



**FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION**

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**CONSOLIDATED JOINT COASTAL PERMIT AND
SOVEREIGN SUBMERGED LANDS AUTHORIZATION**

PERMITTEE:

Captiva Erosion Prevention District
c/o Kathleen Rooker
11513 Andy Rosse Lane, Unit 4
Captiva Island, Florida 33924

PERMIT INFORMATION:

Permit Number: 0200269-009-JC

Project Name: Captiva and Sanibel Island
Beach Nourishment

County: Lee

AGENT:

Michelle Pfeiffer
Coastal Planning and Engineering, Inc.
2481 N. W. Boca Raton Blvd.
Boca Raton, Florida 33431

Issuance Date: December 11, 2014

Expiration Date: December 11, 2029

REGULATORY AUTHORIZATION:

This permit is issued under the authority of Chapter 161 and 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 activity is to periodically nourish the beach at the Captiva Island segment of the federally-authorized Lee County Shore Protection project, to restore the northern tip of Captiva Island and to nourish the northern portion of Sanibel Island. Two previously-permitted borrow areas (III-B and VI-E), will be utilized as sand sources for this project. The elevation of the design beach berm inclines from +6.5 feet North American Vertical Datum (NAVD) at the dune line to +4.5 feet NAVD at the crest of the foreshore face of the berm, where it has a seaward slope of 1:10 vertical:horizontal (V:H) to the existing profile.

Phase I includes routine nourishment events at 8-10 year intervals using Borrow Areas III-B and VI-E. Phase II will address emergency nourishment (including larger hot spots) in response to any major storm erosion. Phase III will handle the smaller hot spot nourishment

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using upland sand sources (Stewart – Immokalee, Vulcan – Witherspoon, and CEMEX – Lake Wales and Davenport). Dune repair work is also authorized, in the event of a severe storm. The project may involve the temporary placement, and subsequent dredging, of sand within an offshore sand stockpile/rehandling area.

The activity includes consideration of an application for renewal of a 15-year sovereign submerged lands public easement (Instrument No. 40410, BOT File No. 360229615) containing 149.75 acres or 6,523,288 square feet, more or less, for Borrow Area III-B; and 348.71 acres or 15,190,094 square feet, more or less, for Borrow Area VI-E.

The Permittee has also requested a variance that will be acted upon separately as File No. 0200269-010-BV. The variance is from the provisions of Rule 62-4.244(5)(c), F.A.C., to establish a temporary mixing zone that extends up to 200 meters offshore and up to 1,500 meters alongshore from the point where water discharged from the dredge pipeline (at the beach placement site) reenters the Gulf of Mexico. The variance does not apply to discharges within 1,500 meters of Redfish Pass or Blind Pass.

PROJECT LOCATION:

The Project is located in Lee County and extends into the Gulf of Mexico, Class III Waters. The Beach Restoration site is located on the northern end of Captiva Island, between Department Reference Monuments R-83 and R-84, at Redfish Pass. The Beach Nourishment sites are located on Captiva Island, between R-84 and R-109, Sections 15, 22, 26, 27 and 35, Township 45 South, Range 21 East; and on Sanibel Island, between R-110 to R118, Sections 2, 3, 11, 13 and 14, Township 46 South, Range 21 East.

Borrow Area III-B is located approximately 8.7 nautical miles offshore from the center of Captiva Island. Borrow Area VI-E is located approximately 8.3 nautical miles offshore of the center of Captiva Island. The sand stockpile/rehandling area is located offshore of the project area, located approximately from R-84 to R-118.

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, F.S., Chapter 18-21 and Section 62-330.075, F.A.C., and the policies of the Board of Trustees.

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As staff to the Board of Trustees, the Department has reviewed the project described above, and has determined that the placement of sand on the beach 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 also determined that the borrow areas for the beach nourishment activity require a renewal of the public easement that was previously granted for the use of those lands, pursuant to Chapter 253.77, F.S. The Department intends to grant the public easement renewal, 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 easement renewal will be 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 renewal 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. When the Department received your permit application, a copy was sent to the U.S. Army Corps of Engineers (Corps) for review. The Corps will issue their authorization directly to you, or contact you if additional information is needed. If you have not heard from the Corps within 30 days from the date that your application was received by the Department, contact the nearest Corps regulatory office for status and further information. 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 and Specific Conditions, 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 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 section 62B-49.008, Florida Administrative Code.
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 Bureau of Beaches and Coastal Systems 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; or, 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, 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. This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of sovereignty land of Florida seaward of the mean high-water line, or, if established, the erosion control line, unless herein provided and the necessary title, lease, easement, or other form of consent authorizing the proposed use has been obtained from the State. The Permittee is responsible for obtaining any necessary authorizations from the Board of Trustees of the Internal Improvement Trust Fund prior to commencing activity on sovereign lands or other state-owned lands.
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. Reasonable time may depend on the nature of the concern being investigated.
9. At least forty-eight (48) hours prior to commencement of activity authorized by this permit, the Permittee shall submit to the Bureau of Beaches and Coastal Systems (JCP Compliance Officer) 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 historic or archaeological artifacts, such as, but not limited to, Indian canoes, arrow heads, pottery or physical remains, are discovered at any time on the project site, the Permittee shall immediately stop all activities in the immediate area that disturb the soil in the immediate locale and notify the State Historic Preservation Officer and Bureau of Beaches and Coastal Systems (JCP Compliance Officer). In the event that unmarked human remains are encountered during permitted activities, all work shall stop in the immediate area and the proper authorities notified in accordance with Section 872.02, F.S.
11. Within 30 days after completion of construction or completion of a subsequent maintenance event authorized by this permit, the Permittee shall submit to the Bureau of Beaches and Coastal Systems (JCP Compliance Officer) 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 two paper copies and one electronic copy of as-built drawings submitted to the Bureau of Beaches and Coastal Systems (JCP Compliance Officer).

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. No beach nourishment shall be conducted under this permit until and unless the Department issues a Final Order of Variance (File No. 0200269-010-BV) from Rule 62-4.244(5)(c), F.A.C., to establish an expanded mixing zone for this project.
2. All reports or notices relating to this permit shall be electronically submitted to the Department's JCP Compliance Officer (e-mail address: [JCP Compliance@dep.state.fl.us](mailto:JCPCompliance@dep.state.fl.us)) unless otherwise specified in the specific conditions of this permit.
3. The Permittee shall not store or stockpile tools, equipment, materials, etc., within littoral zones or elsewhere within surface waters of the state without prior written approval from the Department. Storage, stockpiling or access of equipment on, in, over or through beds of submerged aquatic vegetation, wetlands or hardbottom is prohibited unless it occurs within a work area or ingress/egress corridor that is specifically approved by this permit. Anchoring or spudding of vessels and barges within beds of aquatic vegetation or hardbottom is also prohibited.
4. 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.
5. ***Notice to Proceed Requirements.*** No work shall be conducted under this permit until the Permittee has received a written notice to proceed from the Department for each event. At least 30 days prior to the requested date of issuance of the notice to proceed, the Permittee shall submit a written request for a Notice to Proceed and the following items for review and approval by the Department:
 - 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 of this permit and the attached permit drawings, and shall also be certified by a professional engineer (P.E.), who is registered in the State of Florida. 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. ***Biological Opinion.*** In accordance with Section 161.041(5), F.S., no construction that could result in take of threatened and marine turtles shall begin until the federal

- incidental take authorization is issued in accordance with the federal Endangered Species Act. All terms and conditions and conservation measures in the applicable federal incidental take authorization shall be incorporated into this permit through modification if not addressed in the existing conditions listed below;
- c. Documentation that the new ***Erosion Control Line*** for segment R-83 to R-84 has been executed and recorded in the County Records;
 - d. ***Public Easement***. Documentation that the renewal and modification of the Public Easement has been executed and recorded to the satisfaction of the Department;
 - e. ***Turbidity monitoring qualifications***. Construction at the project site shall be monitored closely by an experienced, independent third party to assure that turbidity levels do not exceed the compliance standards established in this permit. Also, an individual familiar with beach construction techniques and turbidity monitoring shall be present at all times when fill material is discharged on the beach. 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. The names and qualifications of those individuals performing these functions, along with 24-hour contact information, shall be submitted for approval;
 - f. ***Biological monitoring qualifications***: Biological monitoring qualifications shall be submitted to the JCP Compliance Officer for review. If additional monitoring team(s) are subcontracted, or new staff is added to the monitoring team, proposed changes and qualifications shall be submitted to JCP Compliance Officer for review at least 30 days prior to the sampling event. The Permittee's agent is fully responsible for training of new staff members and subcontractors as well as the QA/QC verification of their work;
 - g. A detailed ***Physical Monitoring Plan*** subject to review and approval by the Department; and
 - h. Prior to the second event authorized under this permit, and for each subsequent event, the results of the ***intermediate turbidity monitoring*** shall be evaluated and provided to the Department's JCP Compliance Officer. If the results indicate that the project can be built using a smaller mixing zone, this adjustment shall be made through a modification to the permit prior to commencement of subsequent construction events.
6. ***Pre-Construction Conference***. The Permittee shall conduct a pre-construction conference to review the specific conditions and monitoring requirements of this permit with Permittee's contractors, the engineer of record, those responsible for turbidity monitoring and the JCP Compliance Officer (or designated alternate). 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:

JCP Compliance Officer
e-mail: JCPCCompliance@dep.state.fl.us

Imperiled Species Management Section
Florida Fish & Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, Florida 32399-1600
phone: (850) 922-4330
fax: (850) 921-4369 or email: marineturtle@myfwc.com

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 (listed above) of the **agreed-upon** date, time and location of the meeting, and also provide a meeting agenda and a teleconference number.

