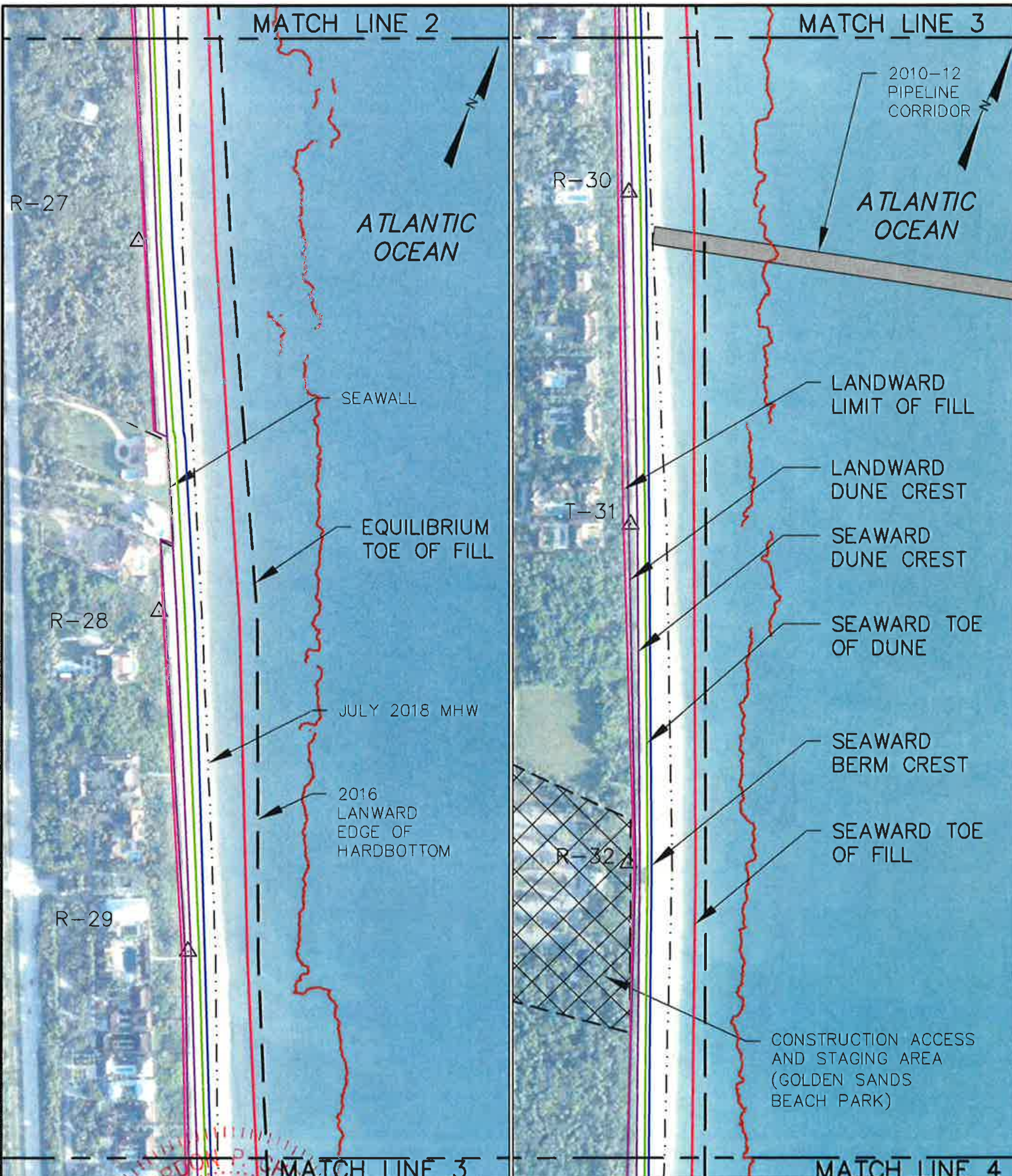

INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT
PLAN VIEW

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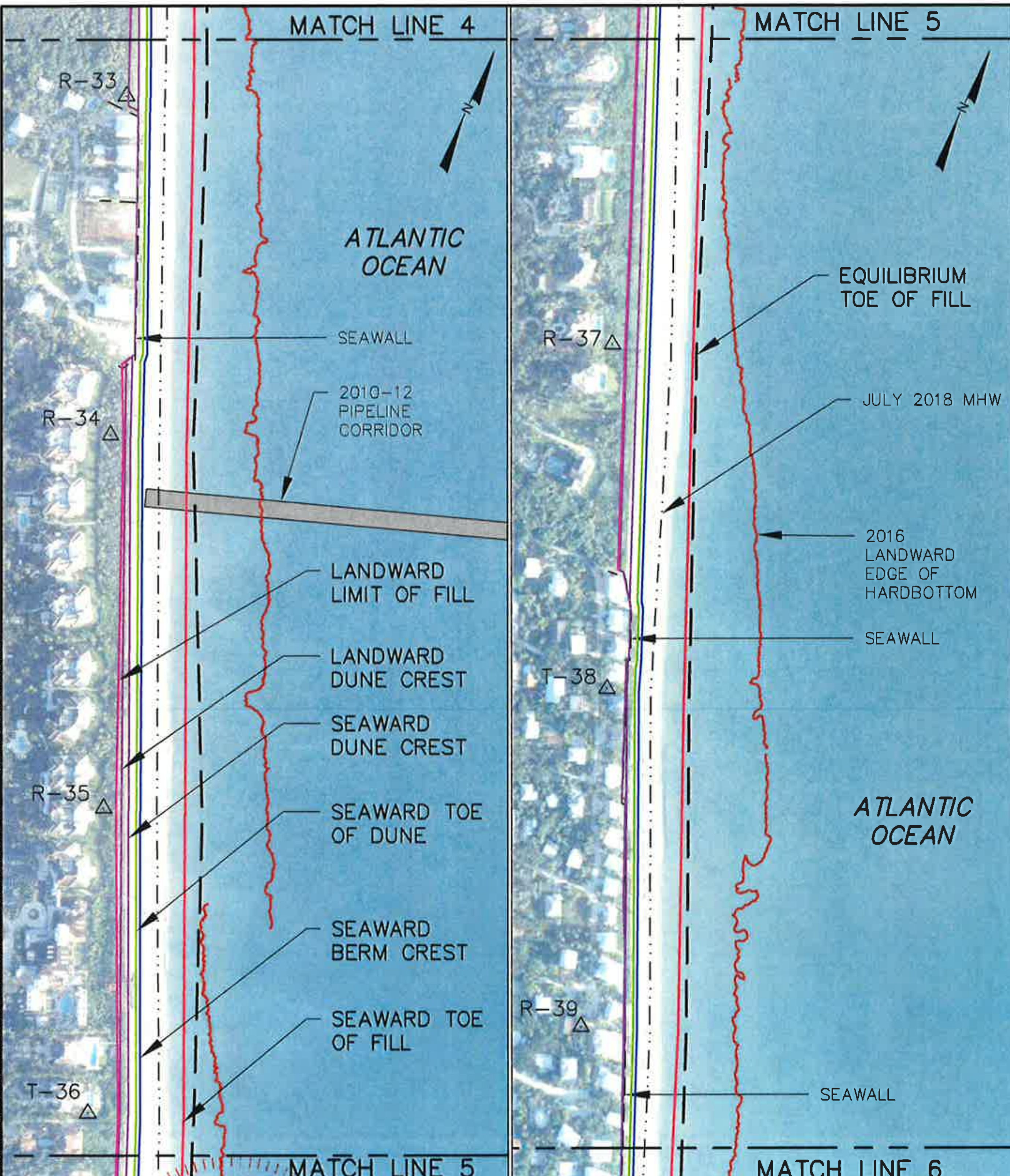

INDIAN RIVER COUNTY, FL
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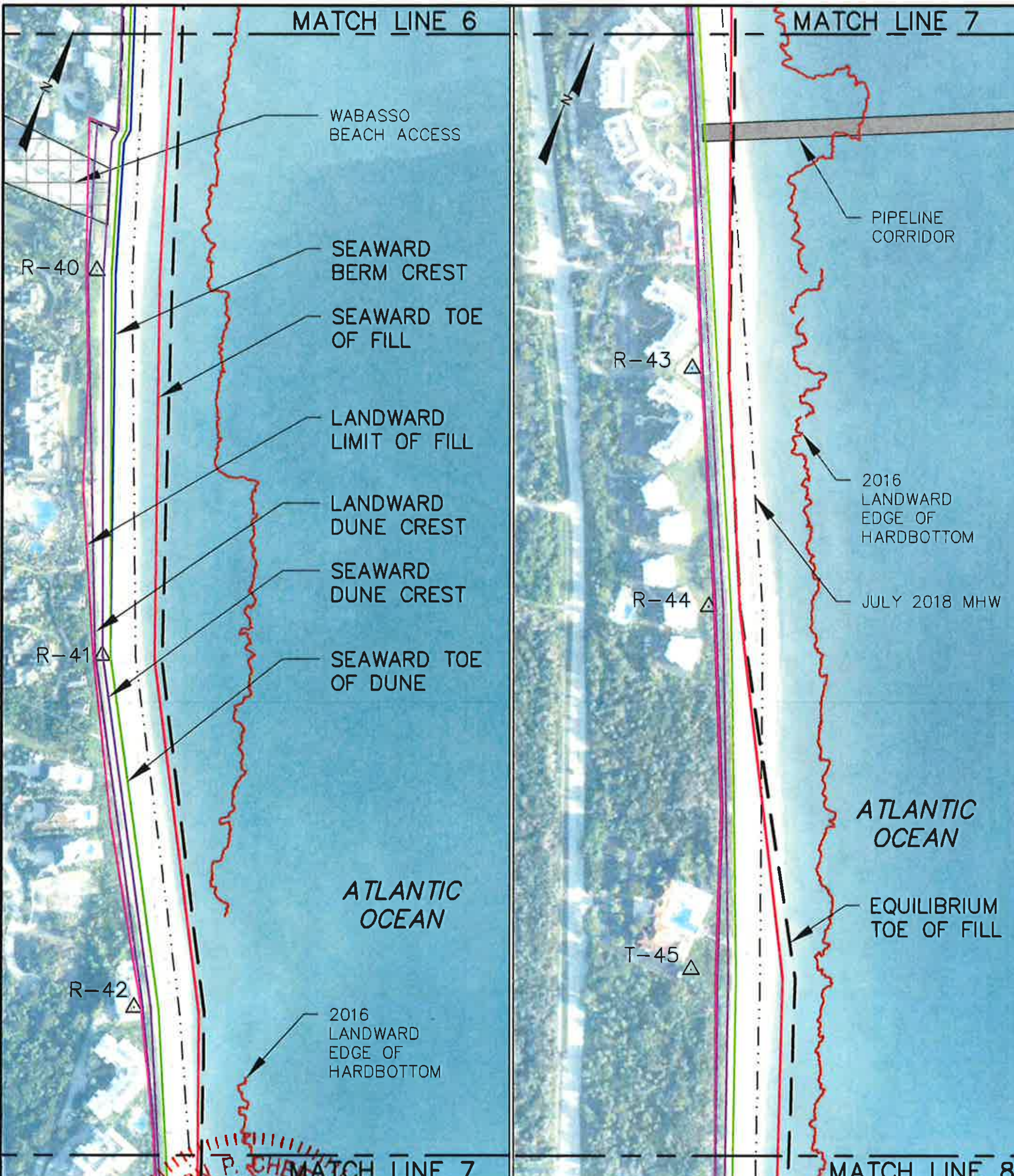

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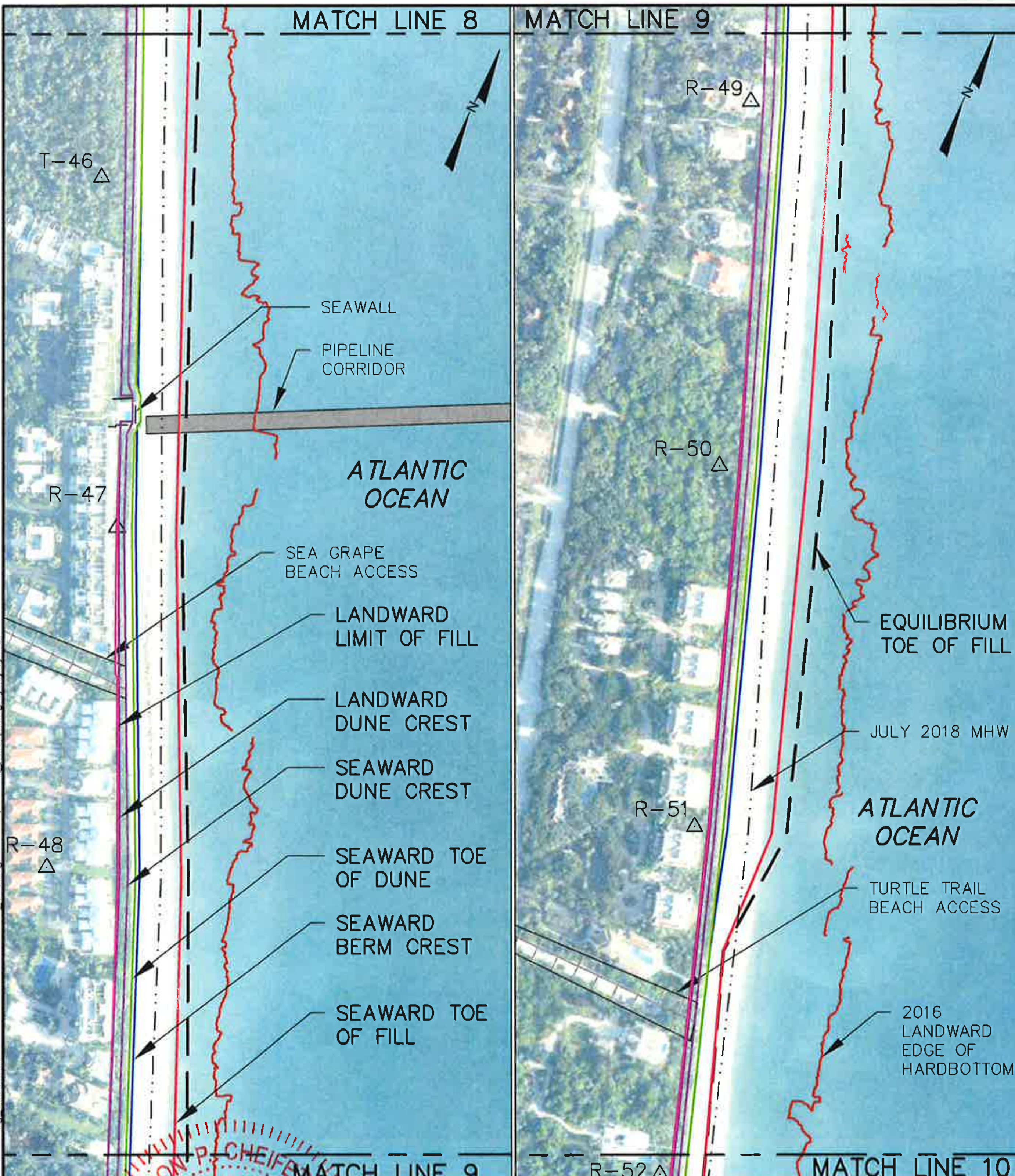

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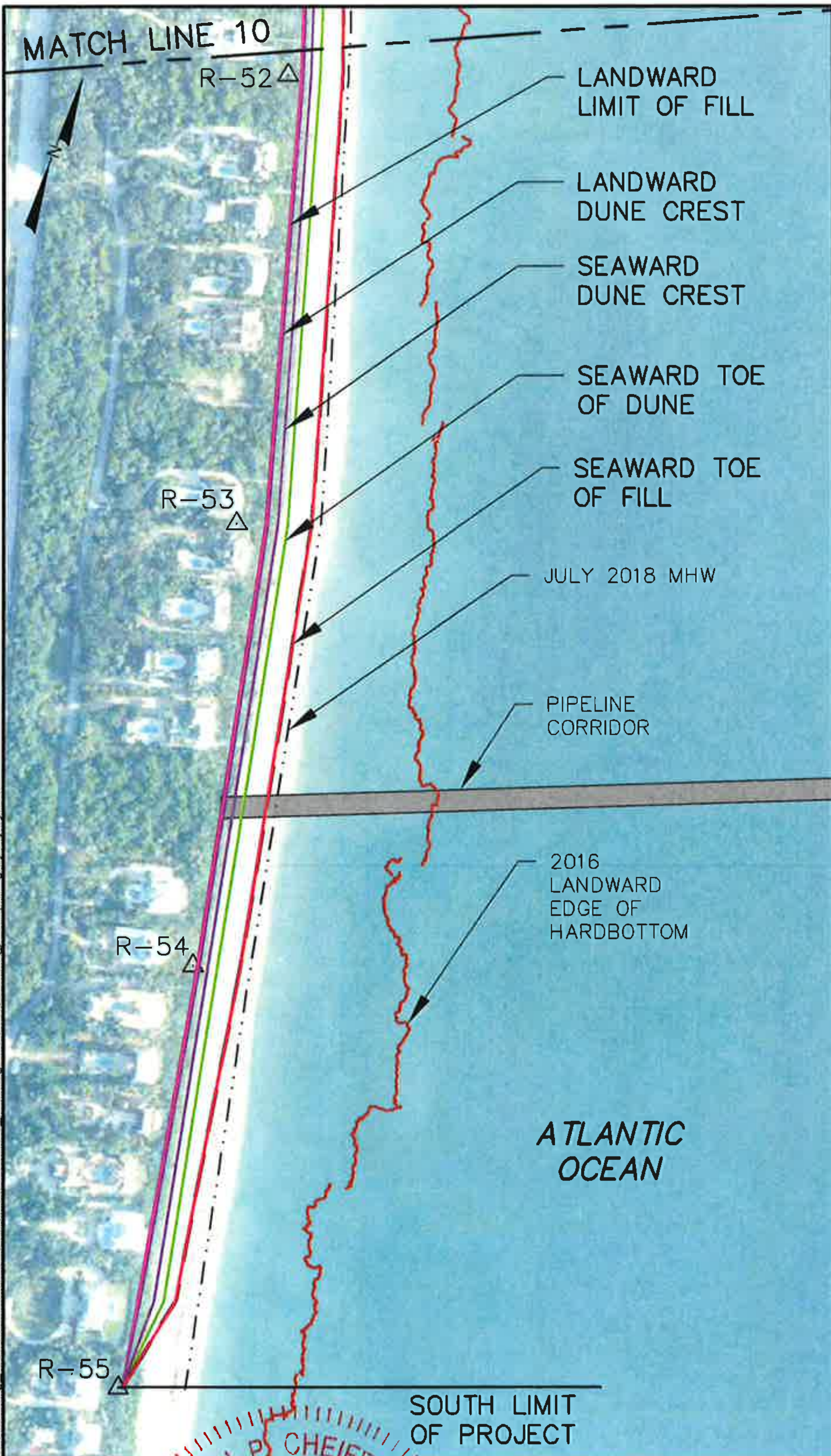

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COMM NO.: 631235714

SHEET: 8 of 29

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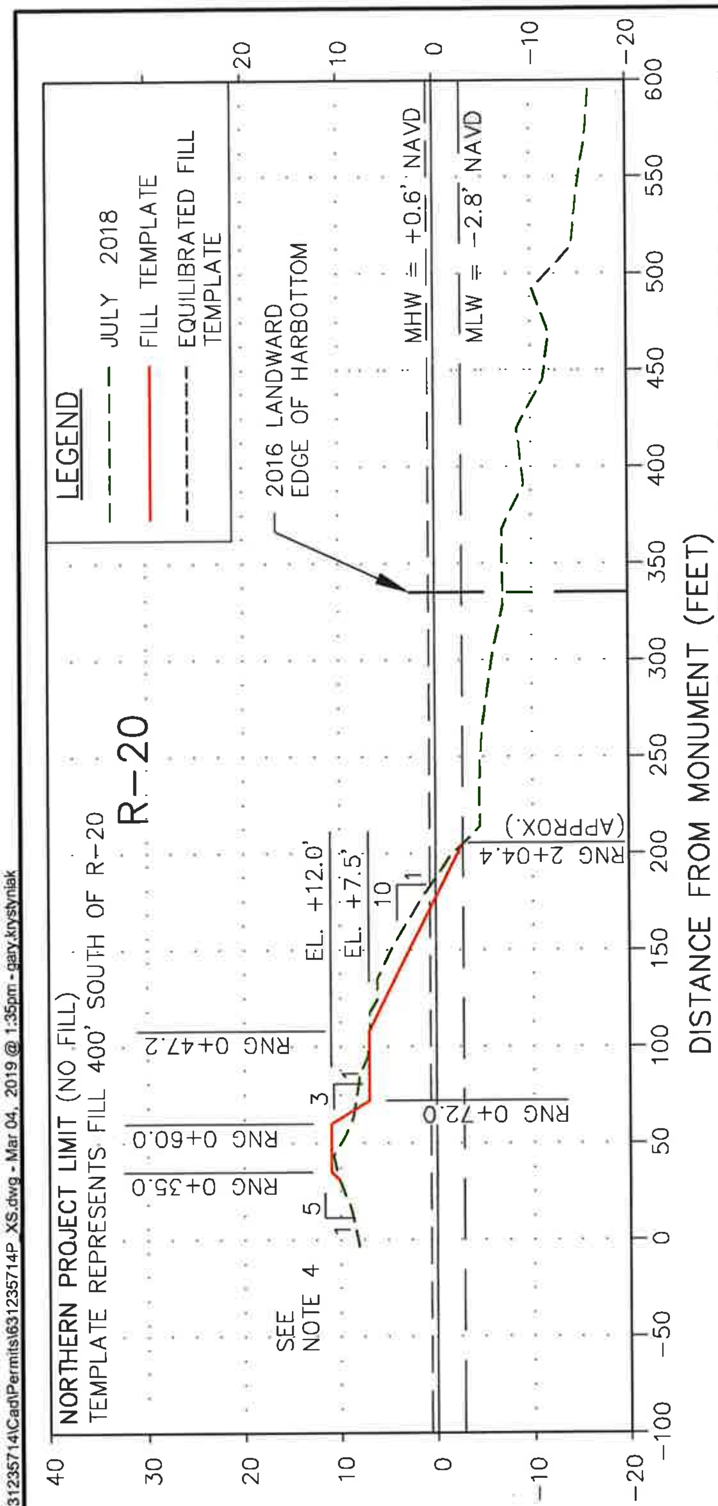

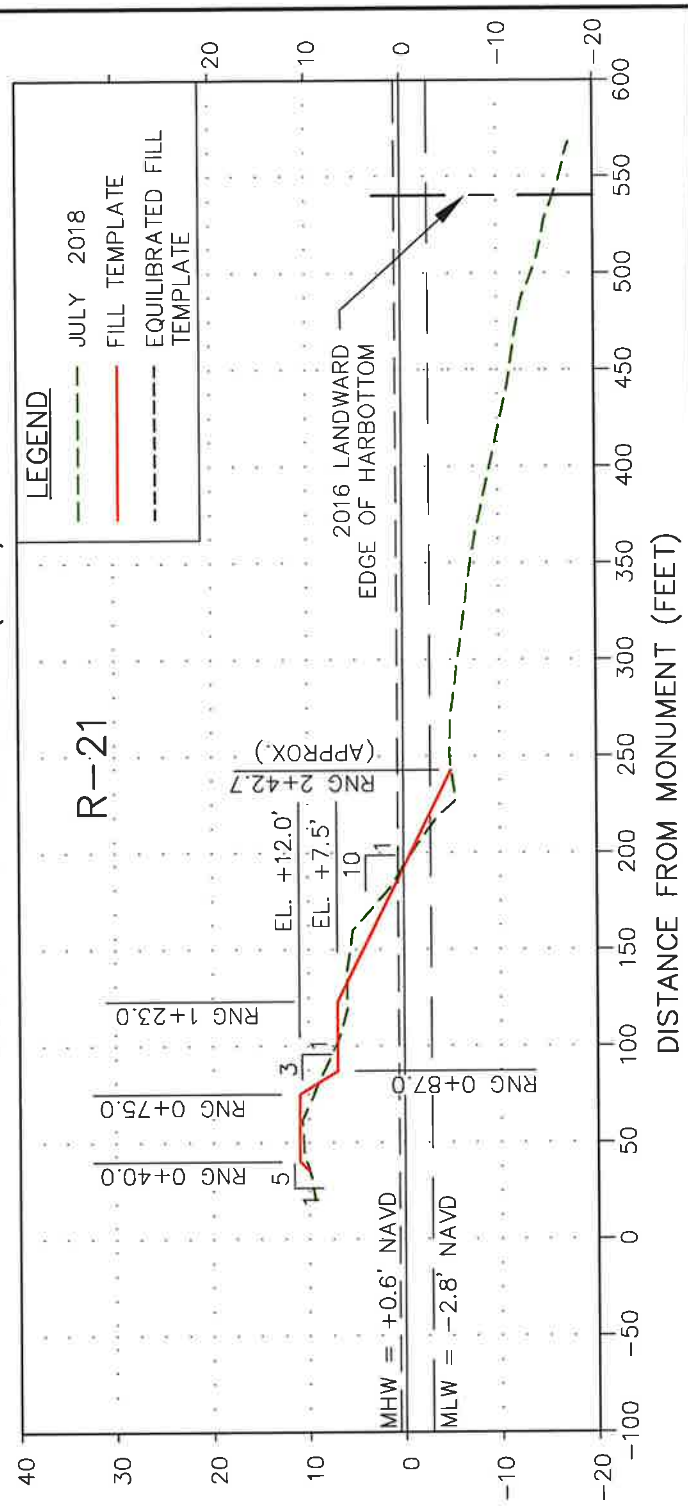

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1. ELEVATIONS ARE IN FEET REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD).
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3. CONSTRUCTED LANDWARD DUNE CREST INTERSECTION WITH EXISTING GRADE TO BE FIELD DETERMINED. IF NECESSARY, SLOPE DOWN NO STEEPER THAN 1V:5H.

NOT FOR CONSTRUCTION
FOR REGULATORY REVIEW ONLY

JORDON P. CHEIFET, P.E. No. 72876

2/27/19
DATE

REVISIONS		
DATE	BY	DESCRIPTION

TITLE: INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT
CROSS SECTIONS

Aptim Environmental & Infrastructure, LLC
2481 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
www.aptim.com
PH. (561) 391-8102
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C.O.A. FL. #4028

DATE: 2/27/19
BY: GK
COMM NO.: 631235714
SHEET: 9 of 29

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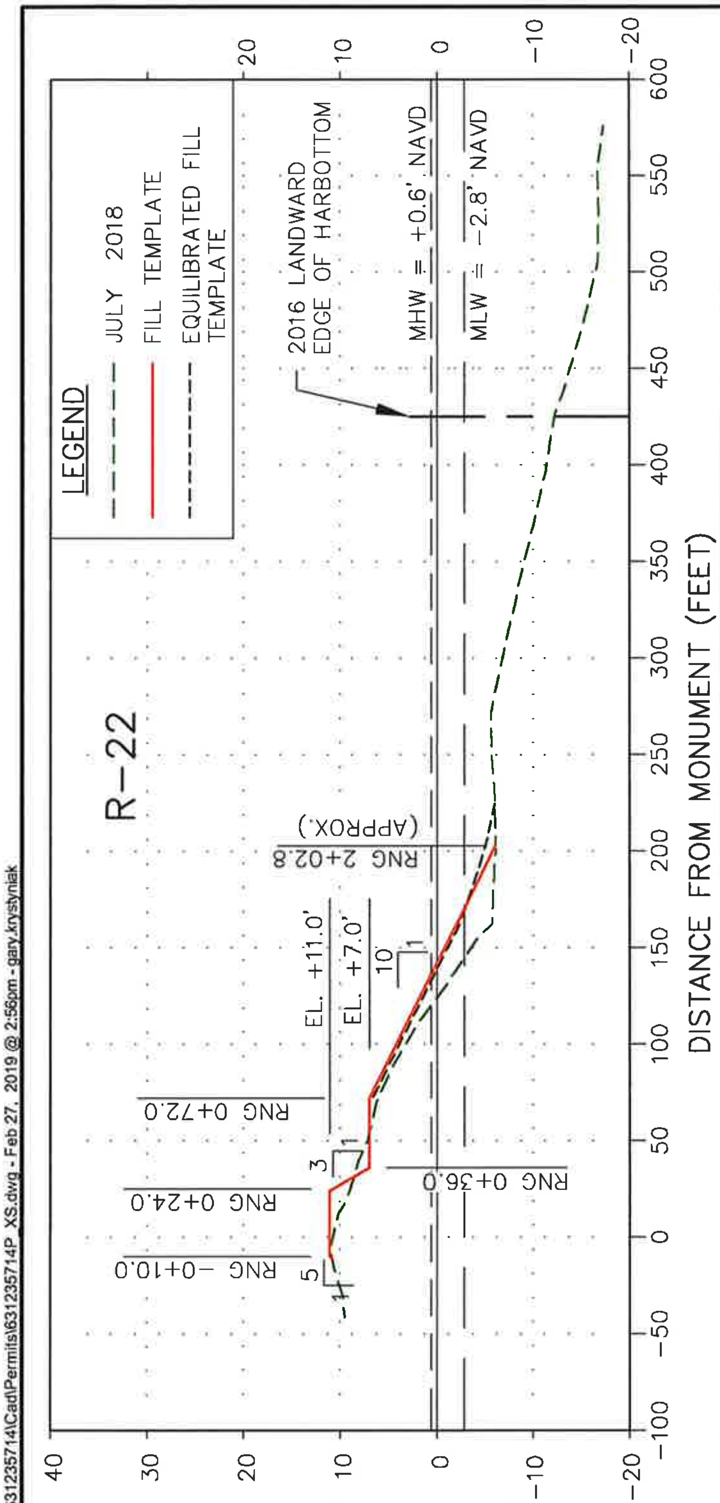

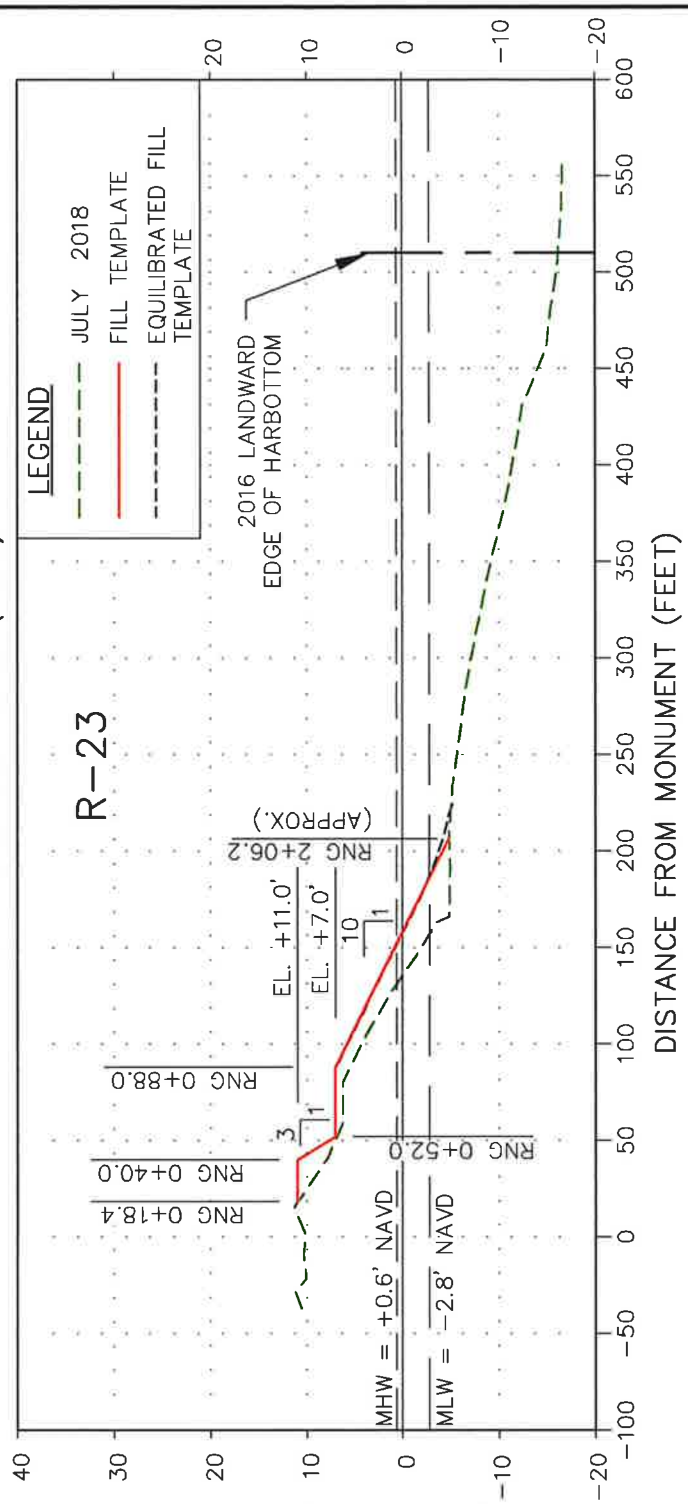

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JORDON P. CHEIFET, P.E. No. 72876

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Aptim Environmental & Infrastructure, LLC
2481 N.W. BOCA RATON BOULEVARD
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www.aptim.com
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C.O.A. FL. #4028

TITLE:
INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT
CROSS SECTIONS

DATE: 2/27/19
BY: GK
COMM NO.: 631235714
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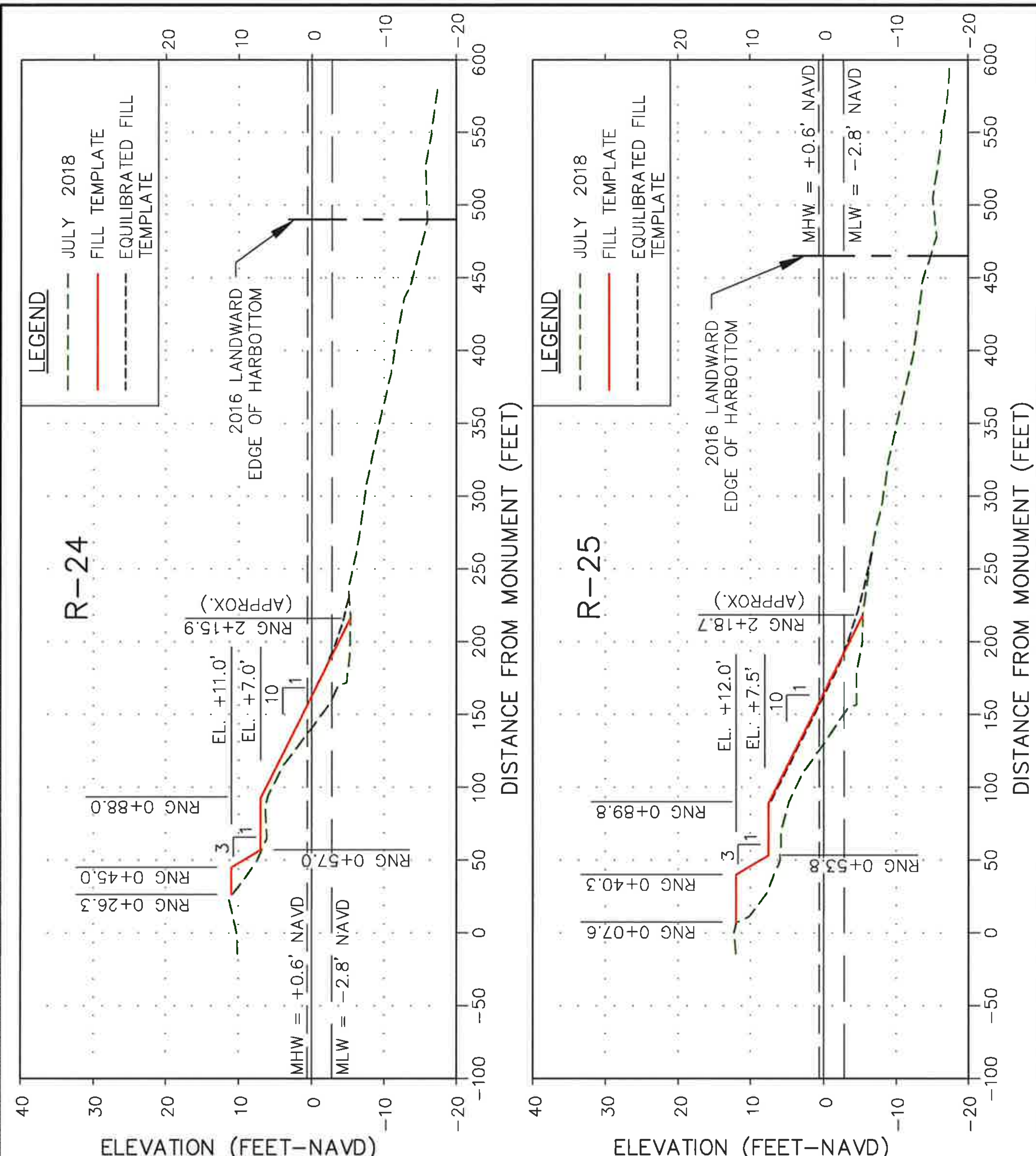

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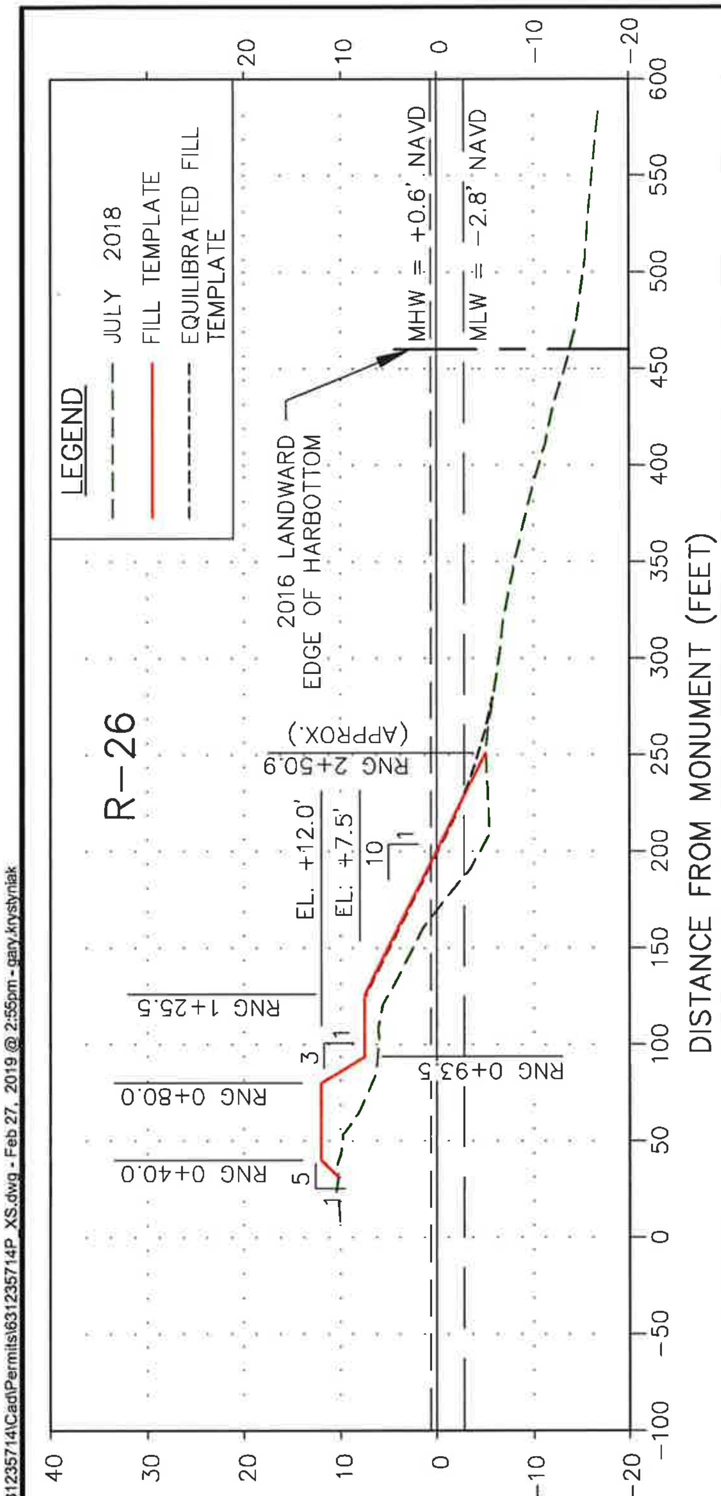

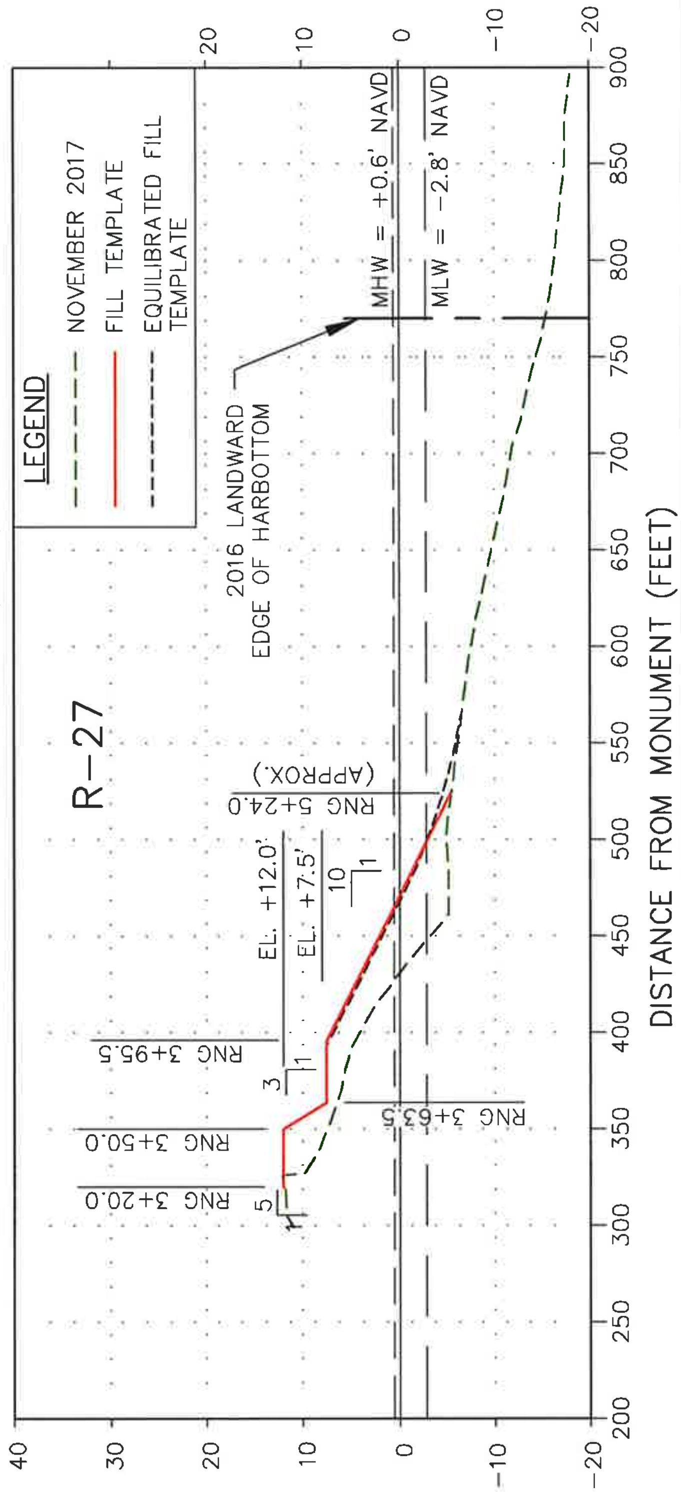

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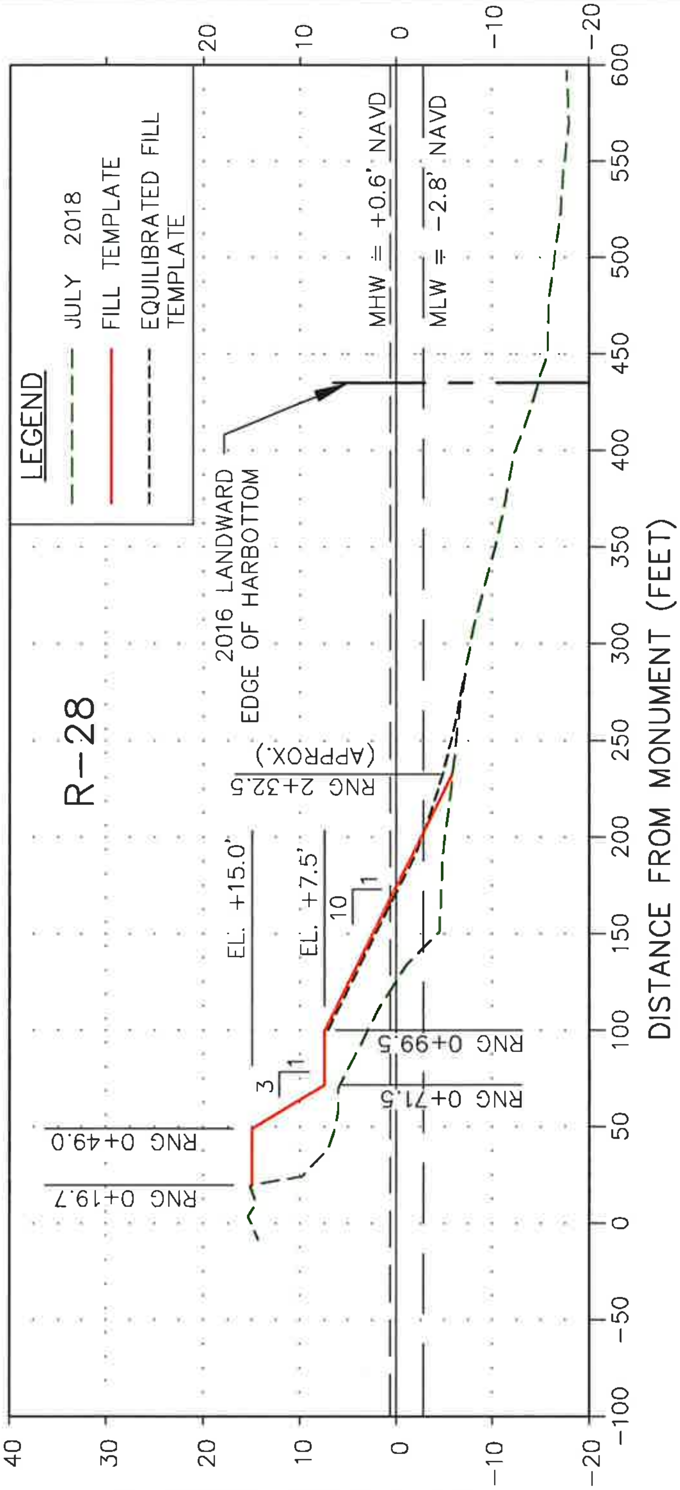

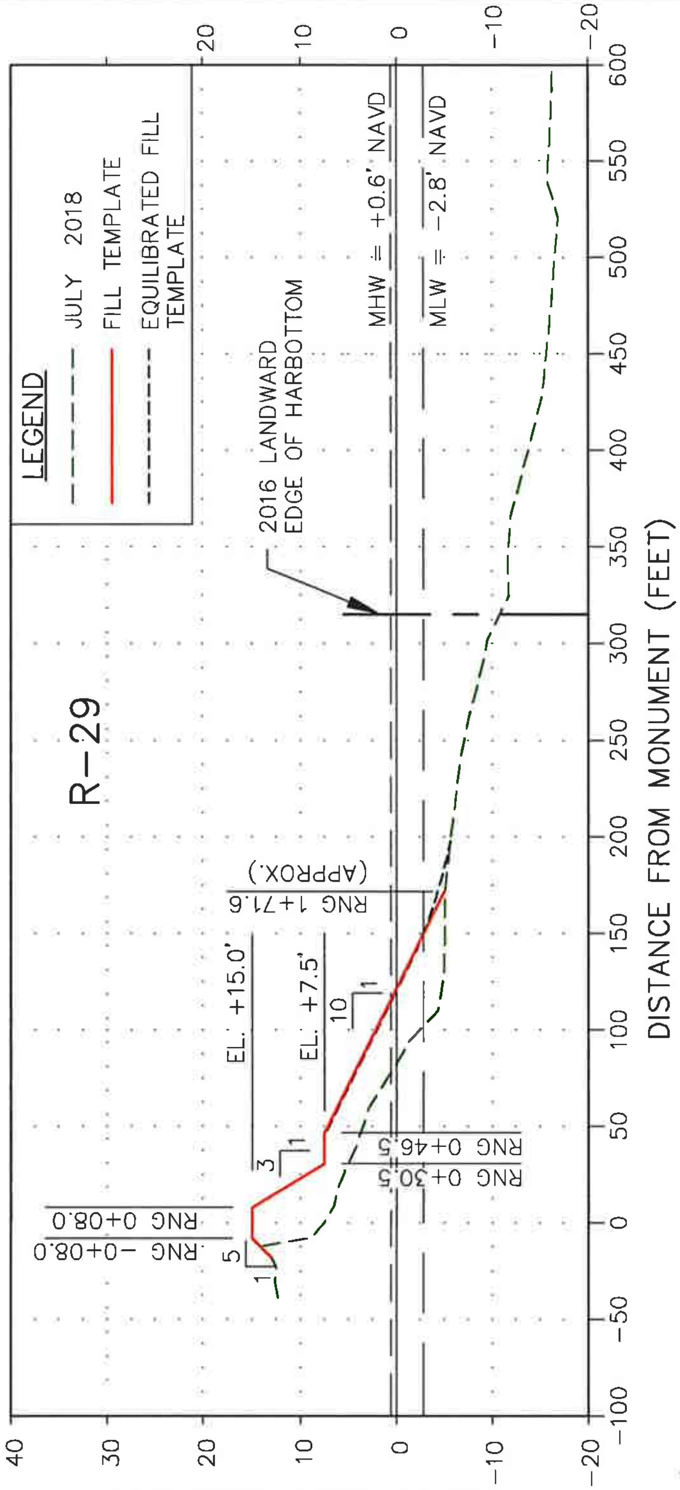

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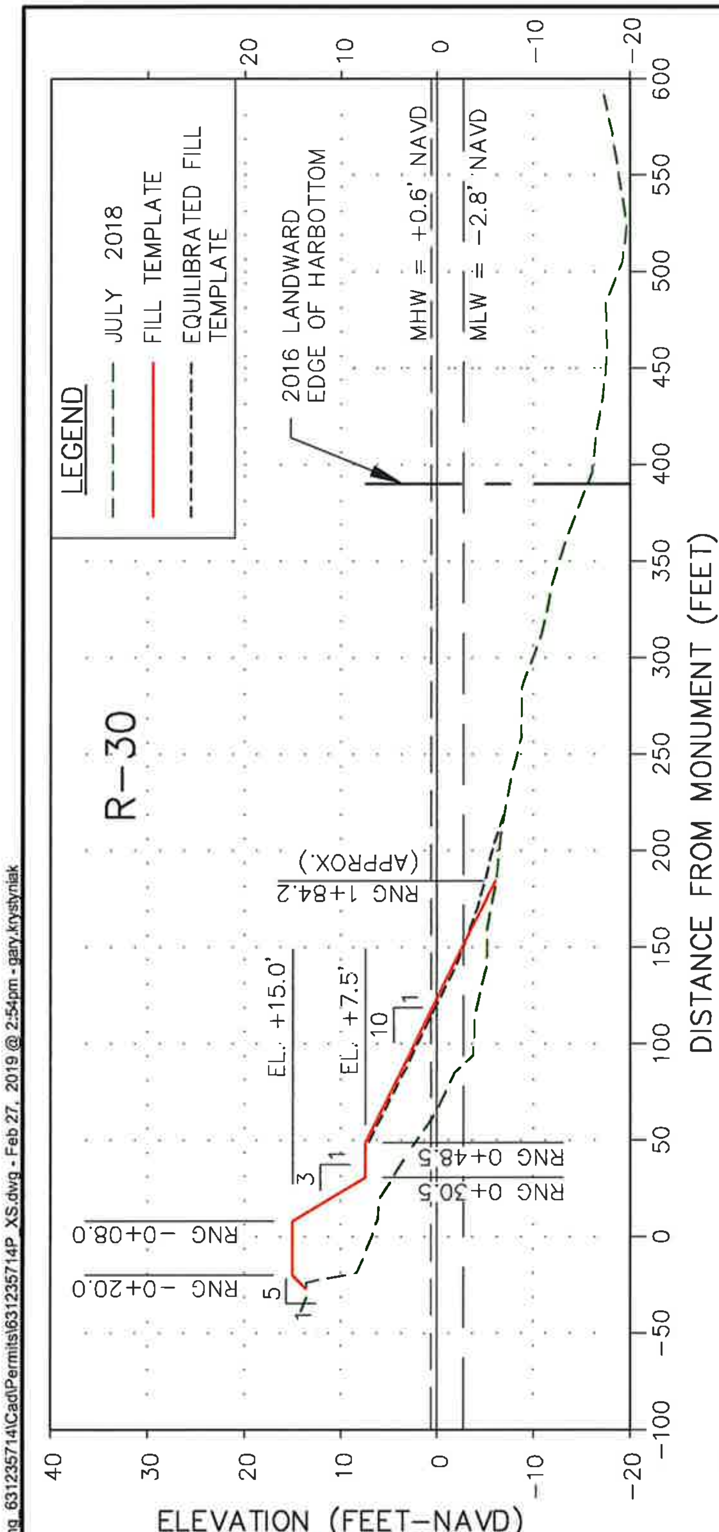

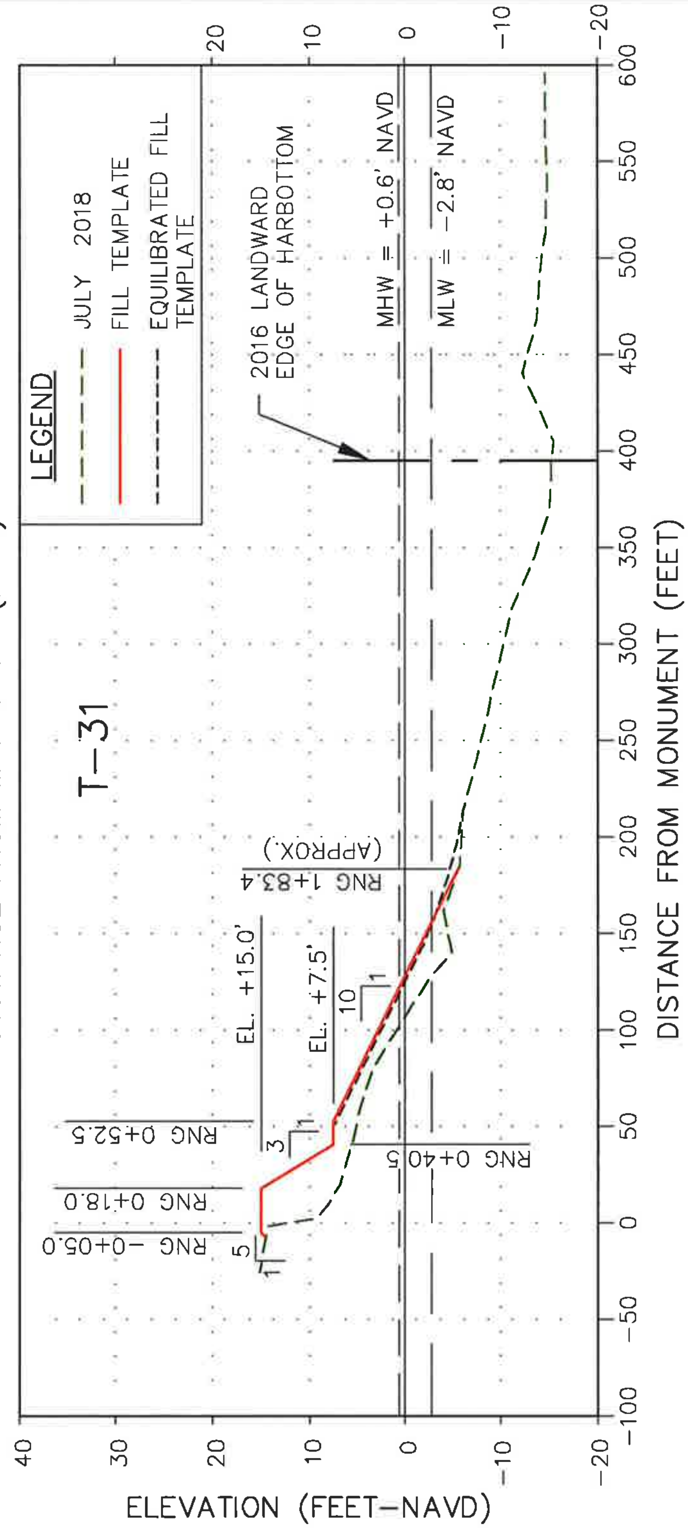

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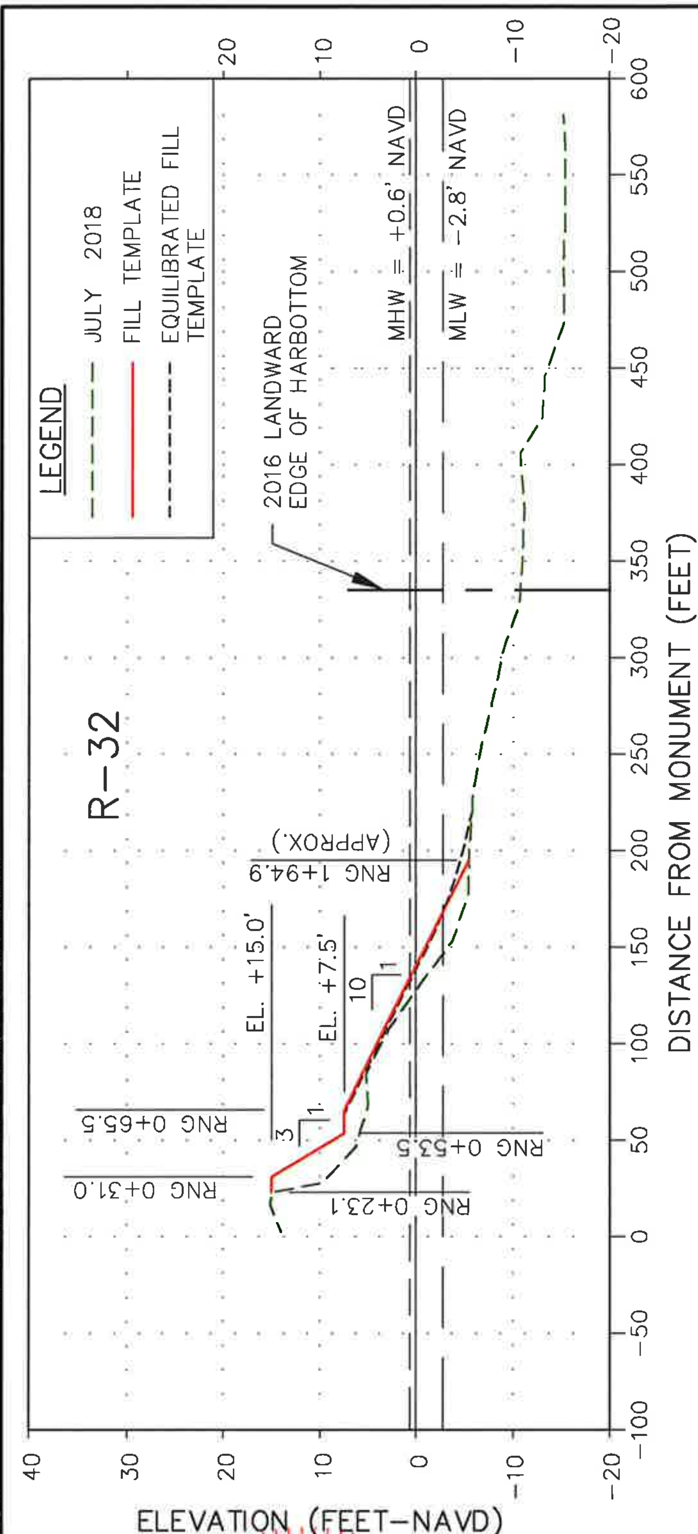

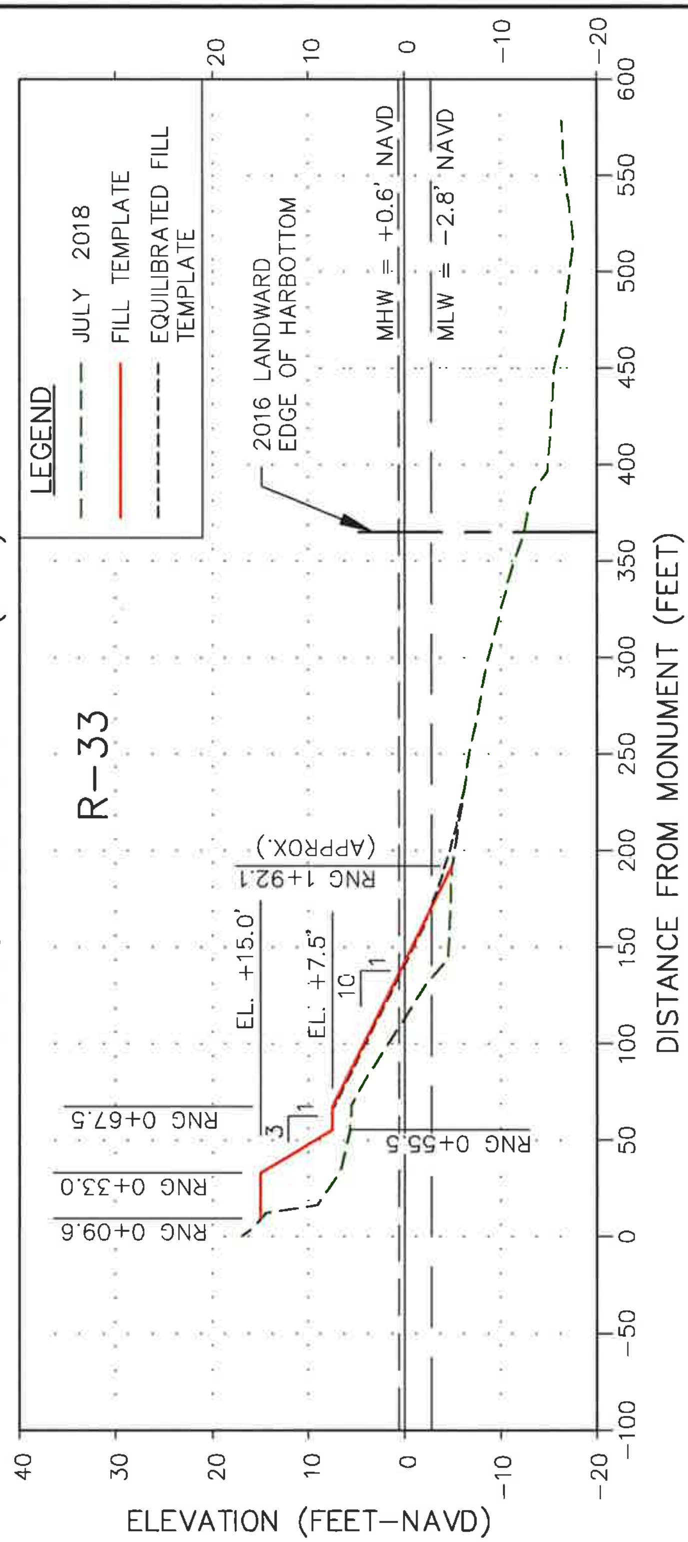

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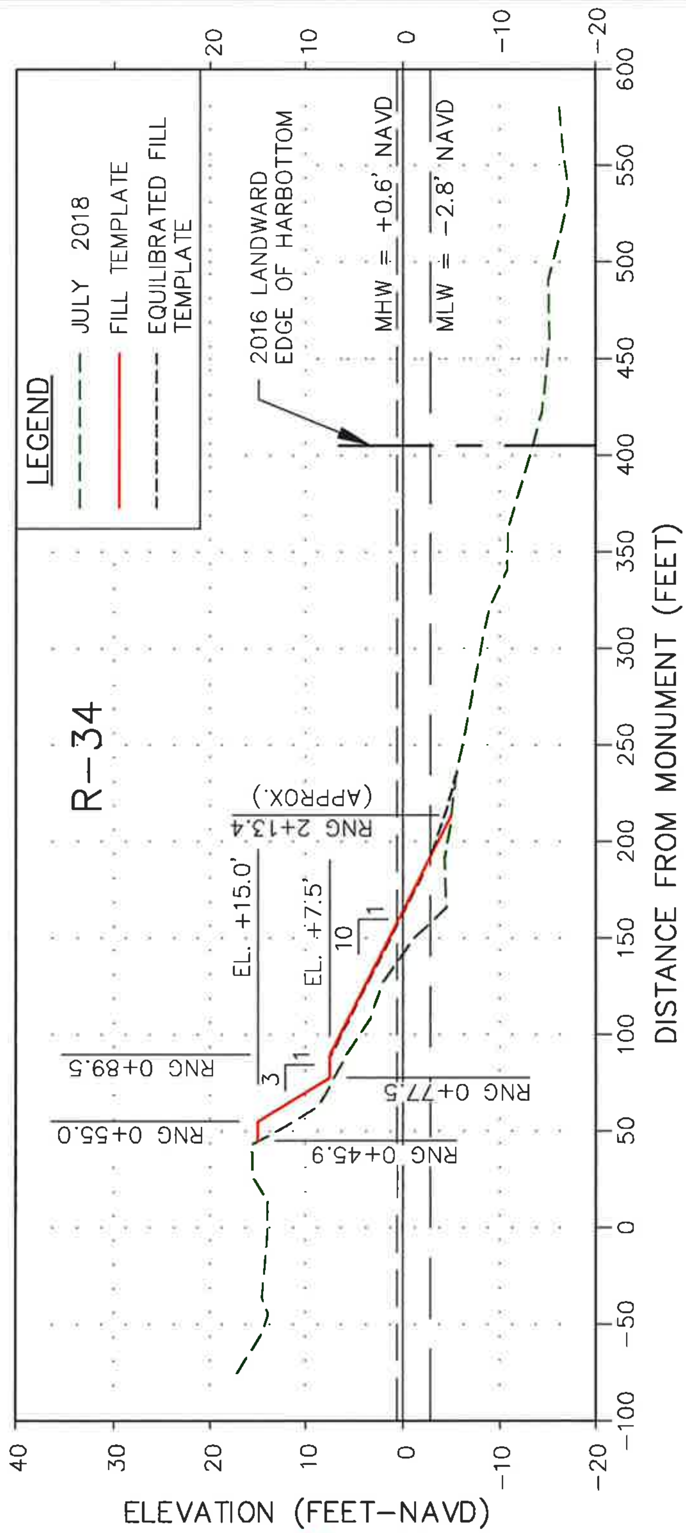