7. 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 Gulf of Mexico; and
 - b. A minimum set-back of 50 feet from open water, or at the landward end of the beach berm (without disturbing the dune), whichever is less, for the pipeline discharge location.
8. A 750-foot (approximately 230-meter) buffer shall be established around hardbottom resources surrounding the borrow areas. No dredging within this 750-foot buffer zone is authorized at this time. This 750-foot buffer provides the Department with reasonable assurance that hardbottom resources will not be impacted by the dredging activities; therefore, if no dredging occurs within this 750-foot buffer zone, biological monitoring of hardbottom resources shall not be required.
9. If the Permittee wishes to dredge within 750 feet of a hardbottom area, then a permit modification would be required. The application for the permit modification must include a biological monitoring plan and revised borrow area drawings delineating the proposed expanded dredging area(s) and all hardbottom within 750 feet (230 meters) of the borrow area(s), based on a quantitative baseline survey of hardbottom resources in the

project area. Even if authorization is granted for dredging within 750 feet of hardbottom areas, no dredging shall occur within 600 feet of hardbottom resources. Additional specific conditions may be included with the modification if as applicable.

10. During construction, weekly reports shall be submitted to the Department's JCP Compliance Officer to provide assurance that dredging activities have not occurred within the buffer surrounding hardbottom resources. Weekly reports shall include figures that show the position of dredging activities in borrow areas relative to the hardbottom resources surrounding the borrow areas. Reports shall include a table with information on the distance of dredging activities from the hardbottom resources surrounding the borrow areas.
11. Measures shall be taken to minimize turbidity in Redfish Pass during placement of sand between R-83 and R-84. Rather than directly pumping the sediment slurry to this site, which is adjacent to OFWs and seagrass beds within Pine Island Sound Aquatic Preserve, drained sediment shall be transported to this site via truck or mechanical means. Sand shall be pumped to the shore south of the Redfish Pass groin, near R-84, then off-road trucks or conveyors shall deliver the dewatered sand to the eroded shoreline of Redfish Pass, between R-83 and R-84. To further reduce the potential for turbidity plumes entering the OFW, sand shall only be placed water ward of the mean high water (MHW) line in this area during outgoing tides.
12. Composite values for the offshore borrow areas shall be updated after each nourishment event, and compatibility calculations shall be updated and provided to the Department's JCP Compliance Officer prior to the next nourishment event.
13. Sediment quality shall be assessed as outlined in the Sediment QA/QC Plan dated February 26, 2014 (received on May 24, 2014). Any placement of material not in compliance with the Plan shall be handled according to the protocols set forth in the Sediment QA/QC plans. The sediment testing result shall be submitted to the JCP Compliance Officer within 90 days following the completion of beach construction. The Sediment QA/QC plans include the following:
 - a. If during construction, the Permittee or Engineer determines that the beach fill material does not comply with the sediment compliance specifications, measures shall be taken to avoid further placement of noncompliant fill, and the sediment inspection results shall be reported to the Department's JCP Compliance Officer.
 - 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's JCP Compliance Officer within 90 days following beach construction. The sediment testing results shall be certified by a P.E. or professional geologist (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's JCP Compliance Officer within 7 days following completion of remediation activities.

Fish and Wildlife Protection Conditions

14. **Manatee, Marine Turtle, and Shorebird Protection Conditions.** During all construction authorized by this permit, and subsequent to authorization of incidental take by the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (FWS) in accordance with Sections 161.041 (5) and 379.2431 (1), F.S., the Permittee shall comply with the following conditions intended to protect manatees, marine turtles and shorebirds from direct project effects:
 - a. All personnel associated with the project shall be instructed about the presence of marine turtles, manatees and manatee speed zones, and the need to avoid collisions with (and injury to) these protected marine species. 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, and for killing marine turtles, which are protected under the Endangered Species Act and the Florida Marine Turtle Protection 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 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 entanglement or entrapment. Barriers must not impede manatee or marine turtle movement.
 - d. All on-site project personnel are responsible for observing water-related activities for the presence of marine turtles and manatees. All in-water operations, including vessels, shall be shut down if a marine turtle or manatee comes within 50 feet of the operation. 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 Florida Fish and Wildlife Conservation Commission (FWC) Hotline at 1-888-404-3922, and 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 shall be removed by the Permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC shall be used. One sign which reads "Caution Boaters, Watch for Manatees" shall be posted. A second sign measuring at least 8 ½" by 11" explaining the requirements for "Idle Speed/No Wake" and the shutdown of in-water operations shall be posted in a location prominently visible to all personnel engaged in water-related activities. Signs already approved by the FWC can be viewed at MyFWC.com/manatee. Questions concerning these signs can be sent to the email address listed above.
 - g. All personnel associated with the project shall be instructed about the potential presence of nesting shorebirds and the need to avoid Take of (including disturbance to) these protected species.
 - h. All vehicles shall be operated in accordance with 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 <6 mph and run at or below the high-tide line.
15. **Hopper Dredging.** In the event a hopper dredge is utilized, the following requirements shall be met in addition to the Terms and Conditions of the applicable NMFS Regional Biological Opinion for Hopper Dredging (Gulf of Mexico):
- a. Handling of captured sea turtles or sea turtle shall be conducted only by persons with prior experience and training in these activities and who are duly authorized to conduct such activities through a valid Marine Turtle Permit issued by the FWC, pursuant to Chapter 68E-1, F.A.C.
 - b. Dredging pumps shall be disengaged by the operator, or the draghead bypass valve shall be open and in use when the dragheads are not firmly on the bottom to minimize impingement or entrainment of sea turtles within the water column. This precaution is especially important during the cleanup phase of dredging operations.
 - c. A state-of-the-art rigid deflector draghead shall be used on all hopper dredges, in all channels, at all times of the year.

- d. The Sea Turtle Stranding and Salvage Network (STSSN) Coordinator shall be notified at Allen.Foley@myfwc.com at the start-up and completion of hopper dredging operations. In the event of capturing or recovering sea turtles or sea turtle parts, the STSSN shall be contacted at SeaTurtleStranding@myfwc.com.
 - e. Relocation trawling or non-capture trawling shall be implemented in accordance with the applicable NMFS Biological Opinion and Incidental Take authorization. Any activity involving the use of nets to harass and/or to capture and handle marine turtles in Florida waters requires a Marine Turtle Permit from FWC.
 - i. The Permittee or their contractor shall e-mail (MTP@MyFWC.com) weekly reports to the Imperiled Species Management section on Friday of each week that trawling is conducted in Florida waters. These weekly reports shall include: the species and number of turtles captured in Florida waters, general health and release information. A summary (FWC provided Excel spreadsheet) of all trawling activity, including non-capture trawling and all turtles captured in Florida waters, including all measurements, the latitude and longitude (in decimal degrees) of captures and tow start-stop points and times for the start-stop points of the tows, including those tows on which no turtles are captured, shall be submitted to MTP@myfwc.com by January 15 of the following year or at the end of the project.
16. **Beach Maintenance.** All derelict concrete, metal, coastal armoring material and other debris shall be removed from the beach prior to any material placement to the maximum extent practicable. If debris removal activities will take place during shorebird breeding or sea turtle nesting seasons, the work shall be conducted during daylight hours only and shall not commence until completion of daily seabird, shorebird or sea turtle surveys each day. All excavations and temporary alterations of the beach topography shall be filled or leveled to the natural beach profile prior to 9 p.m. each day unless otherwise authorized.
17. **Pre-Construction Meeting.** A meeting between representatives of the contractor, the FWC, the permitted sea turtle surveyor and Bird Monitors, as appropriate, shall be held prior to 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 protection measures, as well as additional guidelines when construction occurs during nesting season, such as staging equipment and reporting within the work area and follow up meetings during construction. This meeting may be combined with the Pre-construction meeting required in Specific Condition 6 above.
18. **Nesting Seabird and Shorebird Protection Conditions.** Nesting seabird and shorebird (i.e. shorebird) surveys shall be conducted by trained, dedicated individuals (Bird

Monitor) with proven shorebird identification skills and avian survey experience. A list of candidate Bird Monitors with their contact information, summary of qualifications, including bird identification skills, and avian survey experience shall be provided to FWC. This information shall be submitted to the FWC regional biologist (contact information attached) prior to any construction or hiring for shorebird surveys for revision and consultation. Bird Monitors shall use the following survey protocols:

- a. 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 Florida Shorebird Database (FSD) website (www.FLShorebirdDatabase.org<<http://www.FLShorebirdDatabase.org>>). An outline of data to be collected, including downloadable field data sheets, is available on the website.
- b. 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 date range is based on the best available information regarding habitat ranges and use by species around the state:

All Gulf Coast counties: February 15 – September 1.

Breeding season surveys shall begin on the first day of the breeding season or 10 days prior to project commencement (including surveying activities and other pre-construction presence on the beach), whichever is later. Surveys shall be conducted through August 31st or until all breeding activity has concluded, whichever is later.

- c. Breeding season 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. Portions of the project in which there is no potential for project-related activity during the nesting season may be excluded. One or more shorebird survey routes shall be established in the FSD website to cover these areas.
- d. During the pre-construction and construction phases of the project, surveys for detecting breeding activity and the presence of flightless chicks shall be completed on a daily basis 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.
- e. Surveys shall be conducted by walking the length of the project area and visually surveying for the presence of shorebirds exhibiting breeding behavior, shorebird/seabird chicks or shorebird/seabird juveniles as outlined in the FSD Breeding Bird Protocol for Shorebirds and Seabirds. Use of binoculars is required.

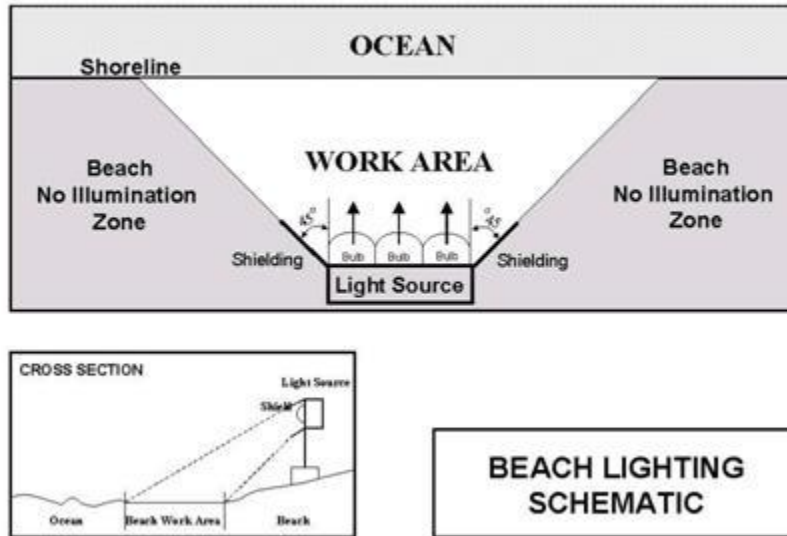
- or terminated. Although solitary nesters may leave the buffer zone with their chicks, the posted area continues to provide a potential refuge for the family until breeding is complete. Breeding is not considered to be completed until all chicks have fledged.
- d. No construction activities, pedestrians, movement of vehicles or stockpiling of equipment shall be allowed within the buffer area.
 - e. Travel corridors shall be designated and marked 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. However, other activities such as stopping or turning 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 accompanied by the Bird Monitor who shall ensure no chicks are in the path of the moving vehicle and no tracks capable of trapping flightless chicks result.
 - f. To discourage nesting within the travel corridor, it is recommended that the Permittee should maintain some activity within these corridors on a daily basis, without disturbing any nesting shorebirds documented on site or interfering with sea turtle nesting, especially when those corridors are established prior to commencement of construction.
20. **Notification.** If shorebird breeding occurs 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”.
 21. **Marine Turtle Nest Surveys and Relocation.** Sand placement may occur during the marine turtle nesting season, May 1 through October 31, provided the following marine turtle protection conditions are met except where such work is prohibited by the managing agency or under applicable local land use codes.
 22. In accordance with Section 161.041 (5), F.S., no construction that could result in Take of threatened and marine turtles shall begin until the federal incidental take authorization is issued in accordance with the federal Endangered Species Act. In the event that additional or different requirements from the permit conditions are specified in the FWS Incidental Take Authorization and Biological Opinion, construction shall not begin until the permit has been modified to include those additional marine turtle protection conditions. No relocation of marine turtle nests shall occur unless specifically authorized by FWC in a permit issued pursuant to Section 379.2431(1), F.S., and Chapter 68E-1, F.A.C.

23. For sand placement projects that occur during the period from April 15 through October 31, daily early morning (before 9 a.m.) surveys shall be conducted as follows. Upon receipt of incidental take from the FWS, eggs shall be relocated per the requirements below (a. to c.). Sea turtle monitors shall not enter posted shorebird buffer areas to conduct monitoring or to relocate nests.

Marine turtle nesting surveys shall be initiated by April 15, shall continue through September 30 and shall comply with the following requirements:

- a. Nesting surveys and nest marking shall 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 Chapter 68E-1, F.A.C. Please contact FWC's Marine Turtle Management Program 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. The contractor shall not initiate work each day until daily notice has been received from the marine 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 marine turtle protection measures.
- b. Only those nests in the area where sand placement occurs shall be relocated. Nest relocation shall not occur upon completion of sand placement. 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 does 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 that are subject to artificial lighting. Nest relocations in association with construction activities shall cease when sand placement activities no longer threaten nests.
- c. 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 place unless other factors threaten the success of the nest. The turtle permit holder shall install an on-beach marker at the nest site and/or 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 shall occur within this area nor shall any activities occur that could result in impacts to the nest. Nest sites shall be inspected daily to assure that nest markers remain in place and the nest has not been disturbed by the project activity.

24. **Marine Turtle or Nest Encounters.** Upon locating a dead or injured sea turtle adult, hatchling or egg that may have been harmed or destroyed as a direct or indirect result of the project, the Permittee shall be responsible for notifying STSSN at SeaTurtleStranding@myfwc.com. Care shall be taken in handling injured sea turtles or eggs to ensure effective treatment or disposition, and in handling dead specimens to preserve biological materials in the best possible state for later analysis. In the event a sea turtle nest is excavated during construction activities, 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.
25. **Equipment Storage and Placement.** All construction pipes that are placed on the beach shall be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Pipes placed parallel to the dune, outside the active construction zone, shall be no farther seaward than 5 to 10 feet away from the toe of the dune. Temporary storage of pipes shall be off the beach to the maximum extent possible. 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.
26. **Project Lighting.** Direct lighting of the beach and nearshore waters shall be limited to the immediate construction area during the sea turtle nesting season and shall comply with safety requirements. Lighting on offshore or onshore 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, 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 to avoid misdirection of 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 (Figure below).



27. **Fill Restrictions.** During the sea turtle nesting season, the contractor shall not extend the beach fill more than 500 feet along the shoreline between dusk and 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, the Permittee may submit a request for an alternate distance to FWC, and FWC shall decide if that distance is acceptable during the preconstruction meeting. Once the beach has been cleared and the necessary nest relocations have been completed, the contractor shall be allowed to proceed with the placement of fill during daylight hours until dusk, at which time the 500-foot length limitation shall apply.
28. **Compaction Sampling.** Sand compaction shall be monitored in the area of sand placement immediately after completion of the project and prior to April 15th for three (3) subsequent years. Compaction shall be monitored in accordance with a protocol agreed to by FWC and the Permittee. The requirement for compaction monitoring can be eliminated if the decision is made to till regardless of post-construction compaction levels. Out-year compaction monitoring and remediation are not required if placed material no longer remains on the beach.

At a minimum, the protocol provided below shall be followed. 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 April 15th. 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 FWC shall 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.

- a. 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).
 - b. At each station, the cone penetrometer shall be pushed to a depth of 6, 12 and 18 inches, three times at each depth (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 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.
 - c. No compaction sampling shall occur within 300 feet of any shorebird nest.
 - d. Any vehicles operated on the beach in association with compaction surveys 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/>).
29. **Tilling Requirements.** If tilling is required as specified above, the area shall be tilled to a depth of 36 inches. All tilling activity shall be completed prior to the marine turtle nesting season. If tilling occurs during shorebird nesting season (See Specific Condition 18.b above), shorebird surveys shall be required prior to tilling per the Shorebird Conditions included within this document. It is the responsibility of the contractors to avoid tilling, scarp removal or dune vegetation planting in areas where nesting birds are present. Each pass of the tilling equipment shall be overlapped to allow thorough and even tilling. 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. If compaction measurements are taken, a report on the results of the compaction monitoring shall be submitted electronically to FWC at marineturtle@myfwc.com prior to any tilling actions being taken.
- a. No tilling shall occur within 300 feet of any shorebird nest.

- b. If flightless shorebird young are observed within the work zone or equipment travel corridor, a Shorebird Monitor shall be present during the operation to ensure that equipment does not operate within 300 feet of the flightless young.
 - c. 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.
 - d. Tilling shall occur landward of the wrack line and avoid all vegetated areas 3 square feet or greater with a 3-foot buffer around the vegetated areas. The slope between the mean high water line (MHWL) and the mean low water line shall be maintained in such a manner as to approximate natural slopes.
 - e. Any vehicles operated on the beach in association with tilling 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/>).
30. **Escarpment Surveys.** Visual surveys for escarpments along the project area shall be made immediately after completion of the sand placement project, weekly during sea turtle nesting season and once between March 15 and April 15 for three (3) subsequent years if sand from the project still remains on the beach. Weekly reports shall be submitted by Friday of each week to marineturtle@myfwc.com.

Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of at least 100 feet shall be leveled and the beach profile shall be reconfigured to minimize scarp formation by April 15. Any escarpment removal shall be reported to FWC by location. If the project is completed during the sea turtle nesting and hatching season, escarpments may be required to be leveled immediately, while protecting nests that have been relocated or left in place. If, during the nesting and hatching season, there is any subsequent reformation of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet, the Permittee shall immediately contact FWC to determine the appropriate action to be taken. If it is determined that escarpment leveling is required during the nesting or hatching season, the FWC shall provide a brief written authorization 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 electronically to marineturtle@myfwc.com along with the annual summary as described below. If escarpment removal occurs during shorebird breeding season (See Specific Condition 18.b above), shorebirds surveys shall be required per the Shorebird Conditions included within this document prior to removal. (NOTE: Out-year escarpment monitoring and remediation are not required if placed material no longer remains on the dry beach).