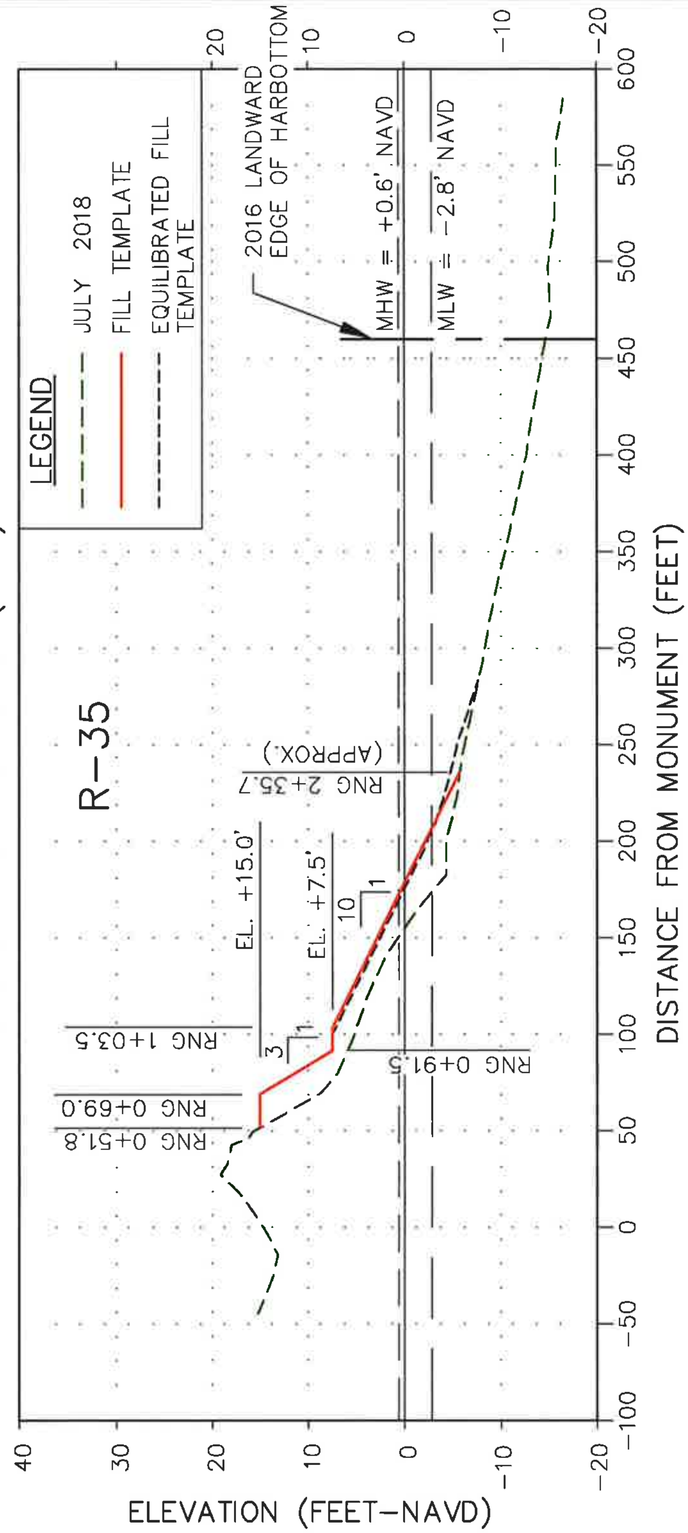

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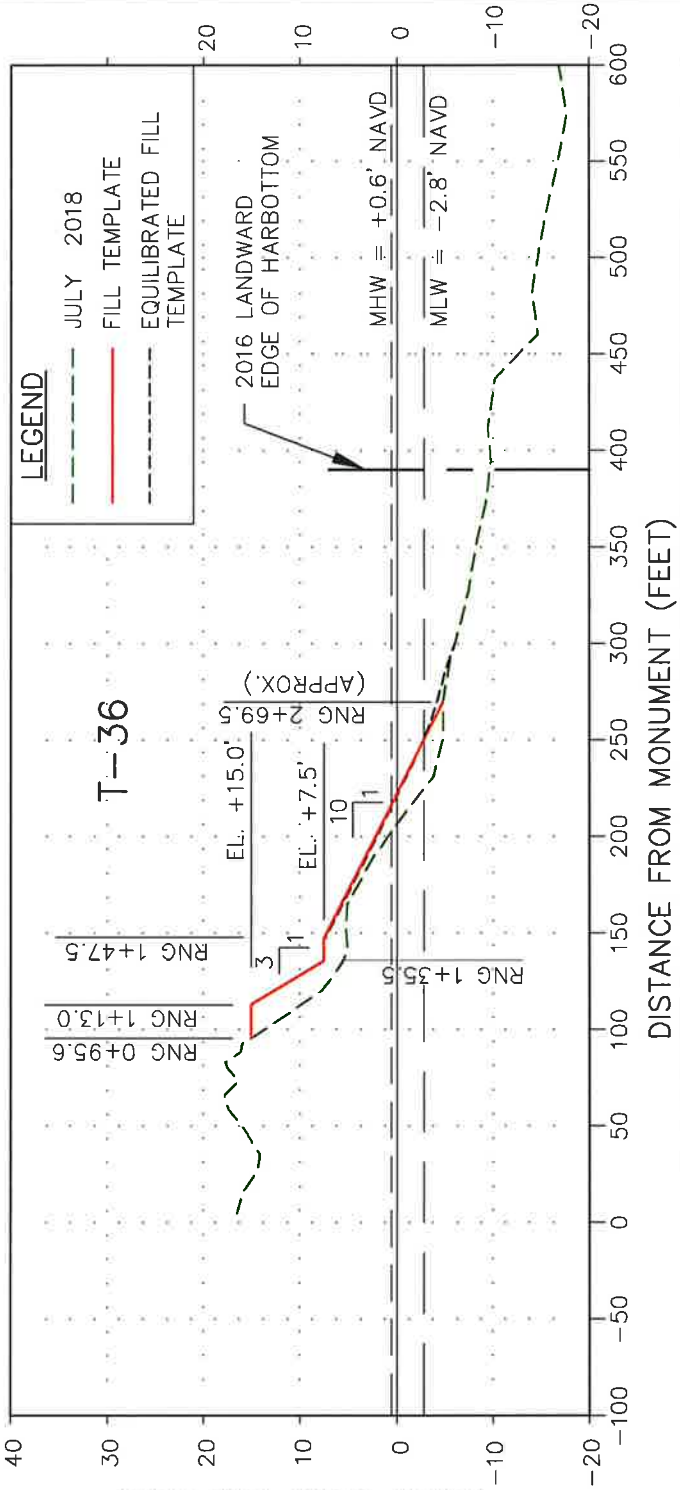

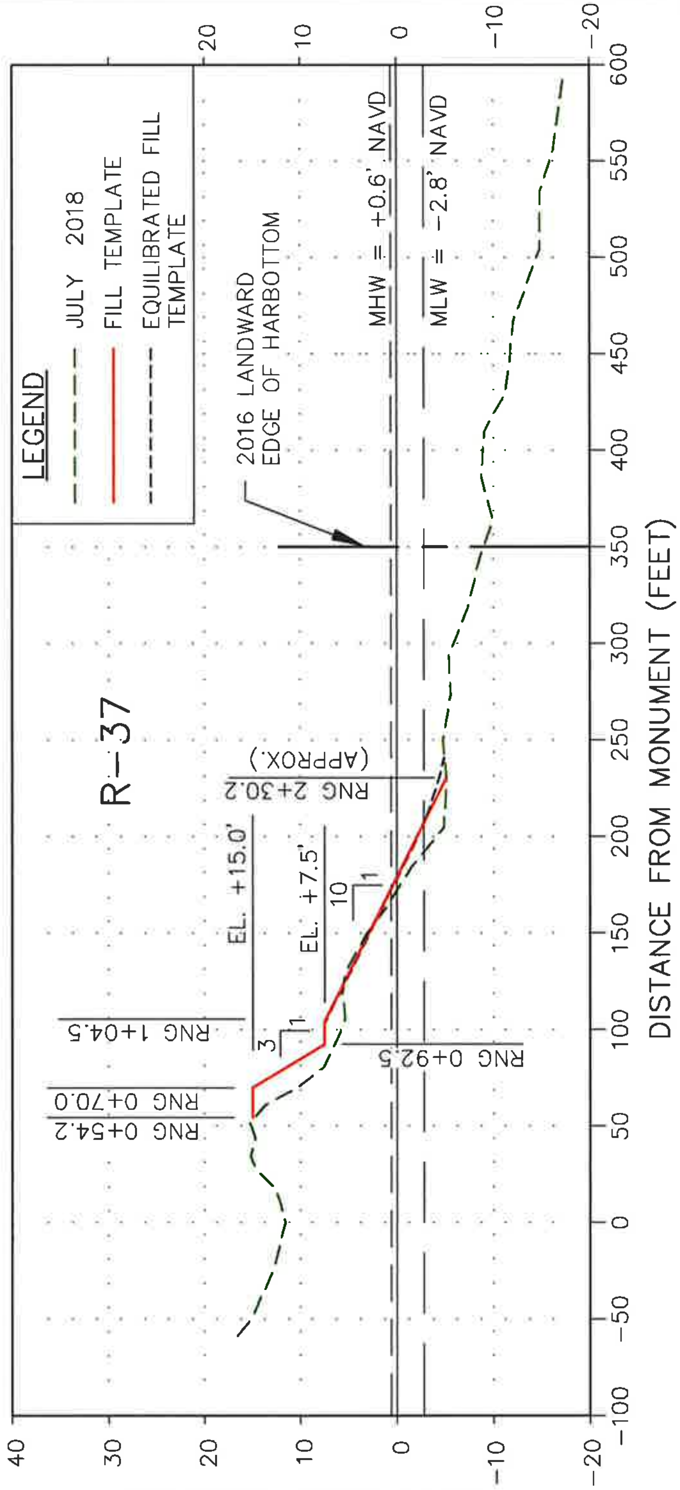

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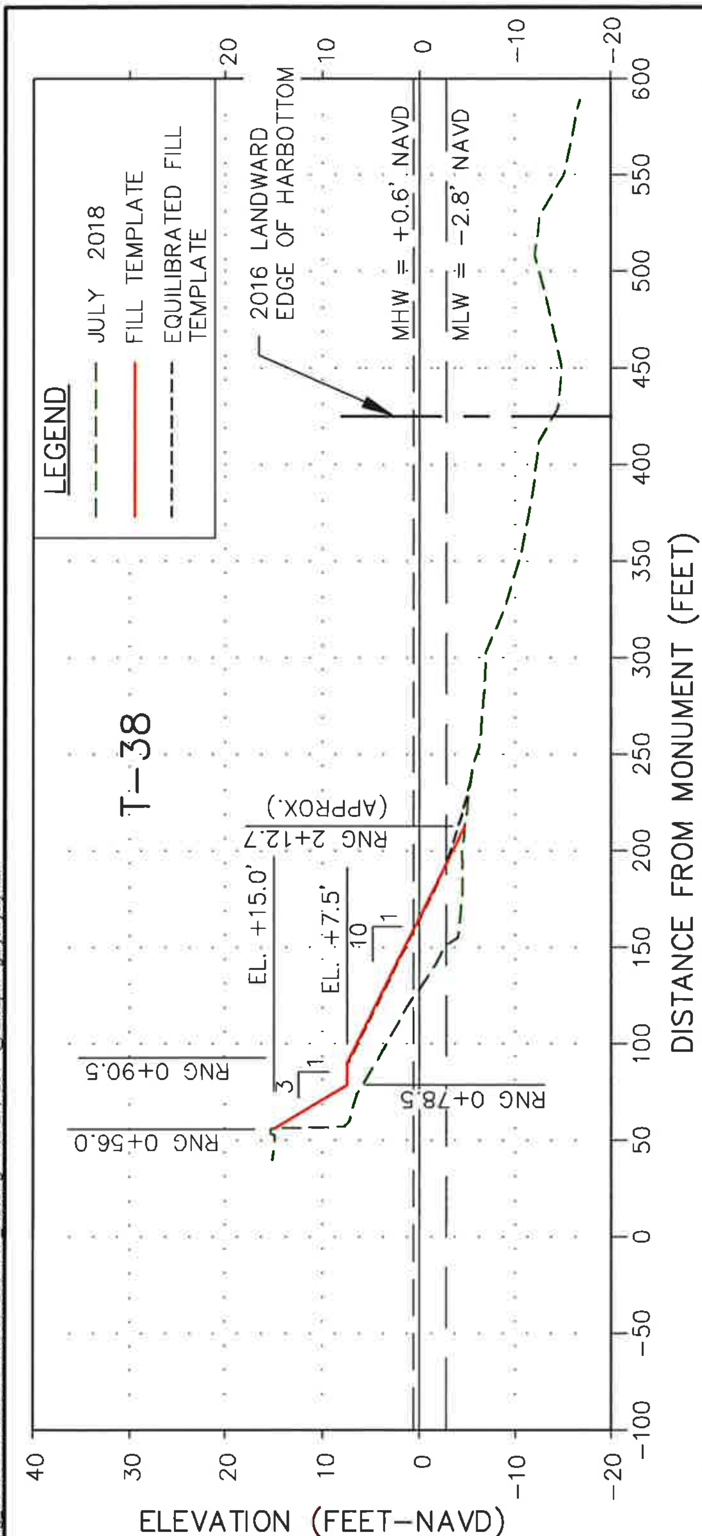

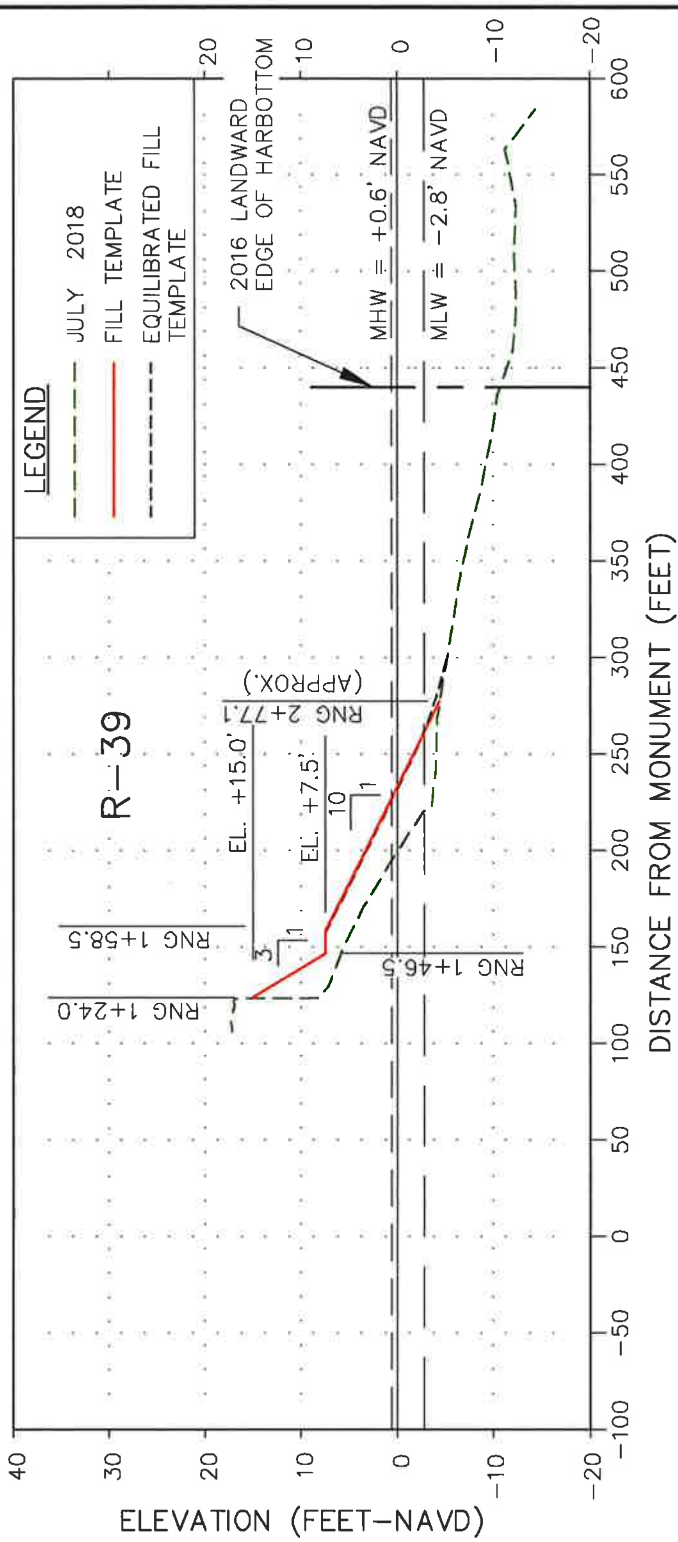

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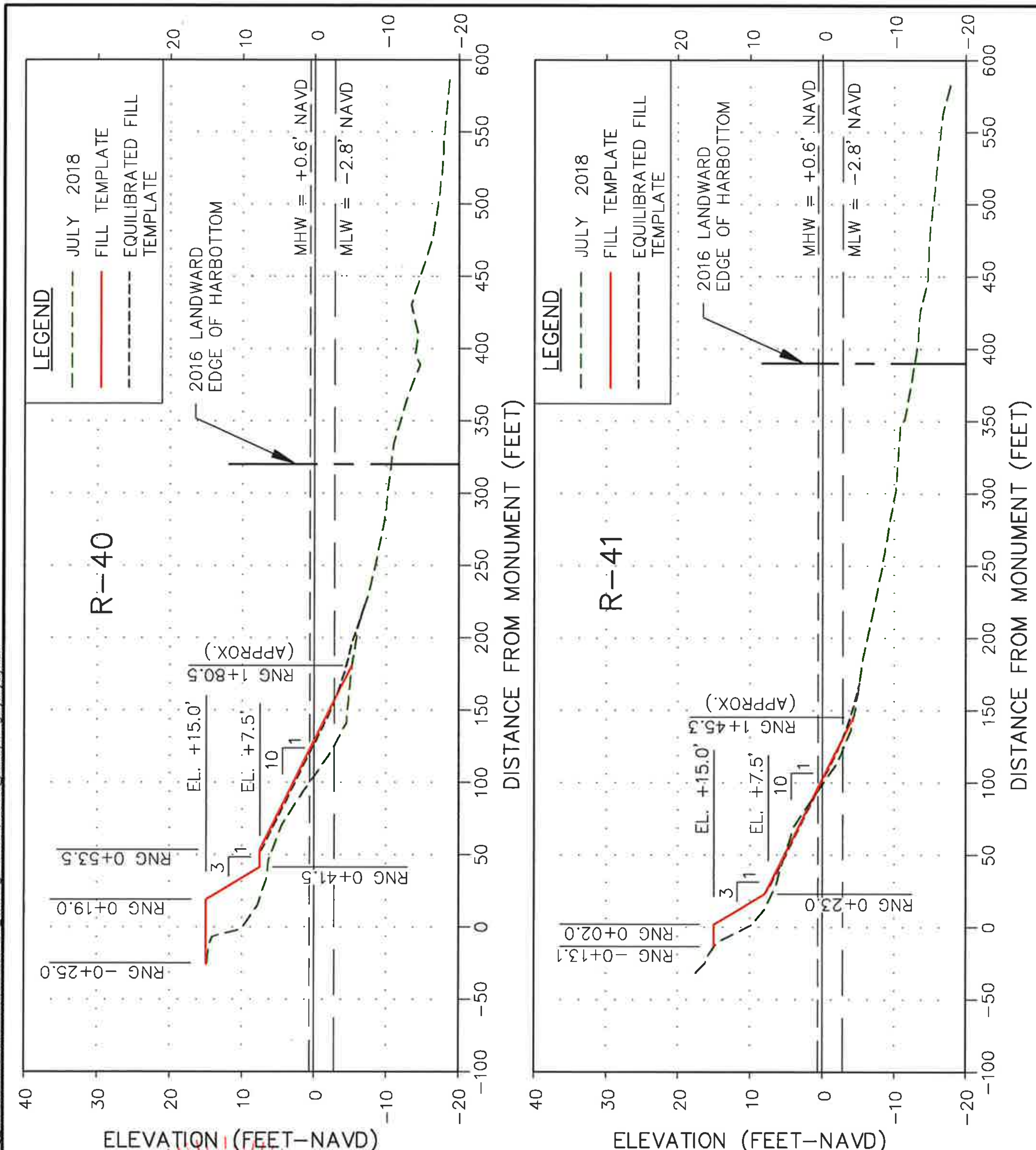

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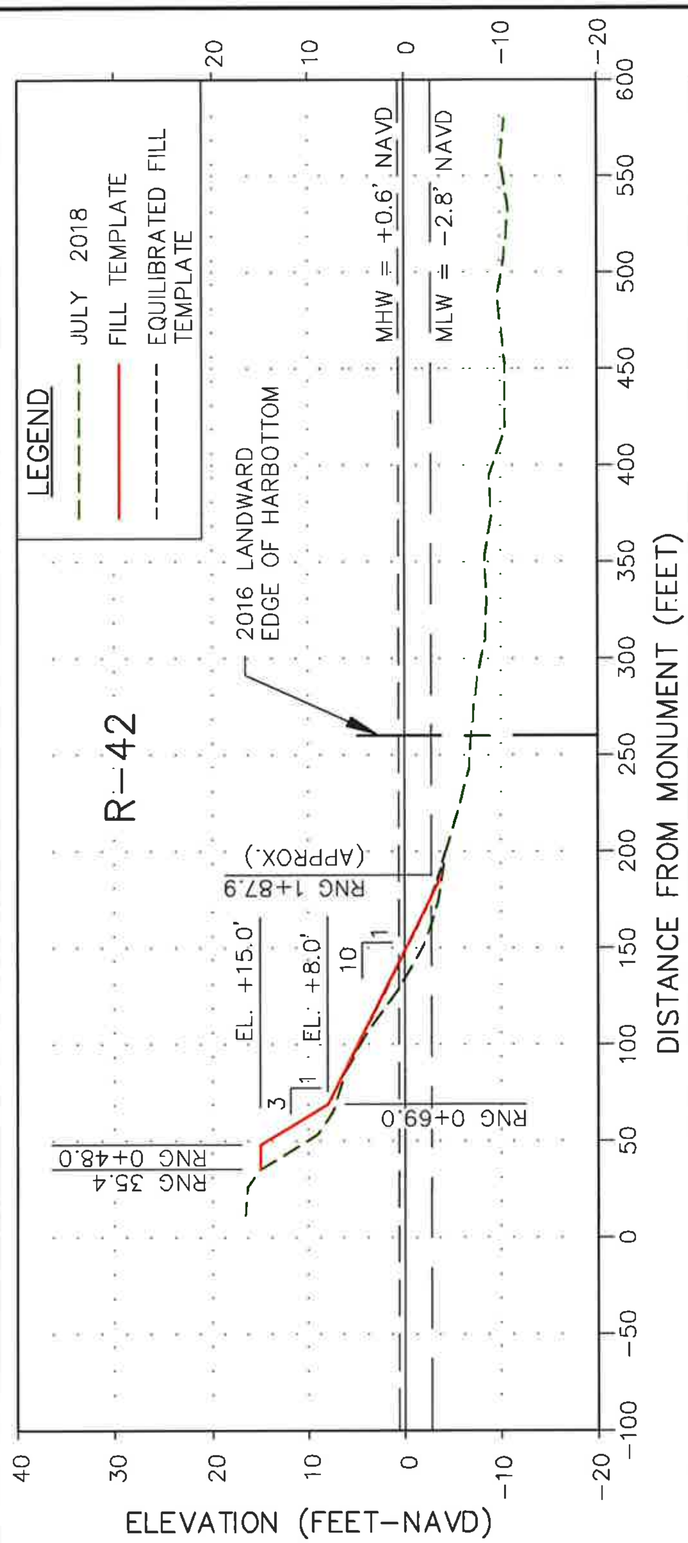

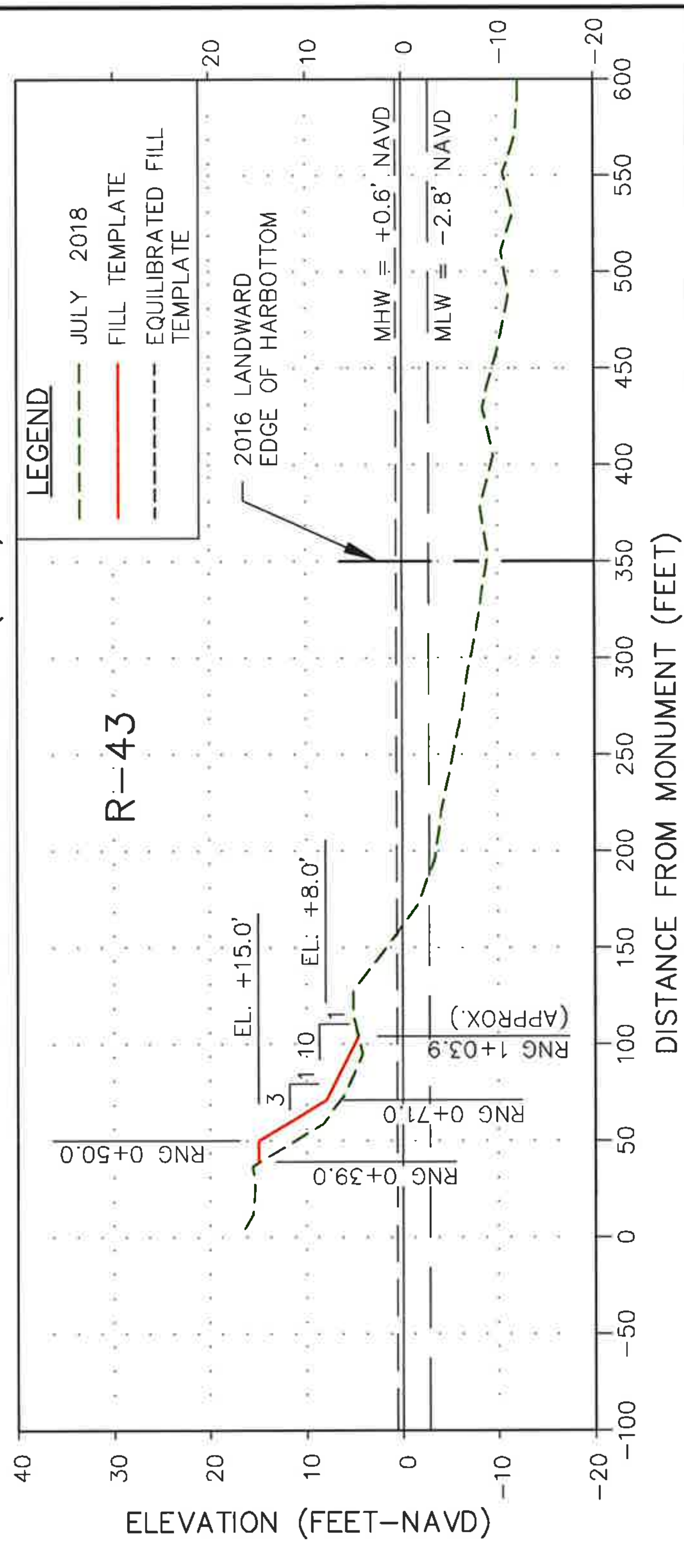

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JORDON P. CHEIFET LICENSE No. 72876 STATE OF FLORIDA PROFESSIONAL ENGINEER

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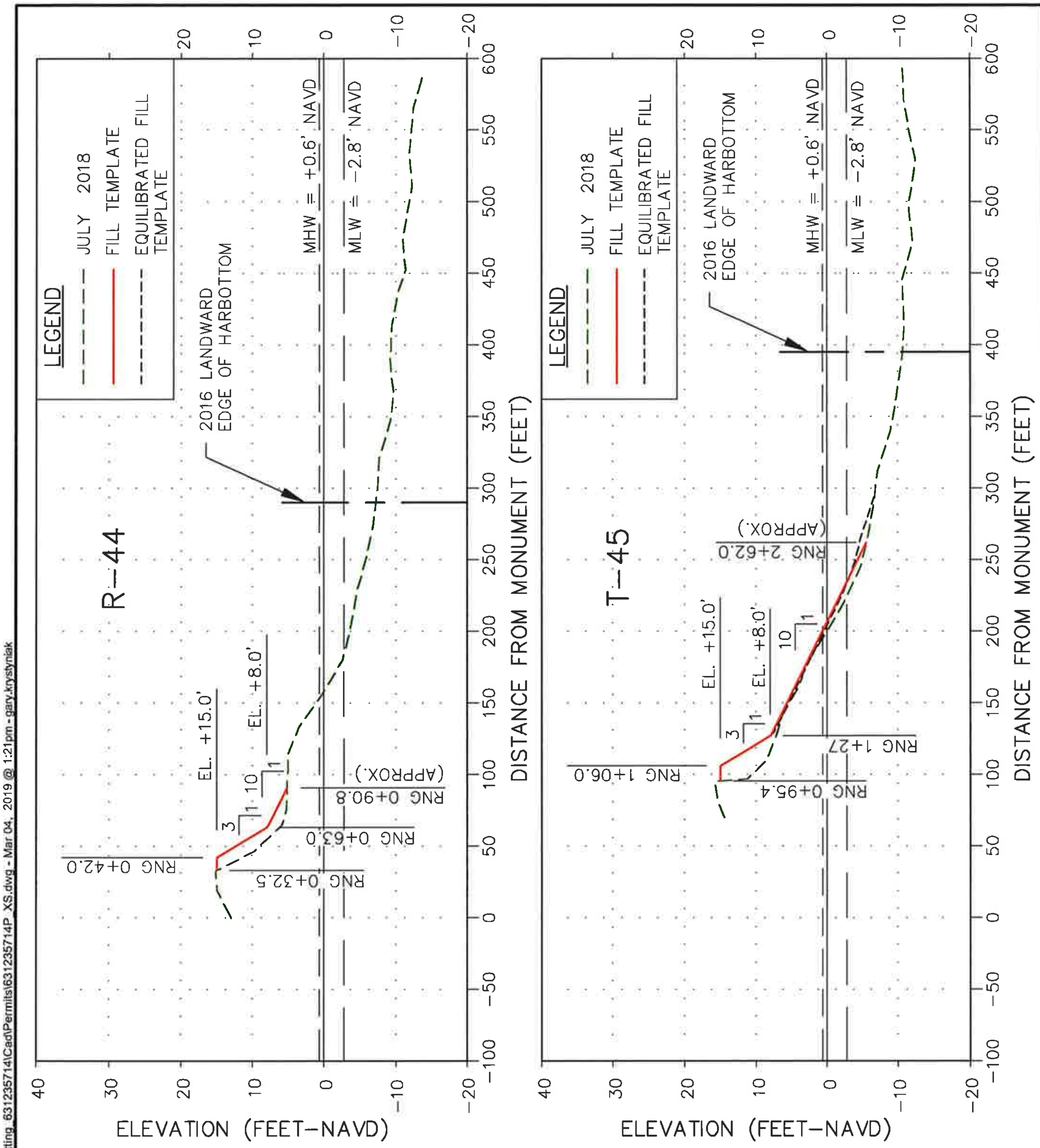

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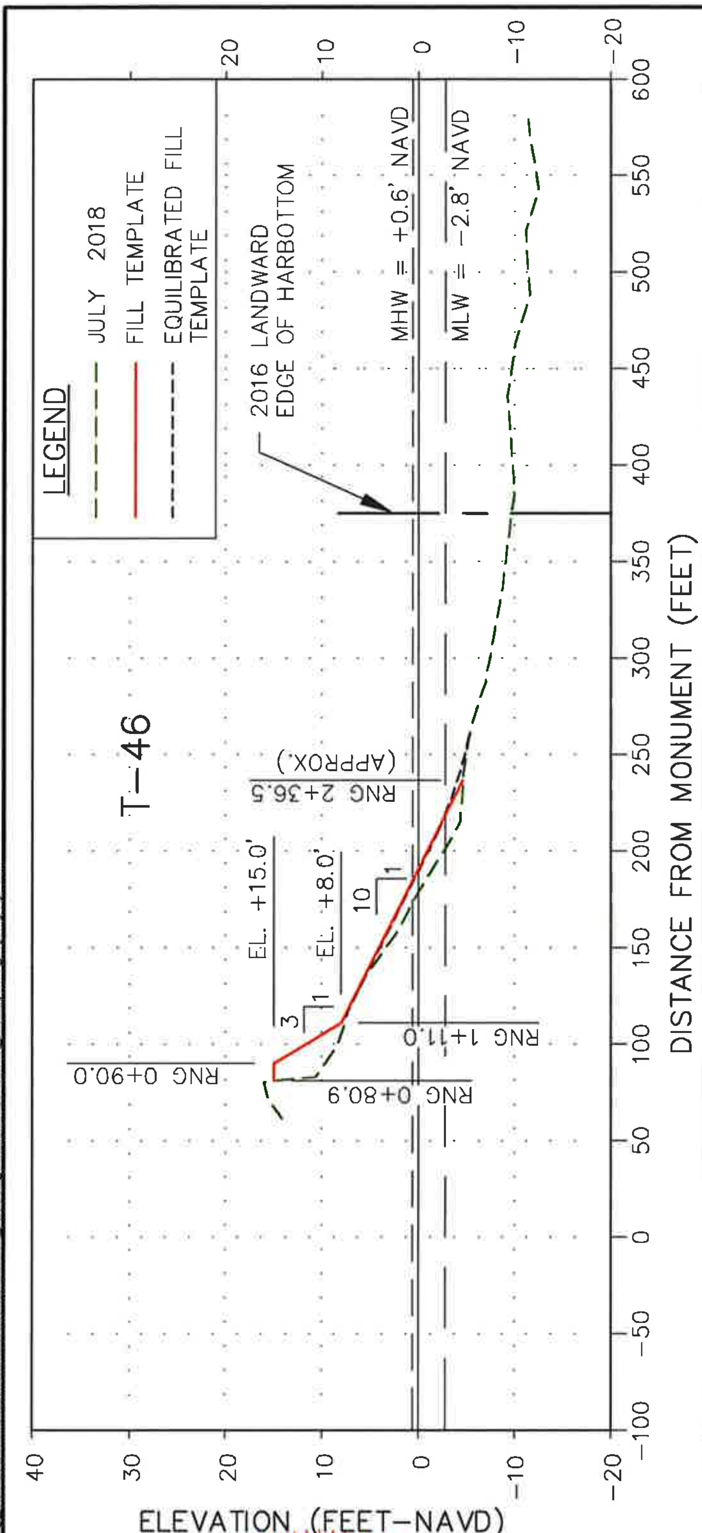

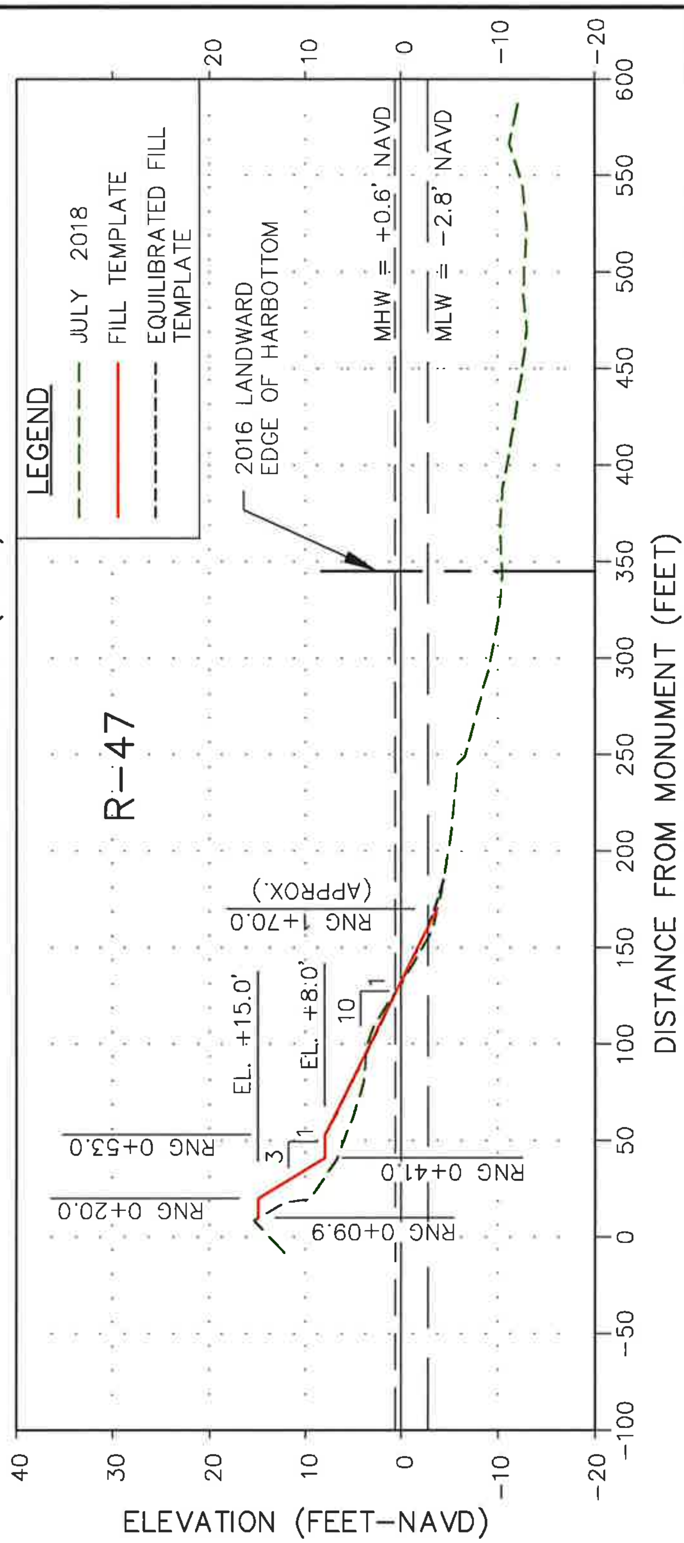

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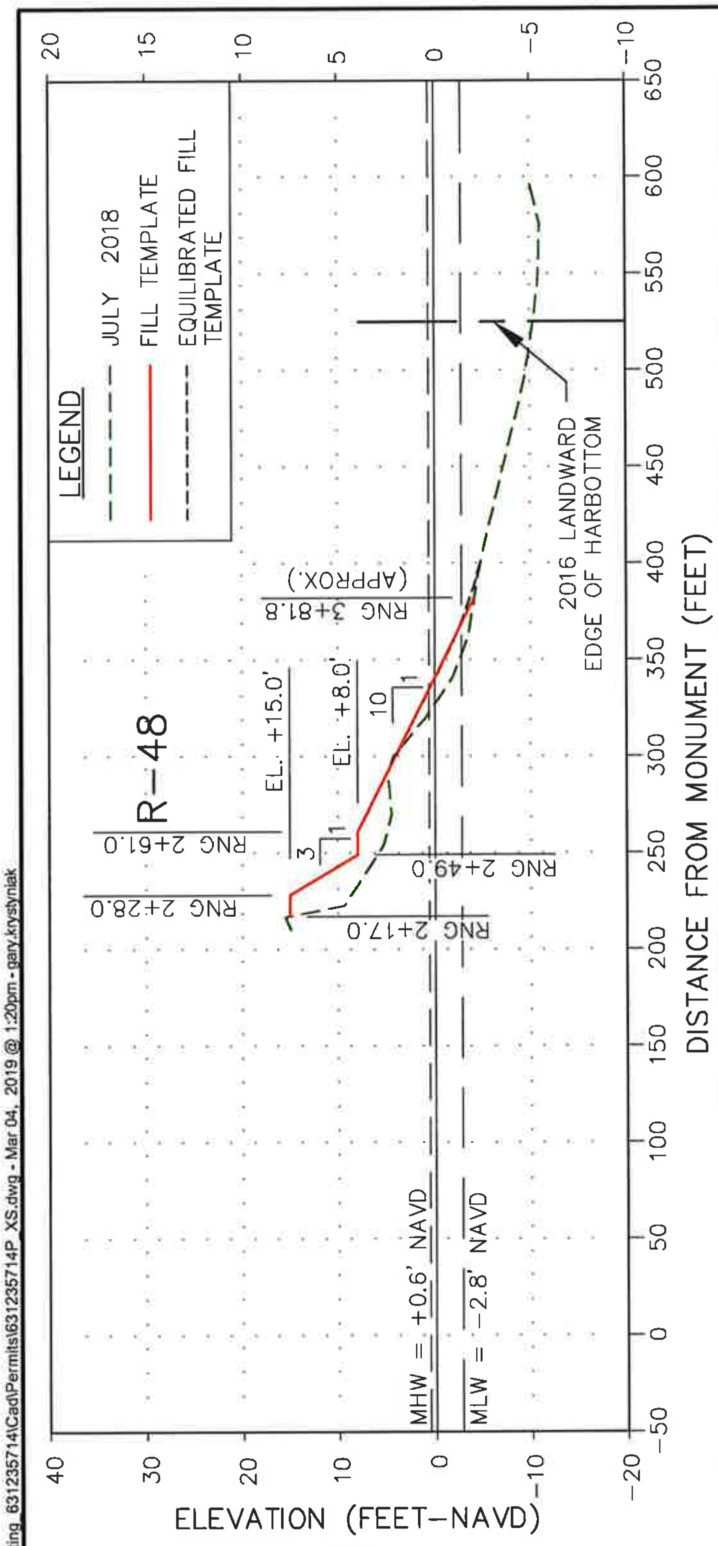

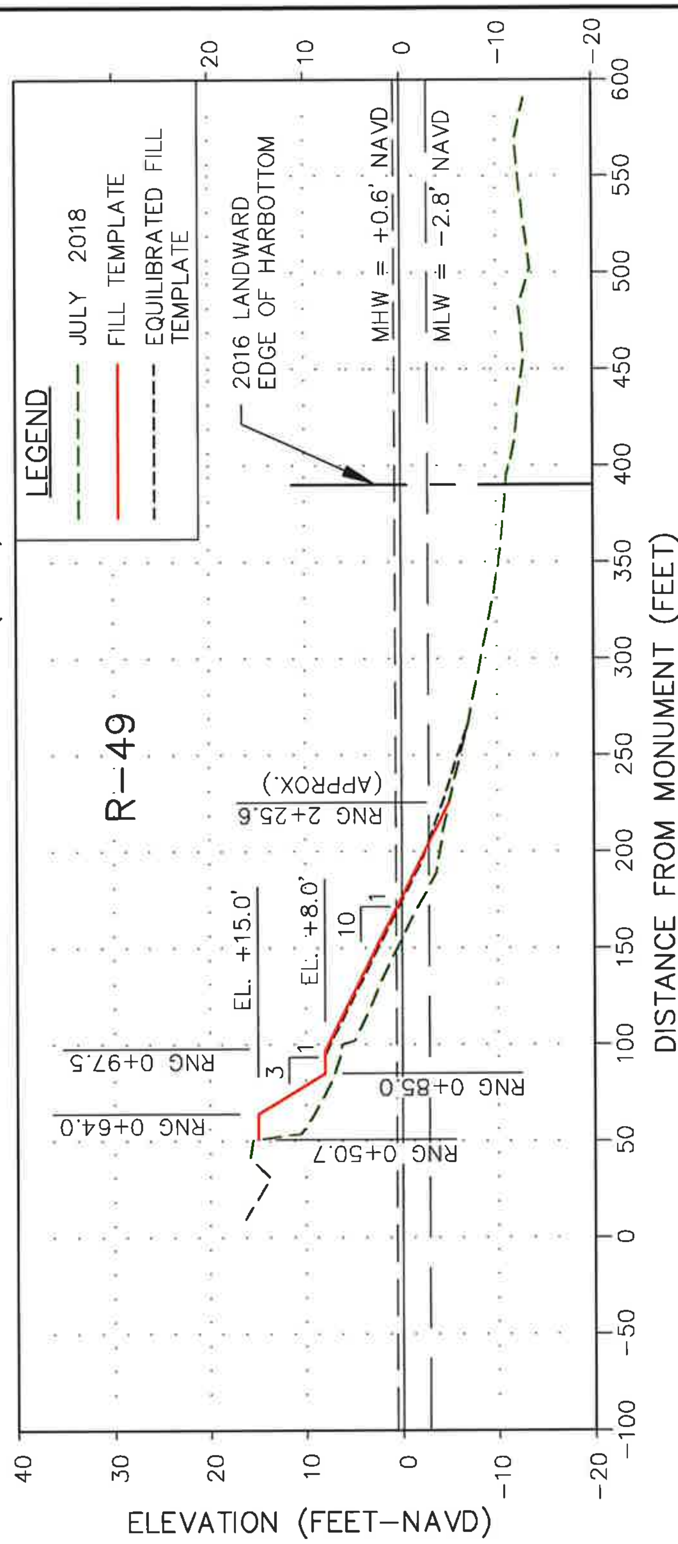

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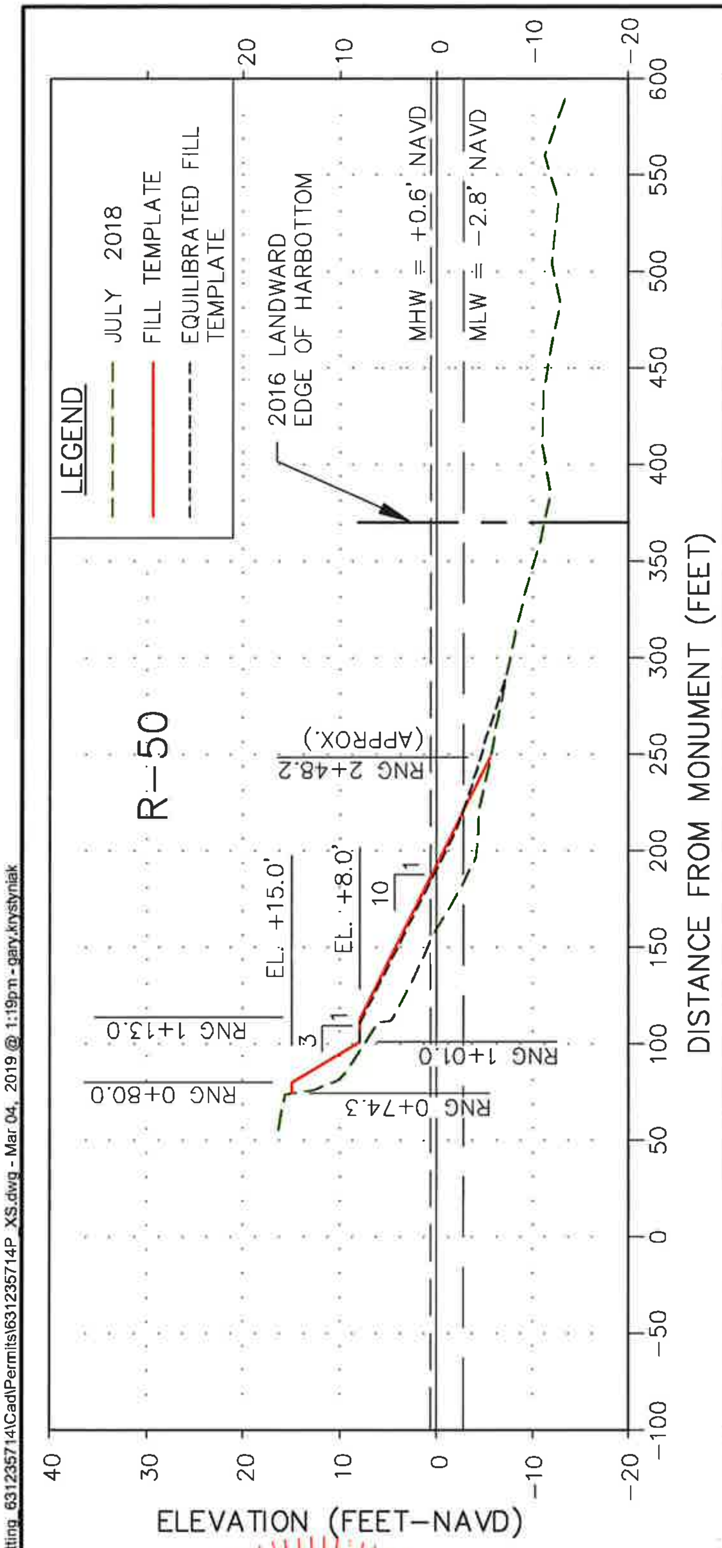
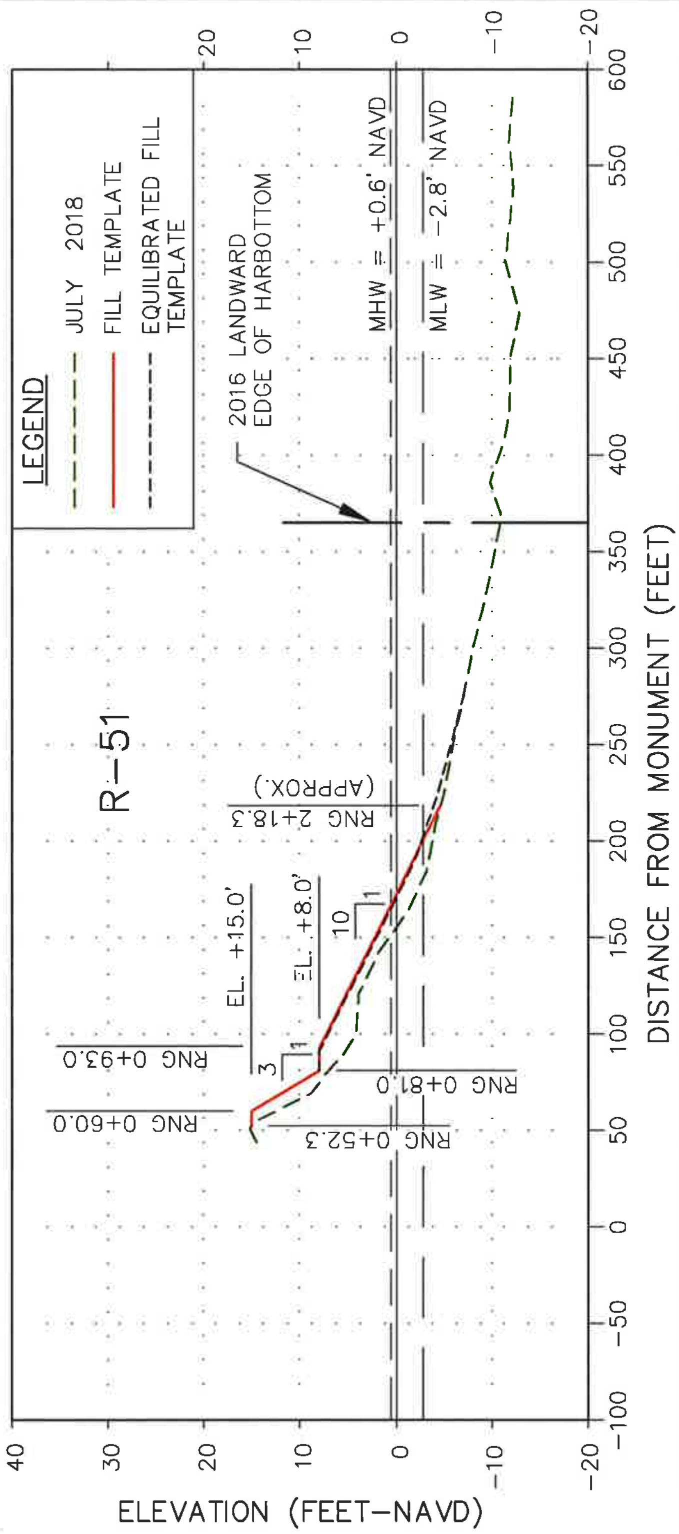




NOTES:

1. ELEVATIONS ARE IN FEET REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD).
2. LANDWARD EDGE OF HARDBOTTOM DELINEATED BY CSA OCEAN SCIENCES, INC. DATED JULY 2016.BEACH PROFILE SURVEYS COLLECTED BY MORGAN AND EKLUND, INC.
3. CONSTRUCTED LANDWARD DUNE CREST INTERSECTION WITH EXISTING GRADE TO BE FIELD DETERMINED. IF NECESSARY, SLOPE DOWN NO STEEPER THAN 1V:5H.

NOT FOR CONSTRUCTION
FOR REGULATORY REVIEW ONLY

JORDON P. CHEIFET, P.E. No. 72876

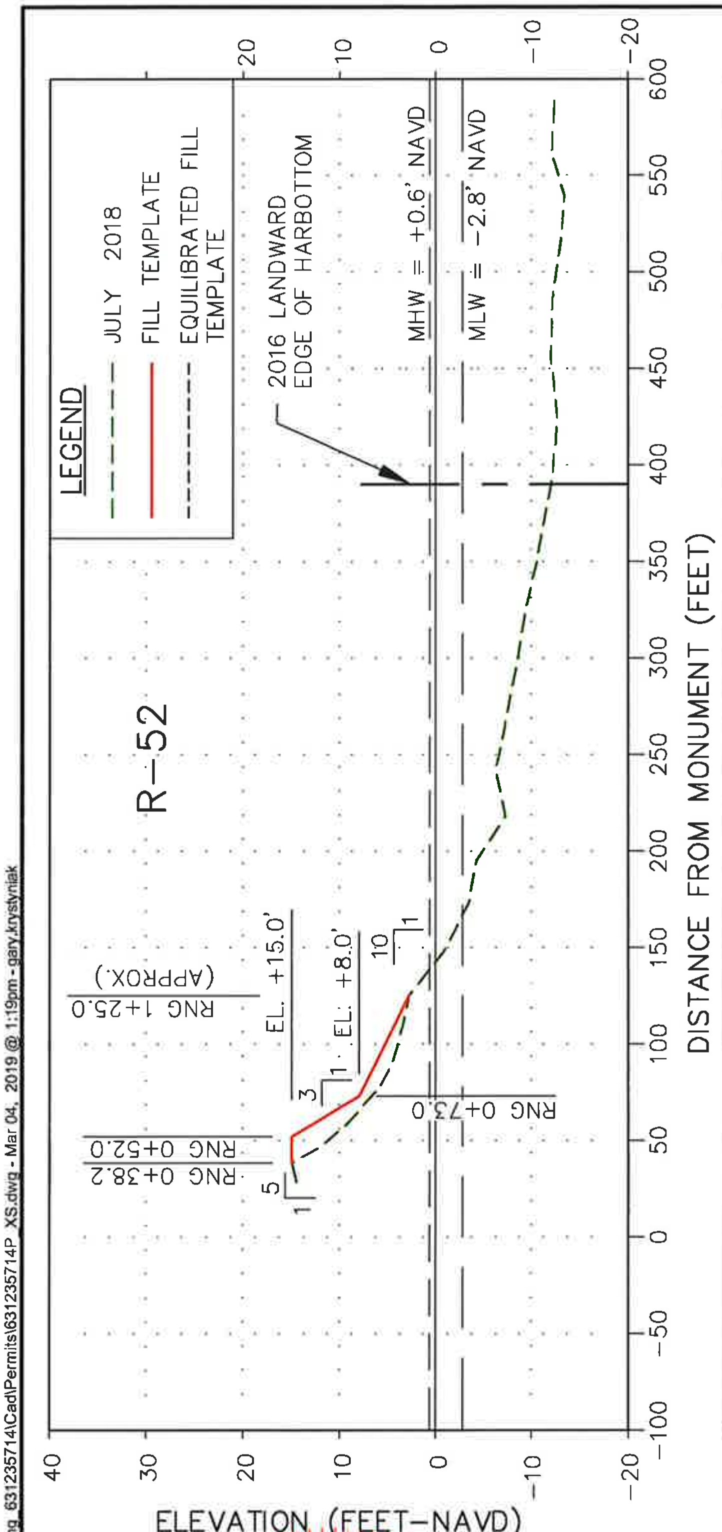
2/27/19
DATE

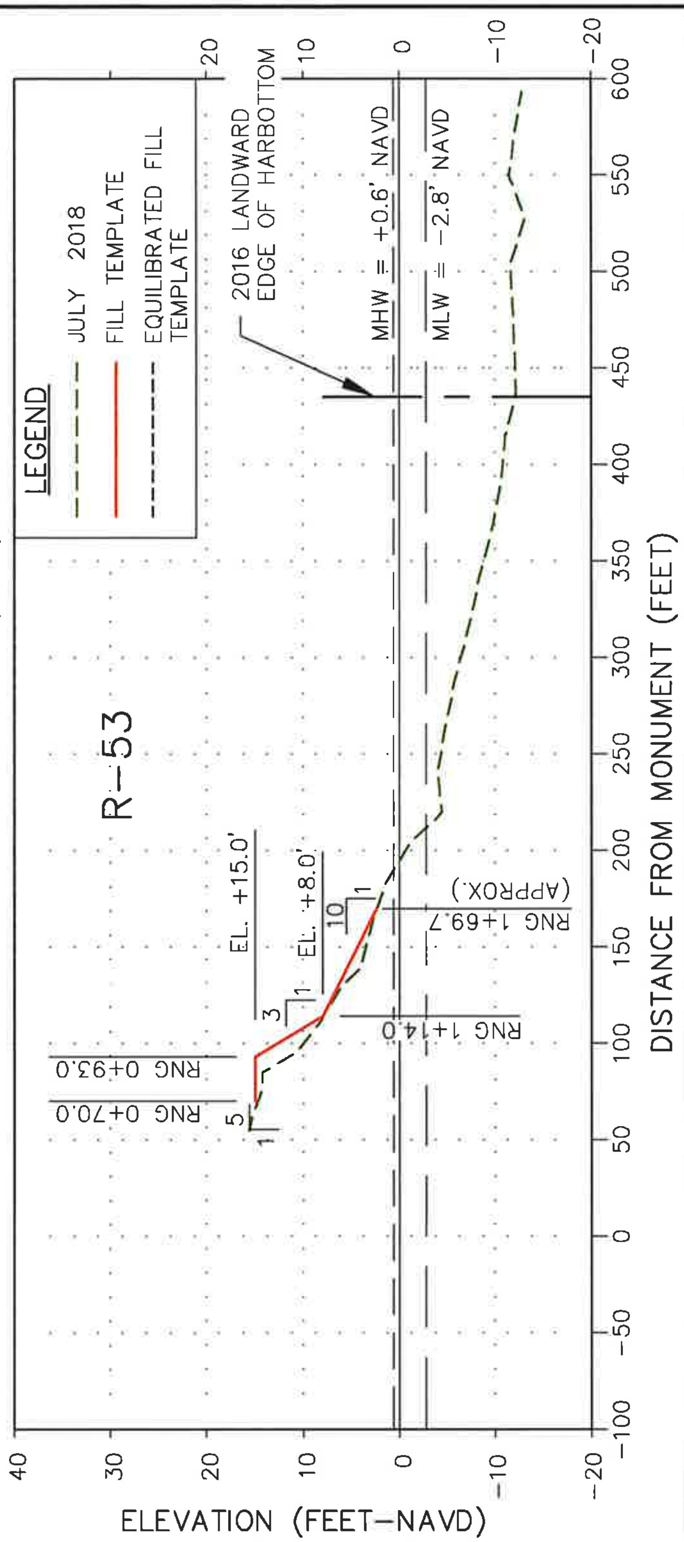
REVISIONS		
DATE	BY	DESCRIPTION

Aptim Environmental & Infrastructure, LLC
2481 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
www.aptim.com
PH. (561) 391-8102
FAX (561) 391-9116
C.O.A. FL. #4028

TITLE:
INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT
CROSS SECTIONS

DATE: 2/27/19
BY: GK
COMM NO.: 631235714
SHEET: 24 of 29





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JORDON P. CHEIFET, P.E. No. 72876

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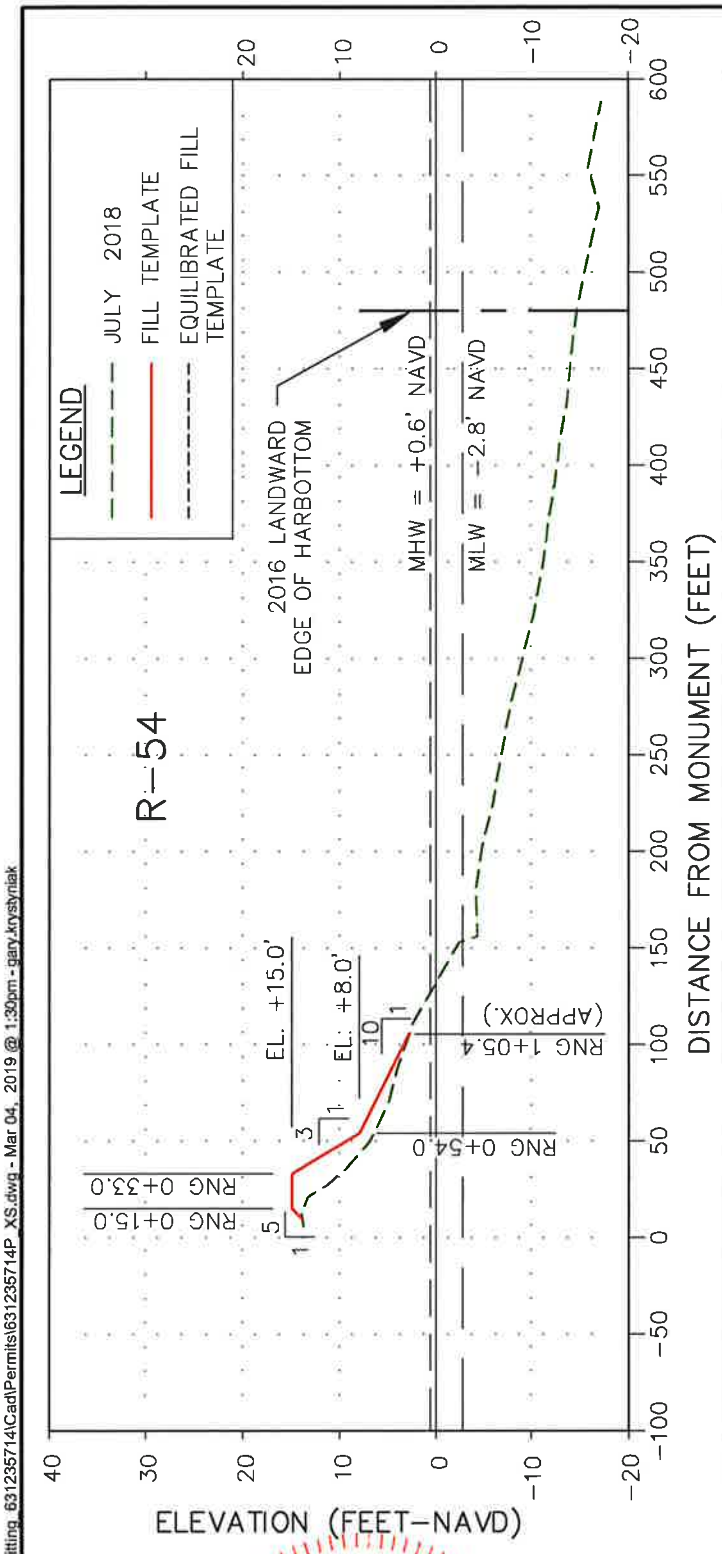
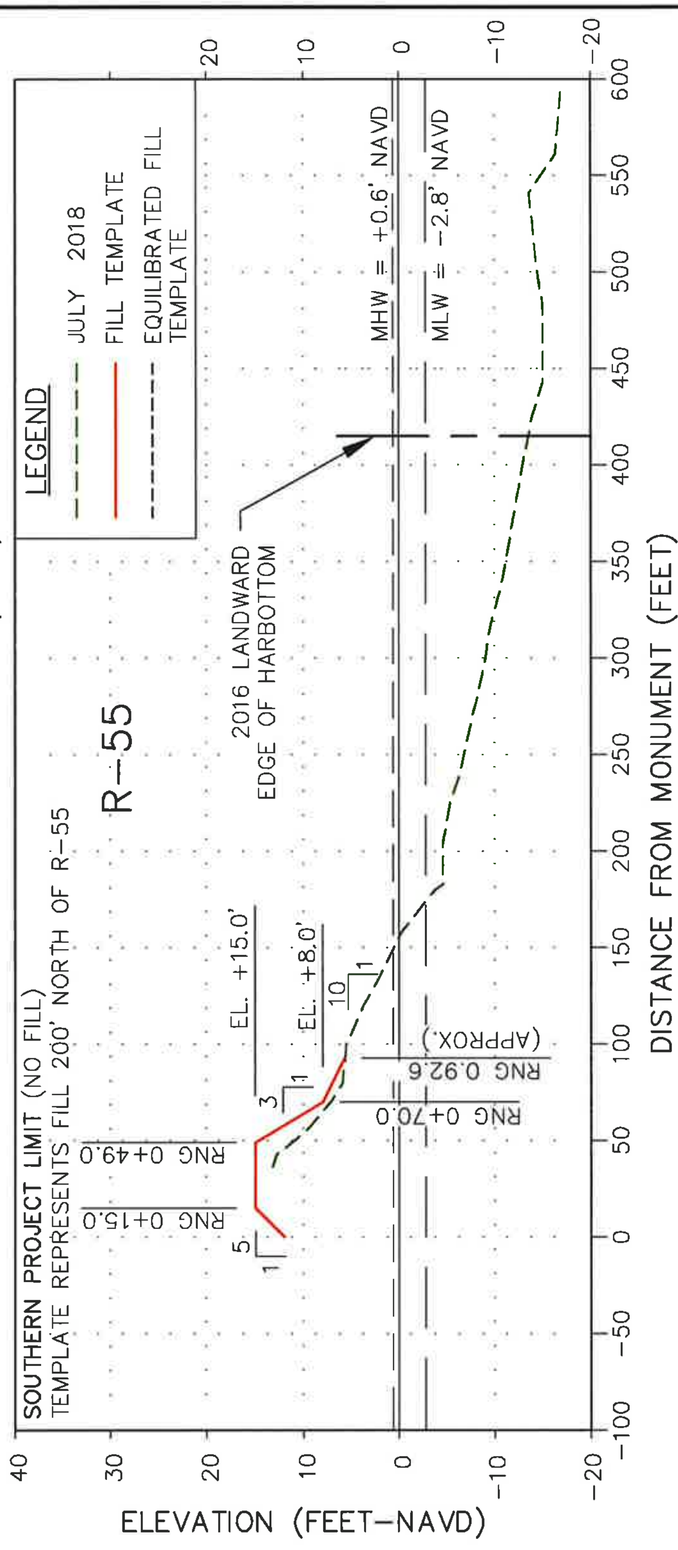
TITLE:
INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT
CROSS SECTIONS

DATE: 2/27/19
BY: GK
COMM NO.: 631235714
SHEET: 25 of 29





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FOR REGULATORY REVIEW ONLY

JORDON P. CHEIFET, P.E. No. 72876

2/27/19
DATE

REVISIONS		
DATE	BY	DESCRIPTION

Aptim Environmental & Infrastructure, LLC
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TITLE:
INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT
CROSS SECTIONS

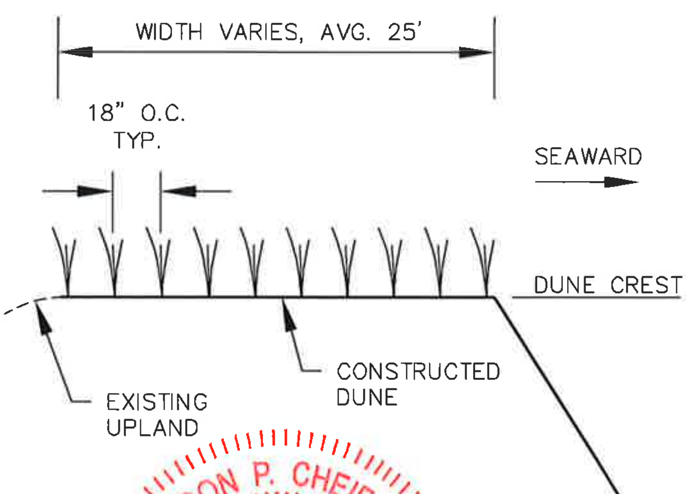
DATE: 2/27/19
BY: GK
COMM NO.: 631235714
SHEET: 26 of 29

PLANTING DETAIL

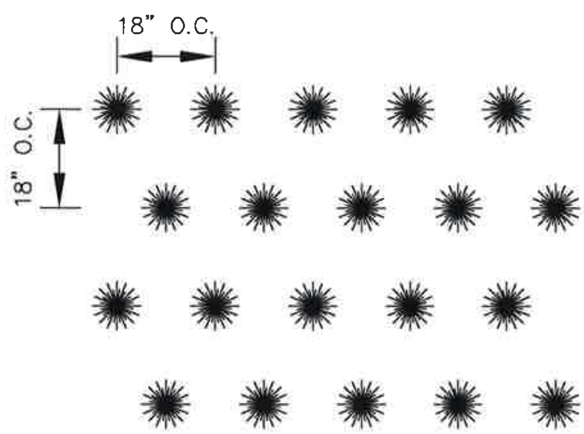
PLANT TYPE	SCIENTIFIC NAME	PERCENT DISTRIBUTION	QUANTITY (APPROX.)	SIZE	SPACING
SEA OATS	UNIOLA PANICULATA	80%	283,550	1" LINER	18" O.C.
BITTER PANICGRASS	PANICUM AMARUM	13%	46,080	1" LINER	18" O.C.
RAILROAD VINE	IPOMOEA PES-CAPRAE	4%	14,180	2" LINER	18" O.C.
DUNE SUNFLOWER	HELIANTHUS DEBILIS	3%	10,630	2" LINER	18" O.C.
TOTAL		100%	354,440		

PLANTING NOTES:

1. ALL PLANTING TO BE INSTALLED ON THE DUNE CREST. IN THE EVENT OF SURPLUS PLANT UNITS, PLANTS MAY BE INSTALLED ON THE UPPERMOST PORTION OF THE SEAWARD DUNE SLOPE OR LANDWARD OF THE CONSTRUCTED FILL TO ENHANCE AREAS OF EXISTING VEGETATION.
2. ALL PLANTINGS MUST BE OF NATIVE SPECIES.
3. ALL PLANTINGS SHALL BE AT A MINIMUM OF 6" BELOW THE SURROUNDING GRADE, AS MEASURED FROM THE TOP OF THE ROOT BALL TO THE SAND SURFACE.
4. ALL PLANTINGS SHALL BE IN STAGGERED ROWS SPACED AT 18" ON CENTER (O.C.).
5. DISTRIBUTION OF PLANTED SPECIES SHALL BE RANDOM ACROSS THE PLANTING AREA (18" O.C.).



TYPICAL DUNE PLANTING
CROSS SECTION
NOT TO SCALE



TYPICAL DUNE PLANTING
STAGGERED LAYOUT
NOT TO SCALE

NOT FOR CONSTRUCTION
FOR REGULATORY REVIEW ONLY

JORDON P. CHEIFET, P.E. No. 72876

2/27/19
DATE

REVISIONS		
DATE	BY	DESCRIPTION

INDIAN RIVER COUNTY, FL
SECTION 3 BEACH AND DUNE RENOURISHMENT PROJECT
PLANTING DETAIL

Aptim Environmental & Infrastructure, LLC
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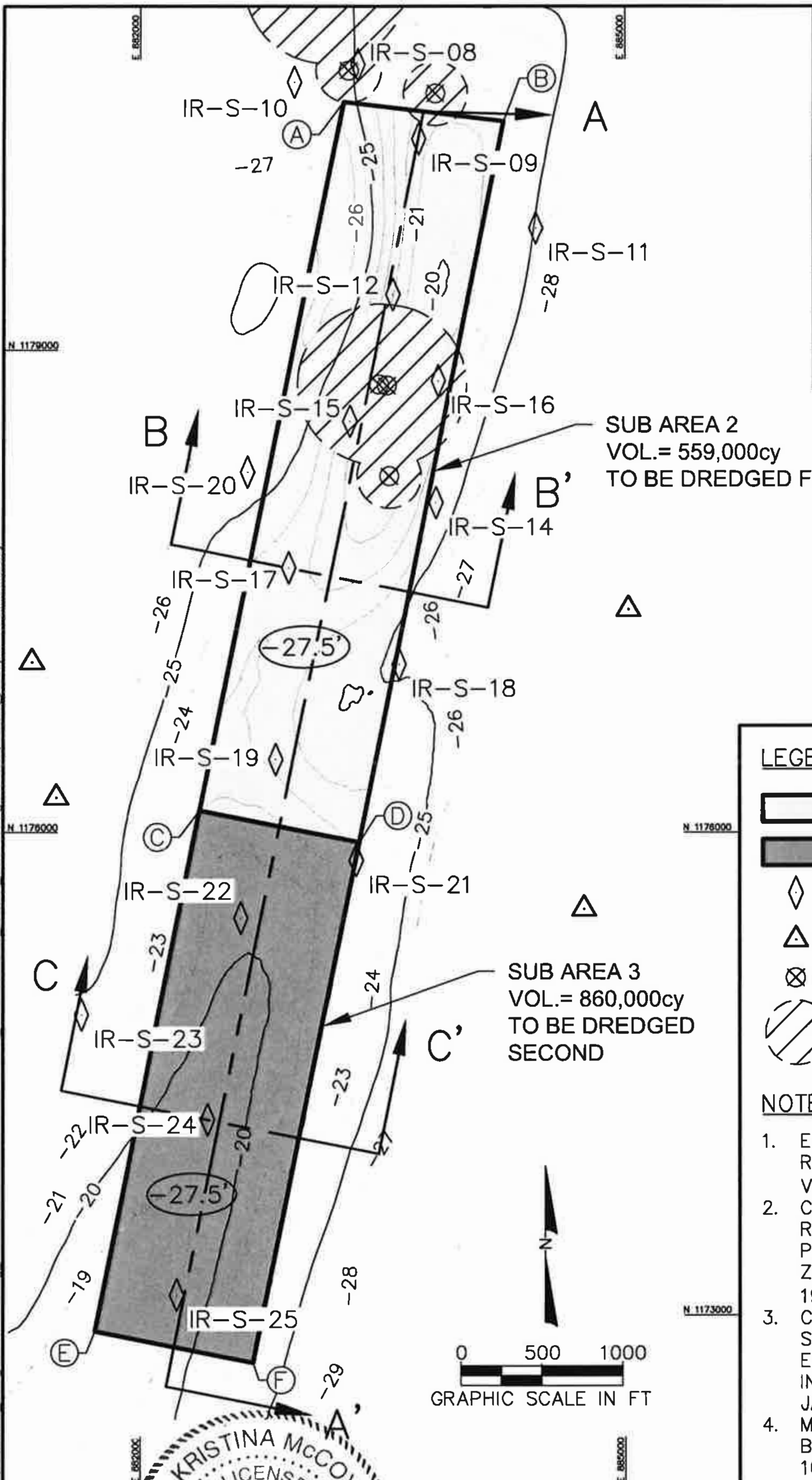
FAX (561) 391-9116
C.O.A. FL #4028

DATE: 2/27/19
BY: GK
COMM NO.: 631235714
SHEET: 27 of 29



BORROW AREA COORDINATE LOCATIONS

CORNER	NORTHING	EASTING
A	1180547.5	883253.0
B	1180426.0	884248.6
C	1176135.4	882367.8
D	1175938.7	883348.3
E	1172899.8	881718.7
F	1172703.1	882699.2

LEGEND:

- SUB AREA 2 BORROW AREA
- SUB AREA 3 BORROW AREA
- 1999 VIBRACORE
- DIVER VERIFIED HARDBOTTOM
- MAGNETIC ANOMALIES
- MAGNETIC ANOMALY NO DREDGE ZONE

NOTES:

1. ELEVATIONS ARE IN FEET REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
2. COORDINATES ARE IN FEET REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
3. CONTOURS GENERATED FROM A SURVEY CONDUCTED BY APTIM ENVIRONMENTAL AND INFRASTRUCTURE, LLC. DATED JANUARY, 2019.
4. MAGNETOMETER SURVEY CONDUCTED BY MORGAN & EKLUND DATED MAY 10-12, 2000.

INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RESTORATION PROJECT
OFFSHORE BORROW AREA - PLAN VIEW

Aptim Environmental & Infrastructure, LLC
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C.O.A. FL #4028

DATE: 2/14/20
BY: KM
COMM NO.: 631235714
SHEET: 28 of 29

REVISIONS

DATE	BY	DESCRIPTION

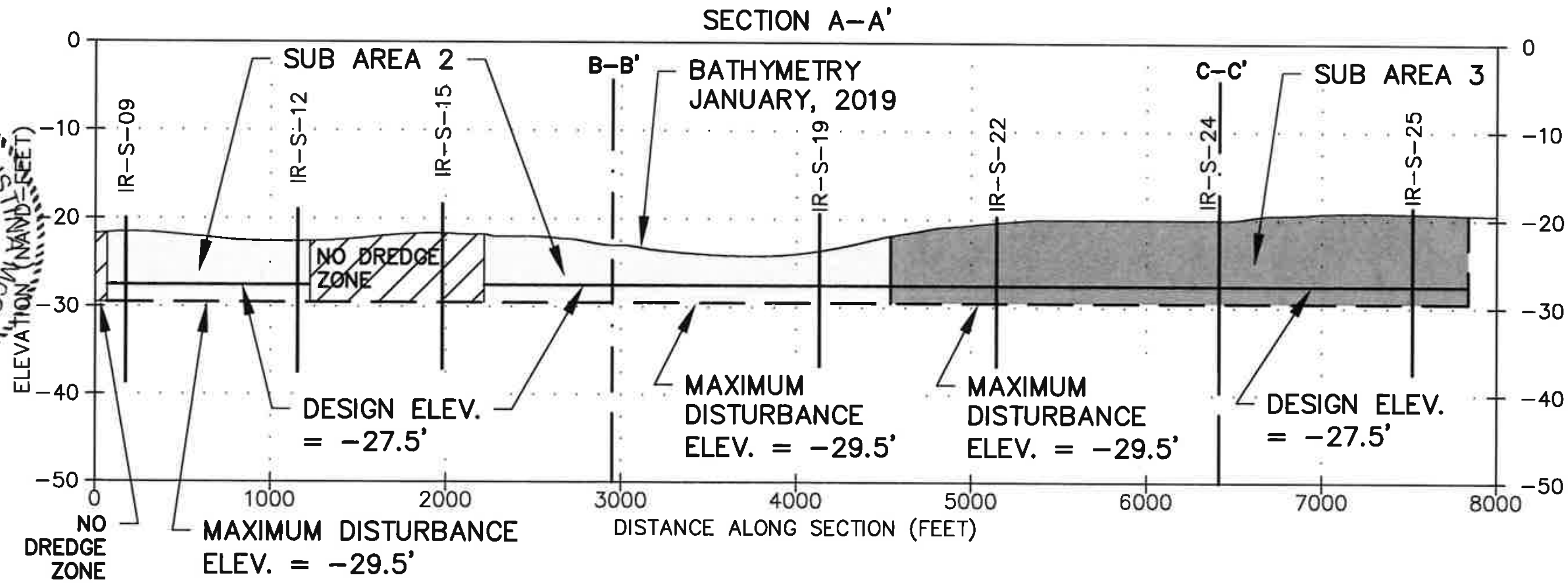
NOT FOR CONSTRUCTION
FOR REGULATORY REVIEW ONLY

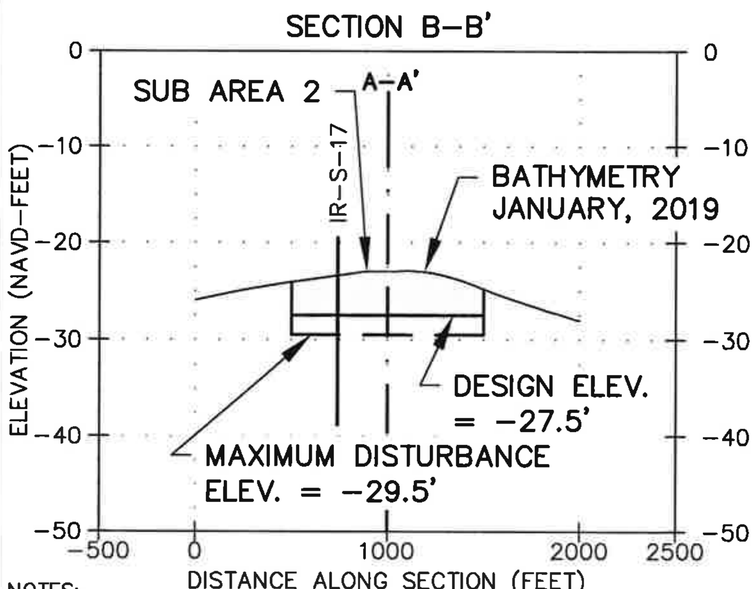
Kristina McCoy
KRISTINA MCCOY, P.G. No. 2718

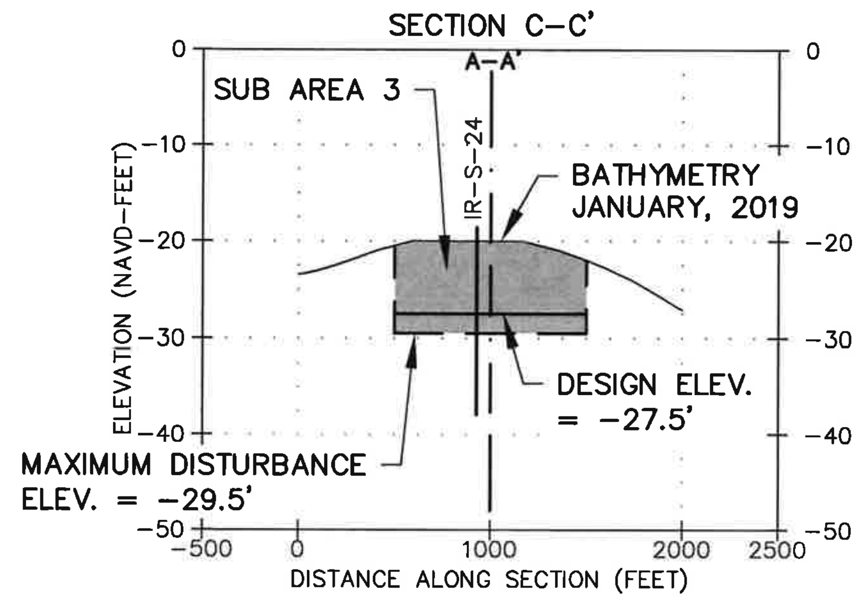
2/14/20
DATE

KRISTINA McCOY LICENSE No. PG2718 STATE OF FLORIDA PROFESSIONAL GEOLOGIST

P:\Indian River\2017 - Sector 3 WO#2_Design and Permitting_631235714\Cad\Permits\631235714P_BA Cut to -27.5_revised_021220.dwg - Feb 14, 2020 @ 3:04pm - Kristina.McCoy







NOTES:

1. ELEVATIONS ARE IN FEET REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD).
2. THE MAXIMUM AFTER DREDGE (AD) ELEVATIONS ARE THE MAX ELEVATIONS ALLOWED WITHIN THE BORROW AREA PER THE PERMITS AND BASED ON THE AD SURVEY.
3. THE CONTRACTOR MAY DISTURB UP TO 2 FEET BENEATH THE MAX AD ELEVATION WITH THEIR EQUIPMENT.

0 10 20 VERTICAL SCALE IN FT

0 500 1000 HORIZONTAL SCALE IN FT

NOT FOR CONSTRUCTION
FOR REGULATORY REVIEW ONLY

KRISTINA MCCOY, P.G. No. 2718

KRISTINA McCOY No. 2718 STATE OF FLORIDA PROFESSIONAL GEOLOGIST

2/14/20
DATE

REVISIONS		
DATE	BY	DESCRIPTION

Aptim Environmental & Infrastructure, LLC
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BOCA RATON, FLORIDA 33431
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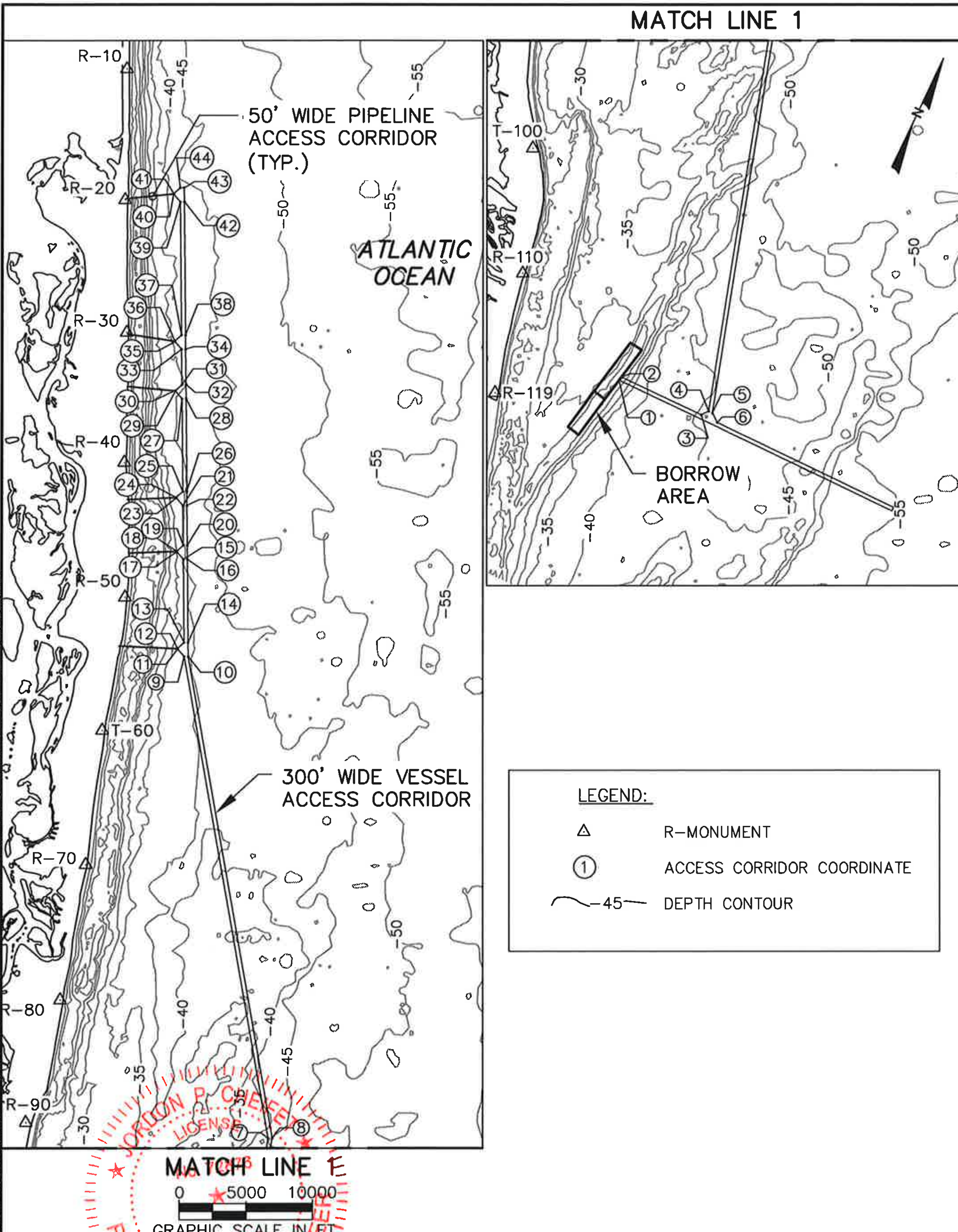
FAX (561) 391-9116
C.O.A. FL #4028

TITLE:

INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RESTORATION PROJECT
OFFSHORE BORROW AREA - CROSS SECTIONS

DATE: 2/14/20
BY: KM
COMM NO.: 631235714
SHEET: 29 of 29



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JORDON P. CHEIFET, P.E. No. 72876

4/4/19
DATE

REVISIONS		
DATE	BY	DESCRIPTION
4/4/19	JPC	CORPS COMMENTS

INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT
VESSEL AND PIPELINE CORRIDOR PLAN VIEW

Aptim Environmental & Infrastructure, LLC
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BOCA RATON, FLORIDA 33431
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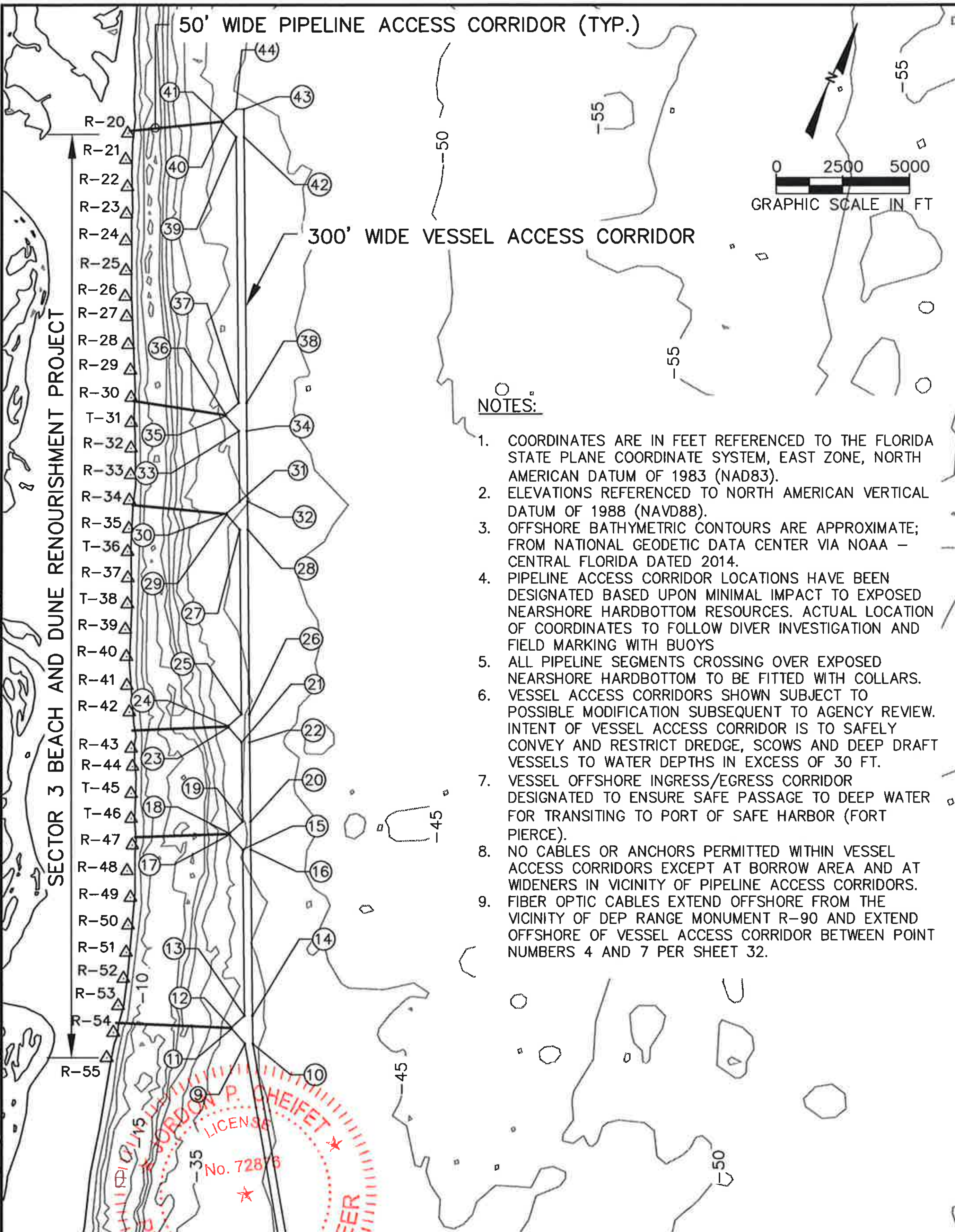
PH. (561) 391-8102
FAX (561) 391-9116
C.O.A. FL #4028

DATE: 2/27/19
BY: GK
COMM NO.: 631235714
SHEET: 30 of 32



NOTES:

1. COORDINATES ARE IN FEET REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
2. ELEVATIONS REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
3. OFFSHORE BATHYMETRIC CONTOURS ARE APPROXIMATE; FROM NATIONAL GEODETIC DATA CENTER VIA NOAA – CENTRAL FLORIDA DATED 2014.
4. PIPELINE ACCESS CORRIDOR LOCATIONS HAVE BEEN DESIGNATED BASED UPON MINIMAL IMPACT TO EXPOSED NEARSHORE HARDBOTTOM RESOURCES. ACTUAL LOCATION OF COORDINATES TO FOLLOW DIVER INVESTIGATION AND FIELD MARKING WITH BUOYS
5. ALL PIPELINE SEGMENTS CROSSING OVER EXPOSED NEARSHORE HARDBOTTOM TO BE FITTED WITH COLLARS.
6. VESSEL ACCESS CORRIDORS SHOWN SUBJECT TO POSSIBLE MODIFICATION SUBSEQUENT TO AGENCY REVIEW. INTENT OF VESSEL ACCESS CORRIDOR IS TO SAFELY CONVEY AND RESTRICT DREDGE, SCOWS AND DEEP DRAFT VESSELS TO WATER DEPTHS IN EXCESS OF 30 FT.
7. VESSEL OFFSHORE INGRESS/EGRESS CORRIDOR DESIGNATED TO ENSURE SAFE PASSAGE TO DEEP WATER FOR TRANSITING TO PORT OF SAFE HARBOR (FORT PIERCE).
8. NO CABLES OR ANCHORS PERMITTED WITHIN VESSEL ACCESS CORRIDORS EXCEPT AT BORROW AREA AND AT WIDENERS IN VICINITY OF PIPELINE ACCESS CORRIDORS.
9. FIBER OPTIC CABLES EXTEND OFFSHORE FROM THE VICINITY OF DEP RANGE MONUMENT R-90 AND EXTEND OFFSHORE OF VESSEL ACCESS CORRIDOR BETWEEN POINT NUMBERS 4 AND 7 PER SHEET 32.

INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT
VESSEL AND PIPELINE CORRIDOR PLAN VIEW

Aptim Environmental & Infrastructure, LLC
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DATE: 2/27/19
BY: GK
COMM NO.: 631235714
SHEET: 31 of 32

NOT FOR CONSTRUCTION
FOR REGULATORY REVIEW ONLY

JORDON P. CHEIFET, P.E. No. 72876

4/4/19
DATE

JORDON P. CHEIFET LICENSE No. 72876 STATE OF FLORIDA PROFESSIONAL ENGINEER

REVISIONS

DATE	BY	DESCRIPTION
4/4/19	JPC	CORPS COMMENTS

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VESSEL ACCESS CORRIDOR POINT TABLE		
POINT #	NORTHING	EASTING
1	1177663.98	883694.44
2	1177963.98	883754.63
3	1177963.99	890327.42
4	1178444.04	890687.60
5	1178444.04	891000.07
6	1177963.99	891639.89
7	1206090.57	882635.31
8	1206228.82	882907.52
9	1235803.80	861526.47
10	1235935.46	861796.03
11	1236097.00	860832.00
12	1236142.35	860809.85
13	1236747.69	861065.43
14	1236879.36	861335.00
15	1242319.80	858343.47
16	1242451.46	858613.03
17	1242613.00	857649.00
18	1242658.35	857626.85
19	1243263.69	857882.43
20	1243395.36	858152.00
21	1245928.80	856581.47
22	1246060.46	856851.03

VESSEL ACCESS CORRIDOR POINT TABLE		
POINT #	NORTHING	EASTING
23	1246222.00	855887.00
24	1246267.35	855864.85
25	1246872.69	856120.43
26	1247004.36	856390.00
27	1253075.80	853090.47
28	1253207.46	853360.03
29	1253369.00	852396.00
30	1253414.35	852373.85
31	1254019.69	852629.43
32	1254151.36	852899.00
33	1256390.80	851470.47
34	1256522.46	851740.03
35	1256684.00	850776.00
36	1256729.35	850753.85
37	1257334.69	851009.43
38	1257466.36	851279.00
39	1266266.80	846647.47
40	1266560.00	845953.00
41	1266605.35	845930.85
42	1266398.46	846917.03
43	1267342.36	846456.00
44	1267210.69	846186.43

JORDON P. CHEIFET LICENSE No. 72876 STATE OF FLORIDA PROFESSIONAL ENGINEER

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JORDON P. CHEIFET, P.E. No. 72876

3/15/19
DATE

REVISIONS		
DATE	BY	DESCRIPTION

INDIAN RIVER COUNTY, FL
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT
VESSEL AND PIPELINE CORRIDOR POINT TABLE

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DATE: 2/27/19
BY: GK
COMM NO.: 631235714
SHEET: 32 of 32

FLORIDA DEPARTMENT OF
Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Noah Valenstein
Secretary

CONSOLIDATED JOINT COASTAL PERMIT AND SOVEREIGN SUBMERGED LANDS AUTHORIZATION

PERMITTEE:
Indian River County
Attn: Richard Szpyrka
1801 27th Street, Building A
Vero Beach, Florida 32960
rszpyrka@ircgov.com

AGENT:
APTIM
Attn: Doris Otero
2481 N.W. Boca Raton Blvd.
Boca Raton, Florida 33431
Doris.Otero@aptim.com

PERMIT INFORMATION:
Permit Number: 0285993-009-JC

Project Name: Indian River County Sector 3 Beach and Dune Nourishment Project

County: Indian River

Issuance Date: July 17, 2020

Expiration Date: July 17, 2035

REGULATORY AUTHORIZATION:

This permit is issued under the authority of Chapter 161 which includes consideration of the provisions contained in Part IV of Chapter 373, Florida Statutes (F.S.), and Title 62, Florida Administrative Code (F.A.C.). Pursuant to Operating Agreements executed between the Department of Environmental Protection (Department) and the water management districts, as referenced in Chapter 62-113, F.A.C., the Department is responsible for reviewing and taking final agency action on this activity.

PROJECT DESCRIPTION:

The project is to nourish the beach and dunes along approximately 6.6 miles of the Indian River County shoreline. Sand for the project will either be pumped to the project site from the offshore South Borrow Area or truck hauled from an approved upland sand source. The approved upland sand sources are the Vulcan Materials' Diamond, Witherspoon, and Sandland mines; the Stewart Mining Industries' Capron Trail mine; and the Jahna Industries' Independent North, Independent South, and Greenbay mines.

The authorized design template consists of dune and berm placement. The dune features a variable crest height between +11 and +15 feet NAVD, a backdune slope of 5:1 (Horizontal:Vertical) and a foredune slope of 3:1. Native dune vegetation will be planted on the constructed dune crest, as necessary. The berm features a variable width between 0 and 12 feet, a crest elevation varying between +7 and +8 feet NAVD, and a 10:1 foreslope from the seaward edge of the berm crest to existing grade.

Five upland staging and truck haul access areas have been authorized along the beach restoration site: Treasure Shores Beach Park (R-24.5 to R-25.6), Golden Sands Beach Park (R-31.8 to R-32.5), Wabasso Beach Park and the adjacent beach access (R-39.8), Sea Grape Trail (R-47.4) and Turtle Trail (R-51.5).

PROJECT LOCATION:

The beach and dune restoration site is located along approximately 6.6 miles of beach east of US Highway A1A between R-20 and R-55, in Indian River County; Section 1, Township 32 South, Range 39 East; Section 6, Township 32 South, Range 40 East; and Sections 3, 10, 14, 15, 23, 25, 26, and 36, Township 31 South, Range 39 East; Atlantic Ocean, Class III Waters. Portions of the project are located within the Archie Carr National Wildlife Refuge, which is designated as Outstanding Florida Waters. The South Borrow Area is located approximately 10,000 feet offshore, positioned between R-105 and R-119, just north of the Indian River County/St. Lucie County border.

PROPRIETARY AUTHORIZATION:

This activity also requires a proprietary authorization, as the activity is located on sovereign submerged lands held in trust by the Board of Trustees of the Internal Improvement Trust Fund (Board of Trustees), pursuant to Article X, Section 11 of the Florida Constitution, and Sections 253.002 and 253.77, F.S. The activity is not exempt from the need to obtain a proprietary authorization. The Board of Trustees delegated, to the Department, the responsibility to review and take final action on this request for proprietary authorization in accordance with Section 18-21.0051, F.A.C., and the Operating Agreements executed between the Department and the water management districts, as referenced in Chapter 62-113, F.A.C. This proprietary authorization has been reviewed in accordance with Chapter 253, Chapter 18-21 and Section 62-330.075, F.A.C., and the policies of the Board of Trustees.

The Department has also determined that the beach and dune renourishment activity qualifies for a Letter of Consent to use sovereign, submerged lands, as long as the work performed is located within the boundaries as described herein and is consistent with the terms and conditions herein. Therefore, consent is hereby granted, pursuant to Chapter 253.77, F.S., to perform the activity on the specified sovereign submerged lands.

As staff to the Board of Trustees, the Department has reviewed the project described above, and has also determined that dredging of the borrow area requires a public easement for the use of those lands, pursuant to Chapter 253.77, F.S. The Department intends to modify the existing public easement, subject to the conditions outlined in the previously issued *Consolidated Intent to Issue* and in the Recommended Proprietary Action (entitled *Delegation of Authority*).

The final documents required to execute the modification of Public Easement No. 40034 have been sent to the Department's Division of State Lands. The Department intends to issue the easement upon satisfactory execution of those documents. **You may not begin construction of this activity on state-owned, sovereign submerged lands until the easement has been executed to the satisfaction of the Department.**

COASTAL ZONE MANAGEMENT:

This permit constitutes a finding of consistency with Florida's Coastal Zone Management Program, as required by Section 307 of the Coastal Zone Management Act.

WATER QUALITY CERTIFICATION:

This permit constitutes certification of compliance with state water quality standards pursuant to Section 401 of the Clean Water Act, 33 U.S.C. 1341.

OTHER PERMITS:

Authorization from the Department does not relieve you from the responsibility of obtaining other permits (Federal, State, or local) that may be required for the project. Failure to obtain Corps authorization prior to construction could subject you to federal enforcement action by that agency.

AGENCY ACTION:

The above-named Permittee is hereby authorized to construct the work that is outlined in the Project Description and Project Location of this permit and as shown on the approved permit drawings, plans and other documents attached hereto. This agency action is based on the information submitted to the Department as part of the permit application, and adherence with the final details of that proposal shall be a requirement of the permit. **This permit and authorization to use sovereign submerged lands are subject to the General Conditions, General Consent Conditions, Specific Conditions, and attached Plans which are a binding part of this permit and authorization.** Both the Permittee and their Contractor are responsible for reading and understanding this permit (including the permit conditions and the approved permit drawings) prior to commencing the authorized activities, and for ensuring that the work is conducted in conformance with all the terms, conditions and drawings.

GENERAL CONDITIONS:

1. All activities authorized by this permit shall be implemented as set forth in the project description, permit drawings, plans and specifications approved as a part of this permit, and all conditions and requirements of this permit. The Permittee shall notify the Department in writing of any anticipated deviation from the permit prior to implementation so that the Department can determine whether a modification of the permit is required pursuant to Rule 62B-49.008, F.A.C.

2. If, for any reason, the Permittee does not comply with any condition or limitation specified in this permit, the Permittee shall immediately provide the Department and the appropriate District office of the Department with a written report containing the following information: a description of and cause of noncompliance; and the period of noncompliance, including dates and times; and, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

3. This permit does not eliminate the necessity to obtain any other applicable licenses or permits that may be required by federal, state, local or special district laws and regulations. This permit is not a waiver or approval of any other Department permit or authorization that may be required for other aspects of the total project that are not addressed in this permit.

4. Pursuant to Sections 253.77 and 373.422, F.S., prior to conducting any works or other activities on state-owned submerged lands, or other lands of the state, title to which is vested in the Board of Trustees, the Permittee must receive all necessary approvals and authorizations under Chapters 253 and 258, F.S. Written authorization that requires formal execution by the Board of Trustees shall not be considered received until it has been fully executed.

5. Any delineation of the extent of a wetland or other surface water submitted as part of the permit application, including plans or other supporting documentation, shall not be considered specifically approved unless a specific condition of this permit or a formal determination under Section 373.421(2), F.S., provides otherwise.

6. This permit does not convey to the Permittee or create in the Permittee any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the Permittee. The issuance of this permit does not convey any vested rights or any exclusive privileges.

7. This permit or a copy thereof, complete with all conditions, attachments, plans and specifications, modifications, and time extensions shall be kept at the work site of the

permitted activity. The Permittee shall require the contractor to review the complete permit prior to commencement of the activity authorized by this permit.

8. The Permittee, by accepting this permit, specifically agrees to allow authorized Department personnel with proper identification and at reasonable times, access to the premises where the permitted activity is located or conducted for the purpose of ascertaining compliance with the terms of the permit and with the rules of the Department and to have access to and copy any records that must be kept under conditions of the permit; to inspect the facility, equipment, practices, or operations regulated or required under this permit; and to sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

9. At least 48 hours prior to commencement of activity authorized by this permit, the Permittee shall electronically submit to the Department, by email at JCPCompliance@dep.state.fl.us, and the appropriate District office of the Department a written notice of commencement of construction indicating the actual start date and the expected completion date and an affirmative statement that the Permittee and the contractor, if one is to be used, have read the general and specific conditions of the permit and understand them.

10. If any prehistoric or historic artifacts, such as pottery or ceramics, stone tools or metal implements, shipwreck remains or anchors, dugout canoes or other physical remains that could be associated with Native American cultures, or early Colonial or American settlement are encountered at any time within the project site area, the permitted project shall cease all activities involving subsurface disturbance in the immediate vicinity of such discoveries. The Permittee, or other designee, shall contact the Florida Department of State, Division of Historical Resources, Compliance and Review Section at (850)245-6333 or (800)847-7278, as well as the appropriate permitting agency office. Project activities shall not resume without verbal and/or written authorization from the Division of Historical Resources. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately and the proper authorities notified in accordance with Section 872.05, F.S.

11. Within 30 days after completion of construction or completion of a subsequent maintenance event authorized by this permit, the Permittee shall electronically submit to the Department, by email at JCPCompliance@dep.state.fl.us, and the appropriate District office of the Department a written statement of completion and certification by a registered professional engineer. This certification shall state that all locations and elevations specified by the permit have been verified; the activities authorized by the permit have been performed in compliance with the plans and specifications approved as a part of the permit, and all conditions of the permit; or shall describe any deviations from the plans and specifications, and all conditions of the permit. When the completed activity differs substantially from the permitted plans, any substantial deviations shall be

noted and explained on as-built drawings electronically submitted to the Department, by email at JCPCompliance@dep.state.fl.us.

GENERAL CONSENT CONDITIONS:

1. Authorizations are valid only for the specified activity or use. Any unauthorized deviation from the specified activity or use and the conditions for undertaking that activity or use shall constitute a violation. Violation of the authorization shall result in suspension or revocation of the grantee's use of the sovereignty submerged land unless cured to the satisfaction of the Board.

2. Authorizations convey no title to sovereignty submerged land or water column, nor do they constitute recognition or acknowledgment of any other person's title to such land or water.

3. Authorizations may be modified, suspended or revoked in accordance with their terms or the remedies provided in Sections 253.04 and 258.46, F.S., or Chapter 18-14, F.A.C.

4. Structures or activities shall be constructed and used to avoid or minimize adverse impacts to sovereignty submerged lands and resources.

5. Construction, use or operation of the structure or activity shall not adversely affect any species that is endangered, threatened or of special concern, as listed in Rules 68A-27.003, 68A-27.004 and 68A-27.005, F.A.C.

6. Structures or activities shall not unreasonably interfere with riparian rights. When a court of competent jurisdiction determines that riparian rights have been unlawfully affected, the structure or activity shall be modified in accordance with the court's decision.

7. Structures or activities shall not create a navigational hazard.

8. Structures shall be maintained in a functional condition and shall be repaired or removed if they become dilapidated to such an extent that they are no longer functional. This shall not be construed to prohibit the repair or replacement subject to the provisions of Rule 18-21.005, F.A.C., within one year, of a structure damaged in a discrete event such as a storm, flood, accident or fire.

9. Structures or activities shall be constructed, operated and maintained solely for water dependent purposes, or for non-water dependent activities authorized under paragraph 18-21.004(1)(f), F.A.C., or any other applicable law.

SPECIFIC CONDITIONS:

1. Unless otherwise specified in the specific conditions of this permit all submittals required herein (e.g., progress reports, water-quality reports etc.) shall be electronically submitted (via e-mail, file transfer site or hard drive). Email submittals shall be sent to the Department's JCP Compliance Officer (e-mail address: JCPCompliance@dep.state.fl.us). If a file transfer site is used, a link shall be e-mailed to the JCP Compliance Officer. If data are too large to be submitted via e-mail or file transfer site, the Permittee may submit the data via an external hard drive, provided by the Permittee. The external hard drive shall be mailed to:

   Department of Environmental Protection
   Office of Resilience and Coastal Protection
   Attn: JCP Compliance Officer
   2600 Blair Stone Road, Mail Station 3566
   Tallahassee, FL 32399-2400

2. The Permittee shall not store or stockpile tools, equipment, or materials within littoral zones or elsewhere within surface waters of the state without prior written approval from the Department. Storing, stockpiling, or accessing equipment on, in, over, or through areas with benthic biological resources (including beds of submerged aquatic vegetation, wetlands, oyster reefs, or hardbottom) is prohibited unless it occurs within a work area or ingress / egress corridor that is specifically approved by this permit and is shown on the approved permit drawings. Anchoring or spudding of vessels and barges within areas with benthic biological resources (including beds of aquatic vegetation, oyster reefs, or hardbottom) is also prohibited.

3. The Permittee shall not conduct project operations or store project-related equipment in, on or over dunes, or otherwise impact dune vegetation, outside the approved staging, beach access and dune restoration areas designated in the permit drawings.

4. The terms, conditions and provisions of the required easement (No. 40034) shall be met. Construction of this activity shall not commence on sovereign submerged lands, title to which is held by the Board of Trustees, until all easement documents have been executed to the satisfaction of the Department.

5. For each construction event under this permit, no work shall commence until the Permittee has satisfactorily submitted all information noted in this condition. At least **45** days prior to commencement of construction, the Permittee shall submit the following items for review by the Department. Unless otherwise notified by the Department within 15 days of receipt of all information specified below, the Permittee shall assume the submittals are satisfactory:

a. An electronic copy of detailed ***final construction plans and specifications*** for all authorized activities. The plans and specifications must be consistent with the project description, conditions and approved drawings of this permit. These documents shall be certified by a professional engineer (P.E.), who is registered in the State of Florida. The Permittee shall point out any deviations from the Project Description of this permit (as stated above) or the approved permit drawings (attached to this permit), and any significant changes that would require a permit modification. The plans and specifications shall include a description of the dredging and construction methods to be utilized and drawings and surveys that show all biological resources and work spaces (e.g., anchoring areas, pipeline corridors, staging areas, boat access corridors, etc.) to be used for this project.

b. ***Turbidity Monitoring:*** In order to assure that turbidity levels do not exceed the compliance standards established in this permit, construction at the project site shall be monitored closely by an independent third party with formal training in water quality monitoring and professional experience in turbidity monitoring for coastal construction projects. Also, an individual familiar with beach construction techniques and turbidity monitoring shall be present at all times when turbidity generating activities are occurring. This individual shall have authority to alter construction techniques or shut down the dredging or beach construction operations if turbidity levels exceed the compliance standards established in this permit.

    i. ***Qualifications***: The names, credentials (demonstrating experience and qualifications) and 24-hour contact information of those individuals performing these functions;

    ii. A ***Scope of Work*** for the turbidity monitoring to ensure that the right equipment is available to conduct the monitoring correctly at any location, and under any conditions;

    iii. ***Draft turbidity sampling map.*** An example of the geo-referenced map that will be provided with turbidity reports, including aerial photography and the boundaries of biological resources and/or OFW (pursuant to Specific Condition 29)

c. **Fish & Wildlife Monitoring Qualifications:** To ensure that individuals conducting monitoring of fish and wildlife resources have appropriate qualifications, the Permittee shall provide documentation demonstrating expertise/experience in surveying the types of resources that are present in the project. The Department and the Florida Fish and Wildlife Conservation Commission (FWC) will review this information for confirmation that the monitors are capable of meeting the requirements in this authorization. This documentation shall include the following:

i. ***Marine Turtle Protection****:* Monitoring plan, including a list of the names and permit numbers for the Marine Turtle Permit Holders.

ii. ***Shorebird Protection****:* Monitoring plan, including a list of Bird Monitors with their contact information, summary of qualifications including bird identification skills and avian survey experience, proposed locations of shorebird survey routes, and the locations of travel routes.

d. **Biological Monitoring*:***

i. ***Qualifications.*** At least 30 days prior to conducting any surveys or monitoring, the Permittee shall submit the names and qualifications of the individuals performing biological surveys and monitoring via email to the JCP Compliance Officer for review by the Department (see Section 4.0 of the Biological Monitoring Plan). Individuals that will be performing biological surveys and monitoring shall be certified SCUBA divers, shall have a BS degree or higher in the study of marine biology or a comparable field, shall have scientific knowledge of local benthic marine hardbottom habitats and their flora and fauna, and shall have professional experience in conducting hardbottom monitoring surveys. If additional monitoring team(s) are subcontracted, or new staff are added to the monitoring team, proposed changes as well as names and qualifications of individuals shall be submitted by the Permittee to the JCP Compliance Officer for Department review at least 30 days prior to conducting any surveys or monitoring. The Permittee shall instruct, and is responsible for ensuring, that their selected biological monitoring firm provides training for new staff members and subcontractors on required survey and monitoring procedures and conducts QA/QC verification of their work;

ii. Prior to the initial (first) fill placement event ONLY, the Permittee shall submit ***Baseline Nearshore Hardbottom Monitoring Results***. The results of the full pre-construction (baseline) survey of nearshore hardbottom (see Sections 2.0 and 5.2.1 of the Biological Monitoring Plan).

iii. Prior to each construction event in which the borrow area will be the sand source and pipelines will be used to transport fill material to the placement area, the Permittee shall submit:

(1) ***Pipeline Corridor Hardbottom Survey Results***. All pre-construction pipeline corridor hardbottom survey data collected for the upcoming construction (nourishment) event (see Sections 3.1 and 5.2.2 of the Biological Monitoring Plan).

(2) ***Pipeline Corridor Hardbottom Survey Report***. A detailed pre-construction pipeline corridor survey report for the upcoming construction event (see Sections 3.2 and 5.2.2 of the Biological Monitoring Plan and Specific Condition 30 of this permit).

(3) ***Post-Placement Pre-Pumping Pipeline Survey Results***. When required (see Section 3.3 of the approved Biological Monitoring Plan and see Specific Condition 30 of this Permit). Post-placement pre-pumping pipeline Survey Data shall be submitted to the JCP Compliance officer 72 hours prior to the intended or actual start of pumping. See Section 5.2.3 of the Biological Monitoring Plan for reporting requirements.

e. Documentation from the U.S. Fish and Wildlife Service (FWS) that this work will be covered under a Statewide Programmatic **Biological Opinion** or a Biological Opinions (BO) issued for construction on this project site. If the BO contains conditions that are not already contained herein, a permit modification may be required prior to construction to include those additional conditions.

f. Documentation confirming that the approved upland source is currently producing the quantity and quality of the authorized sand product required for the upcoming event, as required by Specific Condition 26.

g. Documentation that the modification of ***Public Easement*** No. 40034 has been executed to the satisfaction of the Department.

h. ***Pre-Construction Conference.*** **After all items required by a through g above have been submitted to the Department,** the Permittee shall conduct a pre-construction conference to review the specific conditions and monitoring requirements of this permit with the Permittee's contractors, the engineer of record, those responsible for turbidity monitoring, those responsible for protected species monitoring, staff representatives of the Fish and Wildlife Conservation Commission (FWC) and the JCP Compliance Officer (or designated alternate) prior to each construction event. In order to ensure that appropriate representatives are available, at least twenty-one (21) days prior to the intended commencement date for the permitted construction, the Permittee is advised to contact the Department, and the other agency representatives listed below:

DEP, JCP Compliance Officer
e-mail: JCPCompliance@dep.state.fl.us

FWC, Imperiled Species Management Section
e-mail: marineturtle@myfwc.com

FWC, Regional Biologist
Contact list: http://myfwc.com/conservation/you-conserve/wildlife/shorebirds/

The Permittee is also advised to schedule the pre-construction conference at least a week prior to the intended commencement date. At least seven (7) days in advance of the pre-construction conference, the Permittee shall provide written notification, advising the participants of the agreed-upon date, time and location of the meeting, and also provide a meeting agenda and a teleconference number.

If the actual construction start date is different from the expected start date proposed during the preconstruction conference, at least 48 hours prior to the commencement of each construction event, the Permittee shall ensure that notification is sent to the FWC, at marineturtle@myfwc.com, indicating the actual start date and the expected completion date. The Permittee shall also ensure that all contracted workers and observers are provided a copy of all permit conditions.

6. When discharging slurried sand onto the beach from a pipeline, the Permittee shall employ best management practices (BMPs) to reduce turbidity. At a minimum, these BMPs shall include the following:

   a. Use of shore-parallel sand dike to promote settlement of suspended sediment on the beach before return water from the dredged discharge reenters the Atlantic Ocean; and

   b. The pipeline discharge location shall be a minimum of 50 feet landward from open water. If 50 feet is not attainable due to a narrow beach berm, the pipeline discharge location shall be placed as far landward on the beach berm as possible without disturbing the dune.

7. Sediment quality shall be assessed as outlined in the offshore and upland Sediment QA/QC Plans (as appropriate for the source), dated May 26, 2020. Placement of material that is not in compliance with the Plan shall be handled according to the protocols set forth in the Sediment QA/QC Plan. The sediment testing result shall be submitted to The Department within 90 days following the completion of beach construction. The following requirements are included in the Sediment QA/QC Plan:

   a. If, during construction, the Permittee determines that the beach fill material does not comply with the sediment compliance specifications, the Permittee shall take measures to avoid further placement of noncompliant fill, and the sediment inspection results shall be reported to the Department.

   b. The Permittee shall submit post-construction sediment testing results and an analysis report as outlined in the Sediment QA/QC plan to the Department within 90 days following beach construction. The sediment testing results will be certified by a P.E.

or P.G. from the testing laboratory. A summary table of the sediment samples and test results for the sediment compliance parameters as outlined in Table 1 of the Sediment QA/QC plan shall accompany the complete set of laboratory testing results. A statement of how the placed fill material compares to the sediment analysis and volume calculations from the geotechnical investigation shall be included in the sediment testing results report.

c. A post-remediation report containing the site map, sediment analysis, and volume of noncompliant fill material removed and replaced shall be submitted to the Department within 7 days following completion of remediation activities.

8. The following upland sand source products were reviewed and authorized for use in this project: (1) Beach Sand product from the Vulcan Materials' Diamond, Witherspoon, and Sandland mines; (2) BCH450 and BCH320 products from the Stewart Mining Industries' Fort Pierce mine; and (3) Beach Sand product from Jahna Industries' Independent – North, Independent – South, and Greenbay mines. Any additional upland sand sources will require review and authorization through the permit modification process.

9. Prior to each construction event, the Permittee (or Permittee's Representative) shall submit documentation confirming that the authorized upland sand source(s) is currently producing both the quantity and quality of the authorized sand product(s) to meet the needs of the upcoming event. The documentation shall be signed and sealed by a Registered Professional in the State of Florida (i.e., a P.E. or P.G.) and shall indicate the name(s) of the product(s), the upland sand source(s) and the approximate volume (per product per source) needed for the upcoming event. The Permittee shall submit the documentation to the Department as a preconstruction submittal item no later than 45 days prior to construction. *Note: If the upland source(s) is no longer producing a product consistent with the approved Sediment QA/QC plan, a permit modification will be required to authorize an alternate source.*

10. **In-water Activity.** The Permittee shall adhere to the following requirements for all in-water activity:

a. The Permittee shall instruct all personnel associated with the project about the presence of marine turtles and manatees, and the need to avoid collisions with (and injury to) these protected marine species. The Permittee shall be responsible for harm to these resources and shall require their contractors to advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees or marine turtles, which are protected under the Endangered Species Act, the Marine Mammal Protection Act, the Marine Turtle Protection Act and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate project area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels shall follow routes of deep water whenever possible.

c. Siltation or turbidity barriers (if used) shall be made of material in which manatees and marine turtles cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers shall not impede manatee or marine turtle movement or travel.

d. The Permittee is responsible for all on-site project personnel and shall require them to observe water-related activities for the presence of marine turtles and manatee(s). All in-water operations shall be immediately shall be shut down if a marine turtle or manatee comes within 50 feet of the operation. For unanchored vessels, operators shall disengage the propeller and drift out of the potential impact zone. If drifting would jeopardize the safety of the vessel then idle speed may be used to leave the potential impact zone. Activities shall not resume until the animal(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the animal(s) has not reappeared within 50 feet of the operation. Animals shall not be herded away or harassed into leaving.

e. Any collision with (or injury to) a marine turtle or manatee shall be reported immediately to the FWC Hotline at 1-888-404-3922, and to FWC at ImperiledSpecies@myFWC.com. Any collision with (and/or injury to) a marine turtle shall also be reported immediately to the Sea Turtle Stranding and Salvage Network (STSSN) at SeaTurtleStranding@myfwc.com.

f. Temporary signs concerning manatees shall be prominently posted prior to and during all in-water project activities, at sufficient locations to be regularly and easily viewed by all personnel engaged in water-related activities. Two temporary signs, which have already been approved for this use by the FWC, shall be posted at each location. One sign shall read "Caution Boaters – Watch for Manatees". A second sign measuring at least 8 ½" by 11", shall explain the requirements for "Idle Speed/No Wake" and the shutdown of in-water operations. All signs shall be removed by the Permittee upon completion of the project. These signs can be viewed at MyFWC.com/manatee. Questions concerning these signs can be sent to ImperiledSpecies@myFWC.com.

11. **Construction Area Project Lighting. No temporary lighting of the construction area is authorized at any time during the main portion of marine turtle nesting season (May 1 through October 31).** During early and late nesting season, direct lighting of the beach and nearshore waters shall be limited to the immediate area of active construction while meeting safety requirements as required by law. Lighting on offshore and onshore

equipment shall be minimized by reducing the number of fixtures, shielding, lowering the height and appropriately placing fixtures to avoid excessive illumination of the water's surface and nesting beach. The intensity of lighting shall be reduced to the minimum standard required for general construction area safety. Shields shall be affixed to the light housing on dredge and land-based lights and be large enough to block lamp light from being transmitted outside the construction area or to the adjacent marine turtle nesting beach. (Figure 1 below).

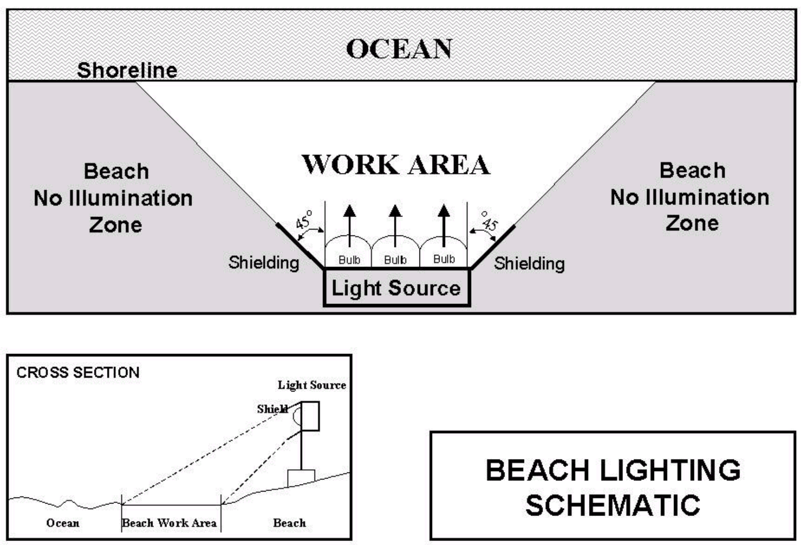


Figure 1

12. **All Beach Related Activities.** The Permittee shall adhere to the following requirements for all beach-related activities during marine turtle and shorebird nesting/breeding seasons (March 1 through October 31) in Indian River County.

   a. The Permittee shall require their contractor and protected species monitors to inspect all work areas that have excavations and temporary alteration of beach topography to determine which areas have deviations (such as depressions, ruts, holes and vehicle tracks) capable of trapping flightless shorebird chicks or marine turtle hatchlings each day. If so, the deviations shall be filled or leveled from the natural beach profile prior to 9:00 p.m. each day. The beach surface shall also be inspected after completion of the project, and all tracks, mounds, ridges or impressions, etc. left by construction equipment on the beach shall be smoothed and leveled.

   b. If any debris, including derelict construction or coastal armoring material, concrete and metal occurs on the beach placement site, it shall be removed from the beach to the maximum extent practicable prior to any placement of fill material. If debris removal activities will take place during protected species nesting seasons, the work shall be conducted during daylight hours only, and shall not commence until completion of daily monitoring surveys.

c. Equipment Storage and Placement. Staging areas and temporary storage for construction equipment and pipes shall be located off the beach to the maximum extent practicable during March 1 through October 31. Nighttime storage of construction equipment that is not in use shall be located off the beach. All construction pipes that are in use on the beach shall be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system, and if placed parallel to the dune shall be 5 to 10 feet away from the toe of the dune.

d. If it is necessary to extend construction pipes past a known shorebird nesting site, then 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. If such placement is not feasible for the project, FWC's Regional Biologist shall be contacted for alternative measures. See contacts available at http://myfwc.com/conservation/you-conserve/wildlife/shorebirds/contacts.

e. Beach Driving. All vehicles shall be operated at speeds less than 6 mph and run at or below the high-tide line. All personnel associated with the project shall be instructed about the potential presence of onsite protected species, and the need to avoid injury and disturbance to these species. In addition, all vehicles operated on the beach shall operate in accordance with the FWC's Best Management Practices for Operating Vehicles on the Beach (http://myfwc.com/conservation/you-conserve/wildlife/beach-driving/). *Note: when flightless chicks are present within or adjacent to travel corridors, construction-related vehicles shall not be driven through the corridor unless a Bird Monitor is present.*

13. **Dune Planting Conditions.** Planting of dune vegetation is encouraged outside of marine turtle nesting season. However, planting activities may occur during the marine turtle nesting season March 1 through October 31 under the following conditions:

a. It is the responsibility of the Permittee to ensure that the project area and access sites are surveyed for marine turtle nesting activity. All nest surveys and activities involving marine turtles shall be conducted only by persons with a valid FWC permit issued pursuant to Florida Administrative Code 68E-1. For information regarding marine turtle permit holders, contact the FWC at MTP@myfwc.com. a. Marine turtle nest surveys shall be initiated at the beginning of the nesting season or 65 days prior to installation of plants (whichever is later). Surveys shall continue until completion of the project or through September 15 (whichever is earliest). Surveys shall be conducted throughout the project area and all beach access sites.

b. Any nests deposited in the area shall be left in place. The marine turtle permit holder shall install an on-beach marker at any nest site and a secondary marker located at a point as far landward as possible to ensure that future location of the nest will be possible should the on-beach marker be lost. A series of stakes and survey ribbon or string shall be installed to establish an area of 3 feet radius surrounding the nest. No planting or other activity shall occur within this area nor shall any activity occur which might cause indirect impacts within this area. Nest sites shall be inspected daily to ensure nest markers have not been removed.

c. The use of heavy equipment (including vehicles such as trucks) is not authorized in marine turtle nesting habitat. A lightweight (ATV style) vehicle, with tire pressures of 10 p.s.i. or less can operate on the beach if required.

d. Any vegetation planting shall be installed by hand labor/tools only.

e. All activity shall be confined to daylight hours and shall not occur prior to the completion of all necessary marine turtle surveys and conservation activities within the project area. Nighttime storage of equipment or materials shall be off the beach.

f. In the event a nest is disturbed or uncovered during planting activity, the Permittee shall cease all work and immediately contact the marine turtle permit holder responsible for marine turtle conservation measures within the project area. If a nest(s) cannot be safely avoided during construction, all activity within the affected project area shall be delayed until complete hatching and emergence of the nest.

g. All planting related activities must avoid marked marine turtle nests including those that may be on the beach before and after the marine turtle nesting season dates (March 1 through October 31). Any impacts to nests or marine turtles that inadvertently occur shall be immediately reported the Florida Fish and Wildlife Conservation Commission (FWC) at MarineTurtle@myfwc.com, and all work shall stop until authorized to continue by the Department and FWC.

h. All irrigation lines for the dune restoration planting, if proposed, will be temporarily installed along the landward side of the dune only and will be removed once the plants have become established. Any watering necessary along the seaward side of the dune will be done by hand on an "as needed" basis.

14. **Marine Turtle Protection Conditions.** Beach nourishment shall occur outside of the main part of marine turtle nesting season, starting after October 31 and completed before May 1. During the May 1 through October 31 period, no construction equipment shall be placed or stored on the beach. Temporary approvals of work to extend into marine turtle nesting season may be authorized on a case by case basis. Such authorizations shall be in writing from the Department with FWC approval and accompanied by proof the

extension is covered under a valid Biological Opinion. If such an authorization is granted all conditions below shall be followed.

15. Construction-related activities are authorized to occur on the nesting beach (seaward of existing coastal armoring structures or dune crest and all sandy beach areas such as those used for beach access during the early nesting season (March 1 through May 1) and late nesting season (November 1 through November 30) under the following conditions:

    a. Daily early morning marine turtle nest surveys shall start at the beginning of marine turtle nesting season (March 1). Daily nesting surveys shall continue through November 30, or until two weeks after the last crawl in the project area, whichever is earlier.

    b. Daily nesting surveys shall be conducted beginning ½ hour prior to sunrise, and no construction activity may commence until completion of the marine turtle survey each day.

    c. The Permittee shall ensure that marine turtle nesting surveys are conducted as required in this authorization, and only conducted by personnel with a valid FWC Marine Turtle Permit, that covers all project activities as required by Chapter 68E-1, F.A.C. If needed, contact FWC at MTP@myfwc.com for information on the authorized Marine Turtle Permit Holders in the project area.

    d. Only those nests laid in the area where sand placement will occur shall be relocated, and nest relocation shall cease after the sand placement is completed. Nests requiring relocation shall be moved no later than 9 a.m., the morning following deposition (no longer than 12 hours from the time the eggs are laid), to a nearby self-release beach site in a secure setting, where artificial lighting will not interfere with hatchling orientation. The relocation site shall be determined in conjunction with and approved by FWC prior to nest relocations. Relocated nests shall not be placed in organized groupings. Relocated nests shall be randomly staggered along the length and width of beach settings that are not expected to experience any of the following: inundation by high tides; severe erosion; previous egg loss; or illumination by artificial lighting.

    e. Nests deposited within areas where construction activities will not occur for 65 days, or nests laid in the nourished berm prior to tilling, shall be marked and left in place. The Marine Turtle Permit Holder shall install on-beach markers at the nest site and shall also install a secondary marker at a point as far landward as possible to assure that the nest can be located should the on-beach marker be lost. No activity shall occur within the marked area, nor shall 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.

f. Beginning March 1, daytime surveys shall be conducted for leatherback marine turtle nests. Nighttime surveys for leatherback marine 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 and eggs shall be relocated per the preceding requirements. Since leatherbacks require at least 1.5 hours to complete nesting, the1-hour interval will ensure that all nesting leatherbacks are encountered.

16. **Fill Restrictions.** During the marine turtle nesting season, the contractor shall not advance the beach fill more than 500 feet along the shoreline between dusk and the following day, until the daily nesting survey is completed, and the beach has been cleared for fill advancement. If the 500-foot advancement limitation is not feasible for the project, an alternative distance shall be established during the preconstruction meeting, if a distance can be agreed upon in consultation with FWC. If the work area is extended, nighttime nesting surveys are required, and a Marine Turtle Permit Holder is required to be present on-site to ensure that no nesting and hatching marine turtles are present. 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 Marine Turtle Permit Holder responsible for nest monitoring has relocated the nest.

17. **Marine Turtle or Nest Encounters.** Upon locating a dead or injured marine turtle, a hatchling, or egg that may have been harmed or destroyed as a result of the project, the Permittee shall be responsible for notifying FWC Wildlife Alert at 1-888-404-FWCC (3922). Care shall be taken in handling injured marine turtles or exposed eggs to ensure effective treatment or disposition, and in handling dead specimens to preserve biological materials for later analysis. If a marine turtle nest is excavated during construction activities, but not as part of the authorized nest relocation process outlined in these specific conditions, the permitted person responsible for egg relocation for the project shall be notified immediately so the eggs can be moved to a suitable relocation site.

18. **Tilling, Compaction and Escarpment Remediation Requirements.** For the years after the first-year sand placement (out-year), compaction monitoring, tilling and escarpment monitoring are not required if placed material no longer remains on the dry beach.

a. **Compaction Sampling.** Sand compaction shall be monitored in the area of sand placement immediately after completion of the nourishment event, and two weeks prior to marine turtle nesting season, for three (3) subsequent years. 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 prior to the beginning of marine turtle nesting season. If a few values exceeding 500 psi are present randomly within the project area, tilling will not be required. Compaction monitoring shall be in accordance with the following protocol:

i. Compaction sampling stations shall be located at 500-foot intervals along the project area. 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).

ii. At each station, the cone penetrometer shall be pushed to depths of 6, 12 and 18 inches three times (i.e., 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 and/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 shall include all 18 values for each transect line, and the final 6 averaged compaction values.

iii. If values exceeding 500 psi are distributed throughout the project area, but do not exist at two adjacent stations at the same depth, then the Permittee shall consult with the FWC to determine if tilling is required. A tilling waiver based on these compaction values shall be submitted to the FWC at marineturtle@myfwc.com.

b. **Tilling Requirements.** If tilling is performed regardless of post-construction compaction levels or tilling is required based on compaction measurements, the area shall be tilled to a depth of 36 inches.

i. All tilling activity shall be completed prior to the marine turtle nesting season. If the project is completed during the marine turtle nesting season, tilling shall not be performed in areas where nests have been left in place or relocated.

ii. Each pass of the tilling equipment shall be overlapped to allow thorough and even tilling. A relatively even surface, with no deep ruts or furrows, shall be created during tilling. To do this, chain-linked fencing or other material shall be dragged over those areas as necessary after tilling.

iii. Tilling shall occur landward of the wrack line and shall avoid all naturally vegetated areas that are at least 3 square feet in size, as well as any planted areas that have been authorized by the Department. A 3-foot-wide No-Tilling buffer shall be maintained around vegetated areas. The slope between the mean high-water line and the mean low water line shall be maintained to approximate natural slopes.

c. **Escarpment Surveys.** Visual surveys for escarpments along the project area shall be made immediately after completion of sand placement, two weeks prior to marine turtle nesting season, and weekly for three (3) subsequent years, each year placed sand remains on the beach. Escarpment remediation shall be as follows:

i. Prior to marine turtle nesting season, escarpments that interfere with marine turtle nesting or that exceed 18 inches in height for a distance of at least 100 feet shall be leveled to the natural beach contour or the beach profile shall be reconfigured to minimize scarp formation. Any escarpment removal shall be reported relative to R- monument location to FWC at marineturtle@myfwc.com, with a copy sent to the JCP Compliance Officer.

ii. If weekly surveys during the marine turtle nesting season document escarpments that exceed 18 inches in height for a distance of at least 100 feet and have persisted for more than two weeks, the FWC shall be contacted immediately to determine the appropriate action to be taken. Submitted information shall include locations and measurements of the escarpments and marine turtle nests located within 20 feet of the escarpments, with photographs when possible. Upon written notification, the Permittee shall level escarpments in accordance with methods that minimize impacts to any existing nest in coordination with the FWC and the marine turtle permit holder. An annual summary of escarpment surveys and actions taken shall be submitted electronically to FWC (marineturtle@myfwc.com).

d. If compaction sampling, tilling or escarpment removal occurs during shorebird breeding season, the Shorebird Conditions (including surveys) included in this authorization shall be followed. No heavy equipment shall operate, and no compaction sampling or tilling shall occur within 300 feet of any shorebird nest. If flightless shorebird chicks are present within the work zone or equipment travel corridor, a Bird Monitor shall be present during the operation to ensure that no heavy equipment operates within 300 feet of the flightless young. It is the responsibility of the Permittee to ensure that their contractors avoid tilling, scarp removal or dune vegetation planting in areas where nesting birds are present.

19. **Post-Construction Monitoring and Reporting Marine Turtle Protection Conditions**

a. For each sand placement event, reports for all required marine turtle nesting surveys shall be provided for the post construction (partial or remaining) nesting season and for two full nesting seasons post construction in accordance with the Table 1 (below). If nesting and reproductive success is less than the criteria in the table below, an additional year of monitoring and reporting may be required. If criteria are not met, additional conditions prior to the next sand placement on this beach may be required by the Department and FWC.

b. Data shall be reported and summarized for the nourished areas in accordance with Table 1 (below). Reports shall summarize all crawl activity, hatching success of a representative sampling of nests left in place (if any) by species, project name and applicable project permit numbers and dates of construction. Data shall be submitted in electronic format (Excel spreadsheets) which are available upon request from marineturtle@myfwc.com. Reports shall be sent to the FWC Imperiled Species Management section at marineturtle@myfwc.com and **copied to** JCPCompliance@dep.state.fl.us. All summaries should be submitted by January 15th of the following year.

Table 1. Marine Turtle Monitoring for Beach Placement of Material

Date	**Duration**	**Variable**	**Criterion**
Nesting Success	Year of in-season construction and two entire nesting seasons post construction, with possible additional year[1 & 2]	Number of nests and non-nesting emergences by day by species	40 percent or greater
Hatching success	Year of in-season construction and one entire nesting season post construction, with possible additional year[1 & 2]	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 entire nesting season post construction, with possible additional year[1 & 2]	Number of hatchlings by species to emerge from nest onto beach	Average must not be significantly different than the average hatching success
Disorientations	Year of in-season construction and two entire nesting seasons post construction[1]	Number of nests and individuals that misorient or disorient	
Nests affected by erosion or inundation	Year of construction and two years post construction if placed sand remains on the beach	Number of nests lost and/or affected, by species	
Lighting Surveys	Two in-season surveys the year following construction; First survey between May 1 and May 15 and second survey between July 15 and August 1[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

Date	Duration	Variable	Criterion
Compaction	Three nesting seasons beginning with the year of construction. Not required if the beach is tilled prior to nesting seasons[1]	Shear resistance	Less than 500 psi
Escarpment Surveys	Weekly during nesting season for three years beginning with year of construction[1]	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
1 If placed sand remains on the beach 2 Additional years may be required if variable does not meet criterion based on previous year			

20. **Post-Construction Lighting Surveys.** The Permittee shall ensure that lighting surveys be conducted from the nourished berm and the following actions taken to address potential adverse impacts expected with artificial lights visible from any dry portion of the newly elevated beach. The surveys shall be conducted from the top of the foreshore slope (i.e., the seaward edge of the filled berm before it slopes into the water), facing landward. The survey shall follow standard techniques for such a survey, such as including the number and type of visible lights, location of lights, and photo documentation (see additional techniques as per the 2015 USFWS Statewide Programmatic Biological Opinion).

a. The first survey shall be conducted between May 1 and May 15 for the first nesting season following construction. For each visible light source, the Permittee shall document that the property owners have been notified and has been provided with recommendations for correcting the light as soon as possible. Recommendations shall be in accordance with local lighting ordinances. A report summarizing all visible lights and the recommendations for correcting the light shall be forwarded to local code enforcement. If no lighting ordinances exist, the recommendations to the property owners shall be consistent with FWC lighting guidelines, which include no lights or light sources shall be visible from the newly elevated beach. The second survey shall be conducted between July 15 and August 1 to assess any remaining visible lights requiring corrective action.

b. A summary report of the surveys and what corrective actions or local enforcement actions have been taken shall be submitted to FWC at marineturtle@myfwc.com and copied to JCPCompliance@dep.state.fl.us by December 31 of the year in which surveys are conducted. Upon request by the FWC, the Permittee shall set up and hold a meeting with the those responsible for code enforcement (when applicable), FWC and the USFWS to discuss the report and potential additional corrective action needed, as well as any documented marine turtle disorientations in or adjacent to the project area.