- a. No heavy equipment shall operate within 300 feet of any shorebird nest.

- b. If flightless shorebird young are observed within the work zone or equipment travel corridor, a Shorebird Monitor shall be present during the operation to ensure that equipment does not operate within 300 feet of the flightless young.
 - c. Any vehicles operated on the beach in association with escarpment surveys or removal shall operate in accordance with the FWC's Best Management Practices for Operating Vehicles on the Beach (<http://myfwc.com/conservation/you-protect/wildlife/beach-driving/>).
31. **Post-construction Shorebird Protection Conditions.** If beach cleaning will occur on the nourished beach, a minimum of 30% 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.
32. **Post-construction Monitoring and Reporting Marine Turtle Protection Conditions.** Reports on all marine turtle nesting activity shall be provided for the initial marine turtle nesting (May 1 through September 15) and hatching (through October 31) season and for up to three additional nesting seasons as follows:
- a. For the initial nesting season and the following year, the number and type of emergences (nests or false crawls) shall be reported per species in accordance with the Table below. An additional year of nesting surveys may be required if nesting success for any species on the nourished beach is less than 40%.
 - b. For the initial nesting season, reproductive success shall be reported per species in accordance with the Table below. Reproductive success shall be reported for all sea turtle nests if possible. Otherwise a statistically significant number of nests for each species shall be reported.
 - c. In the event that the reproductive success documented by species meets or exceeds required criteria (outlined in Table below) for each species, monitoring for reproductive success shall be recommended, but not required, for the second year post-construction.
 - d. Monitoring of nesting activity in the seasons following construction shall include daily surveys and any additional measures authorized by the FWC. Summaries shall include all crawl activity, nesting success rates, hatching success of all relocated nests, hatching success of a representative sampling of nests left in place (if any) by species, project name, applicable project permit numbers and dates of construction. Data shall be reported for the nourished areas in accordance with the Table below and shall include the number of nests lost to erosion or washed out. Summaries of nesting

activity shall be submitted in electronic format (Excel spreadsheets) to the FWC Imperiled Species Management section at MTP@myfwc.com. All summaries shall be submitted by January 15 of the following year. The FWC Excel spreadsheet is available upon request from MTP@myfwc.com.

33. Two lighting surveys shall be conducted of all artificial lighting visible from the nourished berm. The first survey shall be conducted between May 1 and May 15 of the first nesting season following construction or immediately after placement if construction is not completed until after May 15, and a second survey between July 15 and August 1. The survey shall be conducted by the Permittee and shall be conducted to include a landward view from the seaward most extent of the new beach profile. The survey shall follow standard techniques for such a survey and include the number and type of visible lights, location of lights and photo documentation. For each light source visible, the Permittee shall document that the property owner(s) have been notified of the problem light and have been provided with recommendations for correcting the light. Recommendations must be in accordance with the Florida Model Lighting Ordinance for Marine Turtle Protection (Chapter 62B-55, F.A.C.) and local lighting restrictions. A report summarizing all lights visible shall be submitted to FWC Imperiled Species Management Section at marineturtle@myfwc.com by the 1st of the month following the survey. A summary report documenting what corrective actions have been taken shall also be submitted by December 15 of that year. After the annual report is completed, a meeting shall be set up with the Permittee or local sponsor, county or municipality, FWC and/or any other pertinent agencies to discuss the survey report as well as any documented sea turtle disorientations in or adjacent to the project area.

Table. Marine Turtle Monitoring:

Metric	Duration	Variable	Criterion
Nesting Success	Year of construction, one year to two or three years post construction if variable does not meet criterion based on previous year	Number of nests and non-nesting emergences by day by species	40% or greater
Hatching Success	Year of construction and one to three years post construction if variable does not meet criterion based on previous year	Number of hatchlings by species to completely escape egg	Average of 60% or greater (data must include washed out nests)
Emergence Success	Year of construction and one to three years post construction if variable does not meet success criterion based on previous year	Number of hatchlings by species to emerge from nest onto beach	Average must not be significantly different than the average hatching success
Disorientation	Year of construction and one to three years post construction	Number of nests and individuals that misorient or disorient	

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 the project area, corrective actions and notifications made	100% reduction in lights visible from nourished berm within one to two month period
Compaction	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 up to three years	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

MONITORING REQUIRED:

34. **Physical monitoring.** The approved Monitoring Plan can be revised at any later time by written request of the Permittee and with the written approval of the Department. If subsequent to approval of the Monitoring Plan there is a request for modification of the permit, the Department may require revised or additional monitoring requirements as a condition of approval of the permit modification.

As guidance for obtaining Department approval, the plan shall generally contain the following items:

- a. 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 completion of construction of the project. Thereafter, monitoring surveys shall be conducted annually for a period of three (3) years, then biennially until the next beach nourishment event or the expiration of the project design life, whichever occurs first. The monitoring surveys shall be conducted during a spring or summer month and repeated as close as practicable during that same month of the year. If the time period between the immediate post-construction survey and the first annual monitoring survey is less than six months, then the Permittee may request a postponement of the first monitoring survey until the following spring/summer. The request shall be submitted as part of the cover letter for the post-construction report. A prior design survey of the beach and offshore may be submitted for the pre-construction survey if consistent with the other requirements of this condition.

The monitoring area shall include profile surveys at each of the Department’s reference monuments within the bounds of the beach fill area and along at least 5,000 feet of the adjacent shoreline on both sides of the beach fill area. For those project

areas that contain erosion control structures, such as groins or breakwaters, additional profile lines shall be surveyed at a sufficient number of intermediate locations to accurately identify patterns of erosion and accretion within this subarea. All work activities and deliverables shall be conducted in accordance with the latest update of the Department's *Monitoring Standards for Beach Erosion Control Projects, Sections 01000 and 01100*.

- b. Bathymetric surveys of the borrow areas shall be conducted within 90 days prior to commencement of construction, and within 60 days following completion of construction of the project concurrently with the beach and offshore surveys required above. Thereafter, monitoring surveys of the borrow areas shall be dependent on their location. Borrow sites located in tidal inlet shoals or in nearshore waters above the depth of closure for littoral transport processes shall be at two (2) year intervals concurrently with the beach and offshore surveys required above. These biennially monitoring surveys are not required for borrow sites located below the depth of closure for littoral transport processes. A prior design survey of the borrow area may be submitted for the pre-construction survey if consistent with the other requirements of this condition.

Survey grid lines across the borrow areas shall be spaced to provide sufficient detail for accurate volumetric calculations but spaced not more than a maximum of 500 feet apart, and shall extend a minimum of 500 feet beyond the boundaries of the borrow site. For borrow sites located in tidal inlet shoals, bathymetric surveys of the entire shoal complex, including any attachment bars, shall be conducted unless otherwise specified by the Department based upon the size of the shoal and the potential effects of the dredging on inlet processes. In all other aspects, work activities and deliverables shall be consistent with the Department's *Monitoring Standards for Beach Erosion Control Projects, Section 01200*.

- c. The Permittee shall submit an engineering report and the monitoring data to the JCP Compliance Officer within 90 days following completion of the post-construction survey and each annual or biennial monitoring survey.

The report shall summarize and discuss the data, the performance of the beach fill project, and identify erosion and accretion patterns within the monitored area. Results shall be analyzed for patterns, trends, or changes between annual surveys and cumulatively since project construction. In addition, the report shall include a comparative review of project performance to performance expectations and identification of adverse effects attributable to the project. The report shall specifically include:

- i. The volume and percentage of advance nourishment lost since the last beach

nourishment project as measured landward of the MHWL of the most recent survey;

- ii. The most recent MHW shoreline positions (feet) in comparison with the design profile at each individual monument location;
- iii. The MHW shoreline position changes (feet) relative to the pre-construction survey at each individual monument location for all the monitoring periods;
- iv. The total measured remaining volume (cubic yards) in comparison with the total predicted remaining volume (cubic yards) above the MHWL and above the Depth of Closure for the entire project area over the successive monitoring periods; and,
- v. Other shoreline position and volumetric analysis the Permittee or engineer deem useful in assessing, with quantitative measurements, the performance of the project.

The report shall include computations, tables and graphic illustrations of volumetric and shoreline position changes for the monitoring area. An appendix shall include superimposed plots of the two most recent beach profile surveys, the design profile, and pre- and post-construction beach profile at each individual monument location.

- d. A digital copy of the monitoring report and a digital file of the survey data shall be submitted to the JCP Compliance Officer in Tallahassee. Failure to submit reports and data in a timely manner constitutes grounds for revocation of the permit. When submitting any monitoring information to the Department's JCP Compliance Officer, 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 the approved Monitoring Plan for Permit No. [0200269-009-JC] for the monitoring period [XX]."**

35. **Water Quality Monitoring.** Turbidity shall be monitored as follows:

Units: Nephelometric Turbidity Units (NTUs).

Frequency: Three times daily at least four (4) hours apart during all dredging and filling operations. 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., one shall immediately follow the other.

Location:

A. Borrow Sites:

Background: Samples shall be collected at surface and mid-depth, at least 500 meters upcurrent from the dredge site and clearly outside the influence of any turbidity generated by the project.