21. **Shorebird Protection.** The term "shorebird" refers to all solitary nesting shorebirds and colonial nesting seabirds. If any project activities as described below are conducted, the following shorebird protection conditions are required during the shorebird breeding cycle, which includes nesting. The following conditions are intended to avoid direct impacts associated with the construction of the project and may not address all potential take incidental to the operation and use related to this authorization.

    a. Shorebird breeding season dates for this project area are March 1 through September 1. Note that while most species have completed the breeding cycle by September 1, flightless young may be present through September and must be protected if present.

    b. Any parts of the project where "project activities" on the beach take place entirely outside the breeding season, do not require shorebird surveys. The term "project activities" includes operation of vehicles on the beach, movement or storage of equipment on the beach, sand placement or sand removal, and other similar activities that may harm or disturb shorebirds. Bird survey routes must be established and monitored throughout the entire breeding season in any parts of the project area where: 1) potential shorebird breeding habitat occurs, and 2) project activities are expected to occur at any time within the breeding season.

    c. Bird surveys shall be conducted in all potential beach-nesting bird habitats within the project boundaries that may be impacted by construction or pre-construction activities. One or more shorebird survey routes shall be established by the Permittee to cover project areas which require shorebird surveys. These routes must be approved by the FWC Regional Biologist as part of the Environmental Protection Plan approval process. Routes shall not be modified without prior FWC approval.

    d. During the pre-construction and construction phases of the project, the Permittee shall ensure that surveys for detecting breeding activity and the presence of flightless chicks shall be completed on a daily basis by a qualified bird monitor prior to movement of equipment, operation of vehicles, or other activities that could potentially disrupt breeding behavior or cause harm to the birds or their eggs or young. If all project activities are completed and all personnel and equipment have been removed from the beach prior to the end of the breeding season, route surveys shall continue to be conducted at least weekly through the end of the breeding season. If breeding or nesting behavior is confirmed by the presence of a scrape, eggs or young, the Permittee (or their designee) shall establish a 300-foot buffer around the site and notify the FWC Regional Biologist within 24 hours.

    e. The Bird Monitor shall conduct a shorebird education and identification program (and/or provide educational materials) with the on-site staff to ensure protection of precocial (mobile) chicks. All personnel are responsible for watching for shorebirds, nests, eggs and chicks. If the Bird Monitor finds that shorebirds are breeding within the project area, a bulletin board shall be placed and maintained in the construction staging area with the location map of the construction site showing the bird breeding areas and a warning, clearly visible, stating that "NESTING BIRDS ARE PROTECTED BY LAW INCLUDING THE FLORIDA ENDANGERED AND THREATENED SPECIES ACT AND THE STATE and FEDERAL MIGRATORY BIRD ACTS".

f. **Bird Monitor Requirements.** The Permittee shall ensure that shorebird surveys are conducted by trained, dedicated individuals (Bird Monitor) with proven shorebird identification skills and avian survey experience. Bird Monitors shall review and become familiar with the general information, employ the data collection protocol, and implement data entry procedures outlined on the FWC's FSD website (http://www.flshorebirddatabase.org or Florida Shorebird Database). The Permittee shall submit a list of Bird Monitors, with their contact information and a summary of qualifications, including bird identification skills and avian survey experience to the FWC Regional Biologist for approval. The Permittee shall submit the names and contact information of the Bird Monitors who have been approved by FWC to JCPCompliance@dep.state.fl.us, prior to any construction or shorebird surveys. In order to be approved, the Bird Monitors must meet the following minimum qualifications:

   i. Has previously participated in beach-nesting bird surveys in Florida (provide references or resume). Experience with previous projects must document the ability to 1) identify all species of beach-nesting birds by sight and sound, 2) identify breeding/territorial behaviors, and find nests of shorebirds that occur in the project area, and 3) identify habitats preferred by shorebirds nesting in the project area.

   ii. Have a clear working knowledge of, and adhere to, the Breeding Bird Protocol for Florida's Seabirds and Shorebirds.

   iii. Have completed full-length webinars: Route-Surveyor Training and Rooftop Monitoring Training, including the annual refresher training. Training resources can be found on the Florida Shorebird Database (FSD) website.

   iv. Familiar with FWC beach driving guidelines.

   v. Experience posting beach-nesting bird sites, consistent with Florida Shorebird Alliance (FSA) Guidelines.

   vi. Has registered as a contributor to the FSD.

22. **Shorebird Survey Protocols.** Shorebird survey protocols, including downloadable field data sheets, are available on the FSD website. All breeding activity shall be reported to the FSD website within one week of data collection. If the use of this website is not feasible for data collection, the FWC Regional Biologist must be contacted for alternative methods of reporting. The Permittee shall ensure that the Bird Monitors use the following survey protocols:

    a. Surveys shall be conducted by walking the length of all survey routes and visually surveying for the presence of shorebirds exhibiting breeding behavior, shorebird chicks or shorebird juveniles, as outlined in the FSD Breeding Bird Protocol for Shorebirds and Seabirds. Use of binoculars (minimum 8x40) is required and use of spotting scope may be necessary to accurately survey the area. If an ATV or other vehicle is needed to cover large survey routes, the Bird Monitor shall stop at intervals of no greater than 600 feet to visually inspect for breeding activity.

    b. Once breeding is confirmed by the presence of a scrape, eggs or young, the Permittee (or their designee) shall notify the FWC Regional Biologist within 24 hours.

23. **Shorebird Buffer Zones and Travel Corridors.** The Permittee shall require the Bird Monitor(s) and Contractor(s) to meet the following:

    a. The Bird Monitor(s) shall establish a disturbance-free buffer zone around any location within the project area where the Bird Monitor has observed shorebirds engaged in breeding behavior, including territory defense. A 300-foot buffer shall be established around each nest or around the perimeter of each colonial nesting area. A 300-foot buffer shall also be placed around the perimeter of areas where shorebirds are seen digging nest scrapes or defending nest territories. All construction activities, movement of vehicles, stockpiling of equipment, and pedestrian traffic are prohibited in the buffer zone. **Smaller, site-specific buffers may be established if approved in writing by the FWC Regional Biologist.** Travel corridors shall be designated and marked outside the buffer areas for pedestrian, equipment or vehicular traffic.

    b. 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 immediately widen the buffer zone to a sufficient size to protect breeding birds.

    c. The Bird Monitor(s) shall ensure that where breeding birds will tolerate pedestrian traffic, traditional pedestrian access will not be blocked. 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 allowed when breeding was initiated within 300 feet of an established beach access pathway.

d. The Bird Monitor(s) shall ensure that the perimeters of designated buffer zones shall be marked according to FSA Posting Guidelines: (http://flshorebirdalliance.org/resources/instructions-manuals.aspx) with posts, twine and FWC-approved signs stating "Do Not Enter, Important Nesting Area" or similar language around the perimeter (see example of signage for marking designated buffer zones at http://myfwc.com/conservation/you-conserve/wildlife/shorebirds/). Posts shall not exceed 3 feet in height once installed. Symbolic fencing (twine, string or rope) should be placed between all posts at least 2.5 feet above the ground and rendered clearly visible to pedestrians. If pedestrian pathway and/or equipment travel corridor modifications are approved by the FWC Regional Biologist, these shall be clearly marked. **Posting shall be maintained in good repair until no active nests, eggs, or flightless young are present.** Although solitary nesters may leave the buffer zone temporarily 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.

e. The Permittee shall ensure that the Bird Monitor(s) 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 transit past breeding areas in these corridors. Stopping or turning heavy equipment and vehicles shall be prohibited within the designated travel corridors adjacent to the breeding site. When flightless chicks are present within or adjacent to travel corridors, movement of vehicles shall be adequately monitored by the Bird Monitor(s), who shall advise the contractor whose responsibility it is to ensure no chicks are in the path of the moving vehicle. In addition, tracks, ruts, or holes capable of trapping flightless chicks shall be smoothed or leveled after the Bird Monitor(s) inspect them for the presence of flightless young.

f. Any injury or death of a shorebird (including crushing eggs or young) resulting from project activities shall be reported immediately to the FWC Regional Biologist.

24. Subarea 2 of the South Borrow Area shall be used for the initial construction event. Subarea 2 shall be completely used prior to dredging Subarea 3. The borrow areas shall be dredged in such a manner that the material remaining shall be practicable and feasible to dredge in the subsequent event should an entire subarea not be used for a single dredge event.

25. Subarea 1 of the South Borrow Area shall be reserved for use as a sand source for emergency beach repair in the event that a storm or other event causes damage to the beach within the authorized project area.

26. Sediment quality shall be assessed as outlined in the Sediment QA/QC Plan, dated May 26th, 2020. Placement of material that is not in compliance with the Plan shall be handled according to the protocols set forth in the Sediment QA/QC Plan. The sediment testing

results shall be submitted to The Department within 90 days following the completion of beach construction. The following requirements are included in the Sediment QA/QC Plan:

a. If, during construction, the Permittee determines that the beach fill material does not comply with the sediment compliance specifications, the Permittee shall take measures to avoid further placement of noncompliant fill, and the sediment inspection results shall be reported to the Department.

b. The Permittee shall submit post-construction sediment testing results and an analysis report as outlined in the Sediment QA/QC Plan to the Department within 90 days following beach construction. The sediment testing results shall be certified by a P.E. or P.G. from the testing laboratory. A summary table of the sediment samples and test results for the sediment compliance parameters, as outlined in Table 1 of the Sediment QA/QC Plan, shall accompany the complete set of laboratory testing results. A statement of how the placed fill material compares to the sediment analysis and volume calculations from the geotechnical investigation shall be included in the sediment testing results report.

c. A post-remediation report containing the site map, sediment analysis, and volume of noncompliant fill material removed and replaced shall be submitted to the Department within 7 days following completion of remediation activities.

MONITORING REQUIRED:

27. Water Quality - Turbidity shall be monitored as follows:

Units: Nephelometric Turbidity Units (NTUs).

Frequency: Monitoring shall be conducted 3 times daily, approximately 4 hours apart, and at any other time that there is a likelihood of an exceedance of the turbidity standard, during all dredging and sand placement operations.
At the dredge site, sampling shall be conducted after overflow from the hopper begins and the associated turbidity plume has reached the edge of the mixing zone. At the fill placement site, sampling shall be conducted after discharge from the hopper begins and the associated turbidity plume has reached the edge of the mixing zone.

Sampling shall be conducted **while the highest project-related turbidity levels are crossing the edge of the mixing zone**. Since turbidity levels can be related to pumping rates, the dredge pumping rates shall be recorded, and provided to the Department upon request. The compliance samples and the corresponding background samples shall be collected at approximately the same time, i.e., background sample shall immediately follow the compliance sample.

Location: Background: Sampling shall occur at surface (approximately one foot below the surface), mid-depth (for sites with depths greater than 6 feet), and bottom (approximately 6 feet-above the bottom for sites with depths greater than 25 feet). All background sampling shall occur clearly outside the influence of any artificially generated turbidity plume or the influence of an outgoing inlet plume.

Borrow Site: Samples shall be collected at least 300 meters up-current from the source of turbidity at the dredge site.

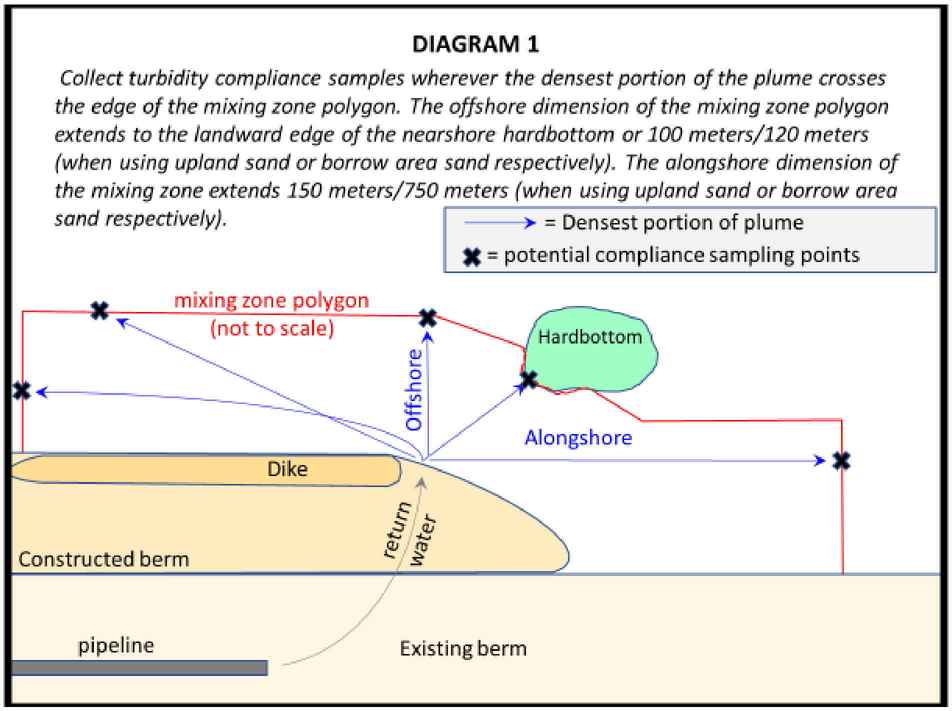
Beach Site: Samples shall be collected at least 300 meters up-current from any portion of the beach that has been, or is being, filled during the current construction event, at the same distances offshore as the associated compliance samples.

Compliance: Sampling shall occur at surface (approximately one foot below the surface), mid-depth (for sites with depths greater than 6 feet), and bottom (approximately 6 feet above the bottom for sites with depths greater than 25 feet).

Borrow Site: Samples shall be collected 150 meters down-current from the cutterhead or the hopper dredge overflow point, or at the edge of the nearest seagrass bed/hardbottom in the downcurrent direction, whichever is closest to the cutterhead or overflow point **and** from any other source of turbidity generated by the dredge, in the densest portion of any visible turbidity plume. If no plume is visible, follow the likely direction of flow.

Beach Site (when placing sand from upland source): Samples shall be collected where the densest portion of the turbidity plume crosses the edge of the mixing zone polygon, which measures up to 100 meters offshore or to the landward edge of the nearshore hardbottom, whichever is closer, and up to 150 meters alongshore from the point where the return water from the dredged discharge reenters the Atlantic Ocean. *Note: If the plume flows parallel to the shoreline, the densest portion of the plume may be close to shore, in shallow water. In that case, it may be necessary to access the sampling location from the shore, in water that is too shallow for a boat. See Figure 2 (below).*

Beach Site (when placing sand from offshore source): Samples shall be collected where the densest portion of the turbidity plume crosses the edge of the mixing zone polygon, which measures up to 120 meters offshore or to the landward edge of the nearshore hardbottom, whichever is closer, and up to 750 meters alongshore from the point where the return water from the dredged discharge reenters the Atlantic Ocean. *Note: If the plume flows parallel to the shoreline, the densest portion of the plume may be close to shore, in shallow water. In that case, it may be necessary to access the sampling location from the shore, in water that is too shallow for a boat. See Figure 2 (below).*



Calibration: The instruments used to measure turbidity shall be fully calibrated with primary standards within one month of the commencement of the project, and at least once a month throughout the project. Calibration with secondary standards shall be verified each morning prior to use, after each time the instrument is turned on, and after field sampling using two secondary turbidity "standards" that bracket the anticipated turbidity samples. If the post-sampling calibration value deviates more than 8% from the previous calibration value, results shall be reported as estimated and a description of the problem shall be included in the field notes.

Analysis of turbidity samples shall be performed in compliance with DEP-SOP-001/01 FT 1600 Field Measurement of Turbidity:
http://publicfiles.dep.state.fl.us/dear/sas/sopdoc/2008sops/ft1600.pdf

If the turbidity monitoring protocol specified above prevents the collection of accurate data, the person in charge of the turbidity monitoring shall contact the JCP Compliance Officer to establish a more appropriate protocol. Once approved in writing by the Department, the new protocol shall be implemented through an administrative permit modification.

28. The **compliance** locations given above shall be considered the limits of the temporary mixing zone for turbidity allowed during construction. If monitoring reveals turbidity levels at the **compliance** sites that are greater than 11 NTUs above the corresponding background turbidity levels when the plume extends into OFW, or 29 NTUs above the corresponding background turbidity levels outside of OFW, construction activities shall **cease immediately** and not resume until corrective measures have been taken and turbidity has returned to acceptable levels. Any such occurrence shall also be immediately reported to the JCP Compliance Officer via email at JCPCompliance@dep.state.fl.us and include in the subject line, "TURBIDITY EXCEEDANCE", and the Project Name and Permit Number. Also notify the Department's Southeast District office.

Any project-associated turbidity source other than dredging or fill placement for beach nourishment (e.g., scow or pipeline leakage) shall be monitored as close to the source as possible. If the turbidity level exceeds 11NTUs above background within OFW or 29 NTUs above background outside of OFW, the construction activities related to the exceedance shall **cease immediately** and not resume until corrective measures have been taken and turbidity has returned to acceptable levels. This turbidity monitoring shall continue every hour until background turbidity levels are restored or until otherwise directed by the Department. The Permittee shall notify the Department, by separate email to the JCP Compliance Officer, of such an event within 24 hours of the time the Permittee first becomes aware of the discharge. The subject line of the email shall state "OTHER PROJECT-ASSOCIATED DISCHARGE, TURBIDITY EXCEEDANCE".

a. When reporting a turbidity exceedance, the following information shall also be included:

i. the Project Name;

ii. the Permit Number;

iii. location and level (NTUs above background) of the turbidity exceedance;

iv. the time and date that the exceedance occurred; and

v. the time and date that construction ceased.

b. Prior to re-commencing the construction, a report shall be emailed to the Department with the same information that was included in the "Exceedance Report", plus the following information:

   i. turbidity monitoring data collected during the shutdown documenting the decline in turbidity levels and achievement of acceptable levels;

   ii. corrective measures that were taken; and

   iii. cause of the exceedance.

29. **Turbidity Reports:** All turbidity monitoring data shall be submitted within one week of analysis. The data shall be presented in tabular format, indicating the measured turbidity levels at the compliance sites for each depth, the corresponding background levels at each depth and the number of NTUs over background at each depth. Any exceedances of the turbidity standard (11 NTUs above background within OFW, 29 NTUs above background outside of OFW) shall be highlighted in the table. In addition to the raw and processed data, the reports shall also contain the following information:

a. time of day samples were taken;

b. dates of sampling and analysis;

c. GPS location of sample and source. *When possible, coordinates should be provided in decimal degrees with a 5 decimal level of precision (i.e., 0.00001). Please also indicate the datum*;

d. depth of water body;

e. depth of each sample

f. antecedent weather conditions, including wind direction and velocity;

g. tidal stage and direction of flow;

h. water temperature;

i. a geo-referenced map, overlaid on an aerial photograph, indicating the sampling locations (background and compliance), location of active construction, the visible plume pattern and direction of flow. The map shall also include the boundaries of any benthic resources or OFW. A sample map shall be submitted to and reviewed by the Department prior to construction (Specific Condition 5);

j. a statement describing the methods used in collection, handling, storage and analysis of the samples;

k. a statement by the individual responsible for implementation of the sampling program concerning the authenticity, precision, limits of detection, calibration of the meter, accuracy of the data and precision of the GPS measurements;

l. When samples cannot be collected, include an explanation in the report. If unable to collect samples due to severe weather conditions, include a copy of a current report from a reliable, independent source, such as an online weather service.

Monitoring reports shall be submitted by email to the Department's JCP Compliance Officer. In the subject line of the reports, include the Project Name, Permit Number and the dates of the monitoring interval. Failure to submit reports in a timely manner constitutes grounds for revocation of the permit. When submitting this information to the Department's JCP Compliance Officer, on the cover page to the submittal and at the top of each page, please state: **"This information is provided in partial fulfillment of the monitoring requirements in Permit No. 0285993-009-JC, for the Indian River County Sector 3 Beach and Dune Nourishment Project"**

30. **Biological Monitoring**

a. The Permittee shall adhere to the current, Department-approved **Biological Monitoring Plan (BMP)** (dated April 29, 2020), which is a binding part of this permit. The Permittee is responsible for ensuring that their selected contractor(s) / subcontractor(s) are knowledgeable of all permit conditions pertaining to monitoring requirements (including the BMP); not just the scope of work in the contract prepared by the Permittee / contractor. The Permittee shall acquire written approval from the Department prior to implementing any revisions to the BMP. Table 2 (below), titled "Hardbottom Monitoring Summary", summarizes surveys, monitoring events, and tasks required by the Biological Monitoring Plan; these are described in detail in the Biological Monitoring Plan itself.

No impacts to hardbottom resources are authorized by this permit. Biological monitoring shall be conducted to provide the Department with reasonable assurance that any unpermitted, project-related, persistent or temporary, negative impacts (direct or indirect) to hardbottom resources will be documented, if they occur. Unpermitted project-related impacts shall be mitigated for. Impacts and their mitigation may be handled through compliance and enforcement action, and the amount of mitigation may be determined according to the Department's UMAM assessment.

b. **Nearshore Hardbottom Monitoring**. Nearshore hardbottom adjacent to the fill template, beyond the ETOF, shall be monitored (see Section 2.0 of the BMP). A single pre-construction monitoring event shall be conducted prior to the initial fill placement event conducted under this Permit (see Specific Condition 5.d.ii of the permit). This pre-construction monitoring event shall serve as the baseline for all post-construction monitoring conducted under this Permit. An immediate post-construction monitoring event (within six months of project completion) and three annual post-construction monitoring events (Years 1, 2, and 3 post-construction) shall be conducted following each fill placement event (i.e., each fill placement event shall trigger a complete round of post-construction monitoring). Unless otherwise approved in writing by DEP staff, all monitoring events shall be conducted during summer months (May through September), as close as practicable to the date the baseline survey was conducted. Standard operating procedures shall be used during each monitoring event to provide consistent and repeatable collection of data. Monitoring data and reports are required to be submitted following each monitoring event, according to the Plan.

c. **Pipeline Corridor Monitoring**. Prior to each fill placement event in which the borrow area will be the sand source and pipelines will be used to transport fill material to the placement area, Pre-Construction Pipeline Corridor Surveys shall be conducted to determine the current presence or absence of hardbottom resources and, if present, to determine the current distribution and condition of hardbottom resources within each authorized pipeline corridor and the area 25 meters to the right and left of each pipeline corridor (see Section 3.1 of the BMP).

For survey areas documented as currently containing hardbottom resources, the Permittee shall use the results of the Pre-Construction Pipeline Corridor Surveys to determine where hardbottom resources can be avoided when placing and using pipelines. For hardbottom resources that cannot be avoided within pipeline corridors, the Permittee shall, to the greatest extent practicable, use the results of the Pre-Construction Pipeline Corridor Surveys to determine the least impactful placement for each pipeline within each corridor and the locations along each pipeline where Minimization Measures (e.g., collars or risers or floating pipeline) can be used to limit impacts to resources. Following survey completion and data analysis, the Permittee shall submit all raw Data and a written Pre-Construction Pipeline Corridor Survey Report to the DEP (see Section 3.2 of the BMP and Specific Conditions 5.d.iii.(1) and (2) of the permit).

Results of the current Pre-Construction Pipeline Corridor Surveys as well as the avoidance and minimization measures that will be employed by the Permittee shall determine whether additional surveys, monitoring of hardbottom resources, or activities to provide assurance are required within project areas. If monitoring is required, the type of monitoring that shall be conducted will be based on current survey results, as specified below:

i. If results of the current Pre-Construction Pipeline Corridor Surveys demonstrate that hardbottom resources are currently absent within a pipeline corridor and the 25-meter buffer to either side of the corridor, then no additional surveys or monitoring will be required for the corridor for the current construction event.

ii. If results of the Pre-Construction Pipeline Corridor Surveys demonstrate that hardbottom resources are currently present within a pipeline corridor or the 25-meter buffer to either side of the corridor, and if the Permittee will avoid hardbottom resources documented within the pipeline corridor and corridor buffer during construction (e.g., during pipeline placement and use), then the Department will require reasonable assurance that resources within the corridor have successfully been avoided. The Permittee shall conduct a Post-Placement Pre-Pumping Pipeline Survey and provide the results (data) of the survey to the Department (see Section 3.3 of the BMP and see Specific Condition 5.d.iii.(3) of the permit). To meet the Department's reasonable assurance requirement for Avoidance, results of the Post-Placement Pre-Pumping Pipeline Survey must demonstrate that hardbottom resources are absent within 25-meter to either side of the placed pipeline. Hardbottom resources that have not been avoided shall be Monitored (see Section 3.4 of the BMP for monitoring methods).

iii. If hardbottom resources within a pipeline corridor and corridor buffer area cannot be avoided during construction (e.g., during pipeline placement and use), then resources within close proximity to placed pipelines (i.e., present within 25-meter to either side of a pipeline) shall be monitored. The Permittee shall conduct a Post-Placement, Pre-Pumping Pipeline Survey and provide the results of the survey to the Department (see Section 3.3 of the BMP and Specific Condition 5.d.iii.(3) of the permit). The type of monitoring required for each hardbottom patch/feature in close proximity to the pipeline shall depend on whether the pipeline, once placed, runs adjacent to or across/through hardbottom resources (see Section 3.4 of the BMP for required monitoring methods). Reports are required to be submitted following each survey, according to the Plan.

d. **Reporting Requirements for Biological Monitoring.** See Section 5.0 of the BMP for reporting requirements.

e. **Hardbottom Monitoring Summary.** All pre-construction survey tasks shall be completed prior to the start of any and all related construction activities, respectively. Post-placement pipeline surveys and initial corridor monitoring events shall be completed prior to the initiation of pumping activities. Other pre- and post-construction monitoring shall be conducted as specified in each individual section of the approved Biological Monitoring Plan. Surveys, monitoring, and tasks required for nearshore hardbottom and pipeline corridors are summarized in Table 2, below. See the Biological Monitoring Plan for details.

Table 2. Hardbottom Monitoring Summary

Project Area	Survey	Survey Type	Survey Period & Number of Events	Deliverables
Nearshore Hardbottom	38 Permanent Transects outside of ETOF (N=24 Biological and N=14 Sediment Only; Max 50 m long each; and Permanent Quadrats (0.5 m^2)	Line-Intercept (all transects)	**Pre-Construction** (N=1): Once prior to initial fill placement (Baseline). **Post-Construction** (N=4 per fill placement event): Immediately (within 6 months) and annually for 3 years (years 1, 2, and 3).	Excel spreadsheet, PDF of field sheets
		Interval Sediment Depth (all transects)		Excel spreadsheet, PDF of field sheets
		Video (all transects)		Video
		Quadrat Sampling (only biological transects)		Excel spreadsheet, PDF of field sheets
	Hardbottom Edge	In-situ Delineation of Edge (from R-19.5 to R-57)		Shapefiles
Pipeline Corridors	Pre-Construction Corridor Area Surveys	Sonar Survey	**Pre-Construction** (N=1 full survey of all 6 corridors prior to each fill placement event)	Sonar survey data
		Diver Verification Survey		PDF of field sheets, Photos/Video
		Hardbottom Mapping		Shapefiles
	Post-Placement Pipeline Survey	Mapping	**Pre-Pumping** (N=1 per corridor per fill placement event): Prior to pumping	Shapefiles
	Corridor Monitoring – All Monitoring Types (1 & 2)	Transect Video Survey	**Pre-Pumping** (N=1 per corridor per fill placement event): Prior to pumping **Post-Construction** (N=1 per corridor per fill placement event)	Video
	Type 1 Corridor Monitoring Only	Transect Video Survey	**During-Construction** (Weekly – multiple events per fill placement)	Video

31. **Physical Monitoring:** The physical monitoring and associated reporting shall be conducted in accordance with the approved physical monitoring plan (approved April 2020) and the conditions of this permit.

One electronic copy of the monitoring report and one electronic copy of the survey data shall be submitted to the JCP Compliance Officer. When submitting any monitoring information to the Department, please include a transmittal cover letter clearly labeled with the following at the top of each page: **“This monitoring information is submitted in accordance with Item No. 3.4 of the approved Physical Monitoring Plan for Permit No. 0285993-009-JC for the monitoring period [XX].”**

32. If the Permittee is unable to complete two maintenance events within the 15-year life of the permit, the Permittee may request (prior to the expiration date of the permit), and the Department shall grant, an extension of the permit expiration date in order to allow

completion of the second maintenance event. The extension would be documented through an administrative modification.

33. **Post-Construction Meeting.** Within 60 days following each construction activity authorized by this permit, the Permittee shall hold a post-construction conference. Attendees shall include at minimum, the Permittee, Agent, Department representative, and FWC representative.

FLAWAC Review

The applicant, or any party within the meaning of Section 373.114(1)(a) or 373.4275, F.S., may also seek appellate review of this order before the Land and Water Adjudicatory Commission under Section 373.114(1) or 373.4275, F.S. Requests for review before the Land and Water Adjudicatory Commission must be filed with the Secretary of the Commission and served on the Department within 20 days from the date when this order is filed with the Clerk of the Department.

Judicial Review

Once this decision becomes final, any party to this action has the right to seek judicial review pursuant to Section 120.68, F.S., by filing a Notice of Appeal pursuant to Rules 9.110 and 9.190, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, M.S. 35, Tallahassee, Florida 32399-3000; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this action is filed with the Clerk of the Department.

EXECUTION AND CLERKING:

Executed in Tallahassee, Florida.
STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

____
Gregory W. Garis.
Program Administrator
Beaches, Inlets and Ports Program
Office of Resilience and Coastal Protection

Attachments: Approved Permit Drawings (29 pages)
Upland Sediment QA/QC Plan (approved on May 26, 2020)
Offshore Sediment QA/QC Plan (approved on May 26, 2020)
Biological Monitoring Plan (approved April 29, 2020)
Physical Monitoring Plan (Approved April 2020)

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this permit and all attachments were sent on the filing date below.

FILING AND ACKNOWLEDGMENT

FILED, on this date, pursuant to Section 120.52, F. S., with the designated Department Clerk, receipt of which is hereby acknowledged.

____________ July 17, 2020

Clerk **Date**

DRAFT SEDIMENT QUALITY CONTROL/QUALITY ASSURANCE PLAN
FOR BEACH OR DUNE RESTORATION USING AN UPLAND SAND SOURCE

0285993-009-JC

Indian River County

Sector 3 Beach and Dune Restoration Project

May 26th, 2020

A. INTRODUCTION

Pursuant to Fla. Admin. Code r. 62B-41.008 (1) (k) 4.b., permit applications for inlet excavation, beach restoration, or nourishment shall include a quality control/assurance plan that will ensure that the sediment from the borrow areas to be used in the project will meet the standard in Fla. Admin. Code r. 62B-41.007(2)(j). To protect the environmental functions of Florida's beaches, only beach compatible fill shall be placed on the beach or in any associated dune system. 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.

The Department has received the results of geotechnical investigations that provide adequate data concerning the character of the sediment and the quantities available within the spatial limits of the upland sand source(s). The Department has received an analysis of the existing or native sediment and the sediment within the permitted upland sand source(s), including the methods of mining and post-mining processing, that demonstrates its compatibility with the naturally occurring beach sediment in accordance with Fla. Admin. Code r. 62B-41.007(2)(j). The sediment analysis and volume calculations were performed using established industry standards, and are certified by a Professional Engineer or a Professional Geologist registered in the State of Florida.

Based upon this information, the Department of Environmental Protection (Department) has determined that use of the sediment from the upland sand source(s) will maintain the general character and functionality of the sediment occurring on the beach and in the adjacent dune and coastal system. Furthermore, this information provides sufficient quality control/quality assurance (QC/QA) that the mean grain size and carbonate content of the sediment from the upland sand source(s) will meet the requirements of Fla. Admin. Code r. 62B-41.007(2)(j); hence, additional QC/QA procedures beyond those described in this permit are not required for these sediment parameters during construction.

This plan outlines the responsibilities of each stakeholder in the project as they relate to the placement of beach compatible material on the beach. These responsibilities are in response to the possibility that non-beach compatible sediments may exist within the upland sand source(s) and could be unintentionally placed on the beach. The QC Plan specifies the minimum construction management, inspection, and reporting requirements placed on the Contractor and enforced by the Permittee, to ensure that the sediment from the upland sand source(s) to be used in the project meet the compliance specifications. The QA Plan specifies the minimum construction oversight, inspection, and reporting requirements to be undertaken by the Permittee or the Permittee's On-Site Representative to observe, sample, and test the placed sediments to verify the sediments are in compliance.

B. SEDIMENT QUALITY SPECIFICATIONS

The sediment from the upland sand source(s) is similar in Munsell color and grain size distribution to the material in the existing coastal system at the beach placement site. The Department and the Permittee acknowledge that it is possible that discrete occurrences of non-beach compatible sediments may exist within the permitted upland sand source(s) that do not comply with the limiting parameters of Fla. Admin. Code r. 62B-41.007(2)(j) 1. – 5 or vary in Munsell color from the composite value. Furthermore, the Department may consider more restrictive values for the sediment parameters to ensure that the sediment from the upland sand source(s) is similar in color and grain size distribution to the sediment in the existing coastal system at the beach placement site. Therefore, fill material compliance specifications for the sediment from the upland sand source(s) proposed for this project are provided in Table 1.

The compliance specifications take into account the variability of sediment on the native or existing beach, and are values which may reasonably be attained given what is known about the upland sand source(s). Beach fill material which falls outside of these limits will be considered unacceptable and subject to remediation, as described in Section E.

Table 1- Sediment Compliance Specifications

Sediment Parameter	**Parameter Definition**	**Compliance Value**
Median Grain Size	50% larger/smaller by weight*	0.30 to 0.55
Mean Grain Size	calculated by moment method*	0.33 to 0.55
Max. Silt Content	passing #230 sieve	2%
Max. Gravel Content*	retained on #4 sieve	2%
Munsell Color	moist Hue	10YR, 2.5Y, or 5Y
	moist Value	≥ 7
	moist Chroma	≤ 2
The beach fill material shall not contain construction debris, toxic material, other foreign matter, or coarse gravel or rocks.		

*Determined using sieves listed in Section D.7.b.

C. QUALITY CONTROL PLAN

The contract documents shall incorporate the following technical requirements, or equivalent language that addresses the sediment quality monitoring on the beach, and, if necessary, remedial actions. The Permittee will seek to enforce these contract requirements during the execution of work. For each construction event, the Contractor shall submit a Quality Control Plan for review and acceptance by the Permittee. This Plan shall comply with the quality control measures set forth in this permit, and also address sediment quality assurance by including: (1) the specific sampling frequency and testing methodology to be provided by the Contractor, (2) the name, address and point of contact for the Licensed Testing Laboratory to be used for the required collection of samples and laboratory testing, and (3) how the Contractor intends to assess compliance with the Sediment Compliance Specifications as shown in Table 1.

The characteristics of the in-situ materials in the upland sand source(s) are indicated by geotechnical data. , including the boring logs and grain size distribution curves. The characteristics of the processed material are also included with the geotechnical data. However, the Contractor should be aware that it is possible for material of differing characteristics to be present and that the mining process may correspondingly require revisions during construction to produce beach compatible sand consistent with the Sediment Compliance Specifications in Table 1.

1. **Assessment at Upland Sand Source.** The material shall be observed by the Contractor while the material is being loaded into the trucks for transport to the Construction Access/Staging Area. Both the Contractor and the Permittee will have benchmark samples labeled with the permit number, "Benchmark Sample", date collected, site name, and information on where the sample was attained. The benchmark sample shall be material that has been deemed beach compatible in accordance with the Sediment Compliance Specifications in Table 1 and shall serve as the minimum requirement for the material being placed on the beach. If any material appears to be non-compliant, it shall be set aside for testing and/or further processing and not transported to the beach.

a. **For conventional hydraulic excavation and stockpiling.** The Contractor will collect a sediment sample at not less than 4 sample for each 3,000 cubic yards of stockpiled material no less than 6 inches below the surface to visually assess grain size, Munsell color, gravel content, and silt content against the benchmark sample. The sample shall be a minimum of 1 U.S. pint (approximately 200 grams). Each sample will be archived with the date, time, and location of the sample. This assessment will consist of handling the fill material to ensure that it is predominantly sand and to evaluate if the physical characteristics of the material meets the Sediment Compliance Specifications in Table 1. If deemed that the material may not be in compliance, the sample shall be tested at a Licensed Testing Laboratory using the criteria outlined in Section D.7.b. Sediment testing results shall be provided to the Permittee and Project Engineer prior to any portion of the 3,000 cubic yards of material represented by that sample being transported to the Construction Access/Staging Area. Sediment testing results shall reference a specific stockpile name and GPS location within the mine. The results of daily inspections, regardless of the quality of the sediment, will be appended to or notated on the Contractor's Daily Report. All samples will be stored by the Permittee for at least 120 days after project completion.

b. **For material requiring special handling and material processing.** If special handling and material processing are necessary to produce beach compatible material consistent with the Sediment Compliance Specifications in Table 1, then sampling and laboratory testing of the processed sand shall be conducted at the upland mine(s) from the stockpiled material before the material is transported to the Construction Access/Staging Areas. The Contractor will collect not less than 4 representative samples from approximately every 3,000 cubic yards of material in the stockpile no less than 6 inches below the surface from the middle of the stockpile. The sample shall be a minimum of 1 U.S. pint (approximately 200 grams). Each sample will be archived with the stockpile name, date, time, and GPS location of the sample. The samples shall be tested at a Licensed Testing Laboratory using the criteria outlined in Section D.7.b. Sediment testing results shall be provided to the Permittee and Project Engineer prior to any portion of the 3,000 cubic yards of material represented by that sample being transported to the Construction Access/Staging Area. The laboratory testing results will be appended to or notated on the Contractor's Daily Report. All samples will be stored for at least 120 days after project completion and shall be made available to the Permittee upon request.

If a sample does not meet the Sediment Compliance Specifications in Table 1, then the 3,000 cubic yards of material represented by that sample shall not be transported to the Construction Access/Staging Area. The material may undergo further processing to meet the Sediment Compliance Specifications with additional laboratory testing to verify the additional processing produces material that meets the Sediment Compliance Specifications, or the material shall be set aside and not used.

2. **Beach Observation**. The Contractor will continuously visually monitor the sediment being placed on the beach to assess grain size, silt content, gravel content, and Munsell color. An assessment will be made during placement at a minimum of once every hour. This assessment will consist of handling the fill material to ensure that it is predominantly sand and to note the physical characteristics, and assure the material meets the Sediment Compliance Specifications in Table 1. If deemed necessary, quantitative assessment of the sand will be conducted for grain size, silt content, gravel content, and Munsell color using the methods outlined in Section D.7.b. If noncompliant sediment is placed on the beach, the Contractor will immediately cease placement until any stockpiled material at the beach construction staging area can be verified as beach compatible. The Contractor will notify the Permittee, providing the time, location, and description of the noncompliant sediment. The Contractor will take the appropriate actions to remediate the noncompliant material to achieve and document compliance with the Sediment Compliance Specifications. The Contractor, in cooperation with the Permittee or Project Engineer, will utilize the sampling records at the upland source(s) to determine where the material originated from to avoid additional placement of noncompliant sediment.

D. QUALITY ASSURANCE PLAN

The Permittee will seek to enforce the construction contract and Department permits related to sediment quality. In order to do so, the following steps shall be followed:

1. **Construction Observation and Sampling for Visual Assessment.** Construction observation by the Permittee's On-Site Representative will be performed on a daily basis during periods of active construction. The Permittee's On-Site Representative will collect a sediment sample to visually assess grain size, Munsell color, gravel content, and silt content. The observation will include handling the fill material to ensure that it is predominantly sand and to evaluate if the physical characteristics of the material meet the Sediment Compliance Specifications in Table 1. If the Permittee or Project Engineer determines that the beach fill material does not comply with the Sediment Compliance Specifications, the Permittee or Project Engineer will immediately instruct the Contractor to cease placement and take the necessary actions to avoid further placement of noncompliant sediment. If deemed necessary, quantitative assessments of the sand will be conducted for grain size, silt content, gravel content, and Munsell color using the methods outlined in section D.7.b. If noncompliant sediment is placed on the beach, the Permittee or Project Engineer will document the time, location, and description of the noncompliant sediment. The noncompliant sediment will be subject to remediation, as described in Section E. The Permittee or Project Engineer, in cooperation with the

Contractor, will utilize the sampling records at the upland source(s) to determine where the material originated from to avoid additional placement of noncompliant sediment.

2. **On-Site Representative.** The Permittee will provide on-site observation by individuals with training or experience in beach nourishment and construction inspection and testing, and who are knowledgeable of the project design and permit conditions. The Project Engineer will actively coordinate with the Permittee's On-Site Representative, who may be an employee or sub-contractor of the Permittee or the Project Engineer. Communications will take place between the Project Engineer and the Permittee's On-Site Representative on a daily basis during periods of active construction.

3. **Pre-Construction Meeting.** The project QC/QA Plan will be discussed as a matter of importance at the pre-construction meeting. The Contractor will be required to acknowledge the goals and intent of the above described QC/QA Plan, in writing, prior to commencement of construction.

4. **Contractor's Daily Reports.** The Permittee's On-Site Representative or Project Engineer will review the Contractor's Daily Reports which will characterize the nature of the sediments encountered at the upland sand source and placed along the project shoreline with specific reference to moist sand color and the occurrence of rock, rubble, gravel, silt, or debris.

5. **On Call.** The Project Engineer will be continuously on call during the period of construction for the purpose of making decisions regarding issues that involve QC/QA Plan compliance.

6. **Addendums.** Any addendum or change order to the Contract between the Permittee and the Contractor will be evaluated to determine whether or not the change in scope will potentially affect the QC/QA Plan.

7. **Post-Construction Sampling for Laboratory Testing.** To assure that the fill material placed on the beach was adequately assessed by the borrow area investigation and design, the Project Engineer or Permittee's On-Site Representative will conduct assessments of the sediment as follows:

a. Post-construction sampling and testing of the fill material will be conducted to verify that the sediment placed on the beach meets the expected criteria/characteristics provided during the geotechnical investigation and borrow area design process. Upon completion of sections of constructed beach, the project Engineer will collect two (2) duplicate sand samples will be collected at each FDEP Reference Monument to quantitatively assess the grain size distribution, moist Munsell color, gravel content, and silt content for compliance. The collected sediment samples shall be a minimum of 1 U.S. pint (at least 200 grams) each and obtained from the bottom of a test hole a minimum of 12 inches deep within the limits of the constructed berm. If the constructed section was filled only at the dune, then the sediment sample will be obtained from the dune. The Engineer will visually assess grain size, Munsell color, gravel content, and silt content of the material. The observation will include handling the fill material to ensure that it is predominantly sand, and to further note the physical characteristics. The Engineer will note the existence of any layering or rocks within the test hole. One sample will be sent for testing at a Licensed Testing Laboratory while the other sample will be archived by the Permittee for 120 days after project completion. All samples and laboratory test results will be labeled with the Project name, FDEP Reference Monument, date sample was obtained, and "Construction Fill Sample."

b. Samples collected for laboratory testing will be evaluated for visual attributes (Moist Munsell color and shell content), sieved in accordance with the applicable sections of ASTM D422-63 (Standard Test Method for Particle-Size Analysis of Soils), ASTM D1140 (Standard Test Method for Amount of Material in Soils Finer than No. 200 Sieve), and ASTM D2487 (Classification of Soils for Engineering Purposes), and analyzed for carbonate content. The samples will be sieved using the following U.S. Standard Sieve Numbers: 3/4", 5/8", 7/16", 5/16", 3.5, 4, 5, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230.

c. Laboratory testing results will include a cumulative grain size distribution table and curve for each sample tested. A summary table of the sediment samples and test results for the sediment compliance parameters shall accompany the complete set of laboratory testing results. The column headings will include: Sample Number; Mean Grain Size (mm, calculated by moment method); Median Grain Size (mm); Sorting Value (phi); Silt Content (% passing #230 sieve); Gravel Content (% retained above #4 sieve); Carbonate Content (%); Munsell

Color Value; and a column stating whether each sample MET or FAILED the compliance values found in Table 1. The sediment testing results will be certified by a P.E or P.G. registered in the State of Florida. A statement of how the placed fill material compares to the sediment analysis and volume calculations from the sand search investigation shall be included in the sediment testing results report. The Permittee will submit post-construction sediment testing results and analysis report to the Department within 90 days following beach construction.

d. In the event that a section of beach contains fill material that is not in compliance with the Sediment Compliance Specifications, then the Department will be notified. Notification will indicate the volume, aerial extent and location of any unacceptable beach areas, and remediation planned.

E. Remediation

1. **Compliance Area.** If a sample does not meet the compliance requirement to not contain coarse gravel or rocks, construction debris, toxic material, or other foreign matter, the Permittee shall determine the aerial extent of the noncompliant beach fill material and remediate regardless of the extent of the noncompliant material. If a sample is noncompliant for the grain size, silt content, gravel content, or Munsell color, and the aerial extent exceeds 10,000 square feet of beach berm or 100 linear feet of dune for dune-only projects, the Permittee shall remediate.

2. **Notification.** If an area of newly constructed beach or dune does not meet the Sediment Compliance Specifications, then the Department (JCPCompliance@dep.state.fl.us) will be notified. Notification will indicate the aerial extent and location of any areas of noncompliant beach fill material and remediation planned. As outlined in Section E.4 below, the Permittee will immediately undertake remediation actions without additional approvals from the Department. The results of any remediation will be reported to the Department following completion of the remediation activities and shall indicate the volume of noncompliant fill material removed and replaced.

3. **Sampling to determine extent.** In order to determine if an area greater than 10,000 square feet of beach berm or 100 linear feet of dune for dune-only projects is noncompliant, the following procedure will be performed by the Permittee's On-site Representative or Project Engineer:

a. Upon determination that the first sediment sample is noncompliant, at minimum, five (5) additional sediment samples will be collected at a maximum 25-foot spacing in all directions and assessed. If the additional samples are also noncompliant, then additional samples will be collected at a 25-foot spacing in all directions until the aerial extent is identified.
b. The samples will be visually assessed to evaluate compliance with the Sediment Compliance Specifications. If deemed necessary by the Project Engineer, quantitative assessments of the sand will be conducted for grain size, silt content, gravel content, and Munsell color using the methods outlined in Section D.7.b. Samples will be archived by the Permittee.
c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of noncompliant fill.
d. The total square footage will be determined.
e. The site map and analysis will be included in the Contractor's Daily Report.

4. **Actions.** The Permittee or Project Engineer shall have the authority to determine whether the material placed on the beach is compliant or noncompliant. If placement of noncompliant material occurs, the Contractor will be directed by the Permittee or Project Engineer on the necessary corrective actions. Should a situation arise during construction that cannot be corrected by the remediation methods described within this QC/QA Plan, the Department will be notified. The remediation actions for each sediment parameter are as follows:

a. Mean grain size: blending the noncompliant fill material with compliant fill material within the adjacent construction berm or dune sufficiently to meet the compliance value, or removing the noncompliant fill material and replacing it with compliant fill material.
b. Silt content: blending the noncompliant fill material with compliant fill material within the adjacent construction berm or dune sufficiently to meet the compliance value, or removing the noncompliant fill material and replacing it with compliant fill material.

c. Gravel content: blending the noncompliant fill material with compliant fill material within the adjacent construction berm or dune sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
d. Munsell color: blending the noncompliant fill material with compliant fill material within the adjacent construction berm or dune sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
e. Coarse gravel or rocks: screening and removing the noncompliant fill material and replacing it with compliant fill material.
f. Construction debris, toxic material, or other foreign matter: removing the noncompliant fill material and replacing it with compliant fill material.

All noncompliant fill material removed from the beach will be transported to an appropriate upland disposal facility located landward of the Coastal Construction Control Line or returned to the upland mine.

5. **Post-Remediation Testing.** Re-sampling shall be conducted following any remediation actions in accordance with the following protocols:

a. Within the boundaries of the remediation actions, samples will be taken at maximum of 25-foot spacing.
b. The samples will be visually assessed to evaluate compliance with the Sediment Compliance Specifications. If deemed necessary by the Project Engineer, quantitative assessments of the sand will be conducted for grain size, silt content, gravel content, and Munsell color using the methods outlined in Section D.7.b. Samples will be archived by the Permittee.
c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of remediation actions.

6. **Reporting.** A post-remediation report containing the site map, sediment analysis, and volume of noncompliant fill material removed and replaced will be submitted to the Department within 7 days following completion of remediation activities.

All reports or notices relating to this permit shall be emailed or sent to the Department at:

FDEP Office of Resilience and Coastal Protection
JCP Compliance Officer
Mail Station 3544
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000
phone: (850) 245-7539
e-mail: JCPCompliance@dep.state.fl.us

End of Plan

SEDIMENT QUALITY CONTROL/QUALITY ASSURANCE PLAN
FOR BEACH RESTORATION OR NOURISHMENT USING AN OFFSHORE BORROW AREA
0285993-009-JC

Indian River County

Sector 3 Beach and Dune Restoration Project

May 26th, 2020

A. INTRODUCTION

As indicated in the title above, this template plan is for use for beach restoration and beach nourishment when an offshore borrow area is used. A different plan document will be used for inlet excavation involving beach or nearshore placement of dredged material.

Pursuant to Fla. Admin. Code r. 62B-41.008 (1) (k) 4.b., permit applications for inlet excavation, beach restoration, or nourishment shall include a quality control/assurance plan that will ensure that the sediment from the borrow areas to be used in the project will meet the standard in Fla. Admin. Code r. 62B-41.007(2)(j). To protect the environmental functions of Florida's beaches, only beach compatible fill shall be placed on the beach or in any associated dune system. 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.

The Permittee has conducted geotechnical investigations that provide adequate data concerning the character of the sediment and the quantities available within the spatial limits of the permitted borrow area(s). The Permittee has provided an analysis of the existing or native sediment and the sediment within the permitted borrow area(s) that demonstrates its compatibility with the naturally occurring beach sediment in accordance with Fla. Admin. Code r. 62B-41.007(2)(j). The sediment analysis and beach volume calculations were performed using established industry standards, and are certified by a Professional Engineer or a Professional Geologist registered in the State of Florida.

Based upon this information and the design of the borrow area(s), the Department of Environmental Protection (Department) has determined that use of the sediment from the borrow area(s) will maintain the general character and functionality of the sediment occurring on the beach and in the adjacent dune and coastal system. Furthermore, this information and the borrow area design provides sufficient quality control/quality assurance (QC/QA) that the sediment from the borrow area(s) will comply with the requirements of Fla. Admin. Code r. 62B-41.007(2)(j); hence, additional QC/QA procedures beyond those described in this permit are not required for these sediment parameters during construction.

This plan outlines the responsibilities of each stakeholder in the project as they relate to the placement of beach compatible material on the beach. These responsibilities are in response to the possibility that non-beach compatible sediments may exist within the borrow area(s) and could be unintentionally placed on the beach. The QC Plan specifies the minimum construction management, inspection, and reporting requirements placed on the Marine Dredging Contractor and enforced by the Permittee, to ensure that the sediment from the borrow area(s) to be used in the project meet the compliance specifications. The QA Plan specifies the minimum construction oversight, inspection, and reporting requirements to be undertaken by the Permittee or the Permittee's On-Site Representative to observe, sample, and test the placed sediments to verify the sediments are in compliance.

B. SEDIMENT QUALITY SPECIFICATIONS

The sediment from the borrow area(s) is similar in Munsell color and grain size distribution to the material in the existing coastal system at the beach placement site. The Department and the Permittee acknowledge that it is possible that discrete occurrences of non-beach compatible sediments may exist within the permitted borrow area(s) that do not comply with the limiting parameters of Fla. Admin. Code r. 62B-41.007(2)(j) 1. – 5., or vary in Munsell color from the composite value. Furthermore, the Department may consider more restrictive values for the sediment parameters to ensure that the sediment from the borrow area(s) is similar in color and grain size distribution to the sediment in the existing coastal system at the beach placement site. Therefore, fill material compliance specifications for the sediment from the borrow area(s) proposed for this project are provided in Table 1.

The compliance specifications take into account the variability of sediment on the native or existing beach, and are values which may reasonably be attained given what is known about the borrow area sediment. Beach fill material which falls outside of these limits will be considered unacceptable and subject to remediation.

Table 1- Sediment Compliance Specifications

Sediment Parameter	Parameter Definition	Compliance Value
Mean Grain Size	calculated by moment method	0.33 mm – 0.55 mm
Max. Silt Content	passing #230 sieve	2%
Max. Shell Content*	retained on #4 sieve	2%
Munsell Color Value	moist Hue	10YR, 2.5Y, or 5Y
	moist Value	≥ 6
	moist Chroma	≤ 2
The beach fill material shall not contain construction debris, toxic material, other foreign matter, or coarse gravel or rocks.		

*Determined using the sieve numbers listed in Section D.7.b

C. QUALITY CONTROL PLAN

The contract documents shall incorporate the following technical requirements, or equivalent language that addresses the location of dredging, sediment quality monitoring on the beach, and, if necessary, remedial actions. The Permittee will seek to enforce these contract requirements during the execution of work.

1. **Electronic Positioning and Dredge Depth Monitoring Equipment**. The Contractor will continuously operate electronic positioning equipment, approved by the Project Engineer, to monitor the precise positioning of the excavation device location(s) and depth(s). A Differential Global Positioning System (DGPS) or equivalent system providing equal or better accuracy will be used to determine the horizontal position and will be interfaced with an appropriate depth measuring device to determine the vertical position of the bottom of the excavation device. The horizontal positioning equipment will maintain an accuracy of +/- 3.0 feet. The vertical positioning equipment will maintain a vertical accuracy of +/-0.5 feet with continuous applicable tidal corrections measured at the project site.

2. **Dredge Location Control**. The Contractor is required to have, in continuous operation on the dredge, electronic positioning equipment that will accurately compute and plot the position of the dredge. Such fixes, and the accompanying plots, will be furnished to the Permittee's on-site representative daily as part of the QC Reports. The electronic positioning equipment will be installed on the dredge so as to monitor, as closely as possible, the actual location of the excavation device(s). The location of the master antenna on the dredge and the distance and direction from the master antenna to the bottom of the excavation device will be reported on the Daily Reports. A printout of the excavation device positions in State Plane Coordinates, the excavation device depths corrected for tide elevation and referenced to the North American Vertical Datum of 1988 (NAVD 88), and the time, will be maintained using an interval of two (2) minutes for each printed fix. A printed and computer file (in ASCII format) copy of the position data will be provided to the Project Engineer as part of the daily report. The Contractor will prepare a plot of the data that includes the State Plane Coordinate grid system and the borrow area limits. The format of the plot may be subject to approval by the Permittee's Engineer. No dredging will take place outside of the borrow area limits (horizontal and vertical limits) as shown on the drawings.

3. **Dredging Observation.** The Contractor will be responsible for establishing such control as may be necessary to ensure that the allowable excavation depths and spatial limits are not exceeded. If the Contractor encounters noncompliant sediment during dredging, the Contractor will immediately cease dredging, relocate the dredge into compliant sediment, and will verbally notify the Permittee's On-site Representative, providing the time, location, and description of the noncompliant sediment. The Contractor will also report any encounters with noncompliant sediment

in the Contractor's Daily Report, providing depth and location in State Plane Coordinates of said materials within the borrow area. The Contractor, in cooperation with the Permittee's Engineer, will use the dredge positioning records, plans, and vibracore descriptions to determine where the Contractor may dredge to avoid additional placement of noncompliant sediment. The Contractor will adjust his or her construction operation to avoid the noncompliant sediment to the greatest extent practicable.

4. **Beach Observation**. The Contractor will continuously visually monitor the sediment being placed on the beach to assess grain size, silt content, gravel content, and Munsell color. If noncompliant sediment is placed on the beach, the Contractor will immediately cease dredging, relocate the dredge into compliant sediment, and verbally notify the Permittee's On-site Representative, providing the time, location, and description of the noncompliant sediment. The Contractor will also report any encounters with noncompliant sediment in the Contractor's Daily Report, providing depth and location in State Plane Coordinates of said materials within the borrow area. The Contractor will take the appropriate remediation actions as directed by the Permittee or Permittee's Project Engineer.

5. **Excavation Requirements**. The Contractor will excavate within the approved boundaries and maximum depths of the borrow area(s) in a uniform and continuous manner. If directed by the Permittee's Project Engineer, the Contractor will change the location and/or depth of excavation within the borrow area limits.

6. **Vibracore Logs and Grain Size Data.** The Contractor will be provided with all descriptions of sediment vibracore borings collected within the borrow area(s), and will acknowledge that he is aware of the quality of the sediment as described in the sediment vibracore logs. These logs and grain size data will be presented in the construction specifications.

D. QUALITY ASSURANCE PLAN

The Permittee will seek to enforce the construction contract and Department permits related to sediment quality. In order to do so, the following steps shall be followed:

1. **Construction Observation and Sampling for Visual Assessment.** Construction observation by the Permittee's On-Site Representative will be performed 7 days a week, at least 8 hours a day during periods of active construction. Most observations will be conducted during daylight hours; however, random nighttime observations shall be conducted.

2. **On-Site Representative.** The Permittee will provide on-site observation by individuals with training or experience in beach nourishment and construction inspection and testing, and who are knowledgeable of the project design and permit conditions. The Project Engineer, a qualified coastal engineer, will actively coordinate with the Permittee's On-Site Representative, who may be an employee or sub-contractor of the Permittee or the Project Engineer. Communications will take place between the Project Engineer and the Permittee's On-Site Representative on a daily basis during periods of active construction.

3. **Pre-Construction Meeting.** The project QC/QA Plan will be discussed as a matter of importance at the pre-construction meeting. The Contractor will be required to acknowledge the goals and intent of the above described QC/QA Plan, in writing, prior to commencement of construction.

4. **Contractor's Daily Reports.** The Project Engineer or Permittee's On-Site Representative will review the Contractor's Daily Reports which characterize the nature of the sediments encountered at the borrow area and placed along the project shoreline with specific reference to moist sand color and the occurrence of rock, rubble, shell, silt, or debris that exceeds acceptable limits. The Project Engineer will review the dredge positions in the Contractor's Daily Report.

5. **On Call.** The Project Engineer will be continuously on call during the period of construction for the purpose of making decisions regarding issues that involve QC/QA Plan compliance.

6. **Addendums.** Any addendum or change order to the Contract between the Permittee and the Contractor will be evaluated to determine whether or not the change in scope will potentially affect the QC/QA Plan.

7. **During Construction Sampling for Visual Inspection.** To assure that the fill material placed on the beach is in compliance with the permit, the Project Engineer or Permittee's On-Site Representative will conduct assessments of the beach fill material as follows:

a. During excavation and fill placement activities, the Permittee's On-Site Representative will collect a sediment sample at not less than 200-foot intervals of newly constructed berm to visually assess grain size, Munsell color, shell content, and silt content. The sample shall be a minimum of 1 U.S. pint (approximately 200 grams). This assessment will consist of handling the fill material to ensure that it is predominantly sand to note the physical characteristics and assure the material meets the sediment compliance parameter specified in this Plan. If deemed necessary, quantitative assessments of the sand will be conducted for grain size, silt content, shell content and Munsell color using the methods outlined in section D.8.b. Each sample will be archived with the date, time, and location of the sample. The results of these daily inspections, regardless of the quality of the sediment, will be appended to or notated on the Contractor's Daily Report. All samples will be stored by the Permittee for at least 60 days after project completion.

b. If the Permittee or Project Engineer determines that the beach fill material does not comply with the sediment compliance specifications in this QC/QA Plan, the Permittee or Project Engineer will immediately instruct the Contractor to cease material excavation operations and take whatever actions necessary to avoid further discharge of noncompliant sediment The Contractor, in cooperation with the Project Engineer, will use the dredge positioning records, plans, and vibracore descriptions to determine where the Contractor may dredge to avoid additional placement of noncompliant sediment. The Contractor will adjust his or her construction operation to avoid the noncompliant sediment to the greatest extent practicable. The sediment inspection results will be reported to the Department.

8. **Post-Construction Sampling for Laboratory Testing.** To assure that the fill material placed on the beach was adequately assessed by the borrow area investigation and design, the Project Engineer will conduct assessments of the sediment as follows:

a. Post-construction sampling of each acceptance section and testing of the fill material will be conducted to verify that the sediment placed on the beach meets the expected criteria/characteristics provided during from the geotechnical investigation and borrow area design process. Upon completion of an acceptance section of constructed beach, the Project Engineer will collect two (2) duplicate sand samples at each Department reference monument profile line to quantitatively assess the grain size distribution, moist Munsell color, shell content, and silt content for compliance. The Project Engineer will collect the sediment samples of a minimum of 1 U.S. pint (at least 200 grams) each from the bottom of a test hole a minimum of 18 inches deep within the limits of the constructed berm. The Project Engineer will visually assess grain size, Munsell color, shell content, and silt content of the material by handling the fill material to ensure that it is predominantly sand, and further to note the physical characteristics. The Project Engineer will note the existence of any layering or rocks within the test hole. One sample will be sent for laboratory analysis while the other sample will be archived by the Permittee. All samples and laboratory test results will be labeled with the Project name, FDEP Reference Monument Profile Line designation, State Plane (X,Y) Coordinate location, date sample was obtained, and "Construction Berm Sample."

b. All samples will be evaluated for visual attributes (Munsell color and shell content), sieved in accordance with the applicable sections of ASTM D422-63 (Standard Test Method for Particle-Size Analysis of Soils), ASTM D1140 (Standard Test Method for Amount of Material in Soils Finer than No. 200 Sieve), and ASTM D2487 (Classification of Soils for Engineering Purposes), and analyzed for carbonate content. The samples will be sieved using the following U.S. Standard Sieve Numbers: 3/4", 5/8", 3.5, 4, 5, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230.

c. A summary table of the sediment samples and test results for the sediment compliance parameters shall accompany the complete set of laboratory testing results. The column headings will include: Sample Number; Mean Grain Size (mm); Sorting Value: Silt Content (%); Shell Content (%); Munsell Color Value; and a column stating whether each sample MET or FAILED the compliance values found in Table 1 The sediment testing results will be certified by a P.E or P.G. registered in the State of Florida. A statement of how the placed fill material compares to the sediment analysis and volume calculations from the sand search investigation and borrow area design shall be included in the sediment testing results report. The Permittee will submit sediment testing results and analysis report to the Department within 90 days following beach construction.

d. In the event that a section of beach contains fill material that is not in compliance with the sediment compliance specifications, then the Department will be notified. Notification will indicate the volume, aerial extent and location of any unacceptable beach areas, and remediation planned.

E. REMEDIATION

1. **Compliance Area.** If a sample does not meet the compliance value for construction debris, toxic material, other foreign material, coarse gravel, or rock, the Permittee shall determine the aerial extent and remediate regardless of the extent of the noncompliant material. If a sample is noncompliant for the silt content, shell content, or Munsell color and the aerial extent exceeds 10,000 square feet, the Permittee shall remediate.

2. **Notification.** If an area of newly constructed beach does not meet the Sediment Compliance Specifications, then the Department (JCPCompliance@dep.state.fl.us) will be notified. Notification will indicate the aerial extent and location of any areas of noncompliant beach fill material and remediation planned. As outlined in section E.4 below, the Permittee will immediately undertake remediation actions without additional approvals from the Department. The results of any remediation will be reported to the Department following completion of the remediation activities and shall indicate the volume of noncompliant fill material removed and replaced.

3. **Sampling to determine extent.** In order to determine if an area greater than 10,000 square feet of beach fill is noncompliant, the following procedure will be performed by the Project Engineer:

a. Upon determination that the first sediment sample is noncompliant, at minimum, five (5) additional sediment samples will be collected at a 25-foot spacing in all directions and assessed. If the additional samples are also noncompliant, then additional samples will be collected at a 25-foot spacing in all directions until the aerial extent is identified.
b. The samples will be visually compared to the acceptable sand criteria. If deemed necessary by the Project Engineer, quantitative assessments of the sand will be conducted for grain size, silt content, shell content, and Munsell color using the methods outlined in section D.8.b. Samples will be archived by the Permittee.
c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of noncompliant fill.
d. The total square footage will be determined.
e. The site map and analysis will be included in the Contractor's Daily Report.

4. **Actions.** The Permittee or Project Engineer shall have the authority to determine whether the material placed on the beach is compliant or noncompliant. If placement of noncompliant material occurs, the Contractor will be directed by the Permittee or Project Engineer on the necessary corrective actions. Should a situation arise during construction that cannot be corrected by the remediation methods described within this QC/QA Plan, the Department will be notified. The remediation actions for each sediment parameter are as follows:

a. Silt: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value, or removing the noncompliant fill material and replacing it with compliant fill material.
b. Shell: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
c. Munsell color: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
d. Coarse gravel: screening and removing the noncompliant fill material and replacing it with compliant fill material.
e. Construction debris, toxic material, or other foreign matter: removing the noncompliant fill material and replacing it with compliant fill material.

All noncompliant fill material removed from the beach will be transported to an appropriate upland disposal facility located landward of the Coastal Construction Control Line.

5. **Post-Remediation Testing.** Re-sampling shall be conducted following any remediation actions in accordance with the following protocols:

a. Within the boundaries of the remediation actions, samples will be taken at maximum of 25-foot spacing.
b. b. The samples will be visually compared to the acceptable sand criteria. If deemed necessary by the Engineer, quantitative assessments of the sand will be conducted for grain size, silt content, gravel content, and Munsell color using the methods outlined in Section D.8.b. Samples will be archived by the Permittee.
c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of remediation actions.

6. **Reporting.** A post-remediation report containing the site map, sediment analysis, and volume of noncompliant fill material removed and replaced will be submitted to the Department within 7 days following completion of remediation activities.

All reports or notices relating to this permit shall be emailed and sent to the Department at:

FDEP Office of Resiliency and Coastal protection
JCP Compliance Officer
Mail Station 3544
2600 Blair Stone Road
Tallahassee, Florida 32399
phone: (850) 414-7716
e-mail: JCPCompliance@dep.state.fl.us

End of Plan

Hardbottom Biological Monitoring Plan

Indian River County Sector 3
Beach and Dune Nourishment Project

FDEP Permit No. 0285993-009-JC

April 2020

TABLE OF CONTENTS

FIGURES

TABLES

1.0 INTRODUCTION

The Indian River County Sector 3 Beach and Dune Nourishment Project authorized by Florida Department of Environmental Protection (FDEP) Permit No. 0285993-009-JC includes the restoration and subsequent nourishment of approximately 6.6 miles of the shoreline (between R-20 and R-55 in Indian River County) using sand from upland and/or offshore sources (Figure 1). The South Borrow Area (located approximately 15 miles southeast of the project area) and six (6) pipeline corridors (located at DEP reference monuments R-20, R-30, R-34, R-42.5, R-46.6, and R-53.6) have been authorized for use (Figure 1).

Hardbottom formations parallel the shoreline along the entire extent of Indian River County Sector 3. Within the project area the landward edge of the nearshore formation ranges from approximately 24 m to 113 m [mean of 55 m] offshore of the permitted equilibrium toe of fill (ETOF). Permit No. 0285993-009-JC does not authorize direct and/or secondary project related impacts to hardbottom resources and requires that biological monitoring be conducted to ensure such impacts would be documented, should they occur. This Plan sets forth the biological monitoring protocols for the Indian River County Sector 3 Beach and Dune Nourishment Project.

2.0 NEARSHORE HARDBOTTOM MONITORING

Biological monitoring for beach fill placement (nourishment) under this permit shall include a pre-construction (baseline) monitoring event during the summer prior to the initial construction event, an initial post-construction monitoring event (within six months of project completion), and three annual post-construction monitoring events (Years 1, 2, and 3 post-construction). Unless approved by FDEP resource review staff, all transects shall be monitored during each monitoring event and all monitoring events shall be conducted during summer months (May through September). The pre-construction monitoring event conducted under this permit prior to the initial nourishment shall serve as the baseline for all subsequent monitoring events. Each subsequent nourishment conducted under this permit shall initiate a complete round of post-construction monitoring (i.e., initial post-construction event and three annual post-construction events). Standard operating procedures shall be used during each monitoring event to provide consistent and repeatable collection of data. The aim of biological monitoring is to identify any unpermitted direct and / or secondary adverse impacts to nearshore hardbottom resources due to the spreading of project sand farther than permitted (i.e., seaward of the permitted ETOF). As such, surveys will document sediment depth and cover as well as the abundance, distribution, condition, and function of hardbottom resources (biotic assemblages). Nearshore hardbottom adjacent to and downdrift of the fill template (but outside of the ETOF) shall be monitored (Figures 2a-2d). Hardbottom monitoring shall consist of nearshore hardbottom edge mapping (Section 2.1) and transect monitoring (Section 2.2), as described below.

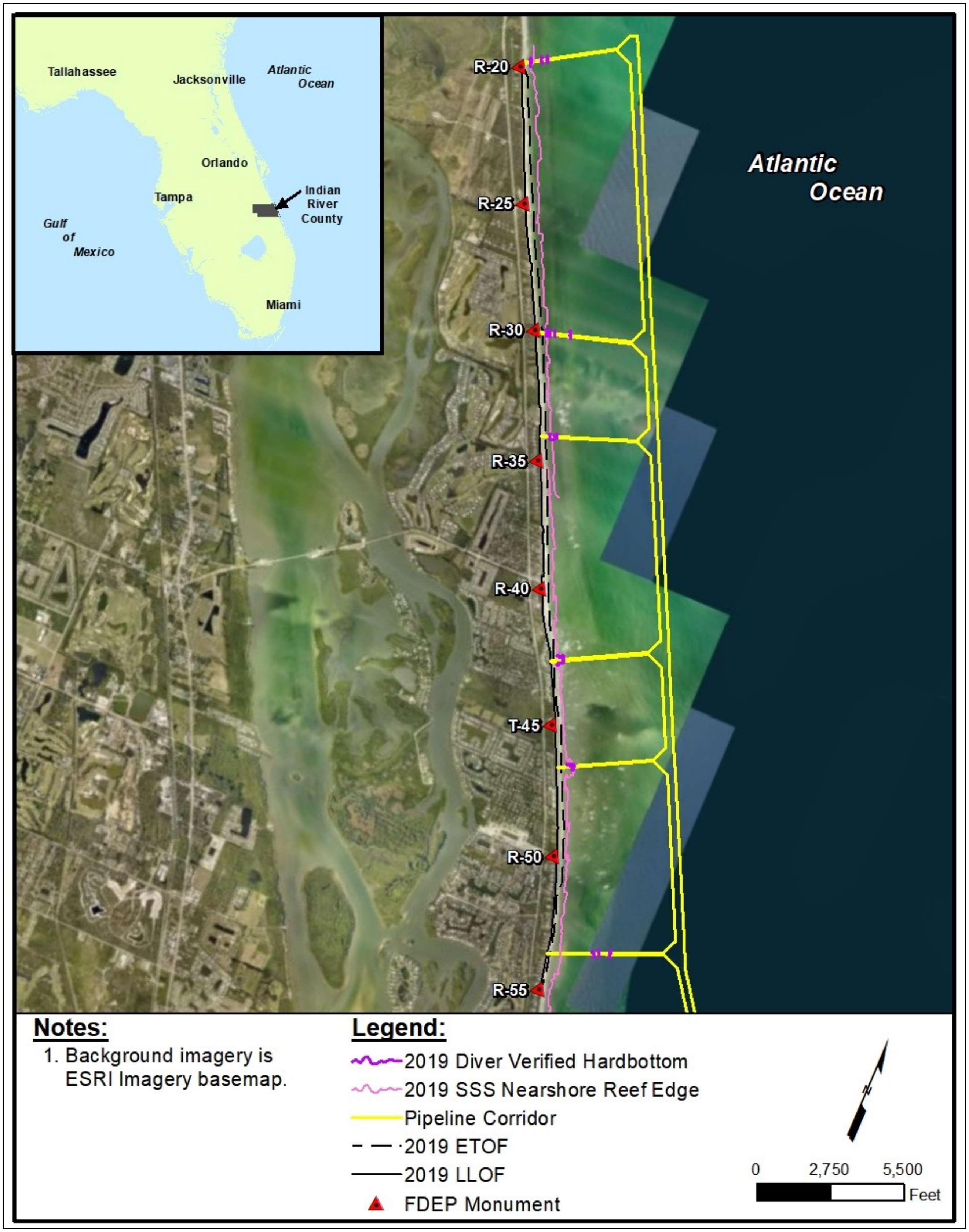


Figure 1. Indian River County Sector 3 Beach and Dune Nourishment Project location.