Compliance: Samples shall be collected at surface and mid-depth, not more than 150 meters downcurrent from the source of turbidity generated by the dredge, in the densest portion of the turbidly plume. If no plume is visible, follow the likely direction of flow.

B. Beach/Discharge Site when working more than 1,500 meters from Redfish Pass and Blind Pass:

Background: Samples shall be collected at surface and mid-depth, at a point approximately 500 meters upcurrent from any portion of the beach that has been, or is being, filled during the current construction event, at the same distance offshore as the compliance station, clearly outside of any turbidity plume generated by the project.

Compliance: Samples shall be collected where the densest portion of the turbidity plume crosses the edge of the mixing zone polygon, which measures up to 200 meters offshore and up to 1,500 meters alongshore from the point where the return water from the dredged discharge reenters the Gulf of Mexico. Samples shall be collected from the surface and mid-depth. *Note: If the plume flows parallel to the shoreline, the densest portion of the plume may be close to shore, in shallow water, and may cross the edge of the mixing zone polygon less than 200 meters offshore. In that case, it may be necessary to access the sampling location from the shore, in water that is too shallow for a boat.*

Intermediate: Required when using a mixing zone that exceeds 150 meters in size. Within the approved mixing zone, samples shall be collected along the densest portion of the turbidity plume (or in the direction of flow if no plume is visible), at 150 meters, 500 meters, 1,000 meters and 1,250 meters downcurrent from the point of discharge into the Gulf of Mexico (if those points are located inside the mixing zone), at surface and mid-depth. The

data generated by this intermediate monitoring shall be used to adjust the size of the mixing zone for future events, not for compliance.

C. Beach/Discharge Site when working within 1,500 meters from Redfish Pass and Blind Pass:

Background: Samples shall be collected at surface and mid-depth, at a point approximately 500 meters upcurrent from any portion of the beach that has been, or is being, filled during the current construction event, at the same distance offshore as the compliance station, clearly outside of any turbidity plume generated by the project.

Compliance: Samples shall be collected where the densest portion of the turbidity plume crosses the edge of the mixing zone, which measures 150 meters in radius from the point where the return water from the dredged discharge reenters the Gulf of Mexico. Samples shall be collected from the surface and mid-depth.

D. Sand stockpile/rehandling area (if utilized during project construction):

Background: Samples shall be collected at surface and mid-depth, at least 500 meters upcurrent from the dredge or offloading sites and clearly outside the influence of any turbidity generated by the project.

Compliance: Samples shall be collected from the surface and mid-depth, not more than 1,500 meters downcurrent from the source of turbidity generated by the dredge or offloading activities, in the densest portion of the turbidly plume. If no plume is visible, follow the likely direction of flow.

Intermediate: Required when using a mixing zone that exceeds 150 meters in size. Within the approved mixing zone, samples shall be collected along the densest portion of the turbidity plume (or in the direction of flow if no plume is visible), at 150 meters, 500 meters, 1,000 meters and 1,250 meters downcurrent from the source of turbidity generated by the dredge or offloading activities, at surface and mid-depth. The data generated by this intermediate monitoring shall be used to adjust the size of the mixing zone for future events, not for compliance.

E. Truck haul beach placement (R-83 to R-84):

Background: Samples shall be collected at surface and mid-depth, at a point approximately 300 meters upcurrent from the discharge point, at the same distance offshore as the associated compliance sample, and clearly outside the influence of any turbidity generated by the project.

Compliance: Samples shall be collected at a point approximately 150 meters downcurrent from the point of discharge into State waters, within the densest portion any visible turbidity plume. Samples shall be collected from the surface and mid-depth.

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 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.

The monitoring requirements for the type of activity and location of the sampling site shall be reflected on the monitoring report forms.

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.

36. 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 29 NTUs above the corresponding background turbidity levels, or zero (0) NTUs above background within OFW, construction activities shall **cease immediately** and not resume until corrective measures have been taken and turbidity has returned to acceptable levels.

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 29 NTUs above background, or zero (0) NTU's above background within 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's JCP Compliance Officer, 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".

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

- a. the Project Name;
- b. the Permit Number;
- c. location and level (NTUs above background) of the turbidity exceedance;
- d. the time and date that the exceedance occurred; and
- e. the time and date that construction ceased.

Prior to re-commencing the construction, a report shall be emailed to the Department's JCP Compliance Officer with the same information that was included in the "Exceedance Report", plus the following information:

- a. turbidity monitoring data collected during the shutdown documenting the decline in turbidity levels and achievement of acceptable levels;
- b. corrective measures that were taken; and
- c. cause of the exceedance.

37. **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 (29 NTUs above background, or zero (0) NTU's above background within OFW) shall be highlighted in the table. In addition to the raw and processed data, the reports shall also contain the following information:

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- a. time of day samples were taken;
- b. dates of sampling and analysis;
- c. GPS location of sample;
- 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 map, overlaid on an aerial photograph, indicating the sampling locations, dredging and discharge locations, and direction of flow. A sample map shall reviewed and approved by the Department prior to construction;
- 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, an explanation shall be included 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 Division in Tallahassee (attn: JCP Compliance Officer) and to the Department's Southeast District office. 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. 0200269-009-JC, for the Captiva and Sanibel Island Beach Nourishment Project."

38. 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.
39. **Planting of Dune Vegetation.** In the event of a major storm, dune and vegetation losses will be replaced to the greatest extent practical. Only Florida native plant species shall be planted, and plant species shall consist predominantly of sea oats (*Uniola paniculata*), dune panic grass (*Panicum amarum*), railroad vine (*Ipomea pes-caprae*) and dune sunflower (*Helianthus debilis*). A dune planting plan, which outlines the plant species, spacing of planting units, and monitoring, shall be submitted to the Department's JCP Compliance Officer for approval at least 30 days prior to planting unit installation. The planted vegetation shall be monitored monthly for 90 days to ensure survivability of the plants. Remedial planting shall occur if mortality is in excess of 50% during any of the three monthly monitoring events. Planting of dune vegetation is authorized to occur during the marine turtle nesting (May 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, nest relocations screening or caging activities shall be conducted only by persons with prior experience and training in these activities and is duly authorized to conduct such activities through a valid permit issued by the FWC, pursuant to Rule 68-E, F.A.C.
 - b. 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.
 - c. Any nests deposited in an area not requiring relocation for conservation purposes (as determined by the marine turtle permit holder) shall be left in situ. 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.
 - d. The use of heavy equipment (including trucks) for dune construction, planting and maintenance shall not occur seaward of the dune crest or armoring structure. Only a lightweight (ATV style) vehicle, with tire pressures of 10 p.s.i. or less shall operate on the beach.

- e. Any vegetation planting or placement of irrigation materials shall be installed by hand labor/tools.
 - f. Irrigation (if proposed) shall be entrenched 1 to 3 inches below grade so as not to pose a barrier to hatchlings and to allow for easy removal. The irrigation system shall be designed and maintained so that watering of the unplanted sandy beach does not occur. In the event a marine turtle nest is deposited within the newly established dune planting area, the Permittee shall modify the irrigation system so that watering within 10 feet of the nest does not occur. Daily inspection of the irrigation system shall be accomplished by the Permittee to ensure compliance with this condition.
 - g. 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 (landward of the dune crest, existing seawalls or bulkheads).
 - h. If a nest is disturbed or uncovered during planting activity, the Permittee shall cease all work and immediately contact the person(s) 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.
40. A 1,000-foot buffer shall be established around the hardbottom resources within the sand stockpile/rehandling area. If this sand stockpile/rehandling area is utilized, no material shall be placed or dredged within 1,000 feet of the hardbottom resources.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION



Martin Seeling, Program Administrator
Beaches, Inlets and Ports Program

FILING AND ACKNOWLEDGMENT

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



Deputy Clerk

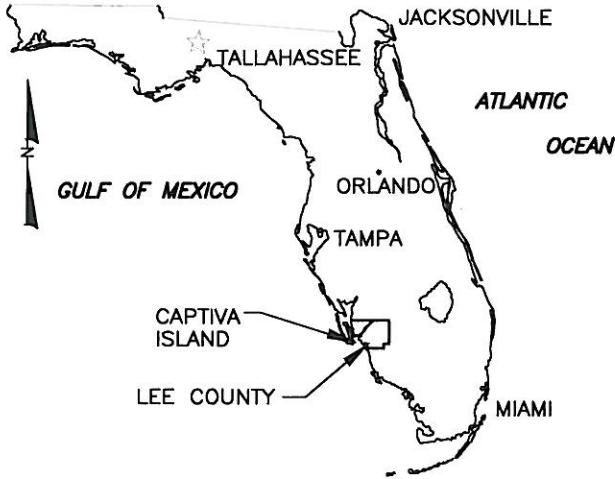
12/11/2014
Date

Prepared by Chiu Cheng.