2.1 Nearshore Hardbottom Edge Mapping and Monitoring

In situ delineation of the nearshore hardbottom edge will provide information on hardbottom exposure within the project area and allow for determination of direct impacts, when occurring, due to hardbottom burial by project fill. The entire length of the nearshore hardbottom edge between FDEP reference monuments R-19.5 and R-57 shall be mapped during each monitoring event. The nearshore hardbottom edge is defined as the visible border between sand and hardbottom. Bounce dives shall not be used to delineate the hardbottom edge unless authorization is granted by FDEP staff. If necessary, requests will be submitted to resource review staff in the Department's Beaches, Inlets, and Ports program.

For *in situ* hardbottom edge mapping, at least two divers shall, together, swim the entire length of the hardbottom edge. One diver shall tow a DGPS antenna transmitting continuous positions to HYPACK hydrographic survey software on board a survey vessel. To accurately map the edge, the towing-diver will swim at a speed conducive to maintaining the buoy on as short a tether as possible. The non-towing diver will record qualitative digital video to document the nearshore hardbottom edge for descriptive analysis (e.g., of the dominant benthic communities, vertical relief, and sand cover). To allow for visual characterization of the hardbottom edge, the recording diver shall position the camera at an oblique angle to the seafloor. Positions of breaks (sand gaps) in the hardbottom edge greater than 5 meters in length will be noted during the survey. If possible, video shall be georeferenced.

2.2 Establishment and Monitoring of Permanent Transects

Hardbottom monitoring adjacent to and downdraft of the fill template (outside of the permitted ETOF) shall occur along permanent shore-perpendicular transects of two types — biological and sediment only (Figures 2a-2d). All survey methods described below (Section 2.2.2) apply to the biological transects, while only line-intercept, interval sediment depth, and video collection apply to sediment only transects. To obtain the most accurate information on sediment depth and the location of sediment and hardbottom, line-intercept and interval sediment depth surveys shall be conducted first along each transect during each monitoring event. For biological transects, line-intercept and interval sediment depth surveys will be followed by qualitative video collection and benthic quadrat surveys.

2.2.1 Establishment of Transects and Quadrats

2.2.1.1 Transect Establishment

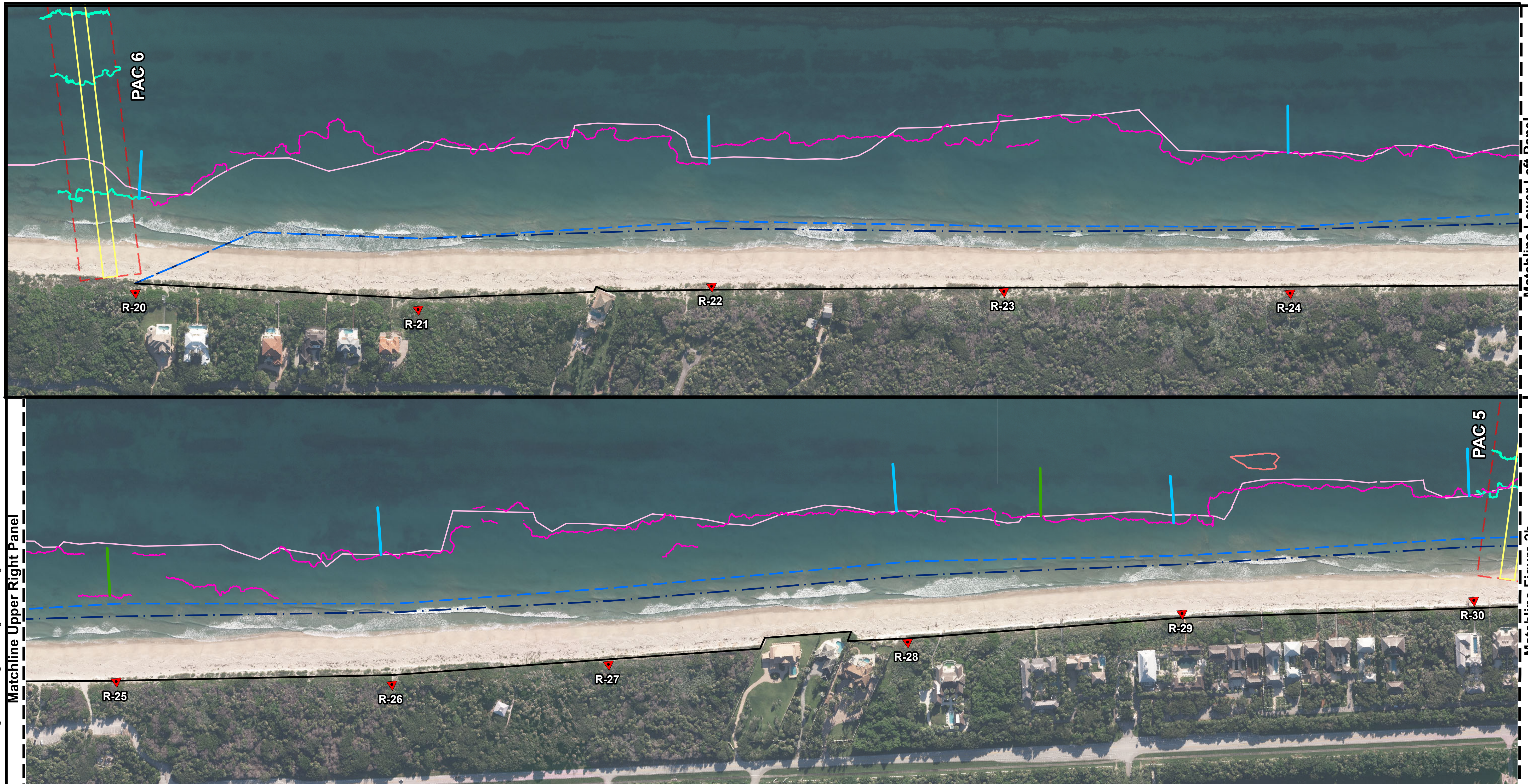
A total of 38 permanent monitoring transects shall be surveyed for this project during each monitoring event (Figures 2a-2d). Twenty-four (24) permanent shore-perpendicular biological monitoring transects shall be established in the area adjacent to and downdrift of the fill template and fourteen (14) permanent shore-perpendicular sediment only transects shall be established adjacent to the fill template (Table 1). The length of all transects, both biological and sediment only, shall be 50 meters. Each transect shall start at the nearshore hardbottom edge and extend 50 meters offshore. The positions of transects are permanent once established (during the initial pre-construction/baseline survey); thus, the positions of transects shall not change over time, and the entire 50-meter length of each transect shall be surveyed in full during each monitoring event. To ensure repeatability in transect placement during monitoring events, permanent markers (pins, iron rods, etc.) shall be installed at the start (meter 0), in the middle (meter 25), and at the end (meter 50) of each transect at the time of establishment.

2.2.1.2 Quadrat Establishment

A total of nine (9) 0.5-m^2 quadrats (0.7 m x 0.7 m) shall be established along the length of each biological transect (N = 9 transects). The first permanent quadrat along each biological transect shall be installed at meter zero (0) (nearshore hardbottom edge). The distribution of the remaining permanent quadrats shall be such that numbers are weighted towards the nearshore region; for example, after placement at meter 0, quadrats would be established at roughly the 5, 10, 15, 20, 25, 30, 40, and 50 meter marks. During establishment, quadrats shall be positioned such that areas covered by sand are avoided (i.e., quadrat placement during establishment will be biased to include hardbottom). The distribution of hardbottom along each transect during the baseline survey will therefore influence the positions at which quadrats are established. All quadrats are permanent once established, and post-construction surveys shall use the same quadrat locations as the pre-construction survey, regardless of the exposure or burial condition of each location after initial quadrat establishment. To ensure repeatability in quadrat placement during monitoring events, pins (or nails or eye-bolts) shall be installed to permanently mark the location of each quadrat. The quadrats shall be placed on the north side of the transect line so that the pin marking the quadrat location represents the southwest corner of the quadrat. The permanent location of each quadrat shall be recorded and reported for each survey; post-construction survey quadrat positions shall match baseline quadrat positions.

Table 1. Transect information including name, project area (location relative to fill template), nearest R-monument, type, and length.

Project Area	Nearest R-Monument (R#)	Transect Name	Transect Type (Bio/Sed)	Transect Length (m)
Adjacent	20	T-20	Bio	50
Adjacent	22	T-22	Bio	50
Adjacent	24	T-24	Bio	50
Adjacent	25	S-25	Sed Only	50
Adjacent	26	T-26	Bio	50
Adjacent	28	T-28	Bio	50
Adjacent	28/29	S-28.5	Sed Only	50
Adjacent	29	T-29	Bio	50
Adjacent	30	T-30	Bio	50
Adjacent	31	T-31	Bio	50
Adjacent	31/32	S-31.5	Sed Only	50
Adjacent	32	T-32	Bio	50
Adjacent	32/33	S-32.5	Sed Only	50
Adjacent	33	T-33	Bio	50
Adjacent	34	T-34	Bio	50
Adjacent	35/36	S-35.5	Sed Only	50
Adjacent	36	T-36	Bio	50
Adjacent	36/37	S-36.5	Sed Only	50
Adjacent	37	T-37	Bio	50
Adjacent	38	S-38	Sed Only	50
Adjacent	39	T-39	Bio	50
Adjacent	40	T-40	Bio	50
Adjacent	41/42	S-41.5	Sed Only	50
Adjacent	42	T-42	Bio	50
Adjacent	43	T-43	Bio	50
Adjacent	44	T-44	Bio	50
Adjacent	44/45	S-44.5	Sed Only	50
Adjacent	45	T-45	Bio	50
Adjacent	45/46	S-45.5	Sed Only	50
Adjacent	46	T-46	Bio	50
Adjacent	47/48	S-47.5	Sed Only	50
Adjacent	48	T-48	Bio	50
Adjacent	48/49	S-48.5	Sed Only	50
Adjacent	49/50	S-49.5	Sed Only	50
Adjacent	50	T-50	Bio	50
Adjacent	52/53	T-52.5	Bio	50
Adjacent	54/55	S-54.5	Sed Only	50
Downdrift	56	T-56	Bio	50



Notes:

1. Aerial photography flown by Aerial Cartographics of America (ACA), date flown July 28, 2017.
2. 2016 hardbottom edge was delineated by CSA.
3. 2019 diver verified hardbottom and sidescan sonar were conducted by APTIM.

Legend:

50m Transects
- Biological
- Sediment
- 2019 Diver Verified Hardbottom
- 2019 SSS Nearshore Reef Inshore Edge
- 2016 Diver Delineated Hardbottom Edge
- 2019 ETOF
- 2019 CTOF
- 2019 LLOF
- Pipeline Corridor
- 25m Buffer
- FDEP Monument

Feet
0 175 350
1 inch = 350 feet

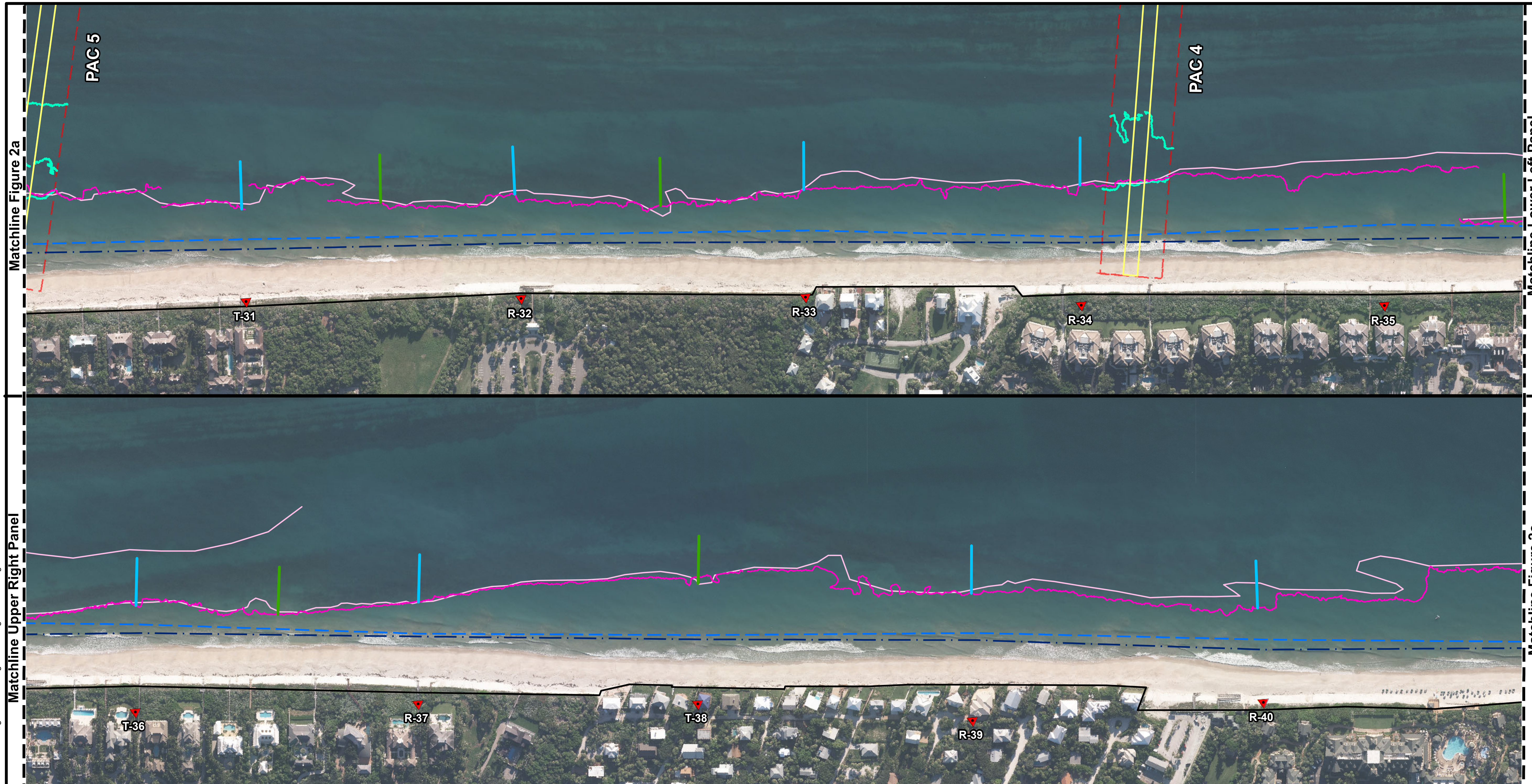
TITLE:
Indian River County Sector 3 Biological Monitoring Plan

APTIM
2481 N. W. BOCA RATON BOULEVARD
BOCA RATON, FL 33431
PH. (561) 391-8102 FAX (561) 391-9116

Date: 2/4/2020	By: HMV	Comm No. : 631235714	Figure No.: 2a

\\cpefs01\gis\Enterprise\Indian River\631235714_BorrowArea\mxd\Biological Monitoring Plan\Biological Monitoring Plan.mxd

Figure 2a. Locations of biological (T) and sediment only (S) transects between R-20 and R-30.



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Legend:

50m Transects

- Biological
- Sediment
- 2019 Diver Verified Hardbottom
- 2019 SSS Nearshore Reef Inshore Edge
- 2016 Diver Delineated Hardbottom Edge
- 2019 ETOF
- 2019 CTOF
- 2019 LLOF
- Pipeline Corridor
- 25m Buffer
- FDEP Monument

Feet
0 175 350
1 inch = 350 feet

TITLE:

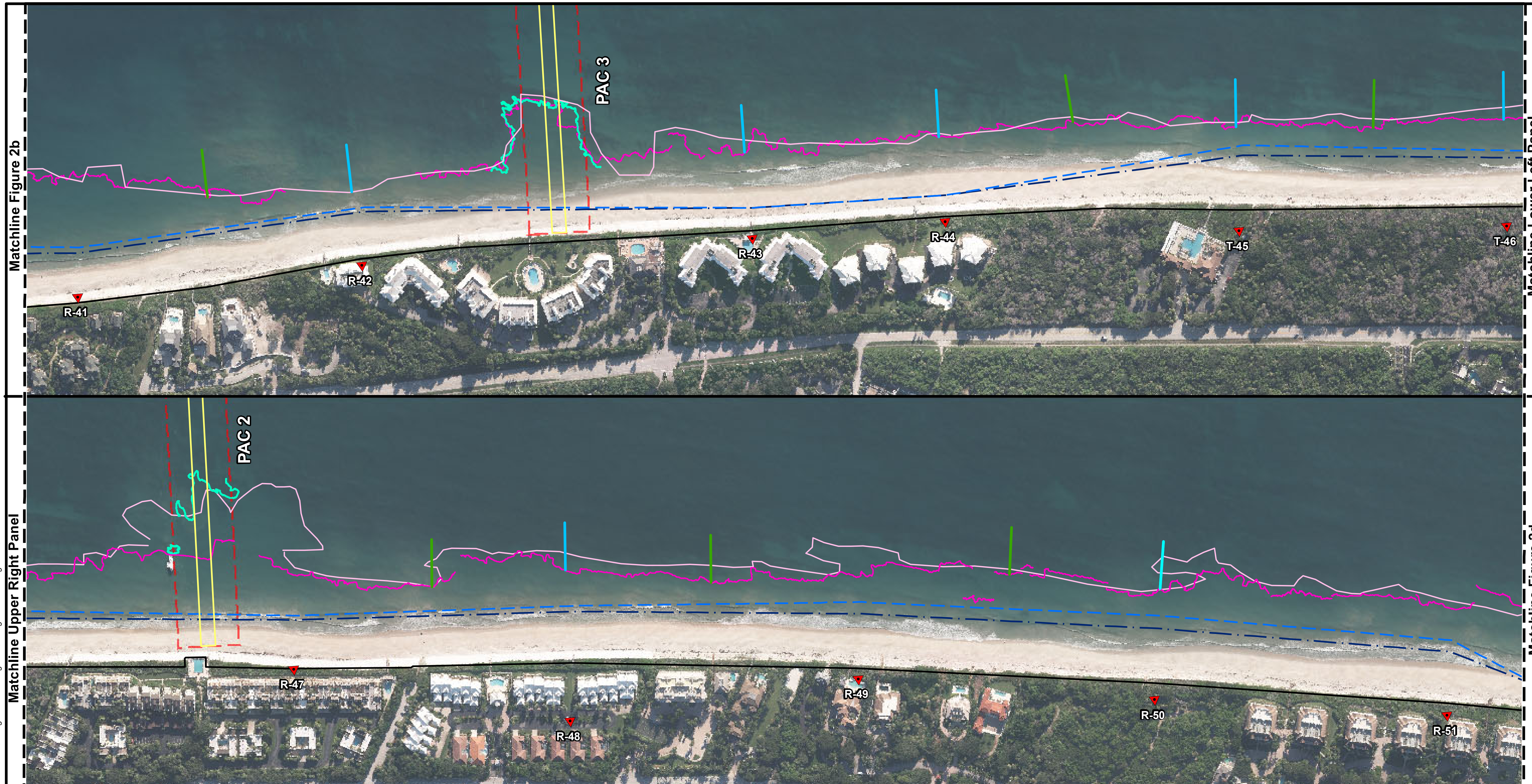
Indian River County
Sector 3
Biological Monitoring Plan

APTIM
2481 N. W. BOCA RATON BOULEVARD
BOCA RATON, FL 33431
PH. (561) 391-8102 FAX (561) 391-9116

Date: 2/4/2020	By: HMV	Comm No. : 631235714	Figure No.: 2b

\\cpefs01\gis\Enterprise\Indian River\631235714_BorrowArea\mxd\Biological Monitoring Plan\Biological Monitoring Plan 2.mxd

Figure 2b. Locations of biological (T) and sediment only (S) transects between R-30 and R-41.



Notes:

1. Aerial photography flown by Aerial Cartographics of America (ACA), date flown July 28, 2017.
2. 2016 hardbottom edge was delineated by CSA.
3. 2019 diver verified hardbottom and sidescan sonar were conducted by APTIM.

Legend:

50m Transects
- Biological
- Sediment
- 2019 Diver Verified Hardbottom
- 2019 SSS Nearshore Reef Edge
- 2016 Diver Delineated Hardbottom Edge
- 2019 ETOF
- 2019 CTOF
- 2019 LLOF
- Pipeline Cooridor
- 25m Buffer
- FDEP Monument

Feet
0 175 350
1 inch = 350 feet

TITLE:
Indian River County Sector 3 Biological Monitoring Plan

APTIM
2481 N. W. BOCA RATON BOULEVARD
BOCA RATON, FL 33431
PH. (561) 391-8102 FAX (561) 391-9116

Date: 2/4/2020	By: HMV	Comm No. : 631235714	Figure No.: 2c

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Figure 2c. Locations of biological (T) and sediment only (S) transects between R-41 and R-51.

Notes:

1. Aerial photography flown by Aerial Cartographics of America (ACA), date flown July 28, 2017.
2. 2016 hardbottom edge was delineated by CSA.
3. 2019 diver verified hardbottom and sidescan sonar were conducted by APTIM.

Legend:

50m Transects

- Biological
- Sediment
- 2019 Diver Verified Hardbottom
- 2019 SSS Nearshore Reef Inshore Edge
- 2016 Diver Delineated Hardbottom Edge
- 2019 ETOF
- 2019 CTOF
- 2019 LLOF
- Pipeline Corridor
- 25m Buffer
- FDEP Monument

Feet
0 175 350
1 inch = 350 feet

TITLE:
Indian River County
Sector 3
Biological Monitoring Plan

APTIM
2481 N. W. BOCA RATON BOULEVARD
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Date: 2/4/2020	By: HMV	Comm No. : 631235714	Figure No.: 2d

\\cpefs01\gis\Enterprise\Indian River\631235714_BorrowArea\mxd\Biological Monitoring Plan\Biological Monitoring Plan 4.mxd

Figure 2d. Locations of biological (T) and sediment only (S) transects between R-51 and T-59.

2.2.2 Transect Monitoring

2.2.2.1 Line-Intercept Survey

In order to document larger areas of uninterrupted sand (physical transitions along the monitoring transects between sand and hardbottom), and to track changes in sediment cover on the hardbottom, line-intercept surveys will be conducted along each permanent transect (biological and sediment only). During each monitoring event, the landward and seaward position of each sand patch / trough at least 0.5 m in length shall be recorded along each transect by reference to transect tape meter marks. Meter mark references shall be to one decimal place (e.g., patch from 2.4 to 3.2 m).

2.2.2.2 Interval Sediment Depth Measurements

In order to track changes in sediment depth associated with changes in sediment cover, each monitoring event will include collection of interval sediment depth measurements along each permanent transect (biological and sediment only). Sediment depth shall be measured at 1-m intervals along the entire length of each transect, inclusive of sand patches. For each measurement, a ruler graduated in centimeters (0 to 30 cm) shall be pressed through the sediment until the ruler reaches the surface of hard substrata or is totally immersed in sand. Depth measurements shall be rounded to the nearest cm (i.e., sediment thickness of less than 0.5 cm will be recorded as “0 cm”, while thickness greater than 0.5 cm but equal or less than 1 cm shall be recorded as “1 cm”, etc.). Measurements greater than 30 cm will be recorded as “> 30 cm”.

2.2.2.3 Quadrat Sampling

Benthic communities and their habitats will be characterized quantitatively using the quadrat method, which includes sampling habitat and assemblages within permanently positioned quadrats along each biological transect. This method ensures that the same quadrats (same location, same size) are sampled in each monitoring event in order to document changes in sediment and benthic communities over time. The sampling protocol is similar to that used in the Benthic Ecological Assessment for Marginal Reefs (BEAMR) (Lybolt and Baron, 2006). As described below, three main benthic characteristics shall be assessed in each quadrat during sampling: physical structure, planar cover of sessile benthos, and coral (scleractinian and octocoral) size and density. As with all non-consumptive surveys, BEAMR is necessarily constrained to visually conspicuous organisms with well-defined, discriminating characteristics for identification.

Physical structure: Maximum topographic relief and mean sediment depth (average of three depth measurements) shall be measured (cm) within each quadrat to document physical structure.

Cover (percent) of functional groups: The distribution of substrata and composition of the benthic community within each quadrat shall be documented by estimating the planar cover (percent) of functional groups. Specifically, the following 21 functional groups shall be assessed: sediment (sand, shell-hash, or mud as subcategories), bare hardbottom, rubble, seagrass, macroalgae, encrusting red algae, turf algae, sponge, octocoral, scleractinian coral, anemone, zoanthid, hydroid, hydrocorals (e.g., *Millepora* spp.), sessile annelid (not including *Phragmatopoma* spp.), wormrock, barnacle, bivalve, bryozoan, echinoderm (crinoids only), and tunicate. Each functional group shall be assigned a cover value (percent) from 0% to 100%, with the total of all functional groups in each quadrat equaling 100%. Macroalgae with at least 1% cover shall be identified to genus and the cover (percent) of each genus shall be recorded. Unattached or floating macroalgae shall be disregarded and shall be removed from quadrats prior to sampling. Scleractinian coral colonies shall be identified to species and octocoral colonies shall be identified to genus. The presence of bioeroding sponges will be noted and species/genera (e.g., *Pione lampa, Cliona deletrix, C. varians*) having at least 1% cover shall be quantified. Other known common sponges will be listed. The cover (percent) of cyanobacteria shall also be assessed but will be recorded separately from other cover estimates (i.e., not included with the main 21 functional groups). Cyanobacteria cover shall be reported as cover over sand (most often as mats) and cover over benthic organisms.

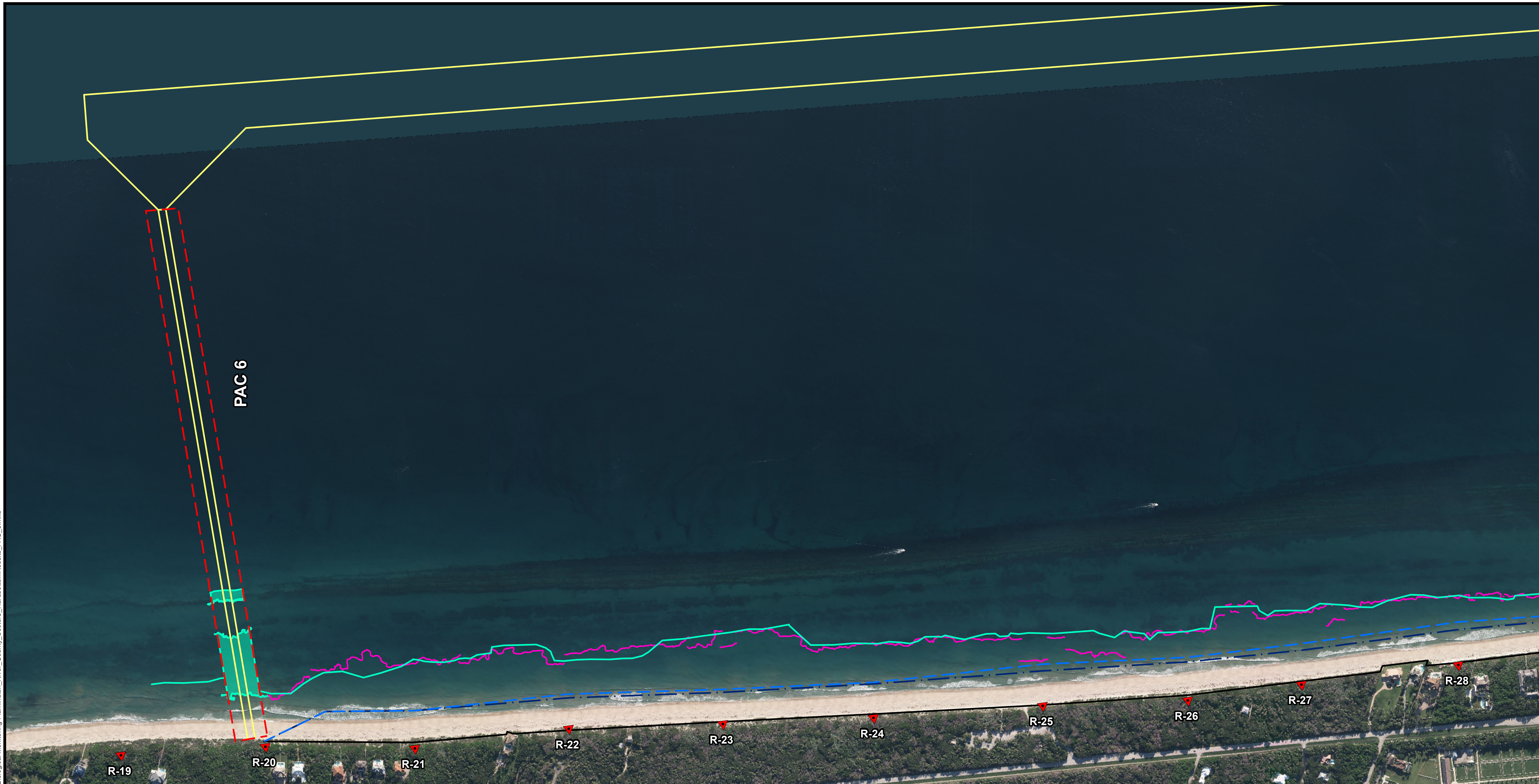
Coral size and density: Monitoring staff shall also measure and record to the nearest centimeter (cm) the maximum dimension (height or width) of each scleractinian coral and octocoral colony within each quadrat. The smallest size recorded shall be one (1) cm; for colonies less than one (1) cm in size, the measurement recorded shall be "< 1 cm". Each colony within each quadrat shall also be enumerated and identified (by species for scleractinians, by genus for octocorals) to determine coral density and composition.

2.2.2.4 Qualitative Video Recording

Qualitative video survey data collected as part of beach nourishment project biological monitoring functions as an archival data set that can be used for general reference purposes or to help resolve potential impacts suggested by quadrat and sediment survey data. As such, video data could be reviewed and compared between surveys and must be of a quality sufficient to allow for post-collection quantitative image analysis using point count procedures. Qualitative video surveys shall be conducted along all permanent monitoring transects using a digital video camera. Video of the seafloor along each transect shall progress no faster than 5 meters per minute over hardbottom, and 10 m per minute over large sand patches. During the survey, a convergent laser guidance system shall be used to precisely maintain the height of the camera so that 30 cm of substrate are visible from top to the bottom of the frame. The transect line shall be clearly visible in all video so that locations may be accurately referenced. A 360° panoramic view at an angle of roughly 30° to the horizon shall be recorded both at the beginning and end of each transect from an elevation of roughly 1 m above the bottom. At the beginning and end of each transect, a standard underwater display shall also be recorded and integrated directly onto the digital video track. The standard display shall report: 1) the project FDEP permit number (e.g., 0555555-001-JC); 2) the transect number; 3) the survey date (e.g., 06/25/2021); 4) the water depth in meters for both the beginning (transect meter 0) and end (final meter) of the transect (e.g., start depth = 2 m, end depth = 4.5 m); and 5) any pertinent notes (e.g., poor visibility, large swell, etc.). Video data (files) will be supplied to FEDP during raw data submittal. Video shall be reviewed at the end of each transect surveyed to ensure the quality is acceptable for general characterization of the benthos; poor quality video shall be re-filmed.

3.0 PIPELINE CORRIDOR MONITORING

Surveys and monitoring are required to provide the FDEP with reasonable assurance that impacts to hardbottom resources within pipeline access corridors (PAC) have been avoided or minimized to the greatest extent practicable and that any project related unpermitted direct and/or secondary adverse impacts to resources shall be documented if they occur. The following includes methods for pre-construction surveys of pipeline corridors and corridor buffers, for post-placement pre-pumping pipeline surveys, and for pre-, during-, and post-construction monitoring of areas containing hardbottom resources in close proximity to construction activities. Requirements and actions to be taken if impacts to resources are documented are also specified. Six (6) pipeline corridors are authorized for use (PAC 1 - PAC 6, Figures 3a-3d). Pre-construction surveys (Section 3.1) and planned impact avoidance and minimization (Section 3.2) are required for all pipeline corridors prior to each construction event while post-placement pre-pumping pipeline surveys (Section 3.3) and monitoring (Section 3.4) are only required for pipeline corridors used for a construction event.



Notes:

1. Aerial photography flown by Aerial Cartographics of America (ACA), date flown July 28, 2017.
2. 2016 hardbottom edge was delineated by CSA.
3. 2019 hardbottom includes interpretation from sidescan sonar survey and diver mapped hardbottom collected by APTIM.

Legend:

- FDEP Monument
- 2019 ETOF
- 2019 CTOF
- 2019 LLOF
- Pipeline Corridor
- 25m Buffer
- 2016 Diver Delineated Hardbottom Edge
- 2019 Hardbottom

Feet
0 325 650
1 inch = 650 feet

TITLE:
Indian River County
Sector 3
Pipeline Access Corridor Monitoring
PAC 6

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Date: 2/4/2020	By: HMV	Comm No. : 631235714	**Figure No.: 3a**

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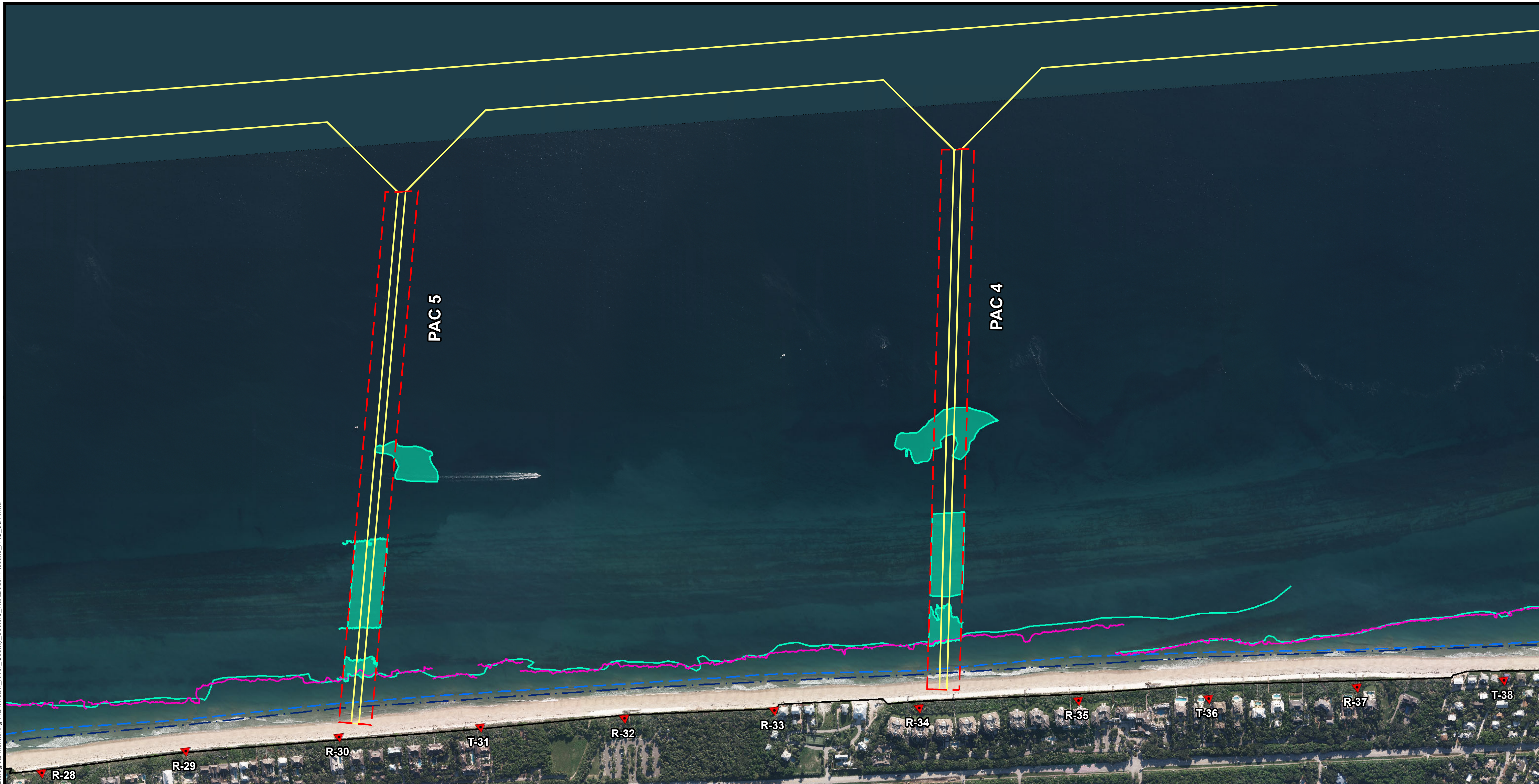

Notes:

1. Aerial photography flown by Aerial Cartographics of America (ACA), date flown July 28, 2017.
2. 2016 hardbottom edge was delineated by CSA.
3. 2019 hardbottom includes interpretation from sidescan sonar survey and diver mapped hardbottom collected by APTIM.

Legend:

- FDEP Monument
- 2019 ETOF
- 2019 CTOF
- 2019 LLOF
- Pipeline Corridor
- 25m Buffer
- 2016 Diver Delineated Hardbottom Edge
- 2019 Hardbottom

Feet
0 325 650
1 inch = 650 feet

TITLE:
Indian River County
Sector 3
Pipeline Access Corridor Monitoring
PAC 5 & 4

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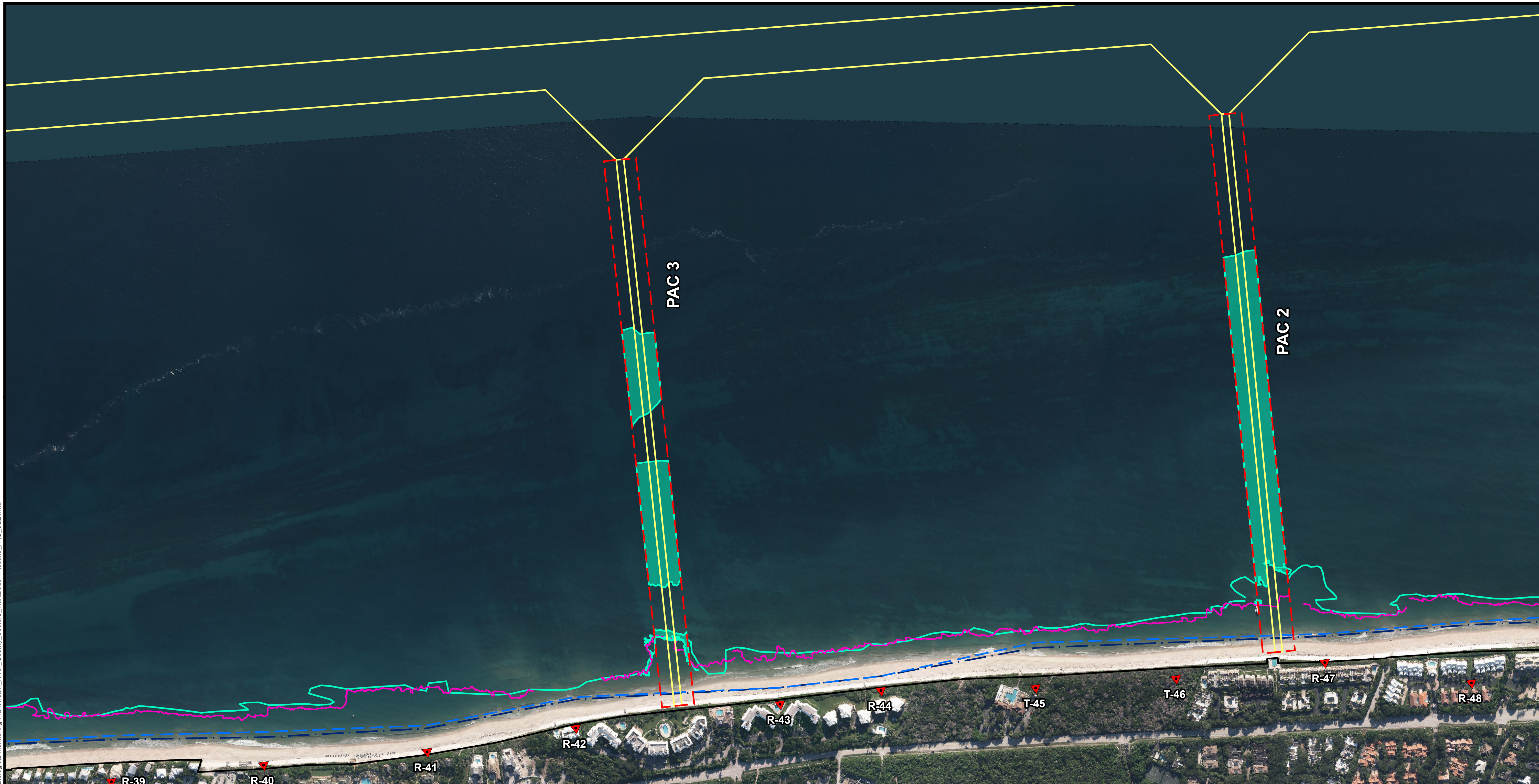
Date: 2/4/2020	By: HMV	Comm No. : 631235714	**Figure No.: 3b**

\\cpefs01\gis\Enterprise\Indian River\631235714_BorrowAreaMxd\Biological Monitoring Plan\Indian_River_County_Sector3_HardbottomResults_PAC_5&4.mxd



Notes:

1. Aerial photography flown by Aerial Cartographics of America (ACA), date flown July 28, 2017.
2. 2016 hardbottom edge was delineated by CSA.
3. 2019 hardbottom includes interpretation from sidescan sonar survey and diver mapped hardbottom collected by APTIM.

Legend:

- FDEP Monument
- 2019 ETOF
- 2019 CTOF
- 2019 LLOF
- Pipeline Corridor
- 25m Buffer
- 2016 Diver Delineated Hardbottom Edge
- 2019 Hardbottom

Feet
0 325 650
1 inch = 650 feet

TITLE:

Indian River County
Sector 3
Pipeline Access Corridor Monitoring
PAC 3 & 2

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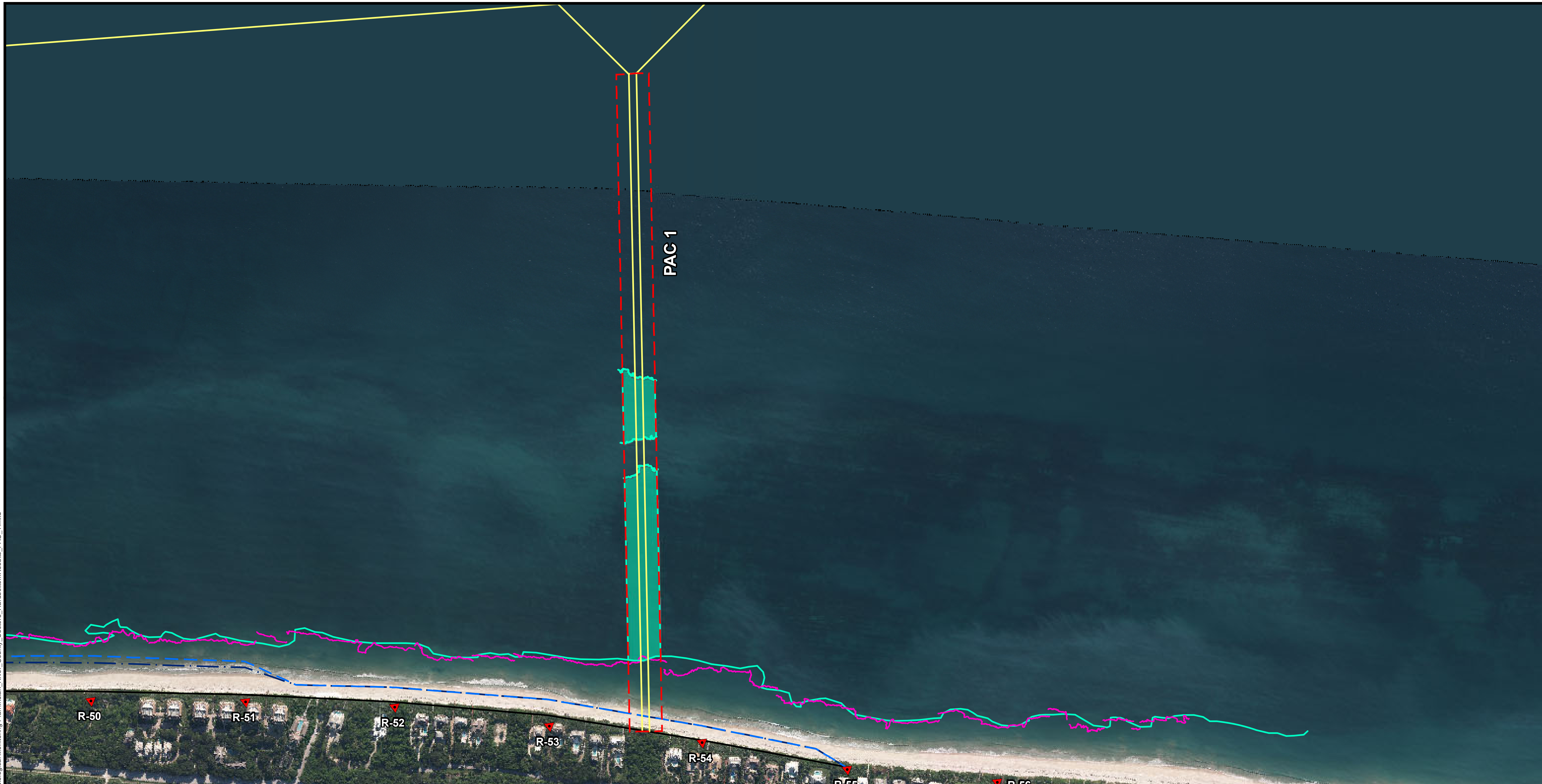
Date: 2/4/2020	By: HMV	Comm No. : 631235714	**Figure No.: 3c**

\\cpefs01\gis\Enterprise\Indian River\631235714_BorrowArea\mxd\Biological Monitoring Plan\Indian_River_County_Sector3_HardbottomResults_PAC_3&2.mxd



Notes:

1. Aerial photography flown by Aerial Cartographics of America (ACA), date flown July 28, 2017.
2. 2016 hardbottom edge was delineated by CSA.
3. 2019 hardbottom includes interpretation from sidescan sonar survey and diver mapped hardbottom collected by APTIM.

Legend:

- FDEP Monument
- 2019 ETOF
- 2019 CTOF
- 2019 LLOF
- Pipeline Corridor
- 25m Buffer
- 2016 Diver Delineated Hardbottom Edge
- 2019 Hardbottom

Feet
0 325 650
1 inch = 650 feet

TITLE:
Indian River County
Sector 3
Pipeline Access Corridor Monitoring
PAC 1

APTIM
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Date: 2/4/2020	By: HMV	Comm No. : 631235714	Figure No.: 3d

3.1 Pre-Construction Pipeline Corridor Surveys

The required survey area for the Sector 3 Beach and Dune Nourishment project includes the area within the six (6) authorized pipeline corridors as well as the area 25 meters to the right and left of each corridor (Figures 3a-3d). Prior to each construction event (fill placement), sonar surveys shall be conducted and used to identify areas of potential hardbottom within the required survey area (i.e., all six [6] corridors) (Section 3.1.1). Potential hardbottom shall then be diver verified (Section 3.1.2) and, when present, hardbottom shall be mapped (Section 3.1.3). Pre-construction pipeline corridor surveys shall be completed for the entirety of the required survey area (all six [6] corridors) prior to any and all construction activities. Once complete, survey information (data and report) shall be provided to the FDEP (Section 5.2.2).

3.1.1 Sonar Surveys

Side-scan or multi-beam sonar surveys shall be conducted within the required survey area to document the current presence or absence of hardbottom resources and, if present, to document the current distribution of hardbottom within corridors (plus 25 m buffer to either side of corridors). Sonar survey records shall be processed post-collection to identify hardbottom signatures. GPS coordinates for each hardbottom signature (location) identified shall be recorded. Hardbottom signatures identified during the post-collection processing of sonar survey records shall be diver verified and, if present, hardbottom shall be mapped.

3.1.2 Hardbottom Verification Surveys

The full list of potential hardbottom signatures identified in the current sonar survey shall be verified by divers in situ. The GPS coordinates of each potential hardbottom location shall be provided to the dive team and divers shall conduct bounce dives to investigate the benthos within a 15 m radius of each location (GPS point). During each investigation, divers shall determine the presence or absence of hardbottom resources and, if present, divers shall note the general condition of the benthic community, identify dominant benthic organisms and substratum types, and estimate the vertical relief of hardbottom in the area. Divers shall also record video or take photographs to document their findings. Locations verified by divers as areas containing hardbottom resources, and any additional areas observed during verification dives as containing hardbottom resources, shall be mapped, in situ, so that the current distribution of all hardbottom resources is documented.

3.1.3 Hardbottom Mapping

To document the current spatial extent and distribution of hardbottom, divers shall delineate the edge of each hardbottom patch/feature within the required survey area (i.e., within pipeline corridors and 25 m to the right and left of each corridor) using survey-grade differential GPS. The edge of hardbottom patches/features is defined as the visible border between sand and hardbottom; however, if sand cover over hardbottom is intermittent, and benthic components/organisms are observed protruding through the sand, then this edge, known as the edge of emergent epifauna, shall serve as the hardbottom edge in these locations and shall be delineated as such. Divers shall swim the entire edge (hardbottom or emergent epifauna) of each hardbottom patch/feature within the required survey area while towing a buoy equipped with a DGPS antenna attached by a cable to a Hypack navigation software system onboard a survey vessel. However, if a hardbottom patch/feature resides partially within and partially outside of the required survey area, then only the portion of the edge of the patch/feature within the survey area shall be required to be delineated. Bounce dives shall not be used to delineate the edge of hardbottom patches/features.

3.2 Impact Avoidance and Minimization

To the greatest extent practicable, impacts to hardbottom resources due to construction activities shall be avoided. If hardbottom resources cannot be avoided during construction, then impacts shall be minimized to the greatest extent practicable. As such, results of the current pre-construction survey (Section 3.1) shall be used to determine the least impactful placement for each pipeline within each corridor for each construction (nourishment) event. Where necessary, pre-construction survey results shall also be used to determine the locations along each pipeline within each corridor where collars or risers or floats (floating pipeline) will be used to limit impacts to resources. Following analysis of survey results by the Permittee, a written description of the methods that will be used to minimize impacts to hardbottom resources and the locations in which these methods will be employed shall be included in the Pre-Construction Pipeline Corridor Survey Report provided to the FDEP prior to each construction event (see Section 5.2.2 for requirements).

3.3 Post-Placement Pre-Pumping Pipeline Surveys

For each construction (nourishment) event, a post-placement, pre-pumping pipeline survey shall be conducted within each pipeline corridor identified as currently containing hardbottom resources that will be used in the construction event. Surveys may be conducted on a corridor by corridor basis (i.e., as corridors are needed/used). For each corridor, the survey shall be conducted immediately following pipeline placement, shall be conducted using survey-grade DGPS, and shall document the location of the full length of the placed pipeline within the limits of hardbottom mapped in the most recent (up to date) sonar and in situ diver corridor surveys (see Section 3.1). For each post-placement, pre-pumping pipeline survey conducted, data shall be provided to the FDEP at least 72 hours prior to the intended or actual start of pumping activities (Section 5.2.3). Survey results will determine the type of monitoring required for each area containing resources within 25 m to either side of the placed pipeline (see Section 3.4).

3.4 Pipeline Corridor Monitoring

For each fill placement event, whenever hardbottom resources are present within 25 m to either side of a placed pipeline, monitoring is necessary to document potential project-related impacts, such as damage, burial, and excessive sedimentation and/or turbidity. For each pipeline corridor containing hardbottom resources, the type of monitoring required for each hardbottom patch/feature depends on whether the pipeline runs across/through or adjacent to hardbottom resources. Monitoring methods for each of these scenarios (Monitoring Types 1 and 2 [Table 2 and Figure 4]) as well as actions required to be taken if impacts are documented (see Section 3.4.4) are described below.

Table 2. Monitoring Types and hardbottom patches/features they are required for.

Monitoring Type	Area Required
1	Areas where the pipeline runs across/through hardbottom resources
2	Areas where the pipeline runs adjacent to hardbottom resources that are within 25 m of the placed pipeline

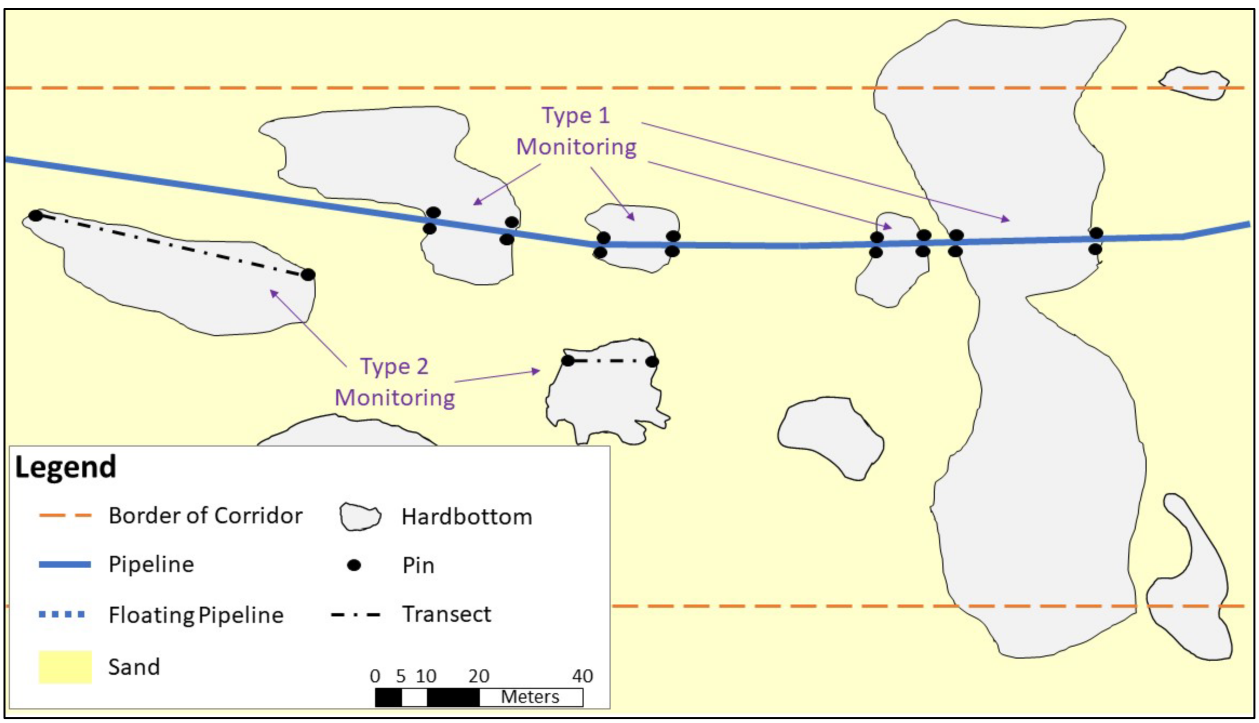

Figure 4. Depiction of pipeline corridor with placed pipeline (non-floating), hardbottom patches/features, and monitoring equipment. Monitoring pin and transect configurations for Monitoring Types 1-2 are indicated.

3.4.1 Type 1 Monitoring – Pipeline Runs Through/Across Hardbottom

Type 1 monitoring shall be conducted for each hardbottom patch/feature where the pipeline runs across/through hardbottom resources. Collars or risers shall be employed to limit impacts when pipelines run across/through hardbottom. Each area containing hardbottom resources that the pipeline runs across/through shall be monitored prior to pumping, during construction, and following construction, as described below (Figure 4).

The pre-pumping monitoring event shall occur as soon as possible after the pipeline has been placed/installed and shall be completed prior to any pumping activities. Initial monitoring activities for each hardbottom patch/feature shall include the establishment of pins (on both sides of the placed pipeline) where the pipeline starts to cross/run through hardbottom resources and where it ends. The coordinates (DGPS) of each pin shall be recorded. Once pins have been installed and coordinates collected, a diver with a digital, underwater video camera shall swim the length of each side of the pipeline (down one side and up the other) in each area where the pipeline crosses/runs through hardbottom and record video of the seafloor. During the pre-pumping monitoring event, a second diver shall accompany the videographer and record the path traveled during video collection and the location (coordinates) of risers/collars using survey grade DGPS. The diver conducting the video survey shall swim at a speed of approximately 5 meters/minute, shall maintain the video camera at a distance of roughly 1 m above the seafloor, and shall hold the camera at an oblique angle to the seafloor to allow for visual characterization of the area. If the diver is moved off course by waves or currents, the diver shall return to the point where he/she was disturbed and resume filming. Video shall be reviewed at the end of the survey to ensure the quality is acceptable for general characterization of the benthos; poor quality video shall be re-filmed.

During-construction monitoring shall start immediately (within 24 hours) following the initiation of pumping activities, and monitoring shall be conducted once per week until the pipeline is demobilized. For each weekly during-construction monitoring event, a diver shall collect video using the same methods employed for the pre-pumping video survey (see above). If, during construction, a pipeline leak is observed (by divers during surveys or by the dredging / pumping crew), turbidity measurements shall immediately be taken. There is no mixing zone for pipeline corridors, so turbidity shall be measured at the source of sedimentation (leak site), and background turbidity shall be measured 300 m upcurrent of the leak. Substantial leaks are those that result in compliance turbidity measurements that exceed state water quality standards of 29 NTUs above background or that result in visual deposition of material (i.e., sedimentation on benthic resources). All dredging / pumping / filling operations shall cease immediately if a substantial leak is identified. All dredging / pumping / filling operations shall also cease immediately if impacts to hardbottom resources are observed. The JCP Compliance Officer shall be notified within 24 hours of documenting / observing substantial leaks or sedimentation or impacts to hardbottom resources and the cause of impacts shall be identified and corrected. See Section 3.4.3 for actions required to be taken if impacts to hardbottom resources are documented during any during-construction monitoring events.

The post-construction monitoring event shall occur immediately following removal of the pipeline. For the post-construction monitoring event, a video survey shall be conducted along with a visual/video inspection of potential impact sites. Areas where video was recorded during the pre-pumping and during-construction monitoring events (i.e., seafloor along both sides of the pipeline) shall once again be surveyed using the same methods employed during previous monitoring events. Since the pipeline will have been removed, the video survey shall be conducted between the installed pins along the GPS track recorded during the pre-pumping monitoring event. Additionally, sites where the pipeline rested directly on hardbottom or hardbottom areas (sites) that were under risers or collars shall be visually inspected and videoed during the post-construction survey. GPS coordinates of these sites collected during the pre-pumping survey shall aid in this effort. Any impacts observed during the video survey or during the visual/video inspection of potential impact sites will be documented and reported to the JCP Compliance Officer within 24 hours. See Section 3.4.3 for actions required to be taken if impacts to hardbottom resources are documented during the post-construction monitoring event.

3.4.2 Type 2 Monitoring – Pipeline Runs Adjacent to Hardbottom

Type 2 monitoring shall be conducted for each hardbottom patch/feature where the pipeline runs adjacent to hardbottom resources that are within 25 m of the placed pipeline (Figure 4). Each area containing hardbottom resources that the pipeline runs adjacent to shall be monitored prior to pumping and following construction as described below.

The pre-pumping monitoring event shall occur as soon as possible after the pipeline has been placed/installed and shall be completed prior to any pumping activities. Initial monitoring activities shall include the installation of a permanent transect through each area (patch/feature) containing hardbottom resources that is adjacent to, and within 25 m of, the placed pipeline. Each installed transect shall run the length of the hardbottom patch/feature adjacent to the placed pipeline, shall be oriented parallel to the pipeline, and shall be within 25 m of the pipeline. Pins or rods shall mark the start and end of each transect and coordinates (DGPS) of transect start and end points shall be recorded. Once transects have been established, a diver with a digital, underwater video camera shall swim the length of each transect and record video of the seafloor. The diver shall swim at a speed of approximately 5 meters/minute, shall maintain the video camera at a distance of roughly 1 m above the seafloor, and shall hold the camera at an oblique angle to the seafloor to allow for visual characterization of the area. If the diver is moved off course by waves or currents, the diver shall return to the point where he/she was disturbed and resume filming. Video shall be reviewed at the end of the survey to ensure the quality is acceptable for general characterization of the benthos; poor quality video shall be re-filmed. The post-construction monitoring event shall occur immediately following demobilization of the pipeline. For the post-construction event, a diver shall swim the length of each transect line and collect video as in the pre-pumping monitoring event (i.e., same methods shall be used). Any impacts observed shall be documented and reported to the JCP Compliance Officer within 24 hours. See Section 3.4.3 for actions required to be taken if impacts to hardbottom resources are documented during the post-construction monitoring event.

3.4.3 Actions Required if Impacts to Resources are Observed

For each instance in which project related impacts to hardbottom resources are detected, the FDEP JCP Compliance Officer shall immediately (within 24 hours) be notified. A detailed Impact Assessment shall also be conducted within 48 hours of detecting impacts. Impact assessments shall include a delineation (using survey-grade DGPS) of all areas in which hardbottom resources have been damaged, injured, buried, or stressed. The condition of impacted benthic organisms shall be assessed and documented (video and photographs) and organisms shall be triaged, if possible. Unless a time extension is requested by the Permittee and granted in writing by the FDEP, results of impact assessment surveys (data and report) shall be submitted to the FDEP JCP Compliance Officer within 10 days of completing the assessment (Section 5.3). The Permittee shall use the results of the impact assessment to develop a Corrective Action Plan. Unless a time extension is requested by the Permittee and granted in writing by the FDEP, the corrective action plan shall be submitted to the FDEP within 30 days of completing the impact assessment. Once agreed to by the FDEP, damage to hardbottom resources shall be remediated by the Permittee as per the approved corrective action plan. Impacted areas (even those subsequently remediated) will require monitoring and may require mitigation and/or restoration, depending on the outcome of remediation and the scale of the impact(s). Pre-impact baseline video (pre-pumping for pipeline corridors) of areas where (or near where) impacts have occurred will be visually analyzed to aid the FDEP in UMAM analysis.

4.0 MONITORING TEAM AND MONITORING SCHEDULE

The names and qualifications of the staff performing the biological monitoring shall be submitted by the Permittee or their Agent to the FDEP for approval. Written agency approval of personnel will be required prior to proceeding with the yearly monitoring. Biological monitoring surveys shall be conducted by staff that are certified SCUBA divers with previous experience in monitoring hardbottom communities and with scientific knowledge of local benthic marine ecosystems and flora and fauna. In addition to this, all in-water crew members responsible for *in situ* quadrat data collection shall have a BS degree or higher in the study of marine biology or a comparable field and shall have scientific knowledge of local benthic marine hardbottom habitats and their flora and fauna. These crew members shall also participate in cross training to verify correct species identification and survey practices as Quality Assurance/Quality Control (QA/QC) procedures at the beginning of each monitoring event. QA/QC results shall reflect consistency of 90% for percent cover and identification of functional groups between observers.

Biological monitoring for the initial beach fill placement under this permit shall include pre- and post-construction monitoring (Table 3). Each subsequent nourishment event shall initiate a complete round of post-construction monitoring. Pipeline corridor monitoring shall be conducted when the borrow area will be used as a sand source for a fill placement event (restoration or nourishment).

Table 3. Monitoring Schedule.

Project Area	Survey	Survey Type	Survey Period & Number of Events	Deliverables
Nearshore Hardbottom	38 Permanent Transects outside of ETOF (N=24 Biological and N=14 Sediment Only; Max 50 m long each; and Permanent Quadrats (0.5 m^2)	Line-Intercept (all transects)	**Pre-Construction** (N=1): Once prior to initial fill placement (Baseline). **Post-Construction** (N=4 per fill placement event): Immediately (within 6 months) and annually for 3 years (years 1, 2, and 3).	Excel spreadsheet, PDF of field sheets
		Interval Sediment Depth (all transects)		Excel spreadsheet, PDF of field sheets
		Video (all transects)		Video
		Quadrat Sampling (only biological transects)		Excel spreadsheet, PDF of field sheets
	Hardbottom Edge	In-situ Delineation of Edge (from R-19.5 to R-57)		Shapefiles
Pipeline Corridors	Pre-Construction Corridor Area Surveys	Sonar Survey	**Pre-Construction** (N=1 full survey of all 6 corridors prior to each fill placement event)	Sonar survey data
		Diver Verification Survey		PDF of field sheets, Photos/Video
		Hardbottom Mapping		Shapefiles
	Post-Placement Pipeline Survey	Mapping	**Pre-Pumping** (N=1 per corridor per fill placement event): <u>Prior to pumping</u>	Shapefiles
	Corridor Monitoring – All Monitoring Types (1 & 2)	Transect Video Survey	**Pre-Pumping** (N=1 per corridor per fill placement event): <u>Prior to pumping</u> **Post-Construction** (N=1 per corridor per fill placement event)	Video
	Type 1 Corridor Monitoring Only	Transect Video Survey	**During-Construction** (Weekly – multiple events per fill placement)	Video

5.0 REPORTING

5.1 Notification of Commencement, Progress, and Completion of Work

Commencement dates of surveys shall be reported via email to the JCP Compliance Officer (JCPCompliance@dep.state.fl) and to staff in the Beaches, Inlets, and Ports program roughly seven (7) days prior to the start of monitoring and the day that monitoring begins. Brief monitoring progress reports shall be submitted (emailed) weekly to the JCP Compliance Officer until completion of the monitoring event. As soon as monitoring activities have ended, the JCP compliance officer shall be notified that the monitoring event has been completed.

5.2 Pre-Construction Monitoring Data and Report Submissions

5.2.1 Baseline Nearshore Hardbottom Survey Data

A single pre-construction (baseline) nearshore hardbottom monitoring event shall be conducted prior to the initial fill placement event (beach restoration) (Section 2.0). Pre-construction monitoring data shall be submitted directly and concurrently by the monitoring firm to the FDEP JCP Compliance Officer, the Permittee, and the Agent (e.g., on portable hard drives or via an FTP site) at least 30 days prior to construction. All data submitted shall be provided in standard formats, as specified below. All transect monitoring data submitted shall have been checked against field datasheets and corrected (if necessary) to ensure accuracy. Raw data provided shall consist of the following, each of which are described below: video and photographs, hardbottom edge survey data, raw transect survey data, and field datasheets.

5.2.1.1 Video and Photographs

Qualitative digital video and any digital photographs shall appear in separate folders. Main folders and subfolders shall be identified by descriptive names, so data may be easily differentiated (e.g., by transect).

5.2.1.2 Hardbottom Edge Survey Data

Hardbottom edge data shall be supplied as a collection of shapefiles (e.g., as an ESRI file geodatabase). Lines or polygons shall represent the in situ mapped landward edge of hardbottom or landward hardbottom patches for data obtained from each survey. This data may be depicted as a single line representing the nearshore edge, two lines representing the nearshore and offshore edges, or polygons representing hardbottom patches, depending on the distribution of hardbottom.

Hardbottom edge data shall have attributes indicating the portion of each line or polygon representing hardbottom. If sand patches greater than 5 m are crossed during the edge survey, these portions of lines/polygons shall, as attributes, be indicated as sand. Lines/polygons representing the permitted ETOF shall also be provided with the collection of shapefiles.

5.2.1.3 Transect and Quadrat Survey Data

Interval sediment depth measurements, line-intercept data, and BEAMR quadrat data collected along transects shall be supplied in Excel format. Each Excel workbook submitted shall include a descriptive name, so data may be easily differentiated by area.

5.2.1.4 Field Datasheets and Survey Logs

Copies (photographs or scans) of field datasheets shall be submitted in pdf format.

5.2.2 Pre-Construction Pipeline Corridor Survey Data and Report Submissions

Prior to each nourishment (fill placement) event, pre-construction pipeline corridor surveys shall be completed for the entirety of the required survey area (Section 3.1). Once complete, the following survey data and survey report shall be provided to FDEP.