Attachments: Approved Permit Drawings (27 pages)
FWC Regional Biologists Contact Information
Offshore sand source QA/QC Plan (approved July 14, 2014)
Upland sand source QA/QC Plan (approved July 14, 2014)

APPENDIX C1
PERMIT DRAWINGS

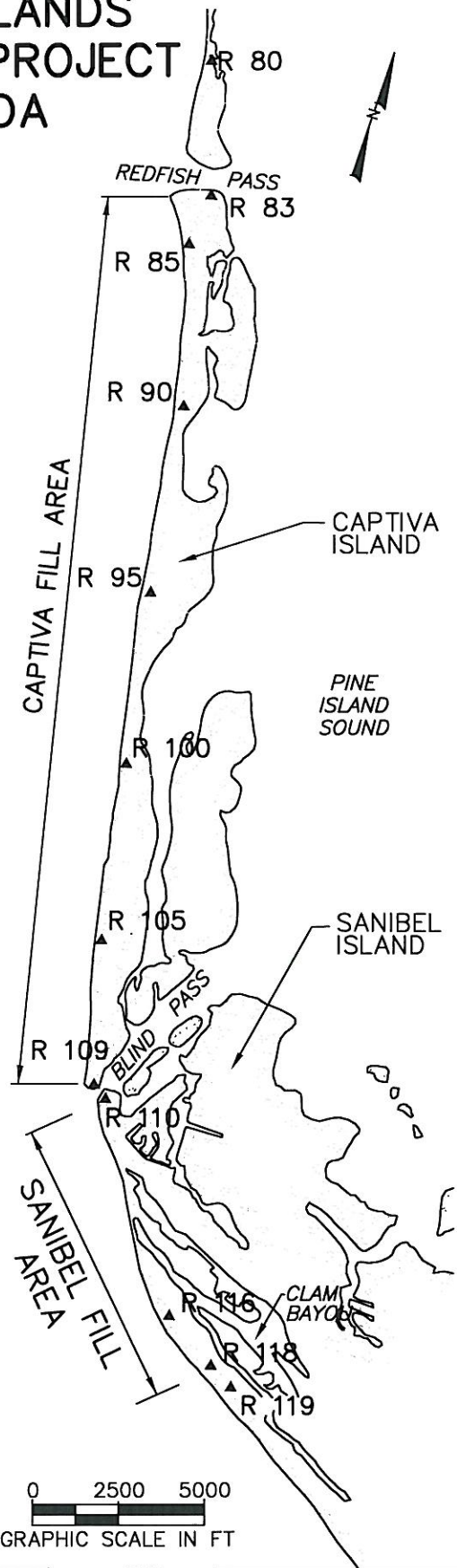
CAPTIVA & SANIBEL ISLANDS BEACH RENOURISHMENT PROJECT LEE COUNTY, FLORIDA



GULF OF MEXICO

SHEET INDEX

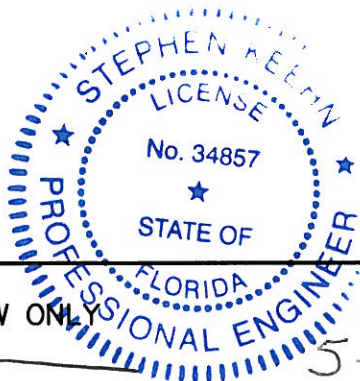
NO.	TITLE
1	LOCATION MAP
2-4	CAPTIVA ISLAND PLAN VIEW
5-6	SANIBEL ISLAND PLAN VIEW
7-20	FILL CROSS SECTIONS
21	BORROW AREA VI-E BATHYMETRY PLAN VIEW
22	BORROW AREA VI-E CROSS SECTION A-A'
23	BORROW AREA VI-E CROSS SECTION B-B'
24	BORROW AREA III-B BATHYMETRY PLAN VIEW
25	BORROW AREA VI-E CROSS SECTION C-C'
26	BORROW AREA VI-E CROSS SECTION D-D'
27	PIPELINE CORRIDOR AND SAND REHANDLING AREA



CAPTIVA & SANIBEL ISLANDS
BEACH RENOURISHMENT PROJECT
LOCATION MAP

COASTAL PLANNING & ENGINEERING, INC.
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C.O.A. FL. #4029

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COMM NO.: 150455
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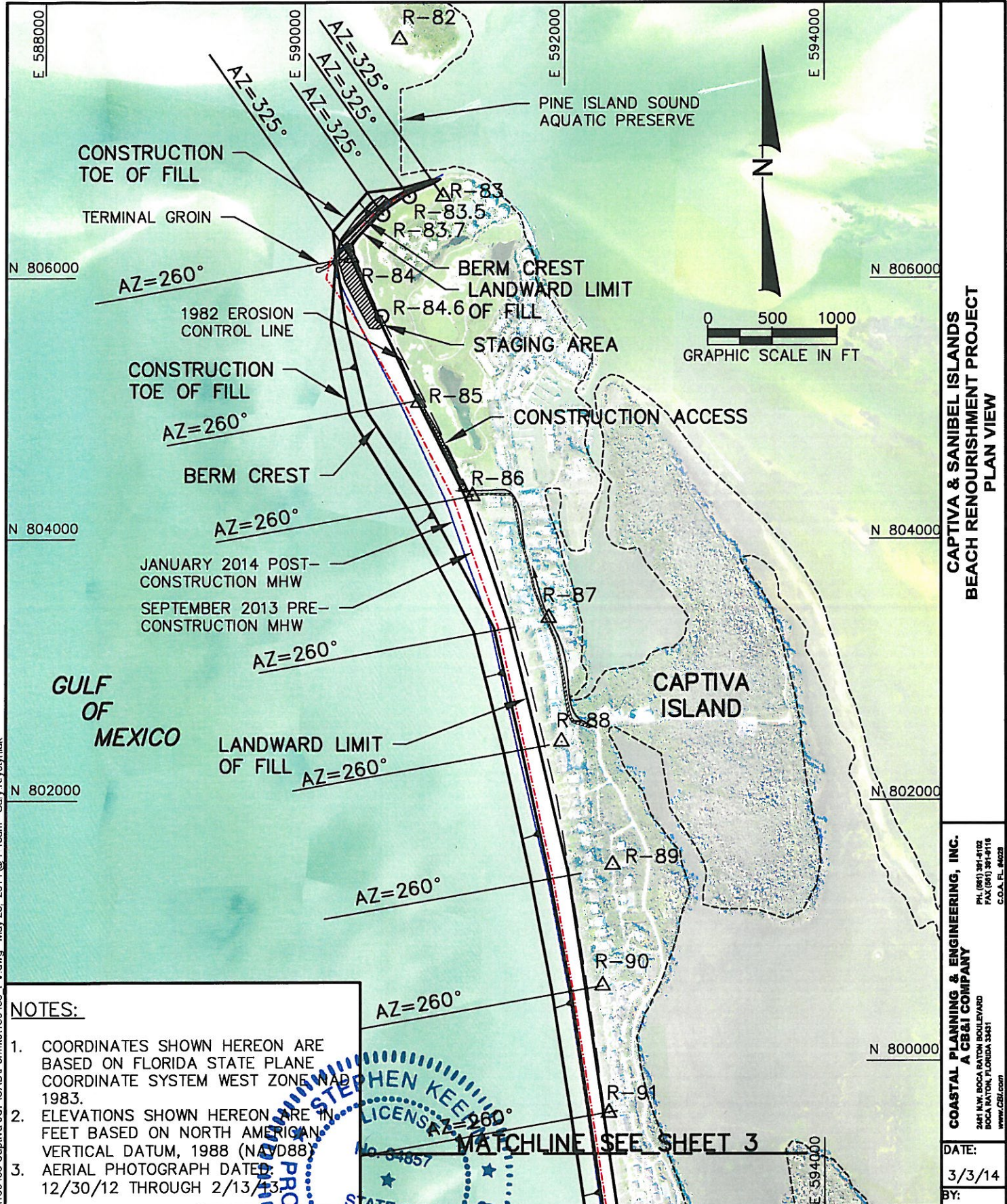
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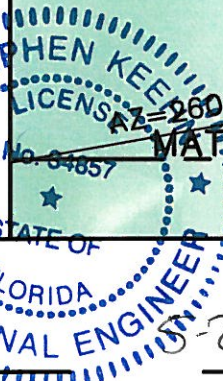


**CAPTIVA & SANIBEL ISLANDS
 BEACH RENOURISHMENT PROJECT
 PLAN VIEW**

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NOTES:

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2. ELEVATIONS SHOWN HEREON ARE IN FEET BASED ON NORTH AMERICAN VERTICAL DATUM, 1988 (NAVD88).
3. AERIAL PHOTOGRAPH DATED: 12/30/12 THROUGH 2/13/13.