5.2.2.1 Pre-Construction Pipeline Corridor Survey Data

All pre-construction pipeline corridor survey data shall be submitted directly and concurrently by the monitoring firm to the FDEP JCP Compliance Officer, the Permittee, and the Agent (e.g., on portable hard drives or via an FTP site) <u>at least 45 days prior to any and all construction activities</u>. Data submitted shall include the following:

- Sonar survey records with potential hardbottom signatures identified,
- A list of all sites (and their GPS coordinates) identified as potential hardbottom by sonar surveys,
- Data and video collected during all diver verification surveys
- Hardbottom delineation data collected during hardbottom mapping

Verification dive data shall be provided in excel workbooks and raw copies (photographs or scans) of field datasheets and survey logs shall be scanned in color and provided in pdf format. All survey data submitted shall have been checked against field datasheets and corrected (if necessary) to ensure accuracy. Hardbottom mapping results for each pipeline corridor (plus 25 m to the left and right) shall be provided as a collection of shapefiles (e.g., as an ESRI file geodatabase). For shapefiles, lines or polygons shall represent the in situ mapped edges of hardbottom patches/features. Lines or polygons shall also be used to indicate the boundaries of each required survey area (i.e. the boundaries of each pipeline corridor and each 25 m buffer on either side of each corridor).

5.2.2.2 Pre-Construction Pipeline Corridor Survey Report

A written pre-construction pipeline corridor survey report shall be submitted directly and concurrently by the monitoring firm to the FDEP JCP Compliance Officer, the Permittee, and the Agent at least 30 days prior to any and all construction activities. The report shall clearly describe methods used in surveys and data analysis and provide results of each survey in appropriate graphical, tabular, and text formats. The report shall identify survey areas where: A) hardbottom resources are currently absent; B) hardbottom resources are currently present but the Permittee will avoid resources during construction; and C) hardbottom resources are currently present and the Permittee will employ minimization measures to limit impacts to resources. The type of minimization measures (e.g., collars or risers) and the specific locations in which they will be employed shall also be included in the report (Section 3.2).

5.2.3 Post-Placement Pre-Pumping Pipeline Survey Data Submissions

For each placed pipeline (Section 3.3), post-placement, pre-pumping pipeline survey data shall be submitted to the FDEP JCP Compliance Officer in electronic format (e.g., on a single portable hard drive or via an FTP site or email) at least 72 hours prior to the intended start or actual start of pumping. Survey mapping results shall be provided as a collection of shapefiles (e.g., as an ESRI file geodatabase). For shapefiles, a line or lines shall represent the in situ mapped position of the placed pipeline. Lines or polygons shall also be used to represent the in situ mapped edges of hardbottom patches/features documented during the current pre-construction hardbottom mapping effort (Section 3.1.3) within corridors. Hardbottom within 25 m to either side of the placed pipeline shall be highlighted.

5.3 Pipeline Corridor Impact Assessment Data and Report Submissions

For each instance in which impacts to hardbottom resources are documented within pipeline corridors during or following construction, results (data and report) of the impact assessment (Section 3.4.3) shall be submitted to the FDEP JCP Compliance Officer within 10 days of completing the assessment, unless a time extension is requested by the Permittee and granted in writing by the FDEP. In combination, the data and report submitted for each impact assessment shall provide all information necessary for the FDEP to calculate the amount of compensatory mitigation that may be required to offset unpermitted impacts using the Uniform Mitigation Assessment Method.

Each data set submitted shall include video and photographs collected during the impact assessment as well as the GPS coordinates for locations with impacted hardbottom resources. Mapping results for areas with impacted resources shall also be provided, as a collection of shapefiles (e.g., as an ESRI file geodatabase). For shapefiles, polygons shall represent the in situ delineated edge of each area containing impacted resources. Additionally, baseline monitoring data for impacted hardbottom patches/features (pre-pumping video for pipeline corridors) shall be provided.

Each impact assessment report shall describe, compare, and contrast the pre-impact and post-impact condition of resources within impacted areas. Pre-impact condition shall be based on pre-pumping monitoring of corridors while post-impact condition shall be based on results of the impact assessment survey. Documentation of the types of impacts encountered (e.g., physical damage to resources caused by construction equipment or activities) shall also be provided. Additionally, the report shall describe the severity of functional losses documented by comparisons of pre and post impact monitoring and assessment data (e.g., reduction in hardbottom acreage and loss of numbers and types of individuals/colonies).

5.4 Post-Construction Monitoring Data and Report Submission

5.4.1 Post-Construction Nearshore Hardbottom Monitoring Data and Report Submissions

5.4.1.1 Post-Construction Nearshore Hardbottom Monitoring Data

<u>Within 45 days of completing each required post-construction monitoring event</u>, all raw data shall be submitted directly and concurrently by the monitoring firm to the FDEP JCP Compliance Officer, the Permittee, and the Agent (e.g., on portable hard drives or via an FTP site). Raw data provided to the FDEP shall consist of the following, each of which are described in Section 5.2.1: video and photographs, hardbottom edge survey data, raw transect survey data, and field datasheets. All data submitted shall be provided in standard formats, as specified in Sections 5.2.1.1 – 5.2.1.4. All transect monitoring data submitted shall have been checked against field datasheets and corrected (if necessary) to ensure accuracy.

5.4.1.2 Post-Construction Nearshore Hardbottom Monitoring Reports

<u>Within 90 days of completing each required post-construction monitoring event</u>, a written monitoring report shall be submitted directly and concurrently by the monitoring firm to the FDEP JCP Compliance Officer, the Permittee, and the Agent. Along with each monitoring report, the data analyzed to produce the report shall also be submitted (e.g., tables used in the analysis of data, tables used to construct figures, and tables and figures provided in the report will be submitted in Excel format). The table entered into Primer and the Primer analysis file shall also be submitted.

Each monitoring report shall clearly describe methods used in monitoring and data analysis and explain any deviations from the monitoring plan or conditions of permit. Reports shall also provide results in appropriate graphical, tabular and text formats. Monitoring reports are to be cumulative; thus, data (in the form of summary tables and figures) from all previous monitoring efforts shall be included in each report, in an updated fashion. Not all data sets will be analyzed and compared statistically. Temporal comparisons by way of univariate and multivariate tests shall be confined to data collected during the most recent monitoring event (current survey) and the baseline survey. Statistical tests will not be used to compare results between different post-construction monitoring events. Noteworthy explanatory observations and other ancillary information shall be provided at the end of the report in an Appendix.

5.4.2 Post-Construction Pipeline Corridor Data and Report Submissions

Within 45 days of completing post-construction monitoring for each corridor requiring biological monitoring (Section 3.4), raw data (video) shall be submitted directly and concurrently by the monitoring firm to the FDEP JCP Compliance Officer, the Permittee, and the Agent (e.g., on portable hard drives or via an FTP site). A very brief monitoring report shall also be provided along with each data submittal. Each report shall clearly describe methods used in monitoring and, if occurring, explain any deviations from the monitoring plan or conditions of permit. The report shall also briefly describe results of the monitoring effort and shall indicate whether or not impacts were observed. The report need not describe the extent of impacts or results of impact surveys if impacts were observed, as this information shall be reported separately, as described below.

If impacts to hardbottom resources were documented within corridors during the post-construction monitoring event, then actions required in Section 3.4.3 shall have been performed and results of the impact assessment shall be reported as specified in Section 5.3.

6.0 REFERENCES

Lybolt M. and R.M. Baron. 2006. BEAMR (Benthic Ecological Assessment for Marginal Reefs): a preferred replacement for AGRRA and similar benthic assessment methods tailored for marginal reefs. Proceedings from the 2006 ISRS European Meeting, Bremen, Germany.

APPROVED

PHYSICAL MONITORING PLAN

Indian River County, FL
Sector 3 Beach and Dune Renourishment Project

FDEP Permit No. 0285993-009-JC
Permittee: Indian River County

February 27, 2019

1. Project Description

The beach renourishment project includes sand nourishment in the form of a dune and narrow berm feature that intersects the existing beach near the waterline. The project is located along 6.6 miles of Atlantic Ocean coastline between FDEP reference monuments R-20 and R-55. The project location includes portions of North Beach, Orchid, Wabasso Beach, Indian River Shores, and unincorporated portions of Indian River County. The recommended beach fill template consists of a dune and narrow berm feature, requiring approximately 461,700 cy of in-place sand. The source of sand for the project will be an offshore source or an upland sand source(s). The offshore site is the previously permitted and utilized South Borrow Area, located approximately 15 miles southeast of the project area. Dune vegetation will be planted on constructed segments following beach fill activities.

2. Purpose

Pursuant to Rule 62B-41.005, F.A.C., physical monitoring of the Sector 3 Beach and Dune Restoration Project requires acquisition of project specific data to include topographic and bathymetric surveys of the beach, offshore, and borrow site areas, aerial photography, and engineering analysis. The physical monitoring data is necessary in order for Indian River County and the FDEP to regularly observe and assess the performance of the project and adjacent shorelines with quantitative measurements. The general objectives of this Physical Monitoring Plan are to:

- Evaluate the post-construction performance of the project area and adjacent shorelines;
- Identify the need for any adjustment, modifications, or mitigation from unexpected adverse effects;
- Provide design guidance for future beach maintenance activities; and
- Function as a database for future beachfront planning, development, and management.

3. Monitoring Plan Elements

The primary components of the Physical Monitoring Plan include:

- Beach profile surveys
- Aerial photography
- Beach sand sampling
- Engineering analysis and reporting

These activities shall be carried out in the Project Area and along the adjacent shorelines as described in this Plan. This monitoring plan may be revised at a later date by written request of Indian River County and with written approval of the FDEP. **Figure 1** summarizes the schedule for physical monitoring with respect to initial construction. Renourishment of the Project shall require the physical monitoring schedule to begin again after the construction event indicated in the figure.

TASK	**SCHEDULE OF EVENTS**						
Project Construction							
Beach Profile Surveys	▲	▲	▲	▲	▲		▲
Aerial Photography		⊕	⊕	⊕	⊕		⊕
Beach Sand Sampling		✚					
Report		★	★	★	★		★
Construction Phase	*Pre*	*Post*	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*

This schedule continues biennially until the next beach nourishment event or the expiration of the project design life, whichever comes first.

Figure 1: Physical Monitoring Schedule

3.1 Beach Profile Surveys

Topographic and bathymetric profile surveys of the beach and offshore shall be conducted within 90 days prior to commencement of construction, and within 60 days following the completion of the project. Thereafter, monitoring surveys will be conducted annually for a period of three years, then biennially until the next beach nourishment event or the expiration of the project life, whichever comes first (**Figure 1**). The monitoring surveys shall be conducted between late April and July and repeated as close as practicable during the same month of the year. If the time period between the immediate post-construction and the first annual monitoring survey is less than six months, the County can request a postponement of the first monitoring survey until the following April-July timeframe.

Beach profile surveys shall be collected at each of the published FDEP reference monuments within the beach fill area and the approximate 5,000 feet of adjacent shoreline on both sides of the beach fill area. As such, profile surveys shall include Indian River County FDEP reference monuments R-15 through R-60, inclusive. Profile surveys will be conducted along published azimuths extending a minimum of 3,000 feet offshore (from the mean high water line at the time of survey) or to the -21 ft NAVD contour, whichever is closer to shore.

All work activities and deliverables regarding beach profile surveys shall be conducted in accordance with the latest update of the *Division of Water Resource Management Monitoring Standards for Beach Erosion Control Projects, Sections 01000 and 0110.*

3.2 Aerial Photography

Aerial photography of the beach and nearshore area shall be collected following the completion of the project and then annually for a period of three years, then biennially until the next beach nourishment event or the expiration of the project life, whichever comes first (**Figure 1**). Aerial photography shall be collected concurrently with beach profile surveying, or as close a timeframe as reasonably possible. Aerial photography shall include the beach and nearshore region from Indian River County FDEP reference monuments R-15 through R-60, inclusive.

Aerial photographs of the study area will be taken for the primary purpose of mapping and quantifying exposed nearshore hardbottom. All work activities and deliverables regarding aerial photography shall be conducted in accordance with the latest update of the *Division of Water Resource Management Monitoring Standards for Beach Erosion Control Projects, Sections 02100 – Environmental Aerial Photography Acquisition.*

3.3 Beach Sand Sampling

Per the project's Quality Control/Quality Assurance Plan, beach sand sample collection and analysis shall be performed following the completion of the project. Sand sample collection and laboratory analysis shall be performed as described in the project's Quality Control/Quality Assurance Plan.

3.4 Engineering Analysis and Reporting

An engineering monitoring report and the monitoring data will be submitted to the Division of Water Resource Management within 90 days following the completion of the post-construction survey and each subsequent annual or biennial monitoring survey (**Figure 1**). The report shall summarize and discuss the survey data, the performance of the project, and identify erosion and accretion patterns within the monitoring area. The report shall include plots of beach profile surveys, tables and graphic illustrations of volumetric and shoreline position changes. Results will be analyzed for patterns, trends, changes between monitoring surveys, and cumulatively since project construction. Geotechnical data and analysis of beach sand sampling, including a comparison to the native sand characteristics, shall be included in the post-construction report. The aerial photographs (when collected) shall be included in the report as an appendix.

Project Design Criteria/Construction Conditions for Dredging Projects
2020 South Atlantic Regional Biological Opinion (SARBO)

SAJ-2007-01645 (SP-BJC) Indian River County Sector 3 Beach Nourishment

The USACE has reviewed the SARBO and determined that the project meets the terms and conditions of the SARBO, with the inclusion of all relevant Project Design Criteria (PDC). Thereby, the permittee shall comply with the following checked (☑) protected species PDC/construction conditions:

A. <u>Standard/General PDCs.</u>

☒ The following standard conditions are applicable for ALL dredging activities regarding the educations and observation of the project:

- EDUCATE.1: The permittee must ensure that all personnel associated with the authorized project are instructed about the potential presence of species protected under the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA) and the appropriate protocols if they are encountered including those in the Protected Species Observer (PSO) PDCs in SARBO Appendix H.

- EDUCATE.2: The permittee understands that all on-site project personnel are responsible for observing water-related activities for the presence of ESA-listed species.

- EDUCATE.3: All on-site project personnel will be informed of all ESA-listed species that may be present in the area and advised that there are civil and criminal penalties for harming, harassing, or killing ESA-listed species or marine mammals.

- EDUCATE.4: All on-site project personnel will be briefed that the disposal of waste materials into the marine environment is prohibited. All crew will attempt to remove and properly dispose of all marine debris discovered during dredging operations, to the maximum extent possible.

- The permittee will comply will all applicable Observing and Reporting PDCs in in Section E of this Attachment.

☒ The following reporting conditions are applicable for ALL dredging activities. All reporting requirements should be provided digitally to the SERODredge@noaa.gov and RD.SARBO.GRBO@usace.army.mil.

- The permittee will notify the USACE Project Manager and NMFS at least 2 weeks prior to construction of any project covered under this Opinion. The Pre-Construction Notification Form (Attachment 1) should be utilized to report all project data. Upon receipt of the notification form, you will receive a list of the Corps primary points of contact for reporting turtle take/incidents. If the permit authorizes multiple work events, the Permittee must submit the SARBO Pre-Construction Notification prior to each event.

SAJ-2007-01645 (SP-BJC) Indian River County Sector 3 Beach Nourishment

- All lethal and nonlethal take associated with a project covered under this opinion will be reported within 48 hours. The Take Reporting form should be obtained from the USACE prior to construction.

- All observations of North Atlantic right whales observed while completing the project will be reported within 24 hours of the observation. Detailed reporting information can be found at: http://sero.nmfs.noaa.gov/protected_resources/right_whale/seus_sightings/index.html

- The permittee will provide a post-construction report within 30 days of completion of the project. The post-construction report should be obtained from USACE prior to construction.

B. <u>All In-water dredging activities and material placement:</u>

☒ INWATER.1 - Species Movement: All work, including equipment, staging areas, and placement of materials, will be done in a manner that does not block access of ESA-listed species from moving around or past construction.

☒ Sand placed on the beach or in the nearshore littoral areas will be placed in a manner that does not create mounds or berms that could prevent nesting sea turtles or hatchings from entering or exiting the beach from nearshore waters.

☒ All placement, including ODMDS placement, will not create an obstruction of species movement in the area (e.g., does not create a mound that would deter or prevent species from moving through the area).

☒ INWATER.2 - Equipment placement: Equipment will be staged, placed, and moved in areas and ways that minimize effects to species and resources in the area, to the maximum extent possible. Specifically:

☒ All vessels will preferentially follow deep-water routes (e.g., marked channels) to avoid potential groundings or damaging bottom resources whenever possible and practicable.

☒ If barges, scows, and other similar support equipment are used, they will be positioned away from areas with sensitive bottom resources such as non-ESA-listed seagrasses, corals, and hardbottom, to the maximum extent possible.

☒ If pipelines are used, they will be placed in areas away from bottom resources and of sufficient size or weight to prevent movement or anchored to prevent movement or the pipeline will be floated over sensitive areas.

☒ INWATER.3 - Turbidity control: All work that may generate turbidity will be completed in a way that minimizes the risk of turbidity and sedimentation reaching non-mobile ESA-listed species (i.e., ESA listed corals and Johnson's seagrasses) as well as other non-ESA-listed non-mobile species (e.g., non-ESA-listed corals, sponges, and other natural resources) to the maximum extent practicable. This may include selecting equipment types that minimize turbidity and positioning equipment away or downstream of non-mobile species.
Refer to Special Condition(s) of the Department of the Army (DA) permit for additional requirements.

☒ INWATER.4 - Turbidity curtains: Turbidity curtains may be used to maintain water quality standards where appropriate and practicable with consideration given to ambient turbidity and if the curtains are practical based on current, wave action, or other factors.
Refer to Special Condition(s) of the Department of the Army (DA) permit for additional requirements.

☒ If turbidity curtains are used, barriers will be positioned in a way that does not block species' entry to or exit from designated critical habitat and does not entrap species within the construction area or block access for them to navigate around the construction area.

☒ Project personnel must take measures to monitor for entrapped species in areas contained by turbidity curtains and allow access for them to escape if spotted.

☒ Beach nourishment projects will be designed to minimize turbidity in nearshore waters by using methods that promote settlement before water returns to the water body (i.e., shore parallel dikes). Turbidity and marine sedimentation will be further controlled using land-based erosion and sediment control measures to the maximum extent practicable. Land-based erosion and sediment control measures will (1) be inspected regularly to remove excess material that could be an entanglement risk, (2) be removed promptly upon project completion, (3) and will not block entry to or exit from designated critical habitat for ESA-listed species.

☒ INWATER.5 - Entanglement: If lines or cables are used (e.g., to mark floating buoys, lines connecting pickup buoy lines, or for turbidity curtains):

(i) In-water lines (rope, chain, and cable) will be stiff, taut, non-looping. Examples of such lines are heavy metal chains or heavy cables that do not readily loop and tangle. Flexible in-water lines, such as nylon rope or any lines that could loop or tangle, will be enclosed in a plastic or rubber sleeve/tube to add rigidity and to prevent the line from looping or tangling. In all instances, no excess line is allowed in the water. Requirements for lines associated with relocation trawling are handled separately in SARBO Appendix B Section 3.5.

(ii) All lines or cables will be immediately removed upon project completion.

(iii) All in-water line and materials will be monitored regularly to ensure nothing has become entangled.

(iv) Cables or lines with loops used to move pipelines or buoys will not be left in the water unattended.

☒ INWATER.8: Lighting near sea turtle nesting beaches:

☒ For dredges and any support vessels operating at night in front of nesting beaches, lighting will be limited to the minimal lighting necessary to comply with U.S. Coast Guard and Occupational Safety and Health Administration requirements (most up-to-date version of Engineering Manual 385-1-1).

☒ Lighting associated with beach nourishment construction activities will be minimized through reduction, shielding, lowering, and/or use of turtle friendly lights, to the extent practicable without compromising safety, to reduce potential disorientation effects on female sea turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward from their natal beaches.

☒ As technology changes, so do turtle friendly lighting options. New information/technology should be used as soon as published guidance for types of appropriate lights and appropriate shielding and positioning of lights is available that is protective of sea turtles (e.g., those outlined by the Florida Fish and Wildlife Conservation Commission's website http://myfwc.com/wildlifehabitats/managed/sea-turtles/lighting/).

C. Geophysical and Geotechnical (G&G) Surveys/ Activities: NA

D. <u>Equipment Specific PDCs</u>

1. Hopper Dredge Requirements:

☒ HOPPER.1: During all hopper dredging operations, NMFS-approved Protected Species Observers (PSOs) will monitor for the presence of ESA-listed species. The dredge operator will maintain a safe working environment for the PSO to access and effectively monitor inflow screening, overflow screening, and dragheads for incidental take of ESA-listed species and associated bycatch after every load. All new hopper dredge vessels or modifications made to existing vessels must be designed to allow safe access to and/or visibility of all collected material in both the inflow box and overflow screening areas so that the PSO is able to inspect the contents after every load for evidence of ESA-listed species. The appointed contact (e.g., Quality Assurance Representative or the Contractor) will immediately notify the USACE who will notify the SARBO Team if conditions limit the ability to safely monitor dredging operations.

☒ Draghead Observation: Upon completion of each load cycle, dragheads will be monitored as the draghead is lifted from the sea floor and placed on the saddle in order to assure that ESA-listed species that may be impinged within the draghead are observed and accounted for. The PSO, or designated dredge crew member under the guidance and supervision of the PSO when safety is of concern, must physically inspect dragheads for evidence of ESA-listed species take after every load.

☒ Inflow Screening Observation:

(i) Inflow screening must be designed to capture and retain material for the PSO to monitor for the presence of ESA-listed species. The screened area must be accessible to the PSO to ensure 100% observer coverage. The PSO must inspect the contents of all inflow screening boxes after every load, including opening the box (where applicable and safely accessible) and looking inside at all contents for evidence of ESA-listed species entrainment. If the contents are not clearly visible and identifiable from a location outside of the box, then in limited instances, the PSO may be required to enter the inflow box to identify contents for evidence of ESA-listed species take.

(ii) All hopper dredges are required to have 100% inflow screening unless they must be removed for safety due to clogging as outlined below.

- Inflow screening size will start at 4-inch by 4-inch, but may be gradually adjusted to a larger screen size if clogging reduces the ability for the PSO to monitor the inflow for the presence of ESA-listed species or if clogging reduces dredging production and thereby expands the time dredging is required. Scenarios that may result in the clogging of inflow and overflow screens are dredge and project specific.

- All modifications will be made in close coordination with the dredging contractor, PSO, appropriate USACE project managers, and NMFS. The USACE will provide NMFS with a notification when screen sizes are increased or inflow screens are removed that will include an explanation of what attempts were made to reduce the clogging problem, how long the problem may persist, and how effective overflow screening will be achieved.

- If inflow screens are increased to be larger than 4-inch by 4-inch or are removed due to clogging, the USACE will continue to re-evaluate the risk of clogging on a load by load basis and the inflow screens will be reinstated when clogging is no longer occurring. The USACE will track the number of loads that inflow screens were removed as part of the reporting requirements.

(iii) Hopper dredge operators will not open the hydraulic doors on the inflow boxes prior to inspection by the PSO for evidence of ESA-listed take.

(iv) If the inflow box cannot be observed due to clogging, the box contents cannot be dumped or flushed unless overflow screening that captures contents for observation by the PSO is operational and monitored for evidence of take. Once overflow screening is operational, PSOs shall also visually monitor box contents as they are dumped or flushed into the hopper.

☒ Overflow Screening Observations:

- All hopper dredges are recommended to have operational overflow screening and monitor for take after each load. Overflow screening is required to be installed and monitored after each load if the inflow screening is removed or bypassed due to clogging.

- Overflow screening must be designed to capture and retain material larger than the screen size for the PSO to monitor for the presence of ESA-listed species. The screened area must be accessible to the PSO to inspect for evidence of ESA-listed species take.

- Screen size will start at 4-inch by 4-inch, but may be adjusted to a larger screen size if clogging reduces the ability for the PSO to monitor the screen for the presence of ESA-listed species or if clogging reduces dredging production and thereby expands the time dredging is required. All modifications will be made in close coordination with the dredging contractor, PSO, appropriate USACE project managers, and NMFS. If screen sizes are increased due to clogging, the risk of clogging will be re-evaluated weekly and the overflow screens will be reinstated using the smallest screen size that can be effectively used (preferably 4 inch by 4 inch) when clogging is no longer occurring.

☒ HOPPER.2: To prevent impingement or entrainment of ESA-listed species within the water column, dredging pumps will be disengaged by the operator when the dragheads are not actively dredging and therefore working to keep the draghead firmly on the bottom. Pumps will be disengaged when lowering dragheads to the bottom to start dredging, turning, or lifting dragheads off the bottom at the completion of dredging.

Hopper dredges may utilize a bypass or other system that would allow pumps to remain engaged, but result in no suction passing through the draghead. This dredge modification (when employed) is commonly referred to as a turtle bypass valve. This precaution is especially important during the cleanup phase of navigation dredging operations to remove remaining high spots or when a shallow veneer of compatible sediment remains within a borrow area; thus limiting overdepth dredging and plowing efficacy of the turtle deflector. In these example circumstances, the draghead may frequently come off the bottom and can suck in turtles/sturgeon resting or foraging in shallow depressions.

☒ HOPPER.3: Pumping water through the dragheads is not allowed while maneuvering or during travel to/from the disposal or pumpout area. The dredge operator will ensure the draghead is embedded in sediment when pumps are operational, to the maximum extent practicable.

☒ HOPPER.4: All waterport or other openings on the hopper dredge are required to be screened to prevent ESA-listed species from entering the dredge.

☒ HOPPER.5: A state-of-the-art solid-faced deflector that is attached to the draghead must be used on all hopper dredges at all times.

2. **Munitions and Explosives (MEC) / Unexploded Ordinance (USO) Screening on a Draghead Requirements:** MEC screening is used in areas where munitions may be present, but may also be used for other purposes such as handling areas with rock.

☐ MEC.2: The PSO will be required to inspect the draghead MEC screens after every load to verify that no ESA-listed species are impinged on the screening.

☐ MEC.3: If MEC screening is used on a beach nourishment outflow, screening will be monitored and USACE will be notified of any potential ESA-listed species takes identified in the beach outflow screening box.

3. **Cutterhead Dredge Requirements:**

☒ CUTTER.1: The cutterhead will not be engaged/turned on when not embedded in the sediment, to the maximum extent possible.

4. **Bed Leveling Requirements:**

☒ LEVEL.1: Bed-levelers used as part of the proposed action will be of a design that produces a sand wave in front of the leading face of the bed-leveling device such that it disturbs sea turtles off the sea/channel floor bottom. All support structures must be welded to prevent impingement or "pinch points" for passing ESA-listed species. The design analyzed in the Brunswick Harbor study is approved to meet these requirements (Dodd 2003). Any other design must be documented and photographed and submitted with the pre-construction notification in order to monitor the designs used. Additional designs may be deemed acceptable during the annual review.

☒ LEVEL.2: The bed-leveler will be slowly lowered to the sea/channel bottom and the depth of the bed-leveler adjusted constantly to meet required depth and to compensate for tidal fluctuations.

☒ LEVEL.3: The bed-leveler will be towed/pushed along the bottom no faster than needed to move the material at the sea/channel bottom (approximately 1-2 knots).

E. Observing and Reporting PDCs:

☒ OBSERVE.1: For generally stationary construction with work contained to a specific project area, such as mechanical dredging equipment:

(i) All personnel working on the project will report ESA-listed species observed in the area to the on-site crew member in charge of operations.

(ii) Operations of moving equipment will cease if an ESA-listed species is observed within 150 ft. of operations by any personnel working on a project covered under this Opinion (e.g., sea turtles, sturgeon, elasmobranchs smalltooth sawfish, giant manta ray, scalloped hammerhead shark, oceanic white tip shark] or ESA-listed marine mammal).

(iii) Activities will not resume until the ESA-listed species has departed the project area of its own volition (e.g., species was observed departing or 20 minutes have passed since the animal was last seen in the area).

☒ OBSERVE.2: For a vessel underway, such as a hopper dredge or support vessel, traveling within or between operations must follow speed and distance requirements, defined below, while ensuring vessel safety:

(i) All personnel working onboard will report ESA-listed species observed in the area to the vessel captain.

(ii) If an ESA-listed species is spotted within the vessel's path, initiate evasive maneuvers to avoid collision.

(iii) If a North Atlantic right whale is spotted, slow to 10 knots and maintain a distance of at least 1,500 ft. in accordance with the North Atlantic Right Whale Protection Rule (62 FR 6729 provides a distance of 500 yards, which is equal to 1,500 ft) and report the observation to 1-877-WHALE-HELP. Resumption of speed should be according to the North Atlantic Right Whale Conservation Plan, as outlined above in Section E. 3.

(iv) If a whale (other than a North Atlantic right whale) is spotted, maintain a distance of at least 300 ft.

☒ OBSERVE.3: Report sightings (not encountered, collided with, or injured by a project covered under 2020 SARBO) of the North Atlantic Right whale: As defined above in Section E. 3. and the reporting requirements in the 2020 SARBO Section 2.9.

☒ OBSERVE.4: Any collision(s) with an ESA-listed species must be immediately reported to the USACE according to their internal protocol and to NMFS consistent with the reporting requirements in the 2020 SARBO Section 2.9. A vessel collision with an ESA-listed species is counted as take for the project. In addition, reports of certain species shall also be reported as listed below. A link to the most current contact information will also be available at (SERODredge@noaa.gov).

(i) Sea turtle take will also be reported to the appropriate state species representative (https://www.fisheries.noaa.gov/state-coordinators-sea-turtle-stranding-and-salvage-network).

☒ OBSERVE.5: Any collision with a marine mammal will be reported immediately to the Southeast Regional Marine Mammal Stranding hotline at 1-877-WHALE-HELP (1-877-942-5343) for guidance. This includes both ESA and non-ESA listed marine mammals.

☒ The permittee will ensure that all PSO have appropriate credentials.

☒ The permittee will comply with the PSO Guidelines for Handling ESA-Listed Species.

F. <u>Endangered Species Requirements</u>

1. Relocation Trawling PDCs:

☒ RELOCATE.1: Relocation trawling and/or non-capture trawling is authorized in association with dredging activities in reasonable circumstances as an avoidance and minimization measure to reduce the risk of potential lethal take of ESA-listed species.

☒ RELOCATE.2: If relocation trawling is deemed appropriate to minimize the risk of lethal take on a project using the risk assessment process outlined in Section 2.9.2.2 of the 2020 SARBO, trawlers will mobilize as quickly as possible.

☒ RELOCATE.3: Trawling specifications listed below and in the PSO PDCs will be followed.

(i) Trawl tow-time duration will not exceed 42 minutes (doors in - doors out).

(ii) Trawl speeds will not exceed 3.5 knots for normal operations; however, speeds may be increased to the minimum speed needed to maintain control of the vessel.

(iii) Lazy lines will be designed according to the design specifications in the Relocation Trawling Net Guidelines to minimize the risk of entanglement with captured species.

☒ RELOCATE.4: Trawling within the range of ESA-listed corals (defined as Palm Beach County, Florida south through the Florida Keys and in the U.S. Virgin Islands and Puerto Rico) is NOT covered by the SARBO.

☒ RELOCATE.5: Relocation trawling is NOT covered by the SARBO in the U.S. Caribbean (i.e., U.S. Virgin Islands and Puerto Rico).

2. **North Atlantic Right Whale –** The following conditions apply to activities in Atlantic Ocean Waters/Entrance Channel between November 1 and April 30.

☒ NARW.1: All Hopper dredging and survey vessels over 33-ft in length will be scheduled, to the maximum extent practicable, outside of North Atlantic right whale migration and calving season to avoid impacts to North Atlantic right whales, including reproducing females and newborn calves. Other information that will be considered includes where material is to be placed and whether the timing of the placement would be high risk for other listed species (e.g. sea turtles).

☒ NARW.2: All on-site project personnel associated with a project including the vessel captain, crew, and PSO on all vessels over 33-ft in length will be instructed on the presence of North Atlantic right whale and other ESA-listed species and the requirements to observe, avoid, and report North Atlantic right whale in the area. The required distances that vessels must maintain from ESA-listed species, PSO observer coverage requirement for 100% monitoring on hopper dredging and relocation trawling, and reporting requirements are defined in the PSO PDCs in Attachment ___.

(i) All captains of dredges, relocation trawlers, survey vessels, and support vessels over 33-ft in length will provide a text message address (that is capable of receiving short emails as text messages) to receive real-time whale alerts throughout the calving season. The text message address will be provided to nmfs.ser.rw.subscribe@noaa.gov at least 14 days prior to the start of dredging or annually on November 1 if the vessel is utilized year-round.

(ii) The dredging company contractor for each project, before the start of dredging, will provide a single whale observer email address to receive aerial survey-related notifications (status, fly/no-fly plans, etc.) that will be immediately sent to all active vessels working in water for the project. The email address will be provided to nmfs.ser.rw.subscribe@noaa.gov and be confirmed annually, prior to each North Atlantic right whale calving season.

(iii) All hopper dredges and relocation trawlers will have onboard dedicated daytime PSOs that meet the qualifications provided by NMFS and detailed in SARBO with at-sea, large whale identification experience to conduct observations for the presence of whales and all other ESA-listed species. The PSO will have the primary duty of observation when the vessel is underway.

(iv) Observers will be onboard dredges and will alternate to reduce observer fatigue. As needed, a crew member on the bridge will assist the PSO with whale observation duty while the vessel is underway. The PSO will provide crew members with appropriate training for large whale observation. Hopper dredges will submit an endangered species watch plan detailing how the requirements to minimize the risk of a North Atlantic right whale/dredge vessel interaction will be accomplished. The watch plan may be a component of an environmental protection plan.

(v) The PSO will note all sightings of ESA-listed species and marine mammals according to the reporting requirements in the 2020 SARBO Section 2.9 and by submitting all necessary forms and information to the ODESS (https://dqm.usace.army.mil/odess/#/home). All ESA listed marine mammals spotted will also be immediately reported by calling 1-877-WHALE_HELP.

(vi) All project vessels will carry operational automatic identification system transmitters as required by the U.S. Coast Guard. Transmitters will be powered on and transmitting while vessels are underway, and NMFS will be provided the vessel name and vessel tracking number (maritime mobile service identities) so that all vessels operating under SARBO can be tracked and confirm compliance with this Plan. Vessel tracking numbers will be recorded in ODESS (https://dqm.usace.army.mil/odess/#/home) and emailed to NMFS at SERODredge@noaa.gov for all vessels over 33-ft in length operating from the Virginia/North Carolina border south to Cape Canaveral, Florida, during the North Atlantic right whale migration and calving season from November 1 through April 30.

☒ NARW.3: Speed requirements must be followed if a North Atlantic right whale has been spotted or reported in the area as defined below. North Atlantic right whale presence may be determined by observers on the vessel, reports from aerial surveys, EWS, or confirmed public sighting reports. All captains are required to use daily available information and reports on the presence of North Atlantic right whales and aerial survey activities in the project area. These speed restrictions apply to all vessels associated with a project covered under SARBO.

(i) Vessels over 65 ft in length: When a whale is observed or reported within 38 nmi of dredge or support vessels, vessels must slow to 10 knots or slowest safe navigable speed for 36 hours92 or until next North Atlantic right whale survey when no whales are observed, whichever is shorter.

(ii) Vessels 33- 65 ft: When a whale is observed or reported within 38 nmi of dredge or support vessels, the vessel must slow to 10 knots for 36 hours, or until the next North Atlantic right whale survey when no whales are observed.

Attachment 8: SARBO Pre/Post-Construction Required Reporting Information

File Number:		
Project Name:		
For ALL projects	Who is in charge of the project?	
	Protectect Species Observer(s) (PSO):	
	PSO Contact Information (Address, phone, email)	
	Other Federal Agencies Associated?	
	Biological Opinion used:	
	What is the project start date?	
	What is the estimated end date?	
	Latitude and Longitude of Dredge Area (decimal degrees)	
	Latitude and Longitude of Disposal Area (decimal degrees)	
	Is the project in the range of ESA-listed species?	
	Is the project within designated critical habitat?	
	Total area that occurs within critical habitat.	
	Project Type	Beach Nourishment
	Pre-project proposed dredge & placement volume (cy)	
	Post-Project actual dredge & placement volume (cy)	
	Does project exceed the previously approved dredge template, including previously considered overdepth and/or advance maintenance?	Yes/No
	If yes to above, please provide explination.	
	Vessels and Equipment used on project	Select
		Select
		Select
For Hopper Dredging Projects	Used UXO/MEC screening	Yes/No
	Screening Size used for the project	
	If inflow screening is removed, please report start and end date of dredging that occurred without inflow screening and the number of loads.	
For Geophysical Surveys	Describe the equipment type, frequency the equipment was operated, maximum source/power level, locatin used, and total time used.	
For Relocation Trawling	Total number of tows for the project	
	Total number of days	
	Relocation trawling start date	
	Relocation trawling end date.	
	Describe bycatch captured	

Attachment 9: ESA Take Reporting		
Required Reporting Information:		**Provide as much datail as possible in the below fields:**
	Location of take (latitude and longitude)	
	Tow Number when take occurred during relocation trawling or dredge load # if during hopper dredging.	
	PSO (Name/Company and Contact Info)	
	Total # of take	
	Previous animal ID/Tracking Tag, if any	
	Passive Intragated Transponder (PIT) Tag (See attachment 1)	
	Genetic Sample collected, if applicable (See Attachment 1)	
	Age class of species (e.g., juvenile, adult)	
	Specimen condition (e.g., alive, fresh dead, decomposed) (See Attachment 1)	
	Final disposition (e.g., released at site, relocated, rehabilitation & outcome, necropsy, disposal)	
	Species Gender	
	Species size/length (See Attachment 1)	
	Beaufort state at time of take	
	Water temp. at time of take (recorded at surface in marine environments and at the bottomg in estuarine/riverine environments)	
	Notes about species condition	
If take occurred during hopper dredging:		
	Location where take was identified (e.g., draghead, inflow box, overlfow box)	
	Screening at the time of take?	
	Size of screening used (both inflow and overflow)	
	Were UXO/MEC installed at time of take?	

HOPPER DREDGE DEFLECTOR DEVICE CHECKLIST

Dept. of the Army Permit Number: SAJ-________-___________

Project Name: ____

Project Location: ____

Dredging Company Name (Contractor): ______________________________

Vessel Name: ____

1. ______ Dredging contractor has received a copy of and read the Dept. of the Army Permit for this project.
2. ______ Permittee and dredging contractor has reviewed the applicable Biological Opinion located at: http://el.erdc.usace.army.mil/seaturtles/refs-bo.cfm
3. ______ Dredging depth(s) for the project:

   Starting Depth(s): ______________________________________

   Final Depth(s): ____

4. ______ Turtle Deflector Device Submittal. Attach a detailed drawing showing structural design and soundness (see attached example drawing) of the Sea Turtle Deflector Device.

   The drawing shall include the following information:

   a. ______ Deflector leading edge angle (90 degrees or less).
   b. ______ Forward vertical face measurement of the deflector (minimum height of 15”).
   c. ______ The approach angle(s) for this project dredging depths.
   d. ______ The opening between deflector and draghead (maximum of 4”x4”).
   e. ______ The aft rigid deflector attachment to the draghead (hinged or trunnion).
   f. ______ The forward deflector attachment link length described for the project dredging depths and project approach angles.

COMMENTS:

(Permittee Signature) (Date)

(Name and Title - Printed)

(Dredging Contractor Signature) (Date)

(Name and Title - Printed)

Hopper dredging shall not commence until this submittal is approved and signed by the Corps:

(District Engineer) (Date)

HOPPER DREDGE PRE-DREDGE INSPECTION CHECKLIST

Dept. of the Army Permit No.: SAJ-_________-____________

Project Name: ____

Project Location: ____

Dredging Company Name (Contractor): ______________________________________

Vessel Name: ____

Inspector's Name and Title: ____

Date of Inspection: ____

Dredging contractor pre-dredge inspection requirements:

1. ______ Has the dredging contractor read the Department of the Army Permit to determine the permit requirements for the protection of endangered sea turtles?
2. ______ Is a copy of the Department of the Army permit on board the vessel?
3. ______ Has the dredging contractor reviewed the applicable Biological Opinion located at: http://el.erdc.usace.army.mil/seaturtles/refs-bo.cfm
4. ______ Has the Turtle Deflector Device been approved by the Corps? (Dredging shall not start until the Turtle Deflector Device is approved and the Initial Hopper Dredge Submittal form has been signed by the Corps).
5. ______ Is a copy of the approved Turtle Deflector Device submittal on board the vessel?
6. ______ Is the approved Turtle Deflector Device submittal being used to perform this pre-dredge inspection?
7. ______ Is the Turtle Deflector Device that is on the dredge the same as the approved submitted Turtle Deflector Device?
8. ______ Is the Turtle Deflector Device structurally sound?
9. ______ Is the leading edge angle of the Turtle Deflector Device 90 degrees or less.
10. ______ Is the forward vertical face of the Turtle Deflector Device a minimum of 15" tall?
11. ______ Are the approach angles submitted for this project dredging depths.
12. ______ Are the opening between Turtle Deflector Device and draghead no more than 4"X4"?
13. ______ Is the aft deflector attachment to the draghead rigid (hinged or trunnion)?
14. ______ Is the forward deflector attachment link length measurement the same length as shown on the approved Turtle Deflector Device submittal for this project dredging depth and project approach angle?

15. ______ Are inflow screens and overflow screens installed?

16. ______ Are inflow basket screen openings no more than 4”X4”?

17. ______ Is there adequate lighting of inflow and overflow screens and proper access for cleaning.

18. ______ Is turtle trawling required by the DA permit?

19. ______ Is the dredging data recording system (DQM/Silent Inspector) operational and the certification current?

COMMENTS: ____

____

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I certify that the above components are properly installed and operational in accordance with the SARBO and the DA permit for the referenced project.

______________________________________ ______________________

(Dredging Contractor Signature) (Date)

SAJ-2007-01645
Attachment 12

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,

Donald R Progulske

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

<u>1980s and 1990s</u> 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.

<u>March 7 and 8, 2006</u> 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.

<u>July 13, 2006</u> 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.

<u>March 11, 2009</u>	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.
<u>April 7, 2009</u>	The Service sent an email to the Corps with an update of the progress of our analysis of including piping plovers in the SPBO.
<u>August 26, 2009</u>	The Service sent to the Corps via email the latest Terms and Conditions for sea turtles and beach mice.
<u>September 17, 2009</u>	The Corps sent an email to the Service describing the actions to be taken for the completion and submittal of the PBA.
<u>January 6, 2010</u>	The Corps and the Service participated in a meeting to finalize the draft SPBO.
<u>January 21, 2010</u>	The Corps sent to the Service via email the revised draft PBA.
<u>March 25, 2010</u>	The Corps and the Service participated in an implementation meeting and submittal of the final PBA.
<u>February 22, 2011</u>	The Corps submitted the final PBA to the Service.
<u>April 18, 2011</u>	The Service sent the final Statewide PBO to the Corps.
<u>June 21, 2010</u>	The Corps provided written concerns with the final Statewide PBO
<u>June 30, 2011</u>	The Service revised the final Statewide PBO.
<u>July 18, 2011</u>	The Corps provided written agreement with the changes that were made and asked for additional changes.
<u>July 22, 2011</u>	The Service made additional revisions per the Corps request.
<u>July 25, 2011</u>	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.

<u>Leatherback Sea Turtle</u>

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

<u>Loggerhead Sea Turtle</u>

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).

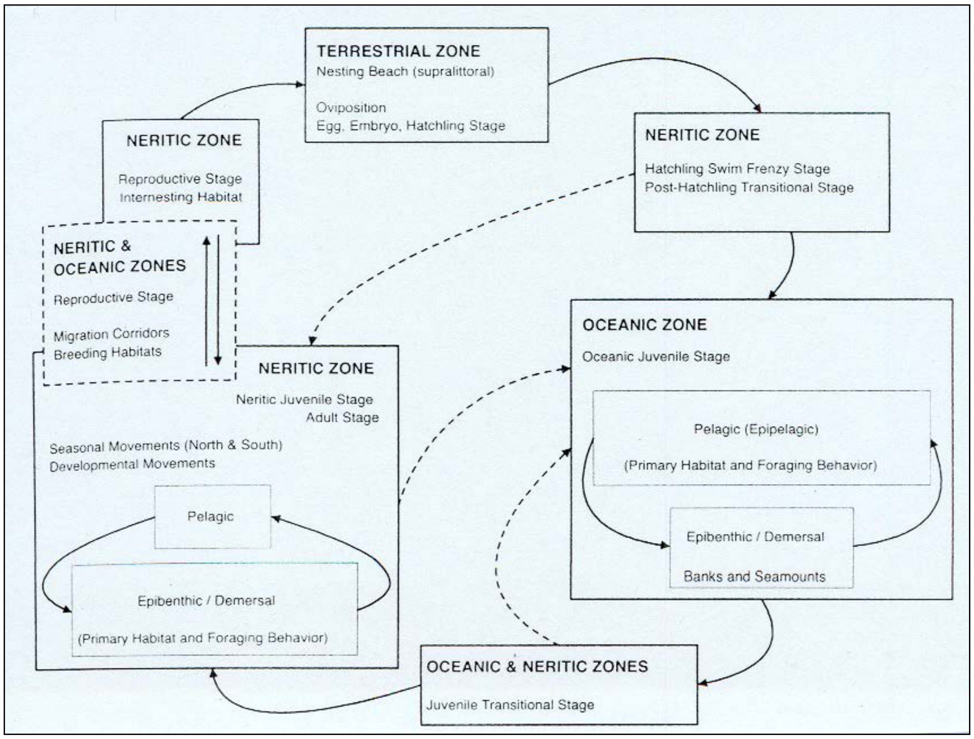

Figure 1. Life history stages of a loggerhead turtle. The boxes represent life stages and the corresponding ecosystems, solid lines represent movements between life stages and ecosystems, and dotted lines are speculative (Bolten 2003).

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).

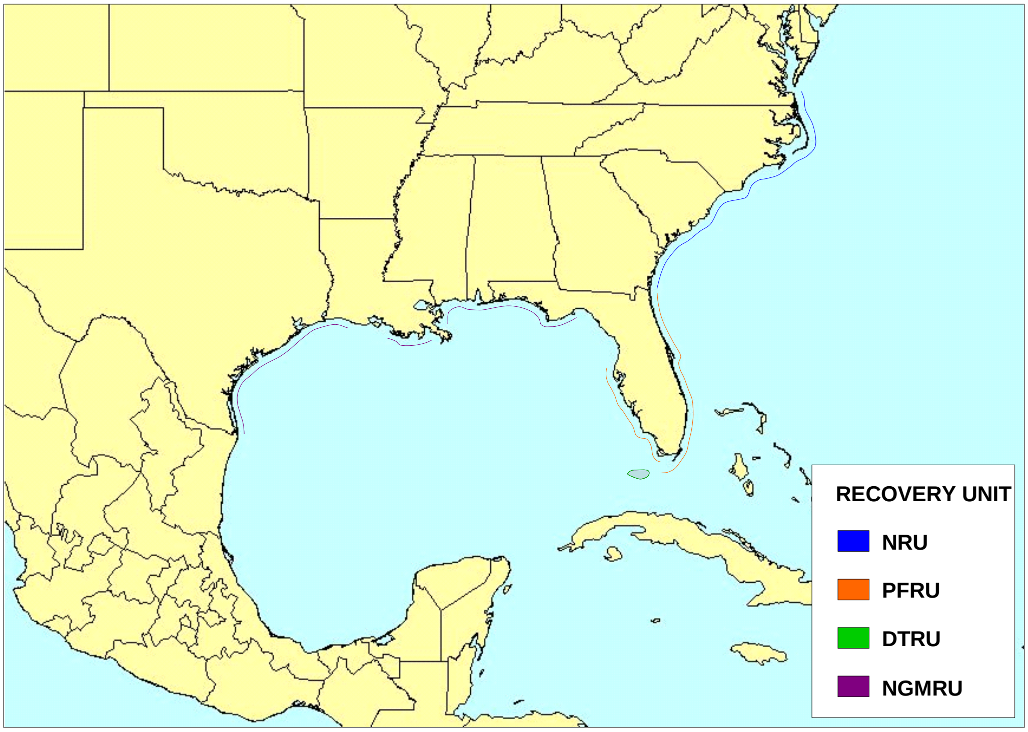

Figure 2. Map of the distribution of the loggerhead recovery units.

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).

<u>Leatherback Sea Turtle</u>

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).

<u>*Recovery Criteria*</u>

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.

<u>Loggerhead Sea Turtle</u>

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

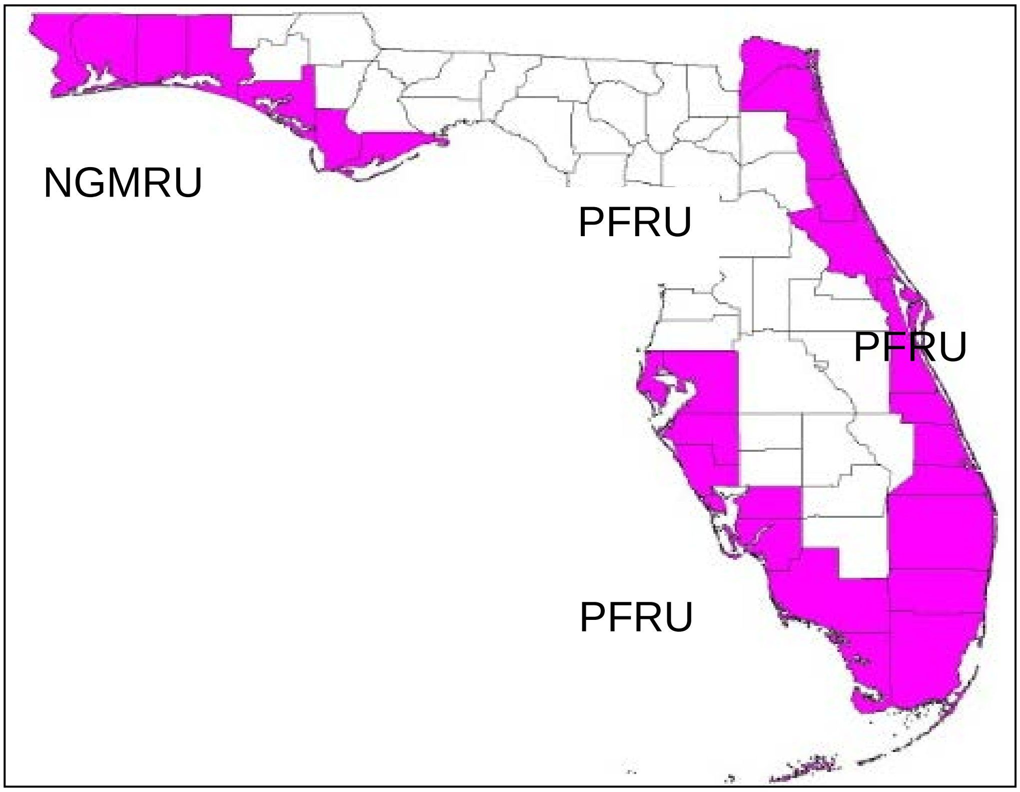

Figure 3. Distribution of loggerhead sea nesting in the PFRU and NGMRU in Florida.

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.

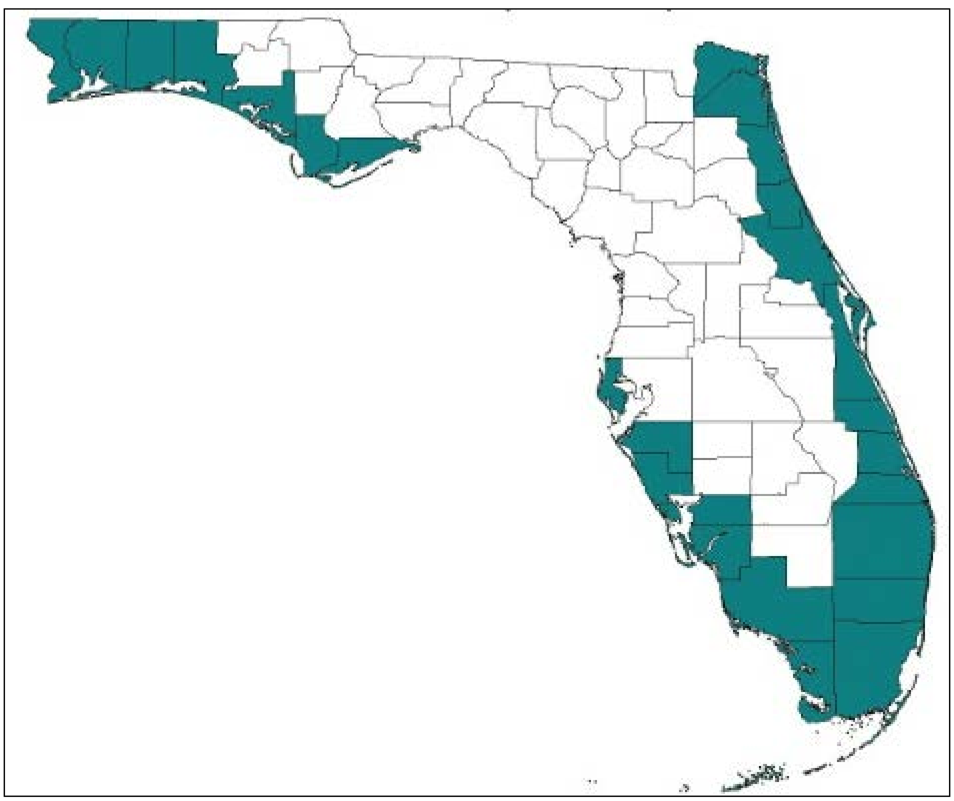

Figure 4. Distribution of green sea turtle nesting in Florida.

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.

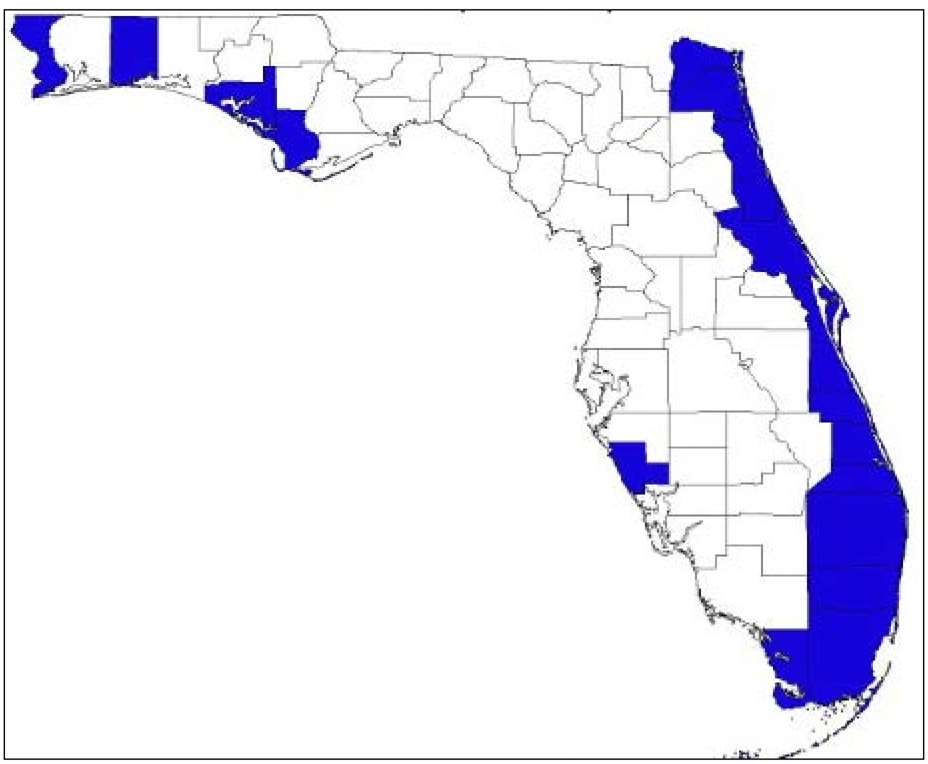

Figure 5. Distribution of leatherback sea turtle nesting in Florida.

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^{o}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**).

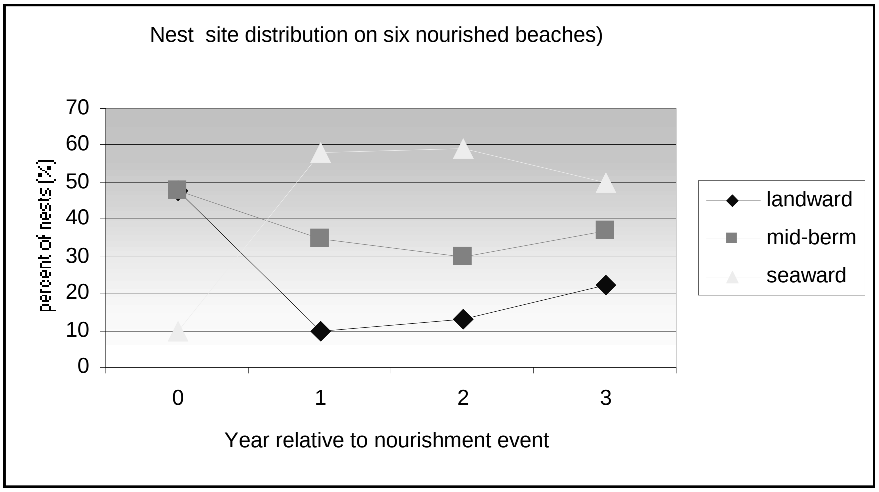

Figure 6. Review of sea turtle nesting site selection following nourishment (Trindell 2005).

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.

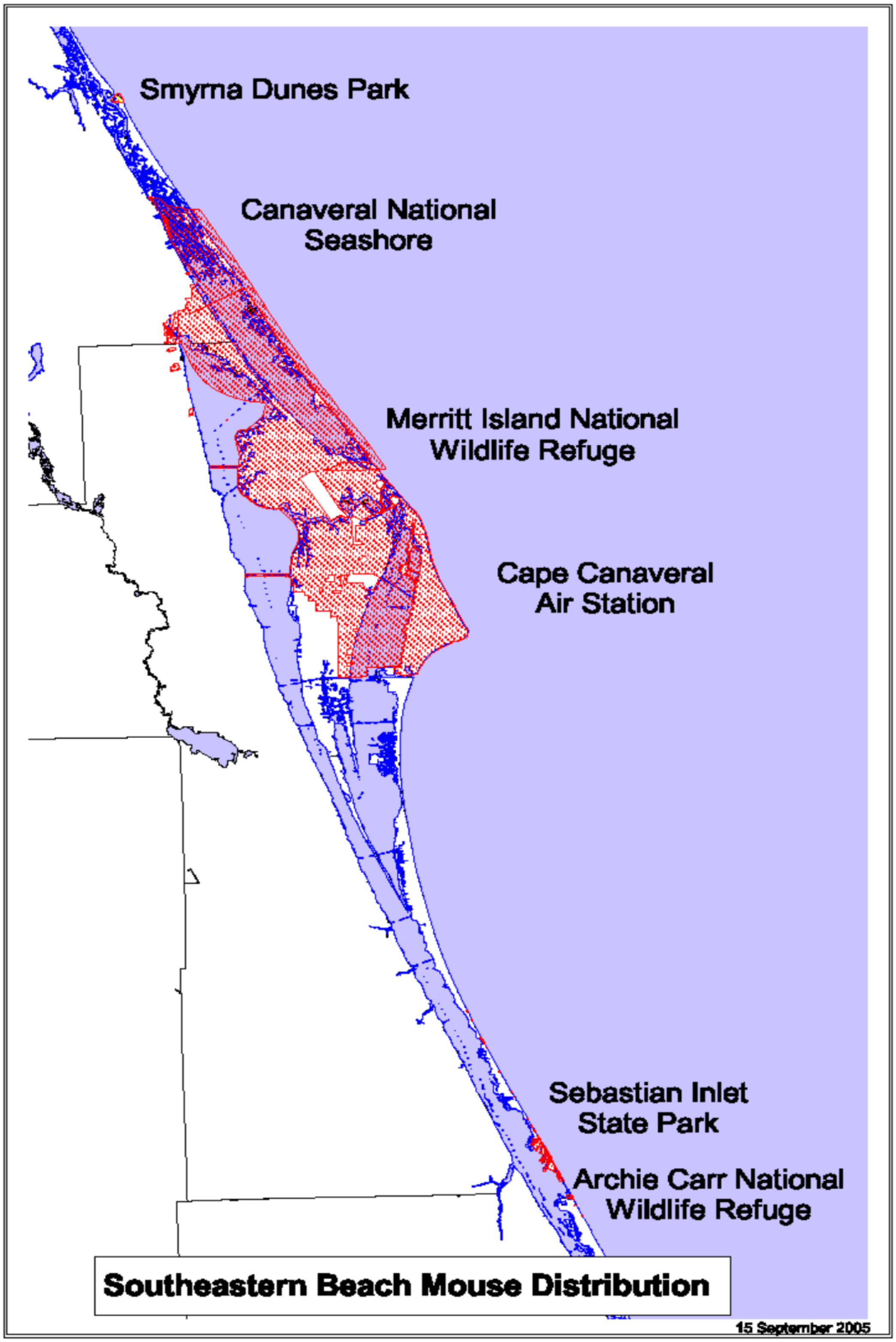

Figure 7. The distribution of the southeastern beach mouse.

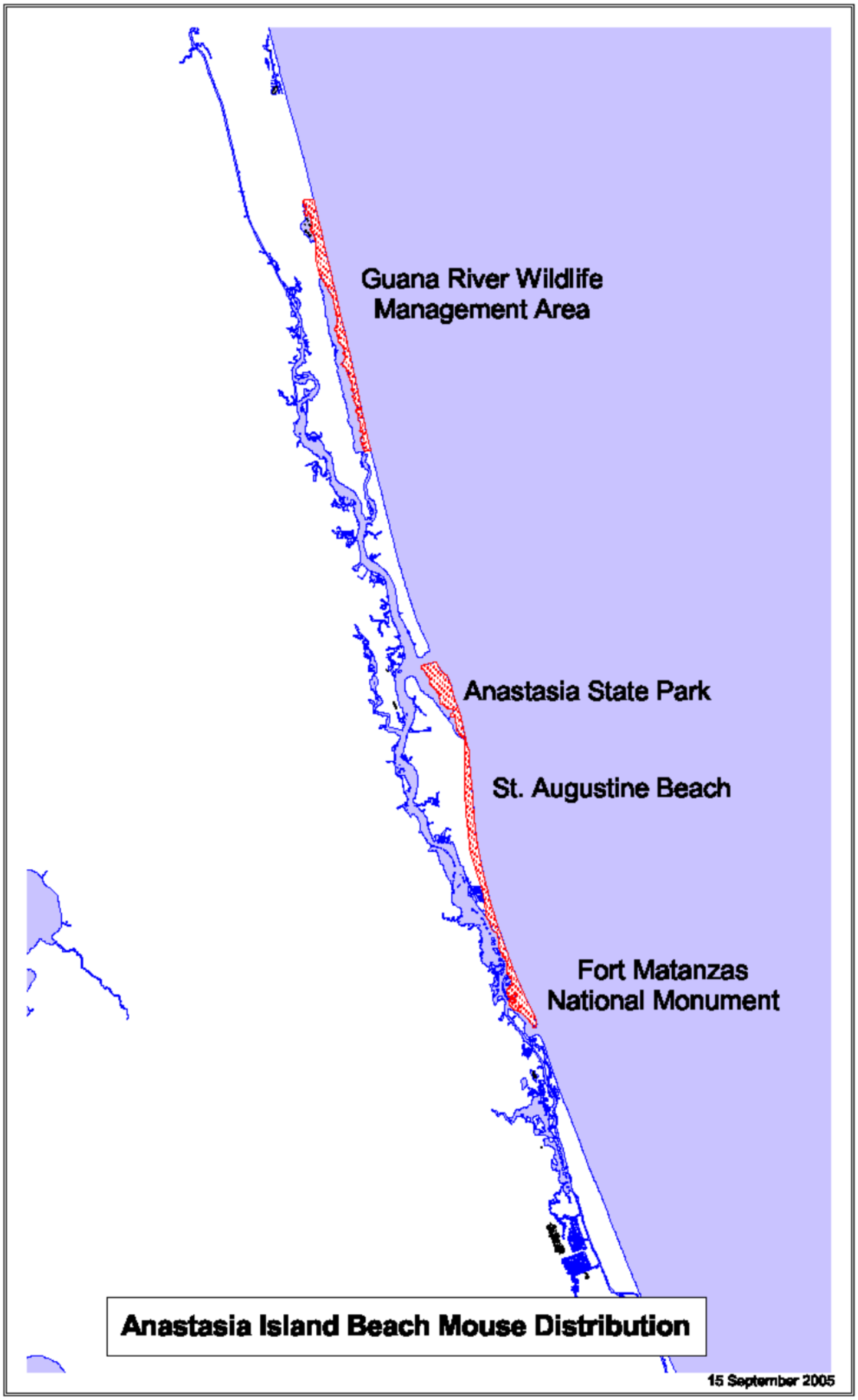

Figure 8. The distribution of the Anastasia Island beach mouse.

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.

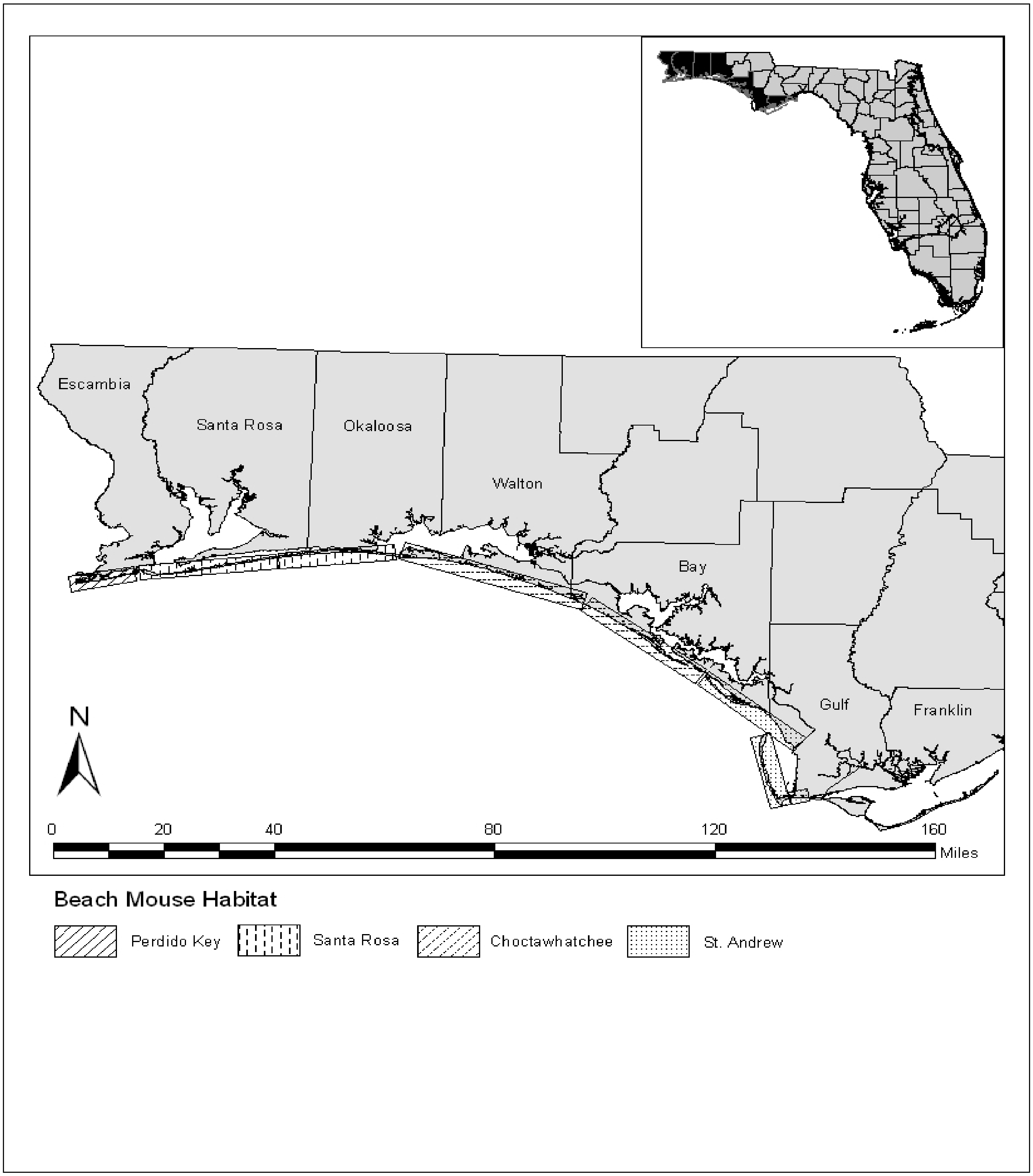

Figure 9. Historical range of Gulf Coast beach mouse subspecies.

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**).

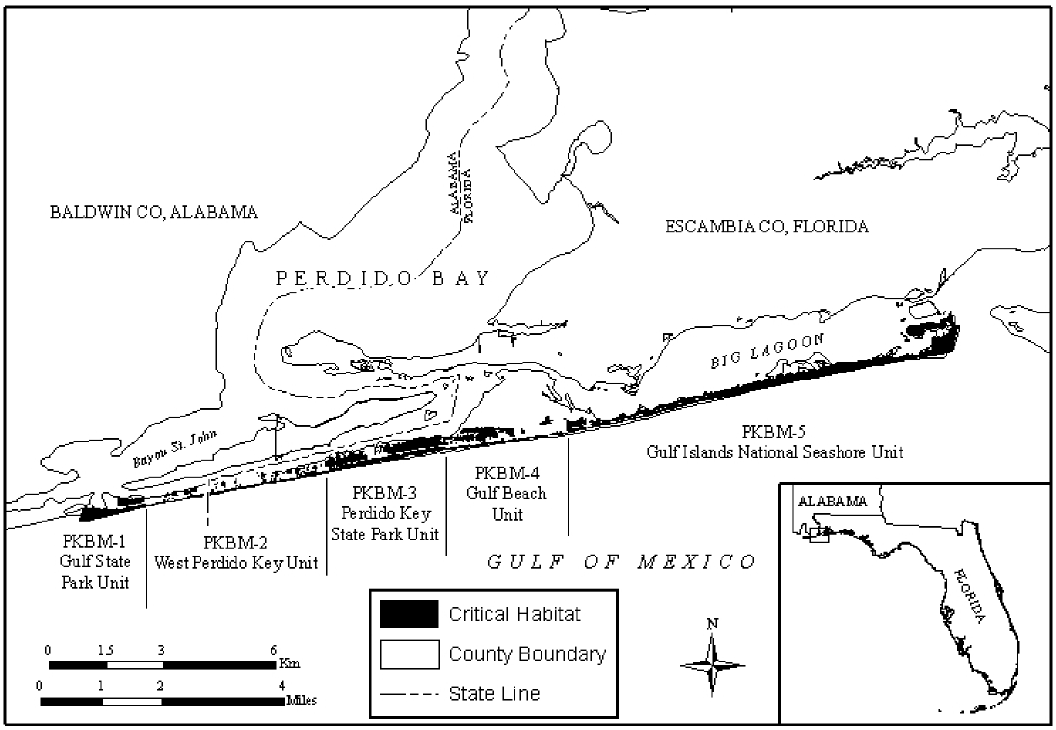

Figure 10. Critical habitat units designated for the Perdido Key beach mouse.

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.

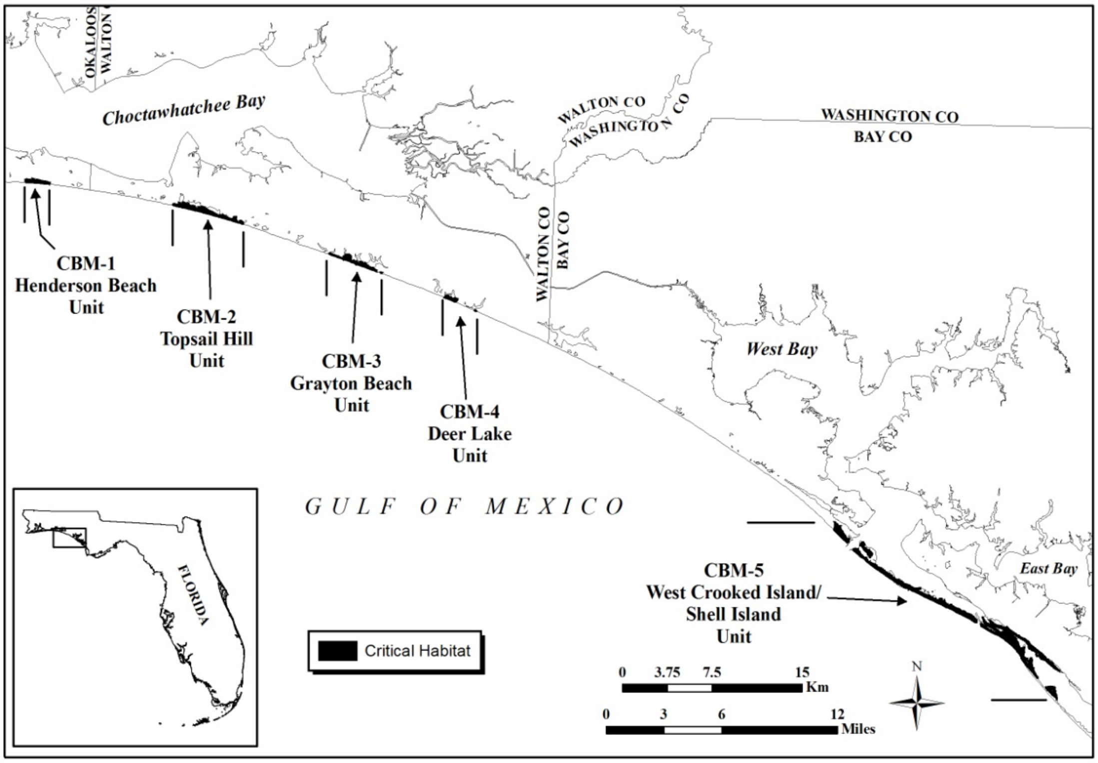

Figure 11. Critical habitat units designated for the Choctawhatchee beach mouse.

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 $\pm$ 4.1 acres and females had a mean home range of 0.81 $\pm$ 2.18 acres. Lynn (2000a) found male and female radio-tagged ABM had a mean home range of 1.68 $\pm$ 0.27 acres and 1.73 $\pm$ 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 ± 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).

<u>Atlantic Coast Beach Mice</u>

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.

<u>Gulf Coast Beach Mice</u>

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 GINS 1,052 PKSP 285	45	172 GSP 172	6
PKBM habitat	990	76	876 GINS 638 PKSP 238	67	114 GSP 114	9

[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

Coastal development

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.

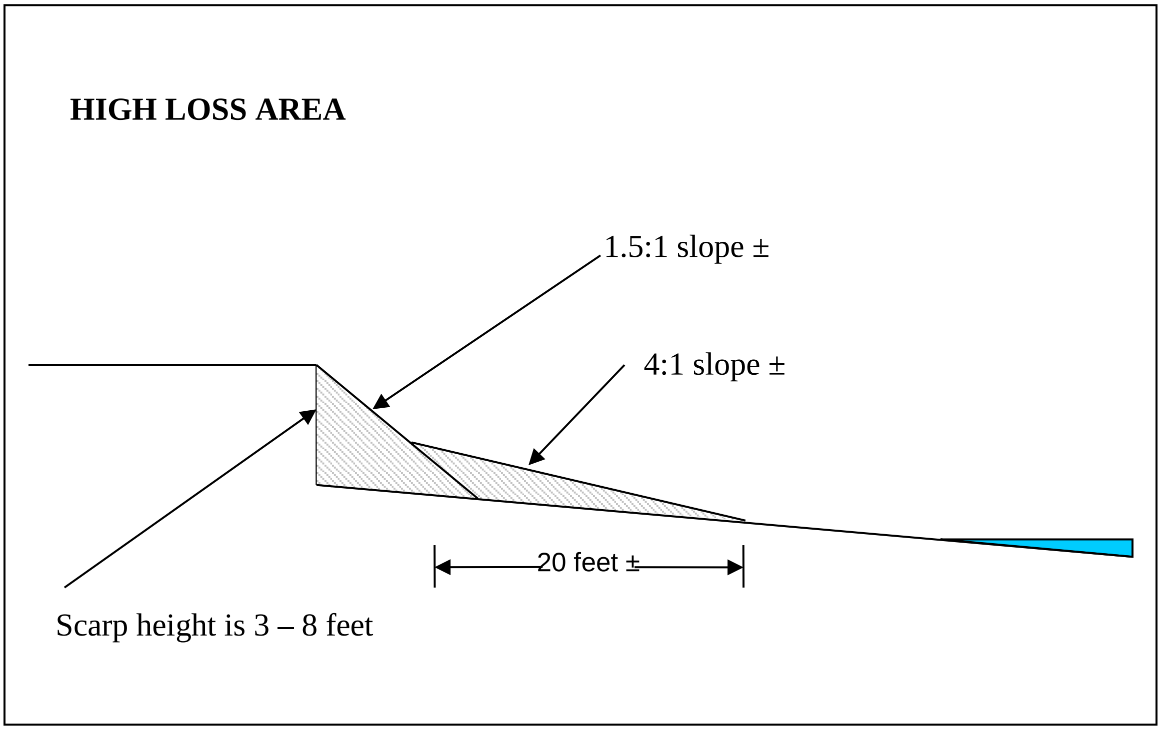

Figure 13. Recommended slope on a high erosion beach for sand placement projects that include the creation of a dune.

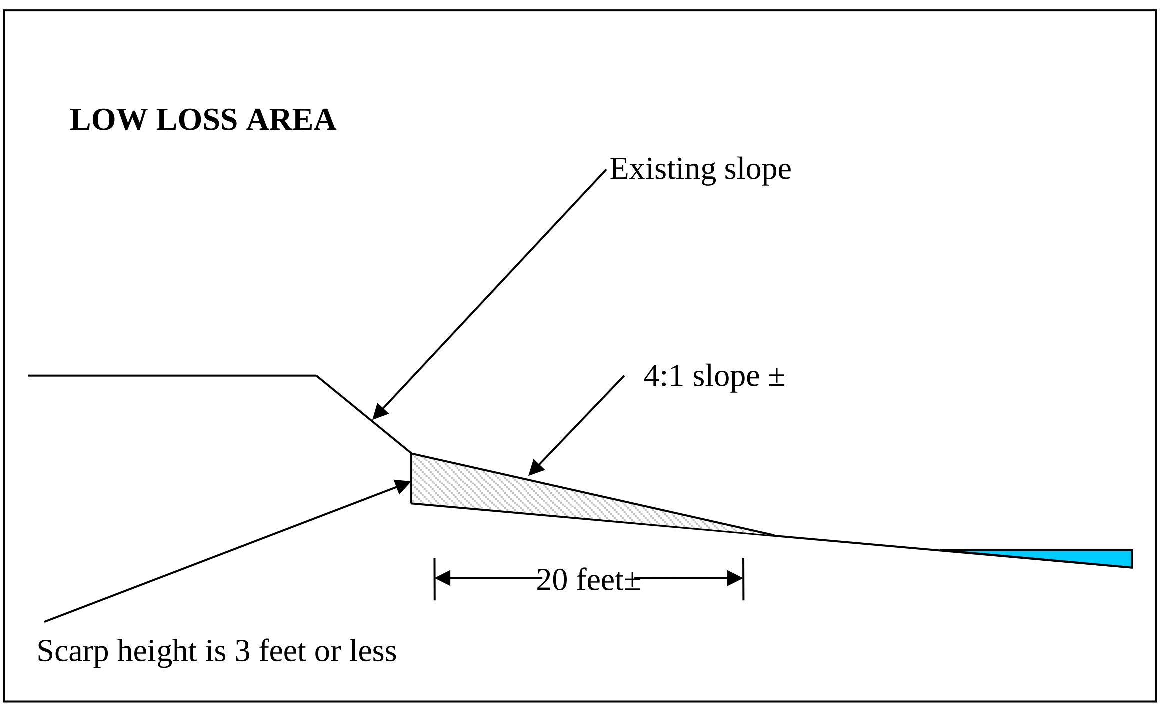

Figure 14. Recommended slope on a low erosion beach for sand placement projects that include the creation of a dune.

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**).

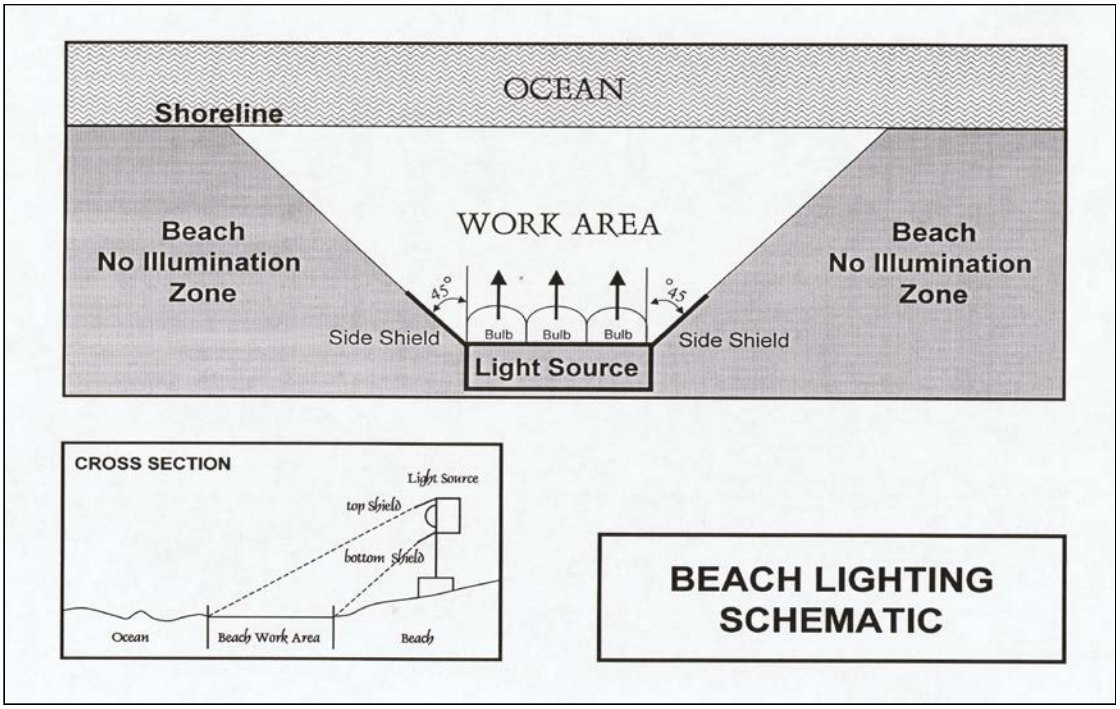

Figure 15. Beach lighting schematic.

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.

<ins>Dune Planting</ins>

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.

Beach Mouse Protection

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.

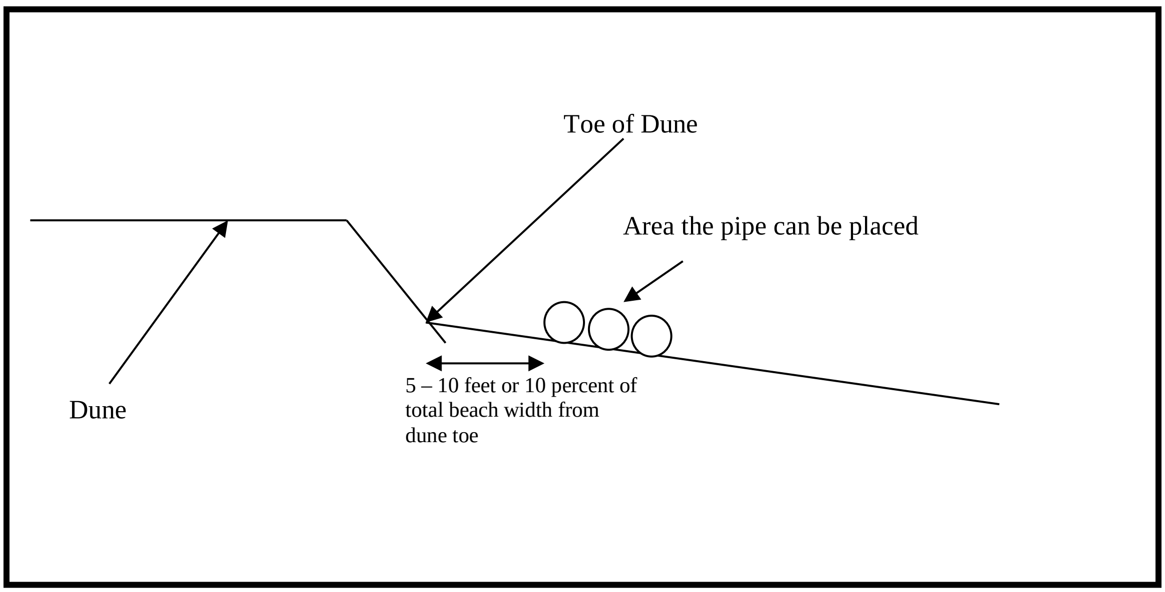

Figure 16. Equipment placement for projects occurring in beach mouse occupied habitat.

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.

<u>Reporting</u>

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**).

<u>Sea Turtle Protection</u>

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,

Donald R. Progulske

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)
FWC, Tallahassee, Florida, (Robbin Trindell)
NMFS, Protected Species Division, St. Petersburg (Eric Hawk)
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.

United States Department of the Interior

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

May 22, 2013

Eric P. Summa
Chief, Environmental Branch (PD-E)
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Summa:

This document transmits the U.S. Fish and Wildlife Service's (Service) Programmatic Piping Plover Biological Opinion (P^{3}BO) for the effects of U.S. Army Corps of Engineers (Corps) planning and regulatory shore protection activities on the non-breeding piping plover (*Charadrius melodus*) and its designated Critical Habitat in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). The current status of the federally listed piping plover is threatened, and the Service designated Critical Habitat for wintering piping plovers on July 10, 2001. This P^{3}BO is for the North Florida Ecological Services Office (NFESO) and the South Florida Ecological Services Office (SFESO) areas of responsibility (AORs). You requested formal consultation by letter of May 7, 2013.

This P^{3}BO is based on the information provided in the Corps May 7, 2013, letter, the Statewide Programmatic Biological Assessment of February 17, 2011, subsequent meetings between Corps and Service personnel, and other sources of information. We have assigned Consultation Code 04EF1000-2013-F-0124 to this consultation. A complete administrative record of this consultation is on file at the NFESO. Each project proposing to utilize this P^{3}BO will undergo an evaluation process by the Corps to determine if it properly fits within this programmatic approach. If it is determined that the minimization measures, Reasonable and Prudent Measures, and Terms and Conditions in the P^{3}BO are applicable to the project, the Service will concur within 30 days and it will be covered by this programmatic consultation. The Corps will consult separately on individual projects that do not fit within this programmatic approach unless the Service grants an exception in accordance with the Incidental Take Statement in the P^{3}BO.

This consultation includes the following proposed activities conducted in the AORs of the NFESO and the SFESO:

1. Operations and maintenance dredging activities of navigational channels and sand placement on the sandy beach and dune (including up to or over hardened structures), the swash zone, and the nearshore regions associated with both shore protection projects and maintenance dredging;
2. Sand placement as an associated authorization of sand extraction from the outer continental shelf by the Bureau of Ocean Energy Management (BOEM);
3. Sand by-passing/back-passing; and
4. Groins and jetty repair, or replacement.

For Civil Works activities, the Corps specified during the consultation process that "fish and wildlife enhancement" activities beyond mitigation of project impacts must be authorized as a project purpose, be authorized as a project feature, or be otherwise approved through Corps headquarters (Engineer Regulation ER 1105-2-100 Appendix G, Amendment #1, 30 June 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)], the Corps does not expect to receive authorization and funding for it. However, the Corps proposes to implement the following Conservation Measures to reduce impacts on piping plovers for all projects (those in both non-optimal and optimal piping plover habitat) included in this consultation with the potential to affect piping plovers or their critical habitat:

1. Adhere to appropriate seasonal windows to the maximum extent practicable;

2. Implement survey guidelines for non-breeding shorebirds when appropriate. For Corps Civil Works projects, the "surveys" must be limited to the term of the construction unless they are otherwise authorized and funded by Congress;

   [Note: The term of the construction is considered to be the time in which the construction contractor is working on the beach. This usually starts soon after the "notice to proceed" and ends when the contractor finishes placing sand or finishes conducting other shore protection activities on/near the beach.]

3. Pipeline alignment and associated construction activities may be modified to reduce impacts to foraging, sheltering, and roosting;

4. Avoid impacts to the primary constituent elements (PCEs) of piping plover Critical Habitat to the maximum extent practicable;

5. The Corps or Applicant will evaluate the project area prior to consultation for the presence of piping plover PCEs as a basis for making their initial determination of effect;

6. The Corps will work with the Service to develop shore protection design guidelines and/or mitigation measures that can be utilized during future project planning to protect and/or enhance high value piping plover habitat locations (*i.e.*, washover fans). For Corps Civil Works projects, "enhancement" must be limited to the extent authorized and funded as a project feature or project purpose;

7. The Corps will attempt to time the construction of Civil Works sand placement and dredging projects to prevent two adjacent beaches or inlets from being constructed in the same year;

8. The Corps Civil Works program will work with the Florida Department of Environmental Protection (FDEP) to consider the value and context of inlet habitat features (*i.e.*, emergent spits, sand bars, etc.) within each inlet's management plan and adjust future dredging frequencies, to the maximum extent practicable and consistent with applicable law, so that adjacent habitats are made available and total habitat loss would not occur at one time within a given inlet complex; and

9. The Corps Civil Works program will consider placing dredged materials in the nearshore region as an alternative to beach placement to minimize effects to piping plovers and their habitat.

With the implementation of these Conservation Measures, the Corps has determined the proposed activities may affect, but are not likely to adversely affect the piping plover in areas not identified as Optimal Piping Plover Areas. Optimal Piping Plover Areas are defined as having documented use by piping plovers, and they include coastal habitat features that function mostly unimpeded. Optimal Piping Plover Areas include:

1. Designated piping plover Critical Habitat Units (see Appendix A);

2. All Federal, State, and County publicly owned land where coastal processes are allowed to function, mostly unimpeded, that have any of the following features in the Action Area:

    a. Located within 1 mile of an inlet;
    b. Emergent nearshore sand bars;
    c. Washover fans;
    d. Emergent bayside and Ocean/Gulf-side shoals and sand bars;
    e. Bayside mudflats, sand flats, and algal flats; or
    f. Bayside shorelines of bays and lagoons.

[Publicly owned land where coastal processes are allowed to function, mostly unimpeded, generally does not include public lands that are solely state-owned water bottoms, street ends, parking lots, piers, beach accesses, or shoreline developed for commercial or residential purposes. It generally does include public lands consisting of parks, preserves, and natural undeveloped shoreline and dunes.]; and

3. The following additional areas are also considered optimal piping plover habitat (FDEP Range Monuments provided in parentheses):

    a. Charley Pass, south of Critical Habitat Unit FL-23 on North Captiva Island, Lee County (R-75.5 and R-83);
    b. Stump Pass and the beaches adjacent to it, Charlotte County (R-15.5 to R-33);
    c. Palmer Point Park, Sarasota County (R-77 to R-83);

d. St. Lucie Inlet and associated shoals, Martin County (R-42 to R-78);
e. Crandon Park, Miami-Dade County (R-89 to R-101); and
f. Sanibel Island, Lee County (R-109 to R-174).

The Service concurs with this determination as it applies to projects in non-optimal habitat, and the Corps will reinitiate consultation if they are unable to implement the Conservation Measures as described above. No additional consultation is required for projects located in habitat determined to be non-optimal for piping plovers. The attached P^3BO addresses projects located in optimal piping plover habitat, as defined above.

As with the Service's Statewide Programmatic Biological Opinion (SPBO), the Corps and the Service will meet annually during the fourth week of August to review the proposed activities, assess new data, identify information needs, and scope methods to address those needs, including, but not limited to, evaluations and monitoring specified in this P^3BO, reviewing results, formulating or amending actions that minimize take of listed species, and monitoring the effectiveness of those actions. This programmatic consultation will be reviewed every 5 years. If new information concerning the projects or the piping plover arises, this consultation will be reviewed sooner than 5 years. Reinitiation of formal consultation is required 10 years after the issuance of this P^3BO.

We are available to meet with agency representatives to discuss this consultation. If you have any questions, please contact Dawn Jennings at the NFESO (904-731-3103) or Craig Aubrey in the SFESO (772-469-4309).

Sincerely yours,

Larry Williams

Larry Williams
State Supervisor

SAJ-2007-01645
Attachment 13

SHORE PROTECTION ACTIVITIES IN THE GEOGRAPHICAL REGION OF THE NORTH AND SOUTH FLORIDA ECOLOGICAL SERVICES FIELD OFFICES

Programmatic Piping Plover Biological Opinion

May 22, 2013

Prepared by:

U.S. Fish and Wildlife Service

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ACRONYMS AND ABBREVIATIONS

Act	Endangered Species Act
AOR	Area of Responsibility
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FWC	Florida Fish and Wildlife Conservation Commission
FR	Federal Register
MBTA	Migratory Bird Treaty Act
NFESO	U.S. Fish and Wildlife Service’s North Florida Ecological Services Office
P^3BO	Programmatic Piping Plover Biological Opinion
PCE	Primary Constituent Elements
Service	U.S. Fish and Wildlife Service
SFESO	U.S. Fish and Wildlife Service’s South Florida Ecological Services Office
SPBO	Statewide Programmatic Biological Opinion
USGS	U.S. Geological Survey

CONSULTATION HISTORY

1980s and 1990s	Beach nourishment projects in Florida began to occur frequently in the late 1980s and early 1990s.
April 19, 2011	The Service issued the original SPBO concerning planning and regulatory sand placement projects in Florida and their effects on nesting sea turtles.
August 22, 2011	The Service issued their revised SPBO. The SPBO did not include take for the non-breeding piping plover or its designated Critical Habitat. Consultation for plovers was conducted on a case-by-case basis.
October 30, 2012	The Service and the Corps held the first annual meeting on the progress of the SPBO. The agencies discussed outstanding piping plover issues, including the proposed terms and conditions. The agencies agreed to conduct a separate re-initiation of consultation for piping plovers limited to peninsular Florida to programmatically address take of piping plovers.
May 7, 2013	The Corps sent a letter to the Service formally requesting a Programmatic Piping Plover Biological Opinion.
Other Collaboration	Numerous telephone conversations and e-mails were conducted between the Corps and the Service concerning the content of the P^3BO and initiation of consultation.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action includes activities associated with the placement of compatible sediment on beaches or in the nearshore region of Optimal Piping Plover Areas. Optimal Piping Plover Areas are defined as having documented use by piping plovers, and include coastal habitat features that function mostly unimpeded. Below is a list of currently known Optimal Piping Plover Areas:

1. Designated piping plover Critical Habitat Units (see Appendix A);

2. All Federal, State, and County publicly owned land where coastal processes are allowed to function, mostly unimpeded, that have any of the following features in the Action Area:

    a. Located within 1 mile of an inlet;
    b. Emergent nearshore sand bars;
    c. Washover fans;
    d. Emergent bayside and Ocean/Gulf-side shoals and sand bars;
    e. Bayside mudflats, sand flats, and algal flats; or

f. Bayside shorelines of bays and lagoons.

[Publicly owned land where coastal processes are allowed to function, mostly unimpeded, generally does not include public lands that are solely State-owned water bottoms, street ends, parking lots, piers, beach accesses, or shoreline developed for commercial or residential purposes. It generally does include public lands consisting of parks, preserves, and natural undeveloped shoreline and dunes.]; and

3. The following additional areas are also considered optimal piping plover habitat (FDEP Range Monuments provided in parentheses):

    a. Charley Pass, south of Critical Habitat Unit FL-23 on North Captiva Island, Lee County (R-75.5 and R-83);
    b. Stump Pass and the beaches adjacent to it, Charlotte County (R-15.5 to R-33);
    c. Palmer Point Park, Sarasota County (R-77 to R-83);
    d. St. Lucie Inlet and associated shoals, Martin County (R-42 to R-78);
    e. Crandon Park, Miami-Dade County (R-89 to R-101); and
    f. Sanibel Island, Lee County (R-109 to R-174).

ACTION AREA

The Action Area includes sandy beaches; emergent bayside and Ocean/Gulf-side shoals and sand bars; bayside mudflats, sand flats, and algal flats; bayside shorelines of bays and lagoons; and emergent nearshore sand bars of the Atlantic Coast (Nassau County to Miami-Dade County) and the Gulf Coast (Monroe County to Taylor County) of Florida (Figures 1 and 2). The proposed action includes the replacement and rehabilitation of groins utilized as design components of beach projects for longer retention time and stabilization of associated sediment placed on the beach. This P^{3}BO includes both Corps Regulatory and Civil Works activities. Both Corps Regulatory and Civil Works activities may include the involvement of other Federal agencies, such as the Department of Defense, BOEM, and the Federal Emergency Management Agency. The activities covered in the P^{3}BO encompass the following:

1. Operations and maintenance dredging activities of navigational channels and sand placement on the sandy beach and dune (including up to or over hardened structures), the swash zone, and the nearshore regions associated with both shore protection projects and maintenance dredging;
2. Sand placement as an associated authorization of sand extraction from the outer continental shelf by the BOEM;
3. Sand by-passing/back-passing; and
4. Groins and jetty repair, or replacement.

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 sand placement actions addressed in this P^{3}BO may include maintenance of these existing projects or beaches that have not experienced a history of sand placement activities. Maintenance dredging activities include dredging of both deep draft harbors and shallow draft inlets when these activities affect optimal piping plover habitat.

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/Critical Habitat description

The piping plover is a small, pale sand-colored shorebird, about 7 inches long with a wingspan of about 15 inches (Palmer 1967). Cryptic coloration is a primary defense mechanism for piping plovers where nests, adults, and chicks all blend in with their typical beach surroundings. Piping plovers on wintering and migration grounds respond to intruders (*e.g.*, pedestrian, avian and mammalian) usually by squatting, running, and flushing (flying).

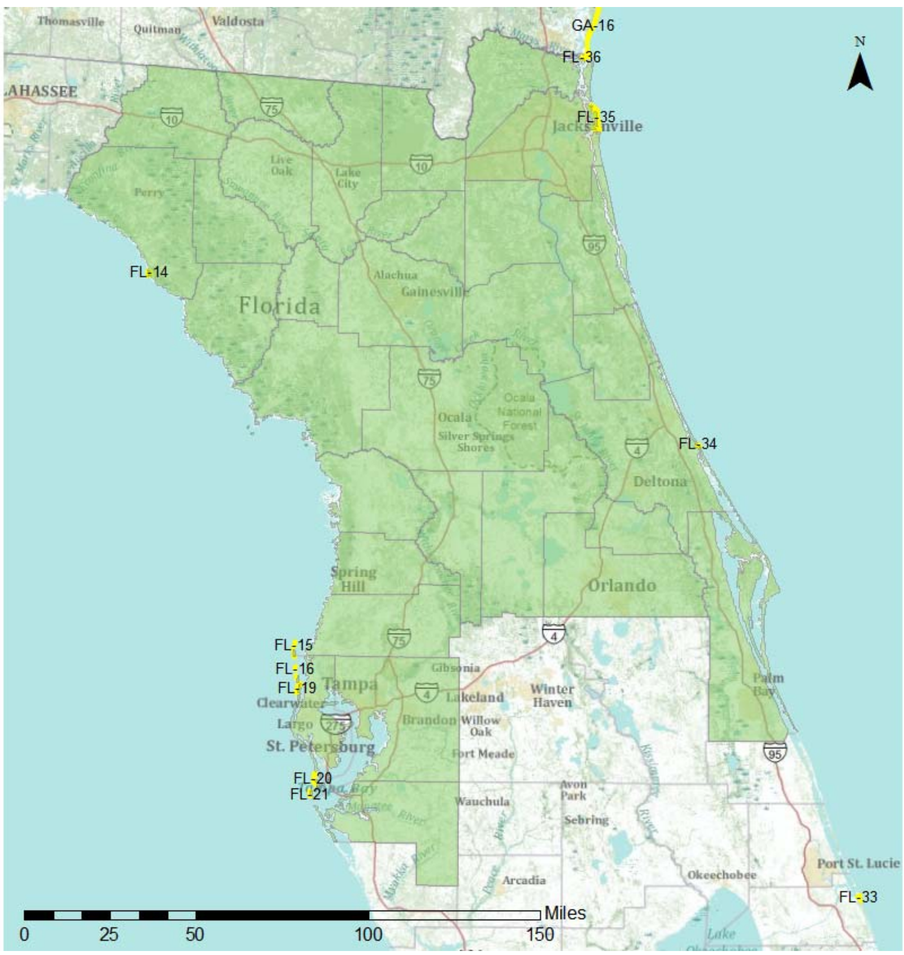

Figure 1 Piping plover designated Critical Habitat in the North Florida Ecological Services Field Office's area of responsibility**.**

On January 10, 1986, the piping plover was listed as endangered in the Great Lakes watershed and threatened elsewhere within its range, including migratory routes outside of the Great Lakes watershed and wintering grounds (Service 1985). Piping plovers were listed principally because of habitat destruction and degradation, predation, and human disturbance. Protection of the species under the Act reflects the species' precarious status range-wide.

Three separate breeding populations have been identified, each with its own recovery criteria: the northern Great Plains (threatened), the Great Lakes (endangered), and the Atlantic Coast (threatened). The piping plover winters in coastal areas of the U.S. from North Carolina to Texas, and along the coast of eastern Mexico and on Caribbean islands from Barbados to Cuba and the Bahamas (Haig and Elliott-Smith 2004). Piping plovers in the Action Area include individuals from all three breeding populations. Piping plover subspecies are phenotypically indistinguishable, and most studies in the nonbreeding range report results without regard to breeding origin. Although a recent analysis shows strong patterns in the wintering distribution of piping plovers from different breeding populations, partitioning is not complete and major information gaps persist.

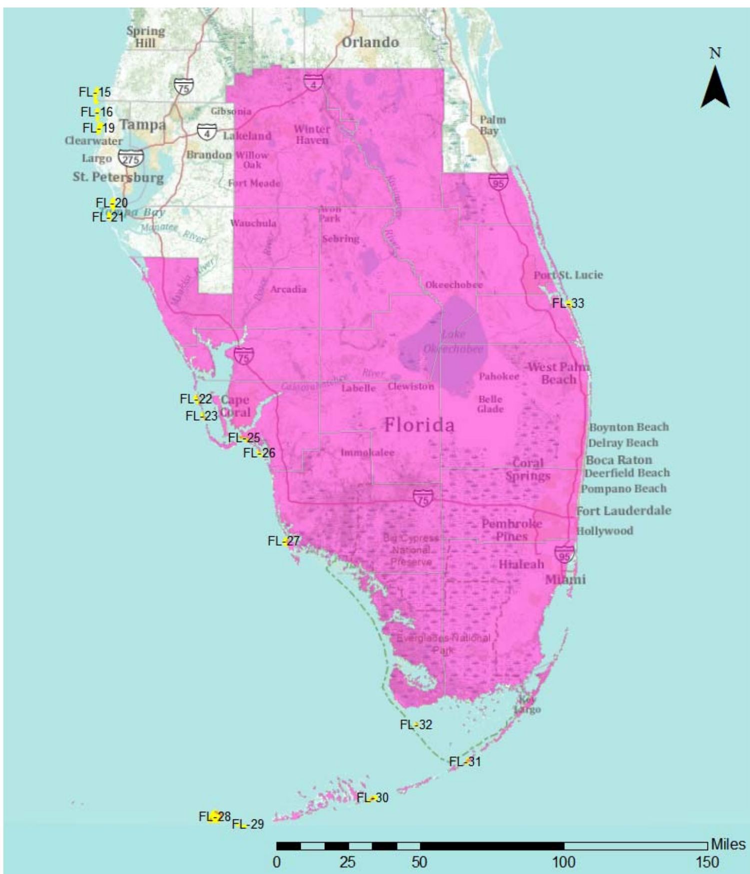

Figure 2 Piping plover designated Critical Habitat in the South Florida Ecological Services Field Office's area of responsibility.

The Service has designated Critical Habitat for the piping plover on three occasions. Two of these designations protected different piping plover breeding populations. Critical Habitat for the Great Lakes breeding population was designated May 7, 2001 (66 Federal Register [FR] 22938, Service 2001a), and Critical Habitat for the northern Great Plains breeding population was designated September 11, 2002 (67 FR 57637, Service 2002). The Service designated Critical Habitat for wintering piping plovers on July 10, 2001 (66 FR 36038, Service 2001b). Wintering piping plovers may include individuals from the Great Lakes and northern Great Plains breeding populations as well as birds that nest along the Atlantic Coast. The three separate designations of piping plover Critical Habitat demonstrate diversity of PCEs between the two breeding populations as well as diversity of PCEs between breeding and wintering populations.

Designated wintering piping plover Critical Habitat originally included 142 areas (the rule states 137 units; this is an error) encompassing approximately 1,793 miles of mapped shoreline and 165,211 acres of mapped areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas.

The PCEs for piping plover wintering habitat essential for the conservation of the species are 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 PCEs are found in geographically dynamic coastal areas that support intertidal beaches and flats (between annual low tide and annual high tide), and associated dune systems and flats above annual high tide (Service 2001a). PCEs of wintering piping plover Critical Habitat include sand or mud flats, or both, with no or sparse emergent vegetation. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting piping plovers (Service 2001a). Important components of the beach/dune ecosystem include surf-cast algae, sparsely vegetated back beach and salterns, spits, and washover areas. Washover areas are broad, unvegetated zones, with little or no topographic relief, that are formed and maintained by the action of hurricanes, storm surge, or other extreme wave action. The units designated as Critical Habitat are those areas that have consistent use by piping plovers and that best meet the biological needs of the species. The amount of wintering habitat included in the designation appears sufficient to support future recovered populations, and the existence of this habitat is essential to the conservation of the species. Additional information on each specific unit included in the designation can be found at 66 FR 36038 (Service 2001a).

Life history

Piping plovers live an average of 5 years, although studies have documented birds as old as 11 (Wilcox 1959) and 15 years. Plovers are known to begin breeding as early as 1 year of age (MacIvor 1990; Haig 1992); however, the percentage of birds that breed in their first adult year is unknown. Piping plover breeding activity begins in mid-March when birds begin returning to their nesting areas (Coutu et al. 1990; Cross 1990; Goldin et al. 1990; MacIvor 1990; Hake 1993). Piping plovers generally fledge only a single brood per season, but may re-nest several times if previous nests are lost. The reduction in suitable nesting habitat due to a number of factors is a major threat to the species, likely limiting reproductive success and future recruitment into the population (Service 2009).

Plovers depart their breeding grounds for their wintering grounds between July and late August, but southward migration extends through November. More information about the three breeding populations of piping plovers can be found in the following documents:

a. Piping Plover, Atlantic Coast Population: 1996 Revised Recovery Plan (Service 1996);
b. 2009 Piping Plover (*Charadrius melodus*) 5-Year Review: Summary and Evaluation (Service 2009);
c. 2003 Recovery Plan for the Great Lakes Piping Plover (*Charadrius melodus*) (Service 2003);
d. Questions and Answers about the Northern Great Plains Population of Piping Plover (Service 2002).

Piping plovers use habitats in Florida primarily from July 15 through May 15. Below (2010) surveyed plovers north of Marco Island, Florida, and found plovers color-banded during the surveys to have very high wintering site fidelity. Both spring and fall migration routes of Atlantic Coast breeders are believed to occur primarily within a narrow zone along the Atlantic Coast (Service 1996). The pattern of both fall and spring counts at many Atlantic Coast sites demonstrates that many piping plovers make intermediate stopovers lasting from a few days up to 1 month during their migrations (Noel and Chandler 2005; Stucker and Cuthbert 2006). Some midcontinent breeders travel up or down the Atlantic Coast before or after their overland movements (Stucker and Cuthbert 2006). Use of inland stopovers during migration is also documented (Pompei and Cuthbert 2004). The source breeding population of a given wintering individual cannot be determined in the field unless it has been banded or otherwise marked. Information from observation of color-banded piping plovers indicates that the winter ranges of the breeding populations overlap to a significant degree. While piping plover migration patterns and needs remain poorly understood, and occupancy of a particular habitat may involve shorter periods relative to wintering, information about the energetics of avian migration indicates that this might be a particularly critical time in the species' life cycle.

Review of published records of piping plover sightings throughout North America by Pompei and Cuthbert (2004) found more than 3,400 fall and spring stopover records at 1,196 sites. Published reports indicated piping plovers do not concentrate in large numbers at inland sites and they seem to stop opportunistically. In most cases, reports of birds at inland sites were single individuals.

Piping plovers migrate through and winter in coastal areas of the U.S. from North Carolina to Texas and in portions of Mexico and the Caribbean. Data based on four rangewide mid-winter (late January to early February) population surveys, conducted at 5-year intervals starting in 1991, show that total numbers have fluctuated over time, with some areas experiencing increases and others decreases. Regional and local fluctuations may reflect the quantity and quality of suitable foraging and roosting habitat, which vary over time in response to natural coastal formation processes as well as anthropogenic habitat changes (*e.g.*, inlet relocation, dredging of shoals and spits). Fluctuations may also represent localized weather conditions (especially wind) during surveys, or unequal survey coverage. For example, airboats facilitated first-time surveys of several central Texas sites in 2006 (Elliott-Smith et al. 2009). Similarly, the increase in the 2006 numbers in the Bahamas is attributed to greatly increased census efforts; the extent of additional habitat not surveyed remains undetermined (Elliott-Smith et al. 2009). Changes in wintering numbers may also be influenced by growth or decline in the particular breeding populations that concentrate their wintering distribution in a given area. Opportunities to locate previously unidentified wintering sites are concentrated in the Caribbean and Mexico (Elliott-Smith et al. 2009). Further surveys and assessment of seasonally emergent habitats (*e.g.*, seagrass beds, mudflats, oyster reefs) within bays lying between the mainland and barrier islands in Texas are also needed.

Midwinter surveys may underestimate the abundance of nonbreeding piping plovers using a site or region during other months. In late September 2007, 104 piping plovers were counted at the south end of Ocracoke Island, North Carolina (National Park Service 2007), where none were seen during the 2006 International Piping Plover Winter Census (Elliott-Smith et al. 2009). Noel et al. (2007) observed up to 100 piping plovers during peak migration at Little St. Simons Island, Georgia, where approximately 40 piping plovers wintered in 2003 to 2005. Differences among fall, winter, and spring counts in South Carolina were less pronounced, but inter-year fluctuations (*e.g.*, 108 piping plovers in spring 2007 versus 174 piping plovers in spring 2008) at 28 sites were striking (Maddock et al. 2009). Even as far south as the Florida Panhandle, monthly counts at Phipps Preserve in Franklin County ranged from a midwinter low of 4 piping plovers in December 2006, to peak counts of 47 in October 2006 and March 2007 (Smith 2007). Pinkston (2004) observed much heavier use of Texas Gulf Coast (ocean-facing) beaches between early September and mid-October (approximately 16 birds per mile) than during December to March (approximately 2 birds per mile).

Local movements of non-breeding piping plovers may also affect abundance estimates. At Deveaux Bank, one of South Carolina's most important piping plover sites, 5 counts at approximately 10-day intervals between August 27 and October 7, 2006, oscillated from 28 to 14 to 29 to 18 to 26 (Maddock et al. 2009). Noel and Chandler (2008) detected banded Great Lakes piping plovers known to be wintering on their Georgia study site in 73.8 $\pm$ 8.1 percent of surveys over 3 years.

Abundance estimates for non-breeding piping plovers may also be affected by the number of surveyor visits to the site. Preliminary analysis of detection rates by Maddock et al. (2009) found 87 percent detection during the midwinter period on core sites surveyed three times a month during fall and spring and one time per month during winter, compared with 42 percent detection on sites surveyed three times per year (Cohen 2009).

Gratto-Trevor et al. (2009) found strong patterns (but no exclusive partitioning) in winter distribution of uniquely banded piping plovers from four breeding populations (Figure 3).

All eastern Canada and 94 percent of Great Lakes birds wintered from North Carolina to southwest Florida. However, eastern Canada birds were more heavily concentrated in North Carolina, and a larger proportion of Great Lakes piping plovers were found in South Carolina and Georgia. Northern Great Plains populations were primarily seen farther west and south, especially on the Texas Gulf Coast. Although the great majority of Prairie Canada individuals were observed in Texas, particularly southern Texas, individuals from the U.S. Great Plains were more widely distributed on the Gulf Coast from Florida to Texas.

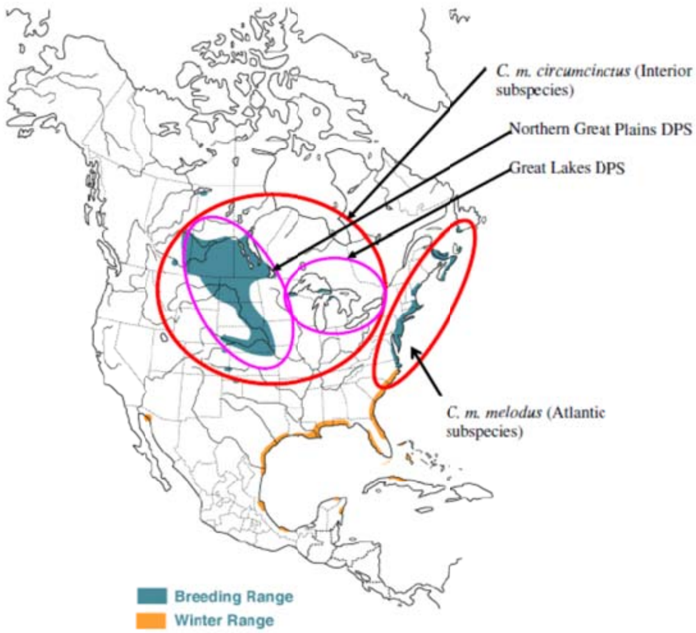

Figure 3 Distribution and range of *C. m. melodus:* Great Lakes DPS of *C. m. circumcinctus*, Northern Great Plains DPS of *C. m. circumcinctus* (base map from Elliott-Smith and Haig 2004 by permission of Birds of North America Online, http://bna.birds.cornell.edu/bna, maintained by the Cornell Lab of Ornithology). Note that this map is a conceptual presentation of subspecies and DPS ranges, and is not intended to convey precise boundaries.

The findings of Gratto-Trevor et al. (2009) provide evidence of differences in the wintering distribution of piping plovers from these four breeding areas. However, the distribution of birds by breeding origin during migration remains largely unknown. Other major information gaps include the wintering locations of the U.S. Atlantic Coast breeding population (banding of U.S. Atlantic Coast piping plovers has been extremely limited) and the breeding origin of piping plovers wintering on Caribbean islands and in much of Mexico.

Banded piping plovers from the Great Lakes, Northern Great Plains, and eastern Canada breeding populations showed similar patterns of seasonal abundance at Little St. Simons Island, Georgia (Noel et al. 2007). However, the number of banded plovers originating from the latter two populations was relatively small at this study area.

This species exhibits a high degree of intra- and interannual wintering site fidelity (Nicholls and Baldassarre 1990a; Drake et al. 2001; Noel and Chandler 2005; Stucker and Cuthbert 2006). Gratto-Trevor et al. (2009) reported that 6 of 259 banded piping plovers observed more than once per winter moved across boundaries of the 7 U.S. regions. Of 216 birds observed in different years, only 8 changed regions between years, and several of these shifts were associated with late summer or early spring migration periods (Gratto-Trevor et al. 2009). Total number of individuals observed on the wintering grounds was 46 for Eastern Canada, 150 for the U.S. Great Lakes, 169 for the U.S. Great Plains, and 356 for Prairie Canada.

Local movements are more common. In South Carolina, Maddock et al. (2009) documented many cross-inlet movements by wintering banded piping plovers as well as occasional movements of up to 11.2 miles by approximately 10 percent of the banded population. Larger movements within South Carolina were seen during fall and spring migration. Similarly, eight banded piping plovers that were observed in two locations during 2006 and 2007 surveys in Louisiana and Texas were all in close proximity to their original location (Maddock 2008).

In 2001, 2,389 piping plovers were located during a winter census, accounting for only 40 percent of the known breeding birds recorded during a breeding census (Ferland and Haig 2002). About 89 percent of birds that are known to winter in the U.S. do so along the Gulf Coast (Texas to Florida), while 8 percent winter along the Atlantic Coast (North Carolina to Florida).

The status of piping plovers on winter and migration grounds is difficult to assess, but threats to piping plover habitat used during winter and migration identified by the Service during its designation of Critical Habitat continue to affect the species. Unregulated motorized and pedestrian recreational use, inlet and shoreline stabilization projects, beach maintenance and nourishment, and pollution affect most winter and migration areas. Conservation efforts at some locations have likely resulted in the enhancement of wintering habitat.

The 2004 and 2005 hurricane seasons affected a substantial amount of habitat along the Gulf Coast. Habitats such as those along Gulf Islands National Seashore have benefited from increased washover events which created optimal habitat conditions for piping plovers. Conversely, hard shoreline structures are put into place following storms throughout the species range to prevent such shoreline migration (see *Factors Affecting the Species Habitat within the Action Area*). Four hurricanes between 2002 and 2005 are often cited in reference to rapid erosion of the Chandeleur Islands, a chain of low-lying islands in Louisiana where the 1991 International Piping Plover Census tallied more than 350 piping plovers. Comparison of imagery taken 3 years before and several days after Hurricane Katrina found that the Chandeleur Islands lost 82 percent of their surface area (Sallenger et al. in review), and a review of aerial photography prior to the 2006 Census suggested little piping plover habitat remained (Elliott-Smith et al. 2009). However, Sallenger et al. (in review) noted that habitat changes in the Chandeleurs stem not only from the effects of these storms, but rather from the combined effects of the storms, long-term (greater than 1,000 years) diminishing sand supply, and sea-level rise relative to the land.

The Service is aware of the following site specific conditions that affect the status of several habitats piping plover use while wintering and migrating, including Critical Habitat Units. In Texas, one Critical Habitat Unit was afforded greater protection due to the acquisition of adjacent upland properties by the local Audubon chapter. In another unit in Texas, vehicles were removed from a portion of the beach decreasing the likelihood of automobile disturbance to plovers. Exotic plant removal is occurring in another Critical Habitat Unit in South Florida. The Service and other government agencies remain in a contractual agreement with the U.S. Department of Agriculture for predator control within limited coastal areas in the Florida panhandle, including portions of some Critical Habitat Units. Continued removal of potential terrestrial predators is likely to enhance survivorship of wintering and migrating piping plovers. In North Carolina, one Critical Habitat Unit was afforded greater protection when the local Audubon chapter agreed to manage the area specifically for piping plovers and other shorebirds following the relocation of a nearby inlet channel.

Biogeography and Habitat Preferences

Wintering piping plovers prefer coastal habitats that include sand spits, islets (small islands), tidal flats, shoals (usually flood tidal deltas), and sandbars that are often associated with inlets (Harrington 2008). Sandy mud flats, ephemeral pools, and overwash areas are also considered primary foraging habitats. These substrate types have a richer infauna than the foreshore of high energy beaches and often attract large numbers of shorebirds (Cohen et al. 2008). Wintering plovers are dependent on a mosaic of habitat patches and move among these patches depending on local weather and tidal conditions (Nicholls and Baldassarre 1990a).

Recent study results in North Carolina, South Carolina, and Florida, complement information from earlier investigations in Texas and Alabama (summarized in the 1996 Atlantic Coast and 2003 Great Lakes Recovery Plans) regarding habitat use patterns of piping plovers in their coastal migration and wintering range. As documented in Gulf Coast studies, nonbreeding piping plovers in North Carolina primarily used sound (bay or bayshore) beaches and sound islands for foraging and ocean beaches for roosting, preening, and being alert (Cohen et al. 2008). The probability of piping plovers being present on the sound islands increased with increasing exposure of the intertidal area (Cohen et al. 2008). Maddock et al. (2009) observed shifts to roosting habitats and behaviors during high-tide periods in South Carolina.

LeDee et al. (2008) conducted a remote analysis of piping plover wintering sites, measuring 11 ecological parameters to determine their correlation to piping plover presence. Piping plover abundance was negatively correlated with urban area and total road length, and positively correlated with inter-tidal area, presence on the mainland (as opposed to the peninsula/island feature), and total inter-tidal and beach area (LeDee et al. 2008).

Recent geographic analysis of piping plover distribution on the upper Texas coast noted major concentration areas at the mouths of rivers, washover passes (low, sparsely vegetated barrier island habitats created and maintained by temporary, storm-driven water channels), and major bay systems (Arvin 2008). Earlier studies in Texas have drawn attention to washover passes, which are commonly used by piping plovers during periods of high bayshore tides and during the spring migration period (Zonick 1997; Zonick 2000). Elliott-Smith et al. (2009) reported piping plover concentrations on exposed seagrass beds and oyster reefs during seasonal low water periods in 2006.

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 the 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). West-central Florida beaches are considered to be low energy beaches with a gradual offshore slope and fine-grained, quartz sand beaches. The dynamics of the Florida shoreline are shaped by the occurrence of storm surges and seas from tropical storms that occur mainly during August through early October. The East coast may also experience erosion from late September through March due to nor'easters. Gulf beaches are largely protected from severe nor'easters. The impacts of these two types of storms may vary from event to event and year to year.

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 7 feet at the Florida-Georgia line to less than 2 feet in Palm Beach County. The mean tidal range along the Gulf Coast is less than 3 feet (microtidal) except in the extreme south where it ranges from 3 to 4 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.

Foraging/Food Habits

Behavioral observations of piping plovers on the wintering grounds suggest that they spend the majority of their time foraging (Nicholls and Baldassarre 1990a; Drake 1999a, 1999b). Plovers forage on moist substrate features such as intertidal portions of ocean beaches, washover areas, mudflats, sand flats, algal flats, shoals, wrack lines, sparse vegetation, and shorelines of coastal ponds, lagoons, and ephemeral pools, and adjacent salt marshes (Gibbs 1986; Zivojnovich and Baldassarre 1987; Nicholls 1989; Coutu et al. 1990; Nicholls and Baldassarre 1990a; Nicholls and Baldassarre 1990b; Hoopes 1993; Loegering 1992; Goldin 1993; Elias-Gerken 1994; Wilkinson and Spinks 1994; Zonick 1997; Service 2001a). Studies have shown that the relative importance of various feeding habitat types may vary by site (Gibbs 1986; Coutu et al. 1990; McConnaughey et al. 1990; Loegering 1992; Goldin 1993; Hoopes 1993). Feeding activities may occur during all hours of the day and night (Staine and Burger 1994; Zonick 1997), and at all stages in the tidal cycle (Goldin 1993; Hoopes 1993). Wintering plovers primarily feed on invertebrates such as polychaete marine worms, various crustaceans, fly larvae, beetles, and occasionally bivalve mollusks found on top of the soil or just beneath the surface (Bent 1929; Cairns 1977; Nicholls 1989; Zonick and Ryan 1996).

As observed in Texas studies, Lott et al. (2009) identified bay beaches (bay shorelines as opposed to ocean-facing beaches) as the most common landform used by foraging piping plovers in southwest Florida. However in northwest Florida, Smith (2007) reported landform use by foraging piping plovers about equally divided between Gulf of Mexico (ocean-facing) and bay beaches. Exposed intertidal areas were the dominant foraging substrate in South Carolina (accounting for 94 percent of observed foraging piping plovers; Maddock et al. 2009) and in northwest Florida (96 percent of foraging observations; Smith 2007). In southwest Florida, Lott et al. (2009) found approximately 75 percent of foraging piping plovers on intertidal substrates.

Home Range

Plovers seem to exhibit strong site fidelity to nonbreeding areas. Plovers vary their habitat use, and it is suggested heterogeneous habitats may be more important than specific habitat features for plovers (Drake et al. 2001; Nicholls and Baldassarre 1990b). Mean home range size (95 percent of locations) for 49 radio-tagged piping plovers in southern Texas in 1997 through 1998 was 3,113 acres, mean core area (50 percent of locations) was 717 acres, and the mean linear distance moved between successive locations (1.97 $\pm$ 0.04 days apart) averaged across seasons, was 2.1 miles (Drake 1999a; Drake et al. 2001). Seven radio-tagged piping plovers used a 4,967-acre area (100 percent minimum convex polygon) at Oregon Inlet in 2005 and 2006, and piping plover activity was concentrated in 12 areas totaling 544 acres (Cohen et al. 2008). Noel and Chandler (2008) observed high fidelity of banded piping plovers along a 0.62 and 2.8 mile section of beach on Little St. Simons Island, Georgia.

Life Cycle

Piping plovers spend up to 10 months of their life cycle on their migration and at wintering grounds, generally July 15 through as late as May 15. Piping plover migration routes and habitats overlap breeding and wintering habitats, and, unless banded, migrants passing through a site usually are indistinguishable from breeding or wintering piping plovers. Migration stopovers by banded piping plovers from the Great Lakes have been documented in New Jersey, Maryland, Virginia, and North Carolina (Stucker and Cuthbert 2006). Migrating breeders from eastern Canada have been observed in Massachusetts, New Jersey, New York, and North Carolina (Amirault et al. 2005). As many as 85 staging piping plovers have been tallied at various sites in the Atlantic breeding range (Perkins 2008), but the composition (*e.g.*, adults that nested nearby and their fledged young of the year versus migrants moving to or from sites farther north), stopover duration, and local movements are unknown. In general, distance between stopover locations and duration of stopovers throughout the coastal migration range remains poorly understood.

Predators and Competitors

Plovers face predation by avian and mammalian predators that are present year-round on the wintering grounds. There are minimal studies on the impacts of predation on migrating or wintering piping plovers, and investigations into effects of predation on nonbreeding piping plovers falls under the Great Lakes recovery plan. Predator control on their wintering and migration grounds is considered to be a low priority at this time, except for the threat of disturbance to roosting and feeding piping plovers posed by dogs off leash (Service 2009). Plovers must compete with other shorebirds for suitable foraging and roosting habitat.

Disease Factors

Neither the final listing rule nor the recovery plans state that disease is an issue for the species, and no plan assigns recovery actions to this threat factor. The Piping Plover 5-Year Review: Summary and Evaluation provides additional information on the limited concern of avian influenza and West Nile virus on the species (Service 2009).

Roosting

Several studies identified wrack (organic material including seaweed, seashells, driftwood, and other materials deposited on beaches by tidal action) as an important component of roosting habitat for nonbreeding piping plovers. Lott et al. (2009) found greater than 90 percent of roosting piping plovers in southwest Florida in old wrack with the remainder roosting on dry sand. In South Carolina, 18 and 45 percent of roosting piping plovers were in fresh and old wrack, respectively. The remainder of roosting birds used intertidal habitat (22 percent), backshore (defined as the zone of dry sand, shell, cobble and beach debris from the mean high water line up to the toe of the dune; 8 percent), washover (2 percent), and ephemeral pools (1 percent) (Maddock et al. 2009). Thirty percent of roosting piping plovers in northwest Florida were observed in wrack substrates with 49 percent on dry sand and 20 percent using intertidal habitat (Smith 2007). In Texas, seagrass debris (bayshore wrack) was an important feature of piping plover roosting sites (Drake 1999a). Mean abundance of two other plover species in California, including the listed western snowy plover, was positively correlated with an abundance of wrack during the nonbreeding season (Dugan et al. 2003).

Seven years of surveys, two to three times per month, along 8 miles of Gulf of Mexico (ocean-facing) beach in Gulf County, Florida, cumulatively documented nearly the entire area used at various times by roosting or foraging piping plovers. Birds were reported using the midbeach to the intertidal zone. Numbers ranged from 0 to 39 birds on any given survey day (Eells unpublished data).

Atlantic Coast and Florida studies highlighted the importance of inlets for nonbreeding piping plovers. Almost 90 percent of roosting piping plovers at ten coastal sites in southwest Florida were on inlet shorelines (Lott et al. 2009). Piping plovers were among seven shorebird species found more often than expected ($p = 0.0004$; Wilcoxon Test Scores) at inlet locations versus noninlet locations in an evaluation of 361 International Shorebird Survey sites from North Carolina to Florida (Harrington 2008).

Population dynamics

Population Size

The International Piping Plover Breeding Census is conducted throughout the breeding grounds every 5 years by the Great Lakes/Northern Great Plains Recovery Team of the U.S. Geological Survey (USGS). The census is the largest known, complete avian species census, and is coordinated by Elise Elliott Smith and various state and provincial coordinators. It is designed to determine species abundance and distribution throughout its annual cycle. The last survey in 2006 documented 3,497 breeding pairs, with a total of 8,065 birds throughout Canada and the U.S. A more recent 2010 Atlantic Coast breeding piping plover population estimate was 1,782 pairs, which was more than double the 1986 estimate of 790 pairs. This was determined to be a net increase of 86 percent between 1989 and 2010 (Service 2011). An associated winter census documented a total of 454 piping plovers in Florida (Elliott-Smith et al. 2009). For the Gulf Coast of Florida, the surveys documented 321 piping plovers at 117 sites covering approximately 522 miles of suitable habitat (Elliott-Smith et al 2009). A total of 133 plovers were observed along the Atlantic Coast during the 2009 survey, and Northwest Florida numbers for the 2006 International Piping Plover Census were 111, with an increased survey effort from previous years. This represents an increase from the 53 piping plovers sighted in the 2001 effort. More information on the results of past International Piping Plover Censuses and an analysis of the data is found in the 2009 Service's Piping Plover 5-Year Review: Summary and Evaluation (Service 2009) and in the report published by the USGS (Elliott-Smith et al. 2009). In addition, bird populations throughout Florida are monitored by volunteers and The Conservancy of Southwest Florida. Launched in 2002 by the Cornell Lab of Ornithology and National Audubon Society, eBird provides data concerning bird abundance and distribution at a variety of spatial and temporal scales. eBird is sponsored in part by several Service programs, research groups, non-government offices, and the University of the Virgin Islands. From January through November 2012, 703 reports of piping plovers were documented in the Action Area by eBird members. Although multiple observations of the same bird may have been documented, these reports included observations totaling 3,466 individuals; 240 reports with observations of 752 individuals located in the NFESO AOR, and 337 reports with observations of 2,032 individuals located in the SFESO AOR.

Population Variability

The pattern of population growth among the recovery units along the Atlantic Coast was uneven, and was accompanied by periodic declines in both overall and regional populations (Service 2011). Although there is some indication of recovery in the Atlantic Coast population, any optimism should be tempered by observed geographic and temporal variability in population growth.

Population Stability

The most consistent finding in the various population viability analyses conducted for piping plovers (Ryan et al. 1993; Melvin and Gibbs 1996; Plissner and Haig 2000; Wemmer et al. 2001; Larson et al. 2002; Amirault et al. 2005; Calvert et al. 2006; Brault 2007) indicates even small declines in adult and juvenile survival rates will cause increases in extinction risk. A banding study conducted between 1998 and 2004 in Atlantic Canada concluded lower return rates of juvenile (first year) birds to the breeding grounds than was documented for Massachusetts (Melvin and Gibbs 1996), Maryland (Loegering 1992), and Virginia (Cross 1996) breeding populations in the mid-1980s and very early 1990s. This is consistent with failure of the Atlantic Canada population to increase in abundance despite high productivity (relative to other breeding populations) and extremely low rates of dispersal to the U.S. over the last 15 plus years (Amirault et al. 2005). This suggests maximizing productivity does not ensure population increases. However, other studies suggest that survivability is good at wintering sites (Drake et al. 2001). Please see the Piping Plover 5-Year Review: Summary and Evaluation for additional information on survival rates at wintering habitats (Service 2009).

Status and distribution

Reasons for Listing

The 1985 final rule stated the number of piping plovers on the Gulf of Mexico coastal wintering grounds might be declining as indicated by preliminary analysis of the Christmas Bird Count data. Independent counts of piping plovers on the Alabama coast indicated a decline in numbers between the 1950s and early 1980s. At the time of listing, the Texas Parks and Wildlife Department stated 30 percent of wintering habitat in Texas had been lost over the previous 20 years. The final rule also stated, in addition to extensive breeding area problems, the loss and modification of wintering habitat was a significant threat to the piping plover.

Threats to Piping Plovers

The Piping Plover 5-Year Review: Summary and Evaluation (Service 2009) provides an analysis of threats to piping plovers in their migration and wintering range. The threats identified in this document that were of primary concern included the loss and modification of wintering habitat (including shoreline development, beach maintenance and nourishment, inlet dredging, and the construction of jetties and groins).

The Piping Plover 5-Year Review: Summary and Evaluation noted that overutilization for commercial, recreational, scientific, or educational purposes was not a current threat to piping plovers on their wintering and migration grounds. Disease was identified as being only a minor threat. The impacts of predation on nonbreeding populations are largely undocumented, but they remain a potential threat. However, the Service considers predator control on piping plover wintering and migration grounds to be a low priority at this time (Service 2009).

Neither the final listing rule nor the recovery plans state disease is an issue for piping plover, and no plan assigns recovery actions to this threat factor. Based on information available to date, West Nile virus and avian influenza are a minor threat to piping plovers (Service 2009).

Habitat loss and degradation on winter and migration grounds from shoreline and inlet stabilization efforts, both within and outside of designated Critical Habitat, remains a serious threat to all piping plover populations. In some areas, beaches that abut private property are needed by wintering and migrating piping plovers. However, residential and commercial developments that typically occur along private beaches may pose significant challenges for efforts to maintain natural coastal processes. The threat of habitat loss and degradation, combined with the threat of sea-level rise associated with climate change, raise serious concerns regarding the ability of private beaches to support piping plovers over the long term.

Future actions taken on private beaches will determine whether piping plovers continue to use these beaches or whether the recovery of piping plovers will principally depend on public property. As Lott et al. (2009) concludes, “The combination of development and shoreline protection seems to limit distribution of non-breeding piping plovers in Florida. If mitigation or habitat restoration efforts on barrier islands fronting private property are not sufficient to allow plover use of some of these areas, the burden for plover conservation will fall almost entirely on public land managers.”

While public lands may not be at risk of habitat loss from private development, significant threats to piping plover habitat remain on many municipal, State, and federally owned properties. These public lands may be managed with competing missions that include conservation of imperiled species, but this goal frequently ranks below providing recreational enjoyment to the public, readiness training for the military, or energy development projects.

Public lands remain the primary places where natural coastal dynamics are allowed. Of recent concern are requests to undertake beach nourishment actions to protect coastal roads or military infrastructure on public lands. If project design does not minimize impediments to shoreline overwash which are necessary to help replenish bayside tidal flat sediments and elevations, significant bayside habitat may become vegetated or inundated, thereby exacerbating the loss of preferred piping plover habitat. Conversely, if beach fill on public lands is applied in a way that allows for “normal” system overwash processes, and sediment is added back to the system, projects may be less injurious to barrier island species that depend on natural coastal dynamics.

Maintaining wrack for food and cover in areas used by piping plovers may help offset effects that result from habitat degradation due to sand placement associated with berm and beach nourishment projects and ensuing human disturbance. Leaving wrack on private beaches may improve use by piping plovers, especially during migration when habitat fragmentation may have a greater effect on the species. In addition, using recreation management techniques, Great Lakes recovery action 2.14 may minimize the effects of habitat loss. Addressing off-road vehicles and pet disturbance may increase the suitability of existing piping plover habitat.

The dredging and mining of sediment from inlet complexes threatens the piping plover on its wintering grounds through habitat loss and degradation. The maintenance of deep draft navigation channels by dredging can alter the natural coastal processes on inlet shorelines of nearby barrier islands (Service 2012). Forty-four percent of the tidal inlets within the U.S. wintering range of the piping plover have been or continue to be dredged, primarily for navigational purposes. The dredging of navigation channels or relocation of inlet channels for erosion-control purposes contributes to the cumulative effects of inlet habitat modification by removing or redistributing the local and regional sediment supply. Dredging can occur on an annual basis or every 2 to 3 years, resulting in continual perturbations and modifications to inlets and their adjacent shoreline habitats (Service 2012).

As sand sources for beach nourishment projects have become more limited, ebb tidal shoals are being utilized as borrow areas more frequently. Exposed ebb and flood tidal shoals and sandbars are prime roosting and foraging habitats for piping plovers. In general, these shoals are only accessible by boat and tend to receive less human recreational use than nearby mainland beaches. This mining of material from inlet shoals for use as beach fill is not equivalent to the natural sediment bypassing due to the virtually instantaneous movement of sand. In a natural system, the sand would gradually and continuously move through the inlet system, providing a greater opportunity for emergent shoals to form (Service 2012).

The Deepwater Horizon oil spill, which started April 20, 2010, discharged into the Gulf of Mexico through July 15, 2010. According to government estimates, the leak released between 100 and 200 million gallons of oil into the Gulf. The U.S. Coast Guard estimates that more than 50 million gallons of oil have been removed from the Gulf, or roughly a quarter of the spill amount. Additional effects to natural resources may be attributed to the 1.84 million gallons of dispersant applied to the spill. As of July 2010, approximately 625 miles of Gulf Coast shoreline was oiled (approximately 360 miles in Louisiana, 105 miles in Mississippi, 66 miles in Alabama and 94 miles in Florida) (Joint Information Center 2010). These numbers reflect a daily snapshot of shoreline that experienced effects from oil; however, they do not include cumulative effects to date, or shoreline that has already been cleaned.

Piping plovers have continued to winter within the Gulf of Mexico shorelines. Researchers have and continue to document oiled piping plovers stemming from this spill. Oiling of designated piping plover Critical Habitat has been documented. Affects to the species and its habitat are expected, but their extent remains difficult to predict. The U.S. Coast Guard, the states, and responsible parties from the Unified Command, with advice from Federal and State natural resource agencies, initiated protective and cleanup efforts per prepared contingency plans to deal with petroleum and other hazardous chemical spills for each state’s coastline. The contingency plans identify sensitive habitats, including all federally listed species’ habitats, which receive a higher priority for response actions. Those plans allow for immediate habitat protective measures for cleanup activities in response to large contaminant spills. While such plans usually ameliorate the threat to piping plovers, it is yet unknown how much improvement will result in this case given the breadth of the effects associated with the Deepwater Horizon incident.

Based on all available data prior to the Deepwater Horizon oil spill, the risk of effects from contamination to piping plovers and their habitat was recognized, but the safety contingency plans were considered adequate to alleviate most of these concerns. The Deepwater Horizon incident has brought heightened awareness of the intensity and extent of impacts to fish and wildlife habitat from large-scale releases. In addition to potential direct habitat degradation from oiling of intertidal habitats and retraction of stranded boom, effects to piping plovers may occur from the increased human presence associated with boom deployment and retraction, cleanup activities, wildlife response, and damage assessment crews working along shorelines. Research studies are documenting the potential expanse of effects to the piping plover.