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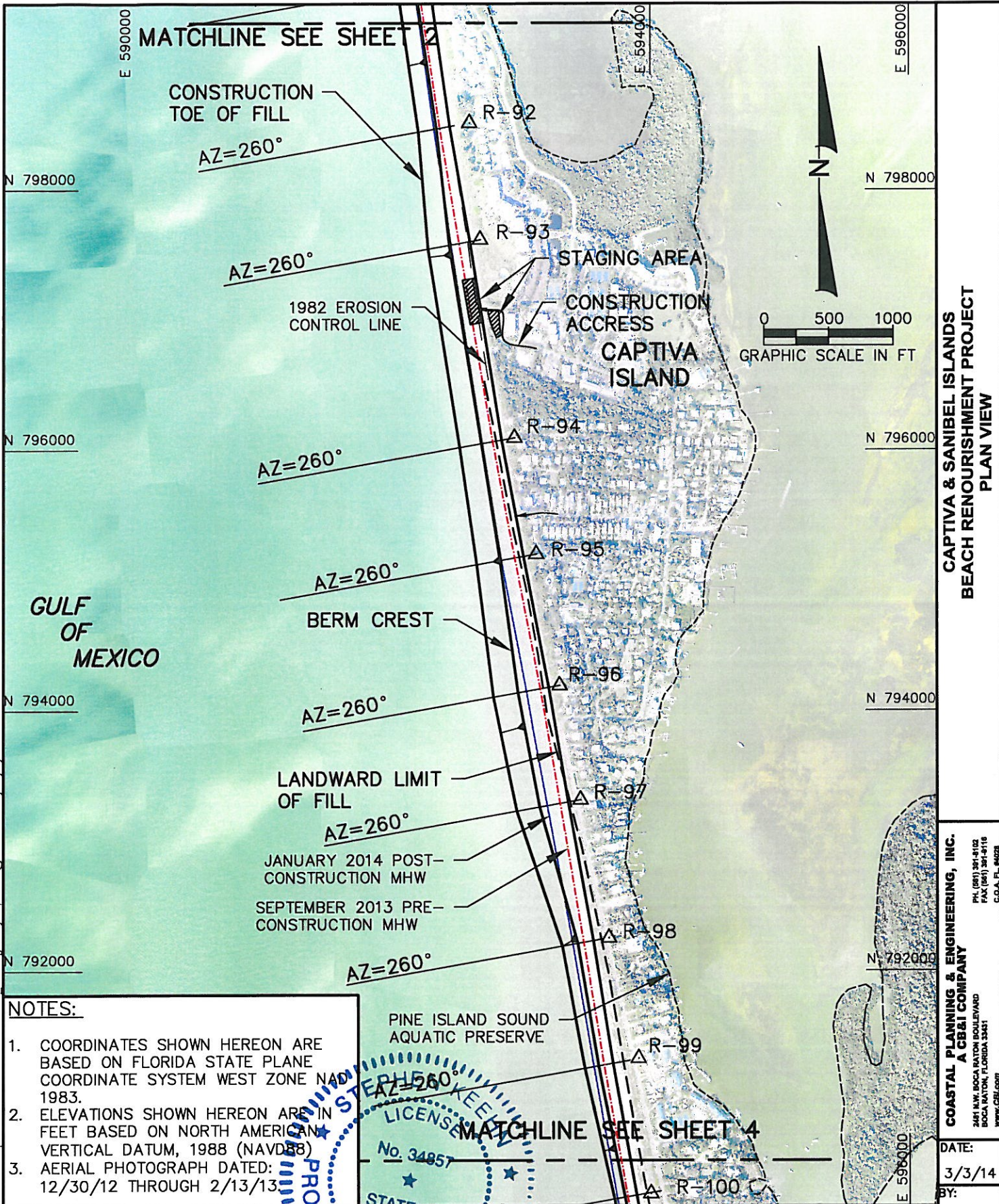
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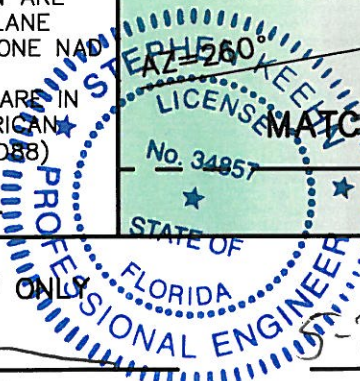


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PINE ISLAND SOUND
 AQUATIC PRESERVE



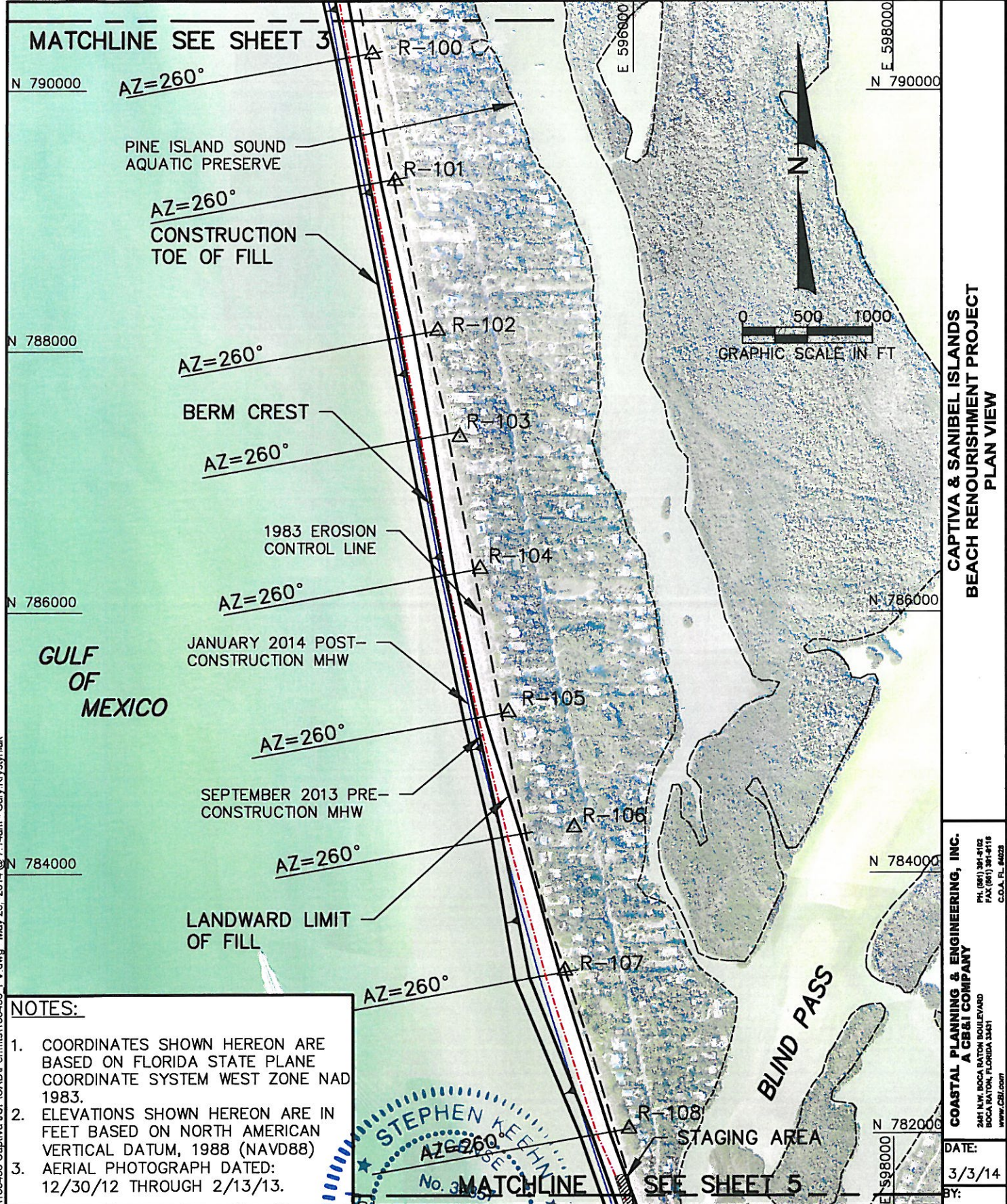
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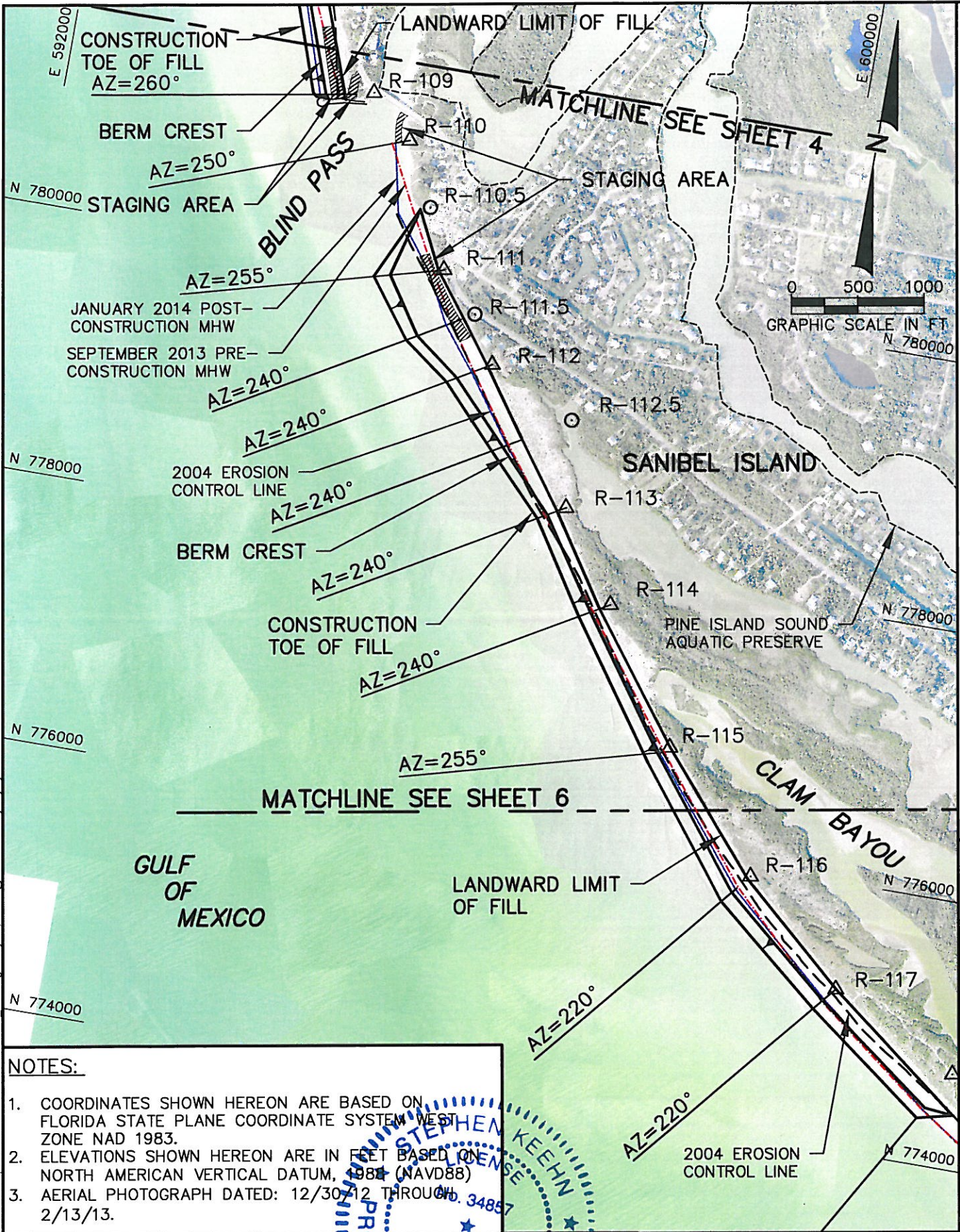
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 No. 34857
 PROFESSIONAL ENGINEER
 STATE OF FLORIDA
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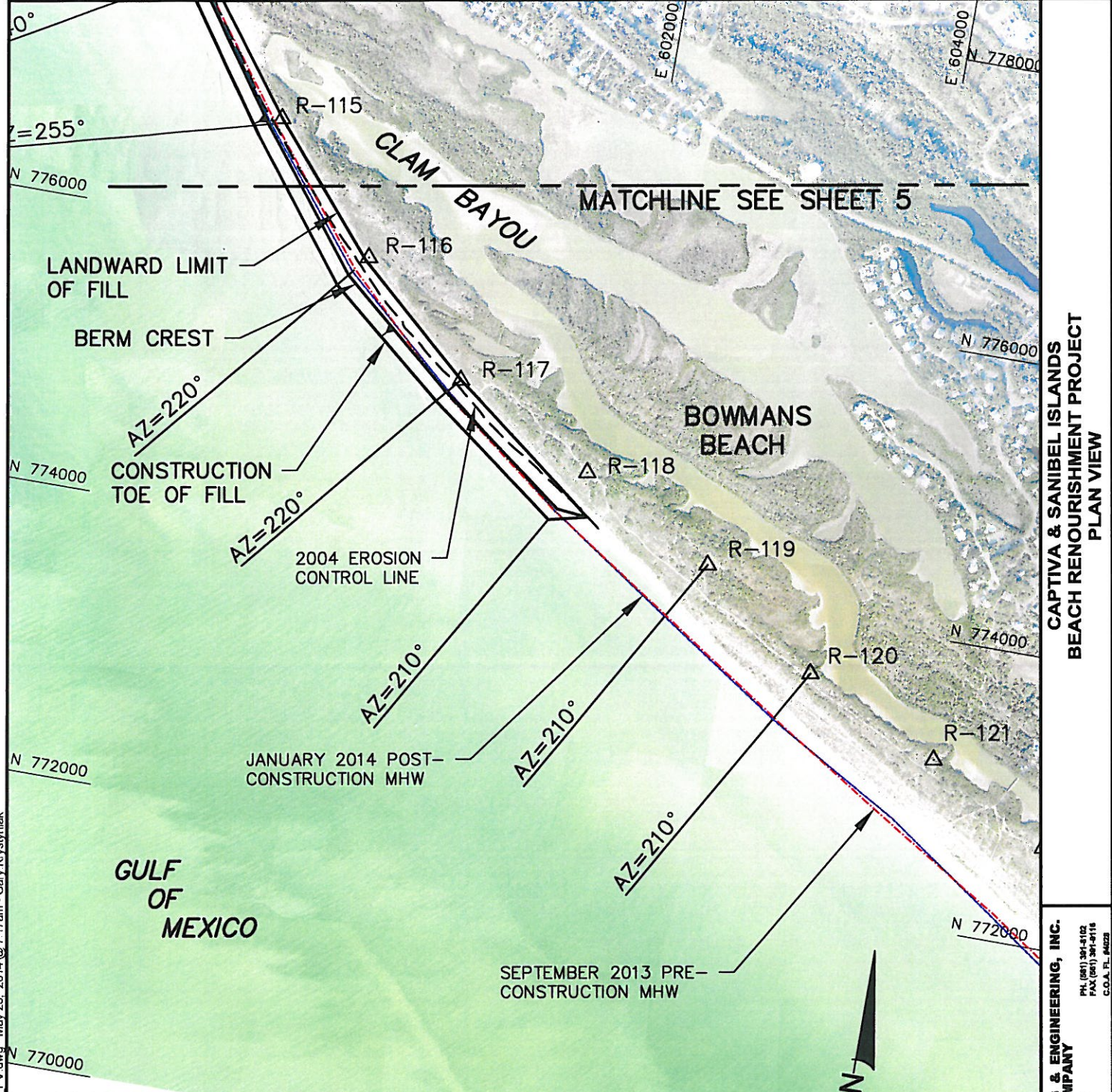
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 PROFESSIONAL ENGINEER