Analysis of the species/Critical Habitat likely to be affected

The proposed action has the potential to adversely affect wintering and migrating piping plovers and their habitat from all three breeding populations that may use the Action Area. The Atlantic Coast and Great Plains breeding populations of piping plover are listed as threatened, while the Great Lakes breeding population is listed as endangered. Therefore, this P^3BO considers the potential effects of this project on this species and its designated Critical Habitat.

The July 10, 2001, FR notice designated approximately 27,328 acres (corresponding to approximately 47 miles of beach) as Critical Habitat for wintering piping plovers in peninsular Florida. There are no Corps civil works shore protection projects located in designated Critical Habitat. There are five Corps civil works navigation projects that typically place dredged material in Critical Habitat Units: King’s Bay (Unit FL-36), Ponce Inlet (Unit FL-34), St. Lucie Inlet (Unit FL-33), Matanzas Pass (Unit FL-25), and Tampa Harbor (Unit FL-21). Maintenance dredging at these navigational channels typically occurs on 1 to 5 year intervals. These five units account for 1,749 acres (10 miles) of the 23,709 acres of total designated Critical Habitat in the Action Area (or 7.4 percent). These and other Critical Habitat Units may also be affected by non-Civil Works projects under Corps regulatory authority.

This P^3BO does not rely on the regulatory definition of “destruction or adverse modification” of Critical Habitat at 50 C.F.R. 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to Critical Habitat.

ENVIRONMENTAL BASELINE

Status of the species/Critical Habitat within the Action Area

As mentioned in Section II(C)1, the 2006 International Piping Plover Census surveys documented 321 wintering piping plovers at 117 sites covering approximately 522 miles of suitable habitat along the Gulf Coast of Florida, and an additional 133 plovers along the Atlantic Coast (Elliott-Smith et al 2009). In addition, bird populations throughout Florida are monitored by volunteers and The Conservancy of Southwest Florida. Launched in 2002, by the Cornell Lab of Ornithology and National Audubon Society, eBird provides data concerning bird abundance and distribution at a variety of spatial and temporal scales. eBird is sponsored in part by several

Service programs, research groups, non-government offices, and the University of the Virgin Islands. From January through November 2012, 703 reports of piping plovers were documented in the Action Area by eBird members. These reports included observations totaling 3,466 individuals; 240 reports with observations of 752 individuals located in the NFESO AOR, and 337 reports with observations of 2,032 individuals located in the SFESO AOR. It is important to note many of these observations may be multiple observations of the same specimen; therefore, these numbers do not represent a population estimate.

The Action Area encompasses 11 Critical Habitat Units in the NFESO's AOR (Figure 1), and an additional 11 Critical Habitat Units in the SFESO's AOR (Figure 2). The descriptions of the Critical Habitat Units associated with the proposed action vary, but generally include land from mean lower low water to where densely vegetated habitat or developed structures, not used by piping plovers, begin and where the PCEs no longer occur. The PCEs consist of intertidal flats including sand or mud flats with no or very sparse emergent vegetation. In addition, adjacent unvegetated or sparely vegetated sand, mud, or algal flats above high tide are important.

Factors affecting the species environment within the Action Area

Coastal development

Shoreline development throughout the wintering range poses a threat to all populations of piping plovers. Beach maintenance and nourishment, inlet dredging, and artificial structures, such as jetties and groins, can eliminate wintering areas and alter sedimentation patterns leading to the loss of nearby habitat. Structural development along the shoreline or manipulation of natural inlets upsets the dynamic processes and results in habitat loss or degradation (Melvin et al. 1991). Increased coastal development brings other recreational disturbances that are known to prevent bird usage of an area, including human disturbance, predation or disturbance by domestic animals, beach raking and cleaning, and habitat degradation by off-road vehicles (Service 2009).

Recreational management techniques, such as vehicle restrictions, pet restrictions, and symbolic fencing (usually sign posts and string) of roosting and feeding habitats, can help to address anthropogenic disturbances to wintering plovers. Educational materials, such as informational signs or brochures, can also provide valuable information to assist the public in understanding the need for conservation measures. Although these measures can be effective, they are not implemented consistently throughout the State.

Accelerated sea-level rise

Potential effects of sea-level rise on coastal beaches vary regionally due to subsidence or uplift as well as the geological character of the coast and nearshore (Service 2009). Low elevations and proximity to the coast make all nonbreeding coastal piping plover foraging and roosting habitats vulnerable to the effects of rising sea-level. Furthermore, areas with small astronomical tidal ranges (*e.g.*, portions of the Gulf Coast where intertidal range is less than 3.3 feet) are the most vulnerable to loss of intertidal wetlands and flats induced by sea-level rise (EPA 2009).

Inundation of piping plover habitat by rising seas could lead to permanent loss of habitat that lies immediately seaward of numerous structures or roads, especially if those shorelines are also armored with hardened structures. Without development or armoring, low undeveloped islands can migrate toward the mainland, pushed by the overwashing of sand eroding from the seaward side and being re-deposited in the bay (Scavia et al. 2002). Overwash and sand migration are impeded on developed portions of islands. Instead, as sea-level increases, the ocean-facing beach erodes and the resulting sand is deposited offshore. The buildings and the sand dunes then prevent sand from washing back toward the lagoons, and the lagoon side becomes increasingly submerged during extreme high tides (Scavia et al. 2002), diminishing both barrier beach shorebird habitat and protection for mainland developments.

A number of groups have met to discuss climate change and its potential impacts to Florida. In 2007, Governor Charlie Crist hosted "Serve to Preserve: A Florida Summit on Global Climate Change." To combat climate change, this summit focused on methods for reducing emissions to avoid contributing to climate change. It did not address efforts to limit coastal development or to encourage more natural coastal processes. Based on the present level of available information concerning the effects of global climate change on the status of the piping plover and its designated Critical Habitat, the Service acknowledges the potential for changes to occur in the Action Area.

Sand placement activities

Sand placement projects have the potential to alter piping plover habitat, including the PCEs of Critical Habitat. Beach nourishment can create a beach seaward of existing hard stabilization or heavy development, where the beach has been lost due to erosion and/or sea-level rise, restoring associated ecosystem functions. Although dredge and fill projects that place sand on beaches or dunes may restore lost or degraded habitat, these projects may degrade habitat by altering the natural sediment composition and depressing the invertebrate base in some areas. This hinders habitat migration with sea-level rise, and replaces the natural dune beach nearshore system with artificial geomorphology (Service 2012). Lott et al. (2009) found a strong negative correlation between sand placement projects and the presence of plovers on the Gulf Coast of Florida; however, he noted that additional research was needed to clarify whether the cause was the sand placement project or the tendency for these projects to be located on highly developed shorelines. Harrington (2008) noted the need for a better understanding of the potential effects of inlet-related projects, such as jetties, on bird habitats.

In areas where the shoreline is highly eroded, sand placement activities can improve piping plover foraging and roosting habitat (National Research Council 1995). Sand placement activities add sand to the sediment budget, increasing the beach width and providing a sand source for emergent nearshore features to form. Although there is some research related to the management of beach nourishment projects to better maintain the habitat for piping plovers, much of this research is focused on beaches in the northern U.S. where breeding occurs (Melvin et al. 1991; Houghton 2005; Maslo et al. 2010). In their wintering grounds, increasing beach width is an important aspect of beach nourishment projects in highly developed, eroding areas. The timing of the project is also important in preventing impacts to piping plovers as a result of sand placement activities.

EFFECTS OF THE ACTION

This section is an analysis of the beneficial, direct, and indirect effects of the proposed actions on wintering piping plovers within the Action Area. The analysis includes effects of interrelated and interdependent 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 wintering piping plovers. Since piping plovers can be present on these beaches for up to 10 months per year, construction is likely to occur while the species is utilizing these beaches and associated habitats. Short-term and temporary impacts to piping plover activities could result from project work occurring on the beach that flushes birds from roosting or foraging habitat. Long-term impacts could include a hindrance in the ability of wintering plovers to recuperate from their migratory flight from their breeding grounds, survive on their wintering areas, or to build fat reserves in preparation for migration back to their breeding grounds. Long-term impacts may also result from changes in the physical characteristics of the beach from the placement of the sand.

Proximity of the action

Maintenance dredging of navigational inlets occurs throughout the state in both Federal and non-Federal channels. Sand placement activities (resulting from both shore protection projects and placement of dredged materials as a result of maintenance dredging activities) would occur within and adjacent to wintering piping plover foraging and roosting habitats. Groin and jetty repair or replacement would occur adjacent to inlets, or along beach habitats where they may be used to stabilize the beach and limit erosion.

Distribution

Sand placement activities that may impact piping plover roosting and foraging would occur along both the Gulf of Mexico and the Atlantic Ocean coasts. The Service expects the proposed construction activities could directly and indirectly affect the availability of habitat for migrating and wintering piping plovers to roost and forage. The proposed construction activities are also expected to cause piping plovers usage of Critical Habitat Units located within the Action Area to temporarily decrease.

Timing

The timing of maintenance dredging, sand placement, and groin/jetty repairs or replacement activities may occur during or outside of the migration and wintering period for piping plovers (July 15 to May 15). For projects occurring outside of the migration and wintering period, the Service expects indirect effects to occur later in time.

Nature of the effect

Although the Service expects direct short-term effects from disturbance during project construction, it is anticipated the action will also result in direct, and indirect, long term effects to piping plovers and Critical Habitat. The Service expects there may be morphological changes to piping plover habitat, including roosting and foraging habitat, and to Critical Habitat within the Action Area. Activities that affect or alter the use of optimal habitat, Critical Habitat, or increase disturbance to the species may decrease the survival and recovery potential of the piping plover. Effects to piping plovers and their habitat as a result of groin and jetty repair or replacement will primarily be due to construction ingress and egress when construction is required to be conducted from land. In addition, construction materials and equipment may need to be stockpiled on the beach. These effects would be more likely to be experienced with repair or replacement of groin structures that are located in shallower water, as the majority of work done to jetties is conducted from the water or from the crest of the structure (Martin 2013).

Duration

Time to complete the project construction varies depending on the project size, weather, and other factors (equipment mobilization and break downs, availability of fuel, lawsuits, etc.). According to Corps estimations, project work could take as little as 1 month and as long as 2 years. Piping plover habitats would remain disturbed until the project is completed and the habitats are restored. Beach restoration projects would typically be complete in 6 to 12 months. The direct effects would be expected to be short-term in duration, until the benthic community reestablishes within the new beach profile. Indirect effects from the activity, including those related to altered sand transport systems, may continue to occur as long as sand remains on the beach.

The effects of the proposed action are of a temporary quantitative and qualitative nature. The habitat will be temporarily unavailable to wintering plovers during the construction period, and the quality of the habitat will be reduced for several months following project activities. Dredging in inlets where emergent shoals have formed would result in a loss of optimal piping plover habitat, which may or may not reform in the same quality or quantity in the future. Dredging inlets, repairing and replacing groins or jetties, or sand placement during months when piping plovers are present causes disturbance that disrupts the birds' foraging efficiency and hinders their ability to build fat reserves over the winter and in preparation for migration, as well as their recuperation from migratory flights (Service 2009). The mean linear distance moved by wintering plovers from their core area is estimated to be approximately 2.1 miles (Drake et al.

2001), suggesting they could be negatively impacted by temporary disturbances anywhere in their core habitat area. The PCEs associated with designated Critical Habitat would be temporarily adversely affected during and following sand placement, but may also experience some positive benefits from the increase in available beach and its associated new wrack.

Disturbance frequency

The frequency of maintenance dredging activities varies greatly, and can be as often as annually or semiannually at some inlets that experience high rates of shoaling, or as infrequently as once every 7 years at inlets that do not experience high rates of shoaling. Sand placement activities as a result of shore protection activities typically occur once every 5 to 7 years. Dredging and sand placement can occur at any time during the year based on availability of funding, other applicable species' windows, and the availability of dredges to conduct the work.

The disturbance frequency related to groin and jetty repair and replacement varies greatly based on the original construction methodology, the construction materials, and the conditions under which the structure is placed. Most structures in Florida are constructed with Florida limerock or granite (preferred). Granite structures can last 50 years or more without requiring maintenance, while limerock structures may require maintenance on a slightly more frequent basis due to their lower densities. On average, hard structures are designed to require only minor repairs (such as replacing dislocated rock) that would only be expected approximately every 20 years (Martin 2013).

Disturbance severity

The Action Area encompasses a large percentage of the wintering range of the piping plover; however, the overall intensity of the disturbance is expected to be minimal. The intensity of the effect on piping plover habitat may vary depending on the frequency of the sand placement activities, the existence of staging areas, and the location of the beach access points. The severity is also likely to be slight, as plovers located within the Action Area are expected to move outside of the construction zone due to disturbance; therefore, no plovers are expected to be directly taken as a result of this action.

Analyses for effects of the action

The Action Area encompasses peninsular Florida within the AORs of the NFESO and the SFESO on both the Atlantic and Gulf coasts of Florida. It consists mostly of designated piping plover Critical Habitat Units and publicly owned land that exhibits the following features: located within 1 mile of an inlet; emergent nearshore sand bars; washover fans; emergent bayside and Ocean/Gulf-side shoals and sand bars; bayside mudflats, sand flats, and algal flats; or bayside shorelines of bays and lagoons.

Direct effects

Sand placement projects that utilize beach compatible material from either an appropriate borrow site or from the authorized Federal channel, have the potential to elevate the beach berm and widen the beach, providing storm protection and increasing recreational space. The construction window (*i.e.,* sand placement, dredging, groin and jetty repair/replacement) for each event is likely to extend through a portion of at least one piping plover migration and winter season. If material is placed on the beach, heavy machinery and equipment (*e.g.,* trucks and bulldozers operating on Action Area beaches, the placement of the dredge pipeline, and sand placement) may adversely affect migrating and wintering piping plovers in the Action Area by disturbing and disrupting normal activities such as roosting and feeding, and possibly forcing birds to expend valuable energy reserves to seek available habitat in adjacent areas along the shoreline. Sand placement may occur in and adjacent to habitat that appears suitable for roosting and foraging piping plovers, or that will become more optimal with time. Short-term and temporary construction effects to piping plovers will occur if the birds are roosting and feeding in the area during a migration stopover. The deposition of sand may temporarily deplete the intertidal food base along the shoreline and temporarily disturb roosting birds during project construction.

For some highly eroded beaches, sand placement will have a beneficial effect on the habitat's ability to support wintering piping plovers. Narrow beaches that do not support a productive wrack line may see an improvement in foraging habitat available to piping plovers following sand placement. The addition of sand to the sediment budget may also increase a sand-starved beach's likelihood of developing habitat features valued by piping plovers, including washover fans and emergent nearshore sand bars.

Maintenance dredging of shallow-draft inlets can occasionally require the removal of emergent shoals that may have formed at the location of the Federally-authorized channel from the migration of the channel over time. In these cases, the dredging activities would result in a complete take of that habitat. However, this take could be either temporary or more permanent in nature depending upon the location of future shoaling within the inlet.

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). 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). The proposed activities associated with this P^3BO only include the repair and replacement of existing groins and jetties. Since the primary effects associated with groins and jetties are associated with their alteration of sand movement, the effects would not change with the proposed action. Temporary adverse effects to the piping plover from disruption in the immediate vicinity of the project would occur during construction.

Indirect effects

Indirect effects are a result of a proposed action that occur later in time and are reasonably certain to occur. During sand placement, suffocation of invertebrate species will occur and degrade the suitability of the habitat for foraging. The effects to the benthic communities and the indirect effects to the piping plover will occur even if sand placement activities occur outside the piping plover migration and wintering seasons. Timeframes projected for benthic recruitment and re-establishment following sand placement are between 6 months and 2 years. Tilling to loosen compacted sand, sometimes required following beach nourishment to minimize effects to nesting sea turtles, may affect wrack that has accumulated on the beach. However, tilling is usually conducted above the wrack line. This may affect feeding and roosting habitat for piping plovers since they often use wrack for cover and foraging.

Natural, undeveloped barrier islands need storms and overwash to maintain the physical and biological environments they support (Young et al. 2006). Sand placement may limit washover fans from developing, which could accelerate the successional state of sand flats such that they will likely become vegetated within a few years (Leatherman 1988). This may reduce an area's value to foraging and roosting piping plovers. The piping plover's rapid response to habitats formed by washovers from the hurricanes in 2004 and 2005 in the Florida panhandle at Gulf Islands National Seashore and Eglin Air Force Base's Santa Rosa Island, and similar observations of their preferences for overwash habitats at Phipps Preserve and Lanark Reef in Franklin County, Florida, and elsewhere in their range, demonstrate the importance of these habitats for wintering and migrating piping plovers.

Restoration of beaches through sand placement may increase recreational pressures within the project area. Recreational activities, including increased pedestrian use, have the potential to adversely affect piping plovers through disturbance and through increased presence of predators, including both domestic animals and feral animals attracted by the presence of people and their trash. Long-term effects could include a decrease in piping plover use of habitat due to increased disturbance levels.

Pilkey and Dixon (1996) stated 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 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. Greater development may also support larger populations of mammalian predators, such as foxes and raccoons, than undeveloped areas. Optimal habitat for the piping plover often occurs on publicly owned lands where human development may be limited; however, development of roads, bridges, and recreational facilities may be subject to scenarios similar to those described above.

Species' response to the proposed action

The Service bases this P^3BO on anticipated direct and indirect effects to piping plovers (wintering and migrating) and their Critical Habitat as a result of dredging, sand placement on beaches, and groin and jetty repair/replacement, which may prevent the maintenance or formation of habitat that piping plovers consider optimal for foraging and roosting. Heavy machinery and equipment (*e.g.*, trucks and bulldozers operating on project area beaches, the placement of the dredge pipeline along the beach, and sand disposal) may adversely affect migrating and wintering piping plovers in the project area by disturbance and disruption of normal activities such as roosting and forging, and possibly forcing piping plovers to expend valuable energy reserves to seek available habitat elsewhere. In addition, foraging in suboptimal habitat by migrating and wintering piping plovers may reduce the fitness of individuals. Furthermore, increased and continual disturbance within optimal habitat, including Critical Habitat Units, could have effects on all three breeding populations of piping plovers.

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 Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

It is reasonably certain coastal development, human occupancy, and recreational use along the Atlantic and Gulf coasts of Florida will increase in the future. However, areas identified as optimal piping plover habitat are not as likely to be affected by coastal development and human occupancy, since they are primarily protected areas that are relatively undeveloped compared to other beaches in Florida. Optimal Piping Plover Areas may still experience heavy recreational use. It is unknown how much influence beach nourishment will contribute to the development and recreational use of the shoreline. Most activities affecting designated piping plover Critical Habitat would require Federal permits or funding. The Service is unable to identify any specific activities that would be considered cumulative effects.

CONCLUSION

There are 2,340 miles of sandy shoreline available (although not necessarily suitable) throughout the piping plover wintering range within the conterminous U.S. The primary effects of the proposed activities are to piping plover foraging and roosting habitat, and these effects are typically limited to the first year following project construction. Beach wrack and the benthic community are often reestablished between 6 months and 1 year following project construction.

In the long-term, sand placement activities will add sediment to the system that could otherwise be removed as part of inlet maintenance, and increase the availability of suitable habitat for the species.

After reviewing the current status of the northern Great Plains, Great Lakes, and Atlantic Coast wintering piping plover populations, the environmental baseline for Action Area, the effects of the proposed activities, the Conservation Measures proposed by the Corps, and the cumulative effects, it is the Service's biological opinion that implementation of these actions, as proposed, is not likely to jeopardize the continued existence of the piping plover.

In addition, after reviewing the current status of the affected species, the environmental baseline for the Action Area, the effects of the proposed activities, and the cumulative effects, it is the Service's biological opinion the action, as proposed, will not adversely modify designated critical habitat for the reason given below.

Although some Critical Habitat Units may be impacted by project activities, these would most frequently be units or portions of units that are highly eroded and where habitat for piping plovers has become degraded. In these instances, the adverse effects of project activities would be offset over time by beneficial effects associated with the restoration of beaches. In all cases, neither the negative nor the positive effects of beach nourishment are likely to be permanent due to the dynamic nature of shoreline processes. Project activities would not affect a Critical Habitat Unit to the extent that, over time, the unit would be unable to serve its intended purposes. Therefore, any loss of habitat would not have a significant effect on the species' persistence or on the function of these Critical Habitat Units as a whole.

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 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 nondiscretionary, and must be implemented by the Corps so they become binding conditions of any permit issued, 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, the protective coverage of section 7(o)(2) may lapse. In order to monitor the effects of incidental take, the Corps must report the progress of the action and its effects on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

It is difficult for the Service to estimate the exact number of piping plovers that could be migrating through or wintering within the Action Area at any one point in time and place during project construction. Disturbance to suitable habitat resulting from both dredging and sand placement activities within the Action Area would affect the ability of an undetermined number of piping plovers to find suitable foraging and roosting habitat during the migrating and wintering periods of any given year. Because the number of piping plovers that would be affected by projects cannot be determined, the Service will use the annual disturbance in shoreline miles as a surrogate for take.

The FDEP's Critically Eroded Beaches in Florida report identified 204.2 miles of critically eroded beaches on the Atlantic Coast of Florida, and an additional 102.3 miles of critically eroded beaches on the Gulf Coast of Florida in the Action Area (FDEP 2012). FDEP's definition of "critically eroded" requires upland development, recreation, wildlife habitat, or important cultural resources to be threatened. Due to the threat to upland interests, it is anticipated that beaches identified by FDEP to be critically eroding would be the most likely to be affected by the proposed action. Of the 204.2 miles of critically eroded beaches on the Atlantic Coast, approximately 49.4 miles are located on public lands primarily managed for conservation purposes; on the Gulf Coast, approximately 14.7 miles of the 102.3 miles of critically eroded beaches are located on public lands, for a total of 64.1 miles in the Action Area that are most likely to be affected. We acknowledge some additional public lands that are not defined as critically eroded and not included in the estimate above may also be affected. However, not all public lands have habitat elements that support migrating or wintering piping plover on a regular basis; therefore, some public lands included in the estimate above are not optimal piping plover habitat.

The July 10, 2001, FR notice designated approximately 27,328 acres, corresponding to approximately 47 miles of beach, as Critical Habitat for wintering piping plovers in peninsular Florida. Most designated Critical Habitat is publicly owned (see Appendix A) and the Critical Habitat most likely to be disturbed would fall under the critically eroded, publicly owned category, part of the estimated 64.1 miles of beach cited above.

An additional 15.0 miles of beach in six units are defined as optimal piping plover habitat, but not located on publically-owned lands or Critical Habitat Units. Over time, most or all of these areas may be subject to project-related disturbance. Therefore, the total shoreline (optimal piping plover habitat) estimated to be effected by the proposed action is 79.1 miles, rounded for our purposes to 80 miles. It is estimated approximately 10 percent or less of the total 80 miles of potentially affected optimal habitat would be impacted in any given year (or approximately 8 miles). In years following emergency events, the impacted area is expected to increase to approximately 25 percent or less of the total mileage, or 20 miles of shoreline. Over the past 10 years, two Congressional Orders occurred due to emergency events (2004-2005 hurricane season, and the 2012 hurricane season). The increased sand placement activities due to emergency events are anticipated to occur once in a 7-year period. This estimate is considered to be conservative, as many of the lands identified as optimal piping plover habitat are undeveloped. Since upland development is generally not threatened in these areas, the cost of placing sand on these shorelines is not justified.

Sand placement resulting from maintenance dredging projects is the most likely activity to affect these areas due to the preference to keep sand within the littoral system. It is expected the exact mileage of shoreline affected by the proposed action will vary from year to year. Maintenance dredging and sand placement activities may result in an unspecified number of piping plovers occupying these areas to be taken in the form of harm (*e.g.*, death, injury) and harassment as a result of this action.

EFFECT OF THE TAKE

In this P^3BO, the Service determined the proposed project is not likely to result in jeopardy to the piping plover.

REASONABLE AND PRUDENT MEASURES

The Service has determined the following Reasonable and Prudent Measures are necessary and appropriate to minimize take of the piping plover in the Action Area. 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 P^3BO; or

2. Initiate consultation with the Service for the specific project or activity.

The Service may respond by either of the following:

1. Allowing an exception to the Terms and Conditions under the P^3BO; or

2. Recommending or accepting initiation of consultation (if initiated by the Corps) for the specific project or activity.

The post construction survey requirements are described in Reasonable and Prudent Measure #5 and Term and Condition #8. These requirements are subject to congressional authorization and the allocation of funds. If the Corps or Applicant cannot fulfill these Reasonable and Prudent Measures, the Corps will notify the Service when initiating consultation for the project.

1. All sand placed on the beach or in the nearshore shall be compatible with the existing beach and will maintain the general character and functionality of the existing beach.

2. The Corps or the Applicant will notify the Service of the commencement of projects that utilize this P^{3}BO for the purposes of tracking incidental take of the species.

3. The Corps shall protect habitat features considered preferred by plovers outside of the project footprint in accordance with Terms and Conditions 3, 4, 5, and 6.

4. The Corps will facilitate awareness of piping plover habitat by educating the public on ways to minimize disruption to the species.

5. The Corps, the Applicant, or the local sponsor shall provide the mechanisms necessary to monitor impacts to piping plovers within the Action Area.

6. The Corps shall facilitate an annual meeting with the Service to assess the effectiveness of the protection and minimization measures outlined in this P^{3}BO.

TERMS AND CONDITIONS

1. 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.

2. The Corps or the Permittee must provide the following information to the Service Field Supervisor of the appropriate Field Office at least 10 business days prior to the commencement of work:

    a. Project location (include FDEP Range Monuments and latitude and longitude coordinates);
    b. Project description (include linear feet of beach, actual fill template, access points, and borrow areas);
    c. Date of commencement and anticipated duration of construction; and
    d. Names and qualifications of personnel involved in piping plover surveys.

3. Prior to construction, the Corps shall delineate preferred piping plover habitat (intertidal portions of ocean beaches, ephemeral pools, washover areas, wrack lines) adjacent to or outside of the project footprint that might be impacted by construction activities. Obvious identifiers shall be used (for example, pink flagging on metal poles) to clearly mark the beginning and end points to prevent accidental impacts to use areas.

4. Piping plover habitat delineated adjacent to or outside of the project footprint shall be avoided to the maximum extent practicable when staging equipment, establishing travel corridors, and aligning pipeline.

5. Driving on the beach for construction shall be limited to the minimum necessary within the designated travel corridor, which will be established just above or just below the primary "wrack" line.

6. 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 piping plovers. Workers shall be briefed on the importance of not littering and keeping the project area trash and debris free. See Appendix B for examples of suitable receptacles.

7. Educational signs shall be installed at public access points within the project area with emphasis on the importance of the beach habitat and wrack for piping plovers. When the project area has a pet or dog regulation, the provisions of the regulation shall be included on the educational signs.

8. For one full piping plover migration and winter season (beginning July 15 to May 15) prior to construction, and 2 years following each dredging and sand placement event, bi-monthly (twice-monthly) surveys for piping plovers shall be conducted in the beach fill and in any other intertidal or shoreline areas within or affected by the project. If a full season is not available, at least 5 consecutive months with three surveys per month spaced at least 9 days apart are required. During emergency projects, the surveys will begin as soon as possible prior to, and up to implementing the project. Piping plover identification, especially when in non-breeding plumage, can be difficult. If pre-construction monitoring is not practicable, it will be so indicated in the notification to the Service (see Term and Condition #2 above) and the Service will decide whether to require a separate individual consultation. See introductory paragraph to Reasonable and Prudent Measures earlier in this document.

9. The person(s) conducting the survey must demonstrate the qualifications and ability to identify shorebird species and be able to provide the information listed below.
The following will be collected, mapped, and reported:

a. Date, location, time of day, weather, and tide cycle when survey was conducted;
b. Latitude and longitude of observed piping plover locations (decimal degrees preferred);
c. Any color bands observed on piping plovers;
d. Behavior of piping plovers (*e.g.*, foraging, roosting, preening, bathing, flying, aggression, walking);
e. Landscape features(s) where piping plovers are located (*e.g.*, inlet spit, tidal creeks, shoals, lagoon shoreline);
f. Habitat features(s) used by piping plovers when observed (*e.g.*, intertidal, fresh wrack, old wrack, dune, mid-beach, vegetation);
g. Substrata used by piping plovers (*e.g.*, sand, mud/sand, mud, algal mat);
h. The amount and type of recreational use (*e.g.*, people, dogs on or off leash, vehicles, kite-boarders); and
i. All other shorebirds/waterbirds seen within the survey area.

All information shall be provided in an Excel spreadsheet. Monitoring results shall be submitted (datasheets, maps, database) on standard electronic media (*e.g.*, CD, DVD) to the appropriate Field Office by July 31 of each year in which monitoring is completed. If an appropriate web based reporting system becomes available, it would be used in lieu of hard copy/media.

[NOTE: As a condition to a permit from the FDEP, the bird monitor may also be required to report shorebird data to the Florida Fish and Wildlife Conservation Commission (FWC) https://public.myfwc.com/crossdoi/shorebirds/SigninExploreData.aspx.]

10. The Corps shall meet with the Service and the FWC (and BOEM as appropriate) annually to discuss the effectiveness of the avoidance measures and additional measures to include for future projects. The agencies will also review the projects utilizing this P^3BO the previous year to ensure that the reporting requirements for calculating the extent of take are adequate. This meeting will also explore:

    a. The possibility of using dredged materials to enhance potential or existing piping plover habitat within and adjacent to the project area;
    b. Methods for funding beneficial use opportunities for dredged materials that are not least-cost disposal to benefit piping plovers and their habitat;
    c. The development of shore protection design guidelines that can be utilized during future project planning to protect and/or enhance piping plover habitat; and
    d. Incorporating artificial lagoons or ephemeral pools into project designs adjacent to inlets where sand placement is proposed.

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. The Corps will facilitate a meeting between the Applicant or the local sponsor, the FWC, and the Service to discuss steps for the long-term protection of wrack within the project area; and

2. The Service encourages continued investigation into opportunities for increasing monitoring for Civil Works operations and maintenance projects.

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

The amount or extent of incidental take for piping plovers will be considered exceeded if sand is placed on more than 8 miles of optimal piping plover shoreline during a nonemergency year, and a maximum of 20 miles of optimal piping plover shoreline during or following an emergency event (declared disaster or Congressional Order) as a result of this programmatic action. If the anticipated level of incidental take is exceeded during the course of this action, 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.

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 10 years after the issuance of this P^3BO. In instances where the amount or extent of incidental take is exceeded, any operations causing such take shall cease pending reinitiation.

MIGRATORY BIRD TREATY ACT

Migratory Bird Treaty Act (MBTA) for all Projects:

Comply with the FWC's standard shorebird protection guidelines to protect against impacts to nesting shorebirds during implementation of these projects on the Gulf Coast during the periods from February 15-August 31 or on the Atlantic Coast from April 1- August 31. All sand placement events could impact nesting shorebirds protected under the MBTA.

***The MBTA implements various treaties and conventions between the U.S., Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the provisions of the MBTA it is unlawful by any means or manner to pursue, hunt, take, capture or kill any migratory bird except as permitted by regulations issued by the Service. The term "take" is not defined in the MBTA, but the Service has defined it by regulation to mean to pursue, hunt, shoot, wound, kill, trap, capture or collect any migratory bird, or any part, nest or egg or any migratory bird covered by the conventions or to attempt those activities.

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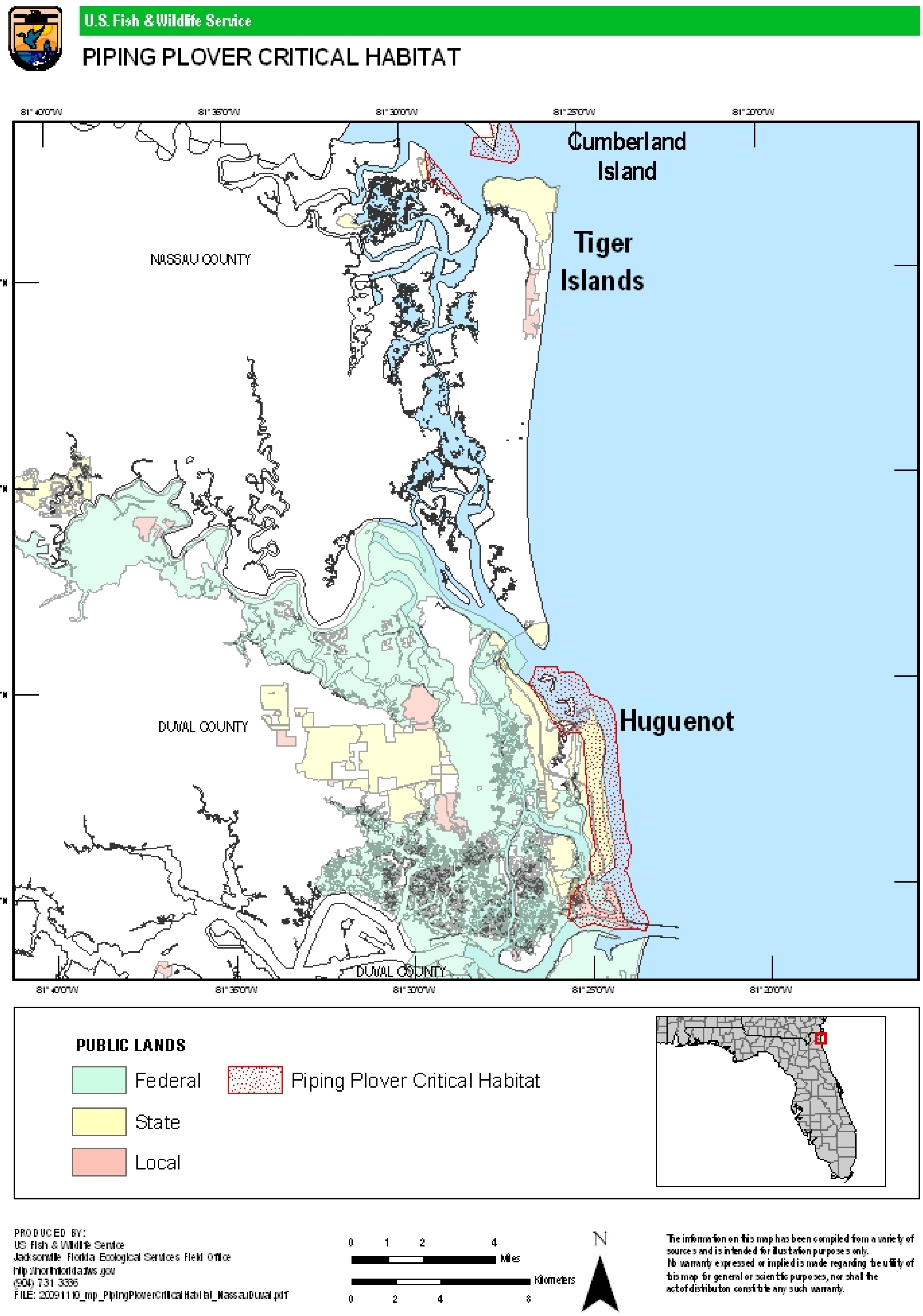
APPENDIX A: PIPING PLOVER CRITICAL HABITAT UNITS IN THE ACTION AREA



U.S. Fish & Wildlife Service
PIPING PLOVER CRITICAL HABITAT
Cumberland Island
Tiger Islands
NASSAU COUNTY
DUVAL COUNTY
Huguenot
PUBLIC LANDS
Federal
State
Local
Piping Plover Critical Habitat
PRODUCED BY:
US Fish & Wildlife Service
Jacksonville Florida Ecological Services Field Office
(904) 731 3336
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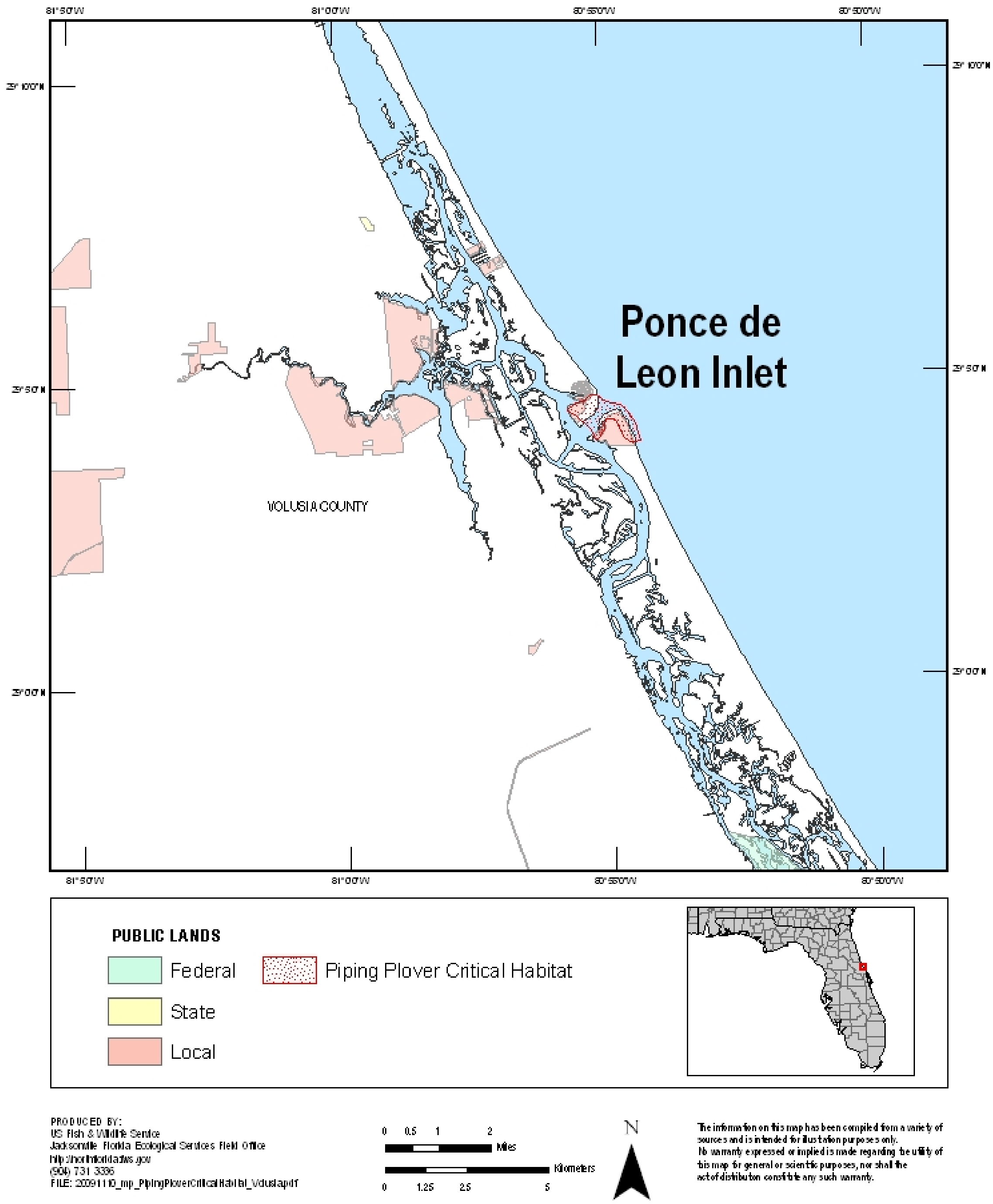
PIPING PLOVER CRITICAL HABITAT



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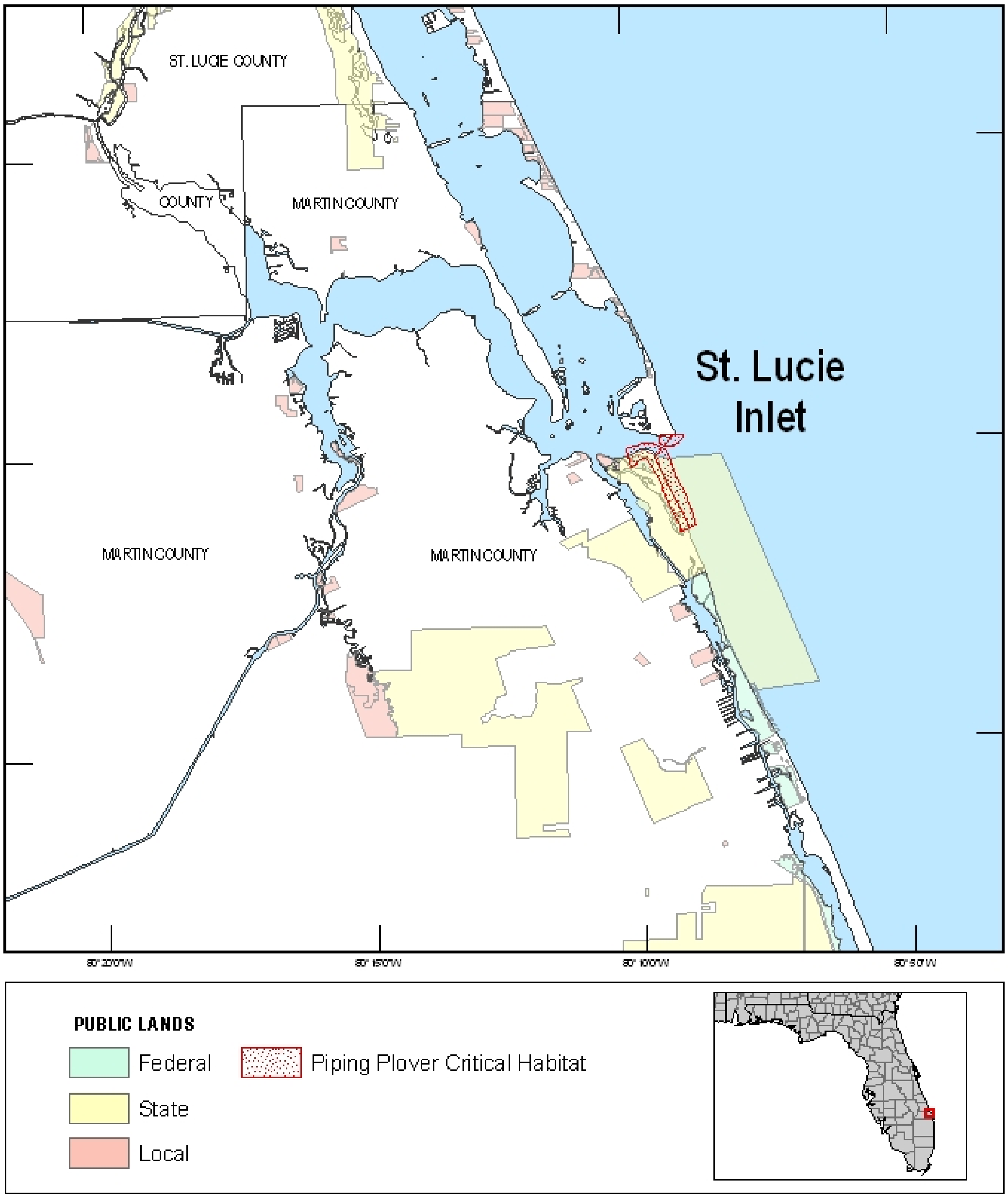
PIPING PLOVER CRITICAL HABITAT



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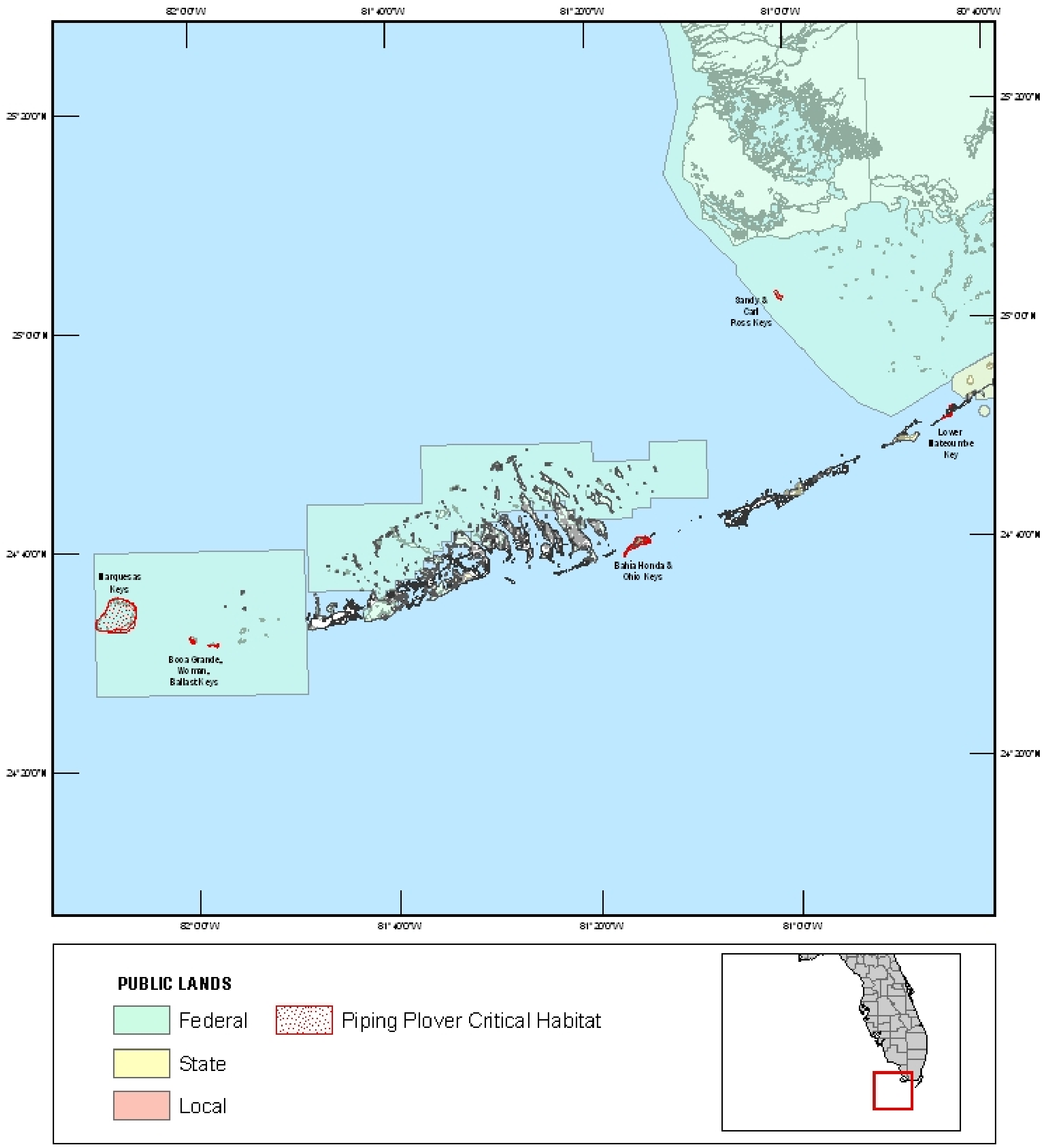
PIPING PLOVER CRITICAL HABITAT



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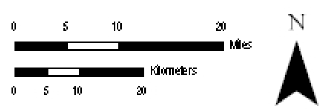

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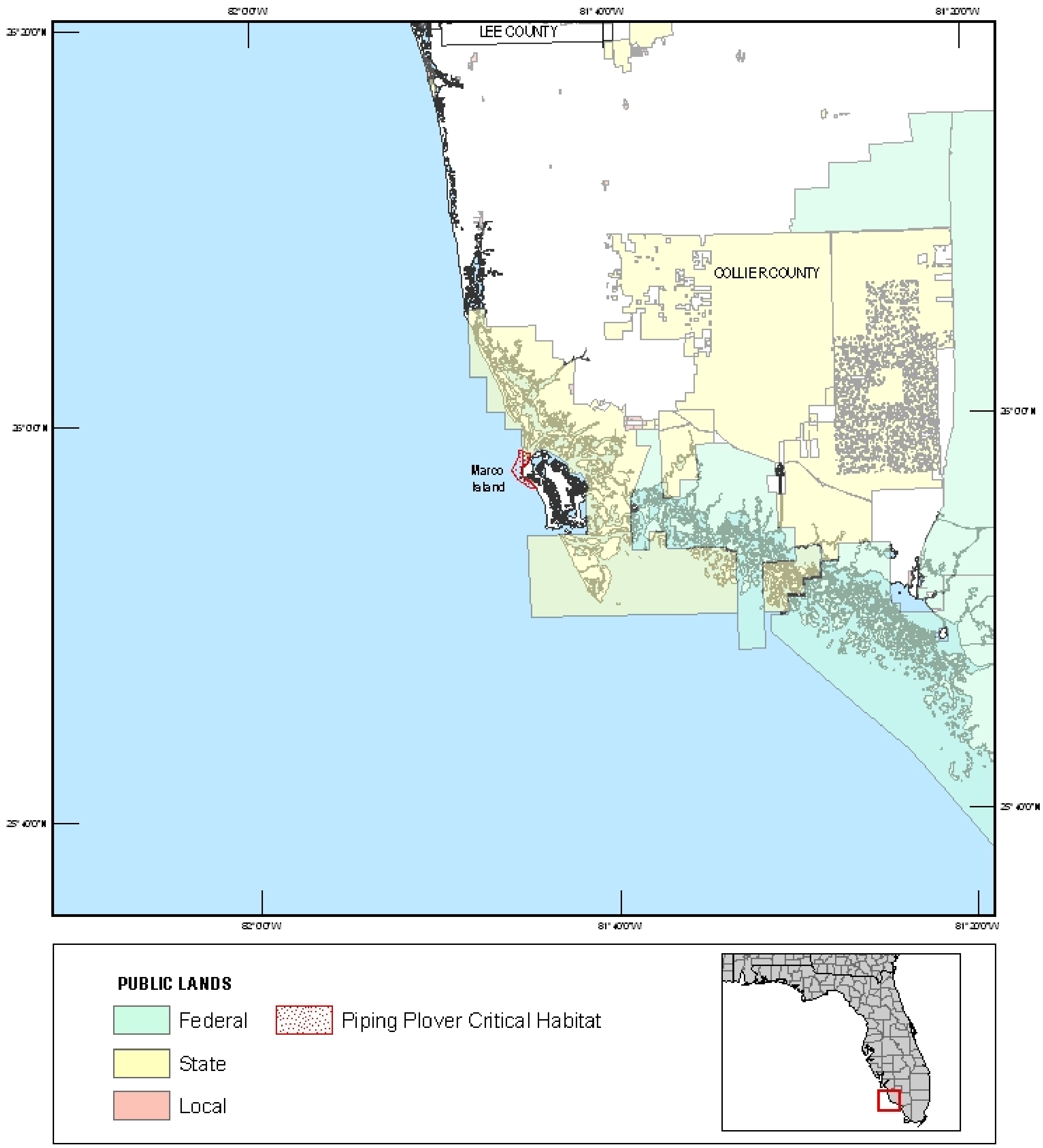

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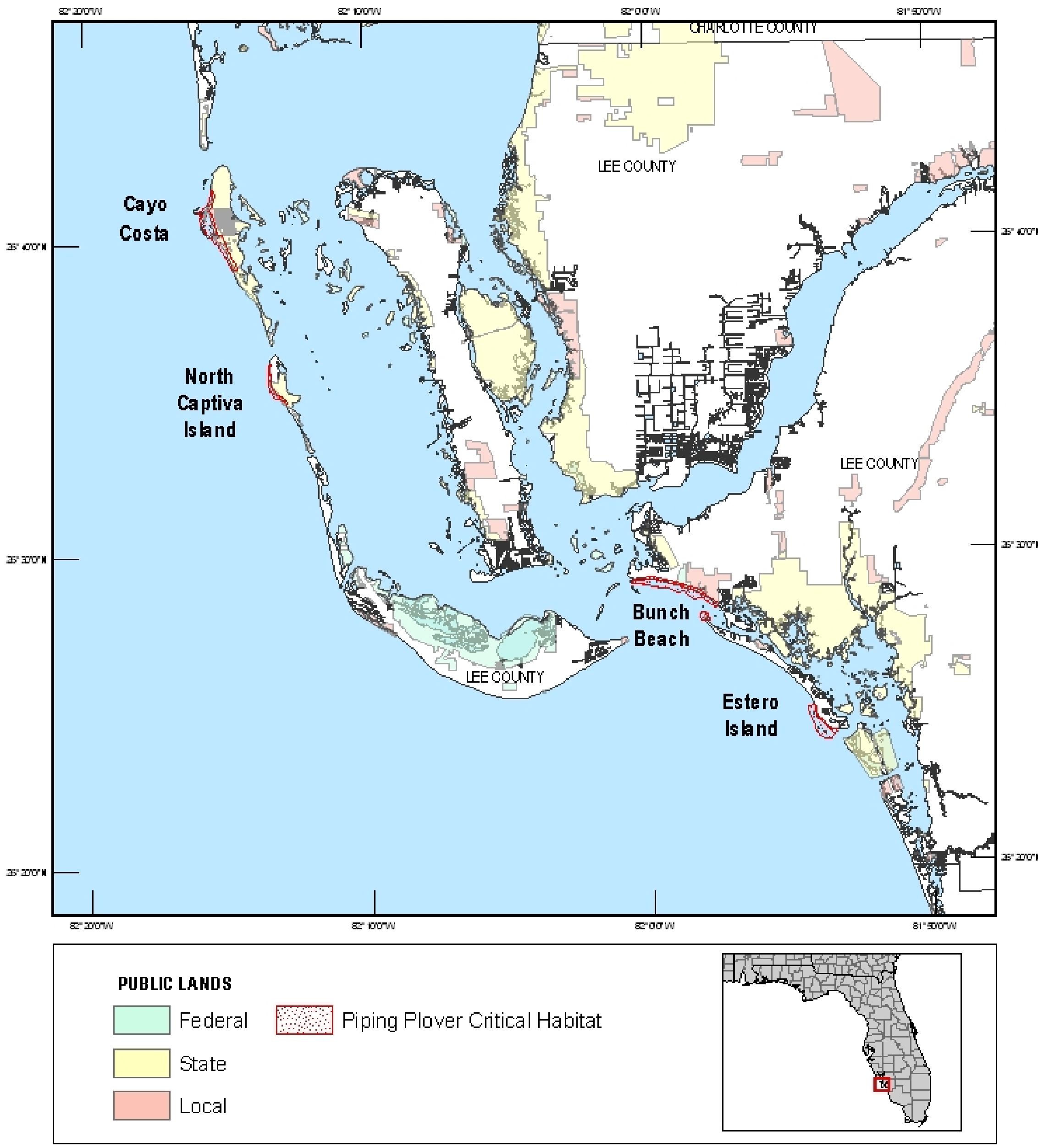
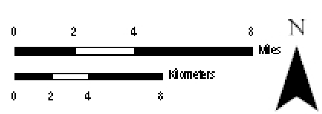
PIPING PLOVER CRITICAL HABITAT





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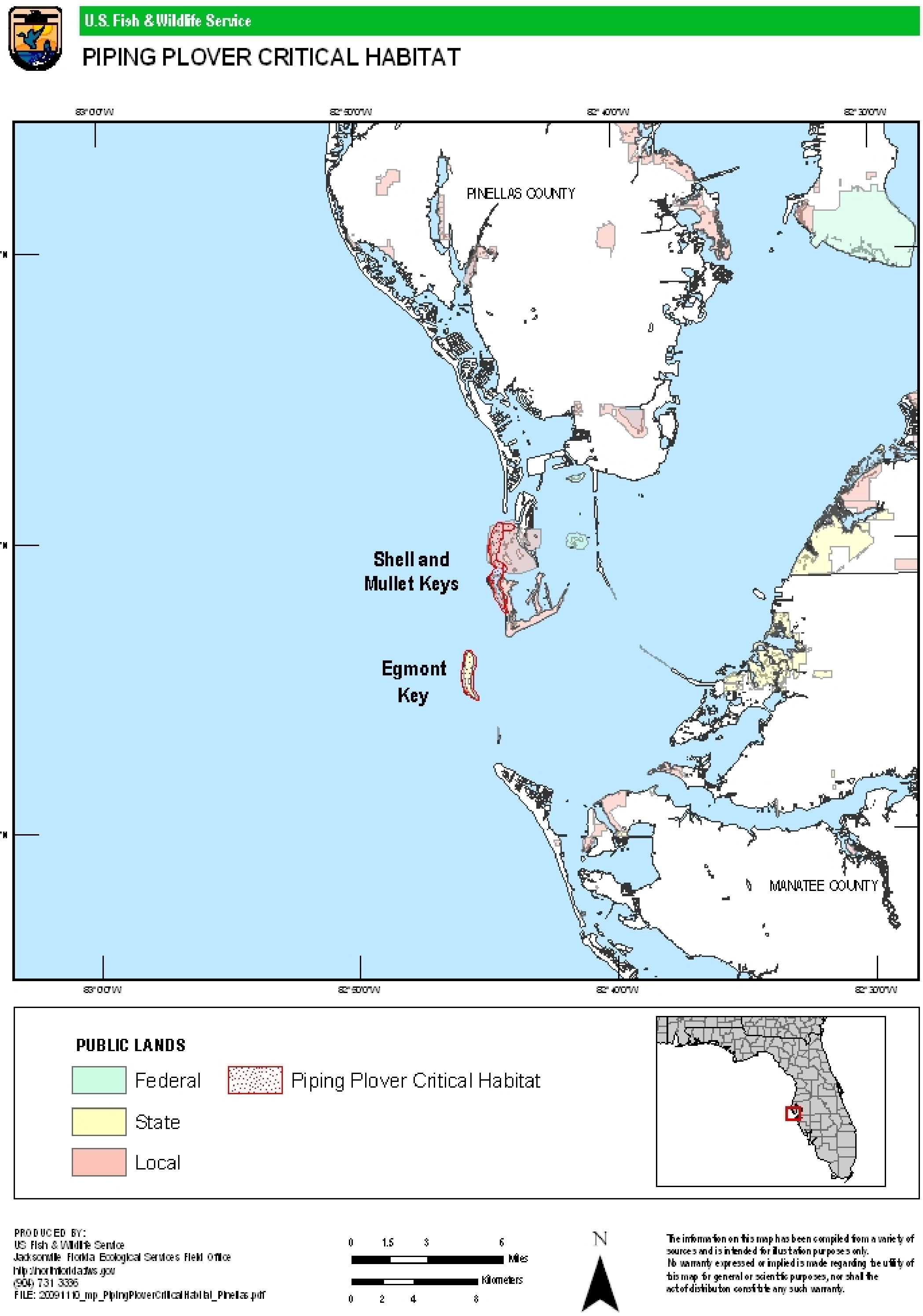
U.S. Fish & Wildlife Service
PIPING PLOVER CRITICAL HABITAT
PINELLAS COUNTY
Shell and Mullet Keys
Egmont Key
MANATEE COUNTY
PUBLIC LANDS
Federal
State
Local
Piping Plover Critical Habitat
PRODUCED BY:
US Fish & Wildlife Service
Jacksonville Florida Ecological Services Field Office
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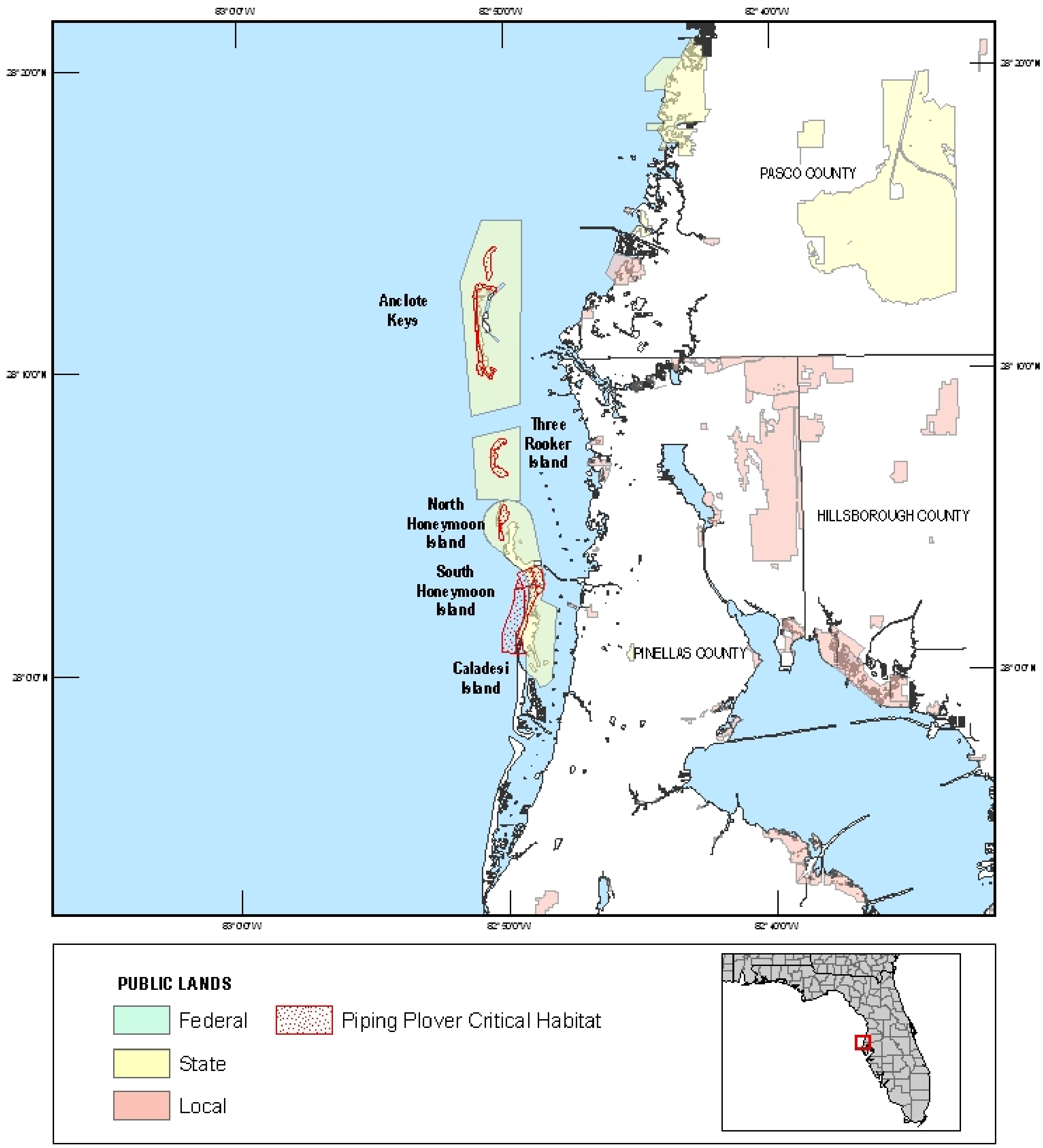
PIPING PLOVER CRITICAL HABITAT



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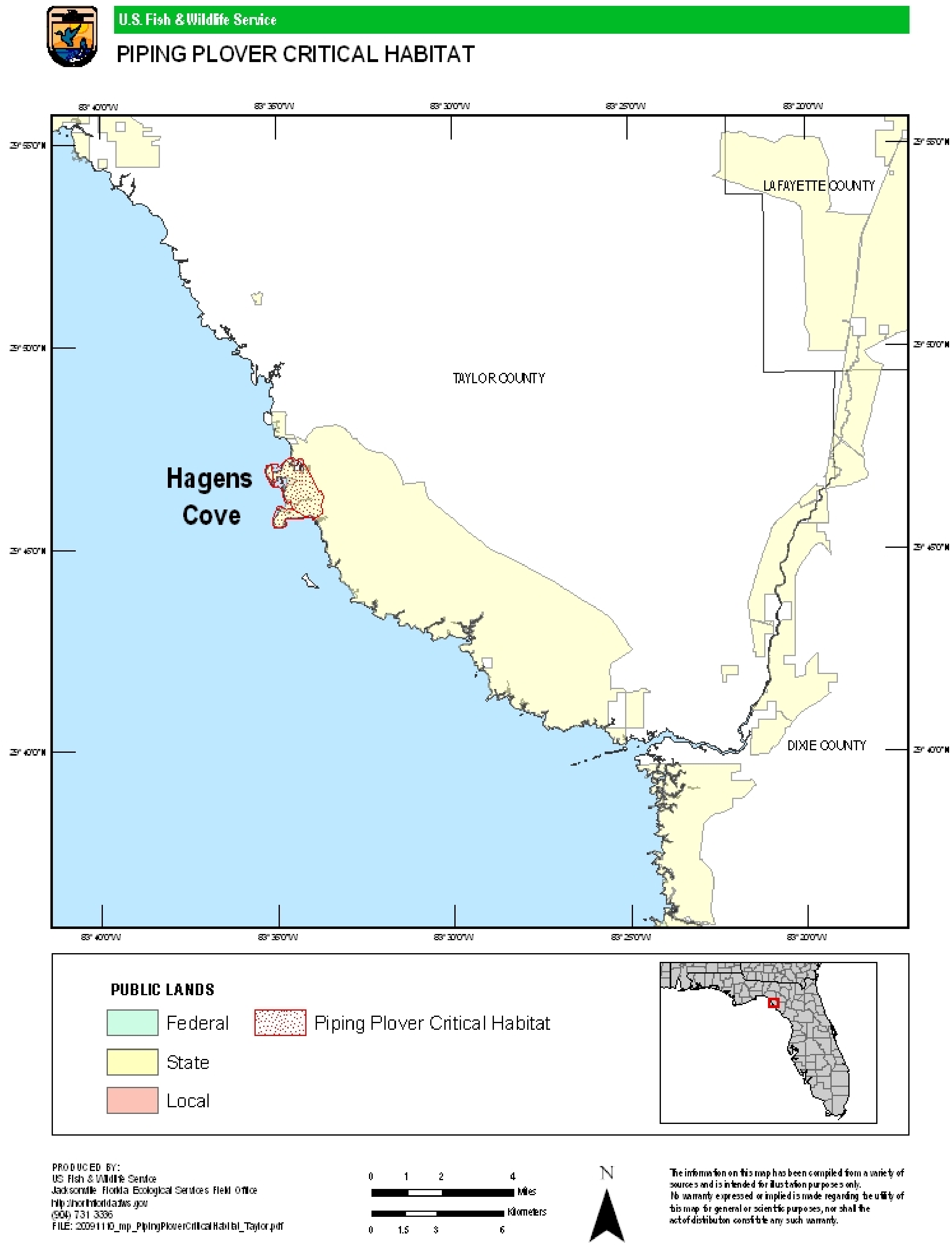

U.S. Fish & Wildlife Service
PIPING PLOVER CRITICAL HABITAT
LAFAYETTE COUNTY
TAYLOR COUNTY
Hagens Cove
DIXIE COUNTY
PUBLIC LANDS
Federal
State
Local
Piping Plover Critical Habitat
PRODUCED BY:
US Fish & Wildlife Service
Jacksonville Florida Ecological Services Field Office
(904) 731 3336
FILE: 20091110_mp_PipingPloverCriticalHabitat_Taylor.pdf
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APPENDIX B: EXAMPLE 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 that is secured and heavy enough not to easily be turned over.

STANDARD MANATEE CONDITIONS FOR IN-WATER WORK

2011

The permittee shall comply with the following conditions intended to protect manatees from direct project effects:

a. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a manatee shall be reported immediately to the Florida Fish and Wildlife Conservation Commission (FWC) Hotline at 1-888-404-3922. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for north Florida or in Vero Beach (1-772-562-3909) for south Florida, and emailed to FWC at ImperiledSpecies@myFWC.com.

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC must be used. One sign which reads *Caution: Boaters* must be posted. A second sign measuring at least 8½ " by 11" explaining the requirements for “Idle Speed/No Wake” and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities. These signs can be viewed at http://www.myfwc.com/WILDLIFEHABITATS/manatee_sign_vendors.htm. Questions concerning these signs can be forwarded to the email address listed above.

CAUTION: MANATEE HABITAT

All project vessels

IDLE SPEED / NO WAKE

When a manatee is within 50 feet of work
all in-water activities must

SHUT DOWN

Report any collision with or injury to a manatee:

Wildlife Alert:

1-888-404-FWCC(3922)

cell *FWC or #FWC

SAJ-2007-01645
Attachment 15

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

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006
O:\forms\Sea Turtle and Smalltooth Sawfish Construction Conditions.doc

AS-BUILT CERTIFICATION BY PROFESSIONAL ENGINEER

Submit this form and one set of as-built engineering drawings to the U.S. Army Corps of Engineers, Enforcement Section, P.O. Box 4970, Jacksonville, Florida, 32232-0019. If you have questions regarding this requirement, please contact the Enforcement Branch at 904-232-3131.

1. Department of the Army Permit Number: SAJ- - (-)

2. Permittee Information:

Name: ____

Address: ____

____

3. Project Site Identification (physical location/address):

____

____

____

4. As-Built Certification: I hereby certify that the authorized work, including any mitigation required by Special Conditions to the permit, has been accomplished in accordance with the Department of the Army permit with any deviations noted below. This determination is based upon on-site observation, scheduled, and conducted by me or by a project representative under my direct supervision. I have enclosed one set of as-built engineering drawings.

______________________________	______________________________
Signature of Engineer	Name (*Please type*)
______________________________	______________________________
(FL, PR, or VI) Reg. Number	Company Name

______________________________	____________________	____________
City	State	ZIP

(Affix Seal)

______________________________	______________________________
Date	Telephone Number

Date Work Started:_____________________ Date Work Completed:_______________________

Identify any deviations from the approved permit drawings and/or special conditions (attach additional pages if necessary):