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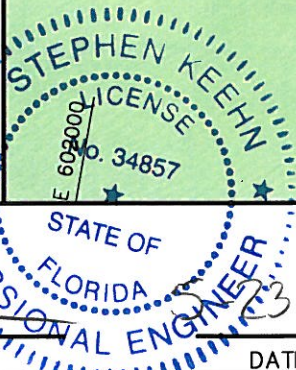
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FAX: (561) 361-8116
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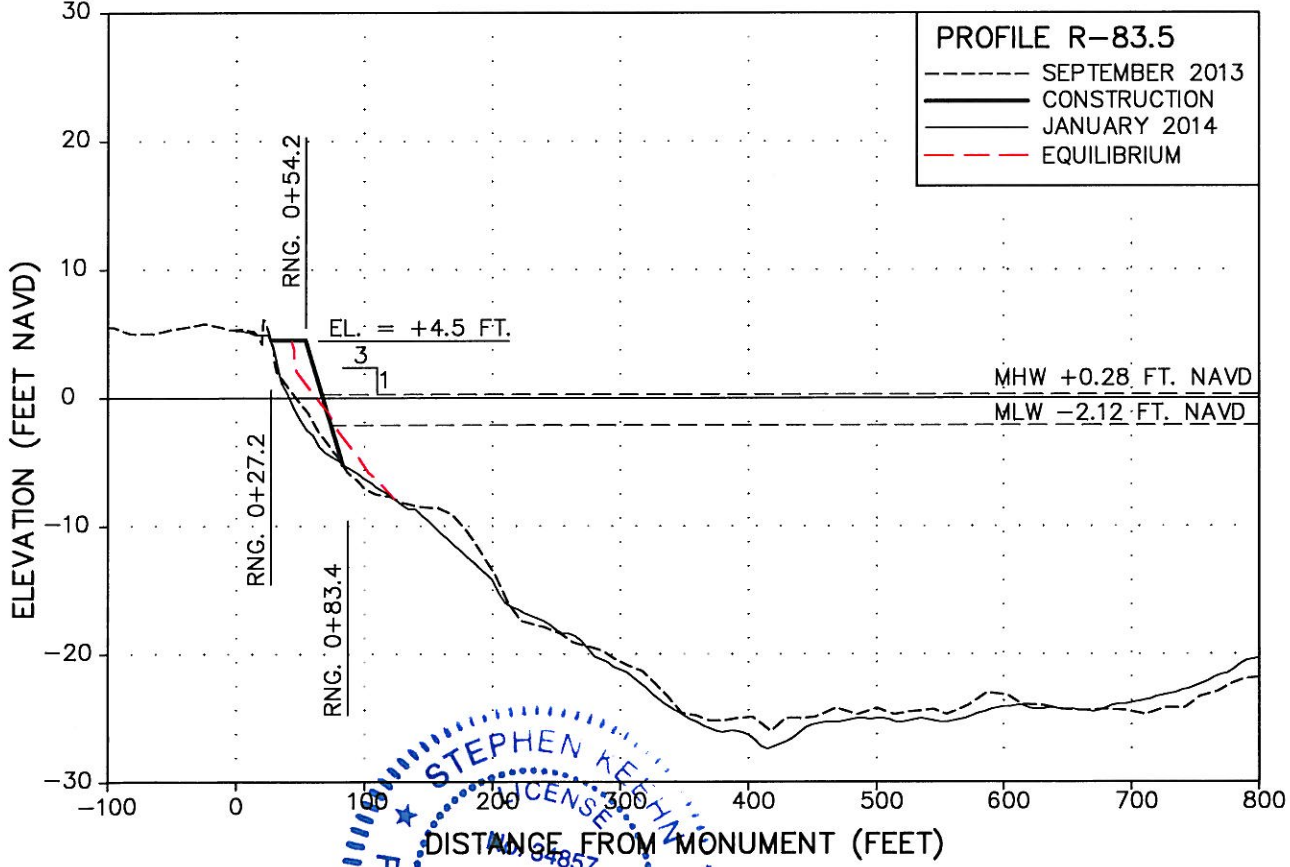
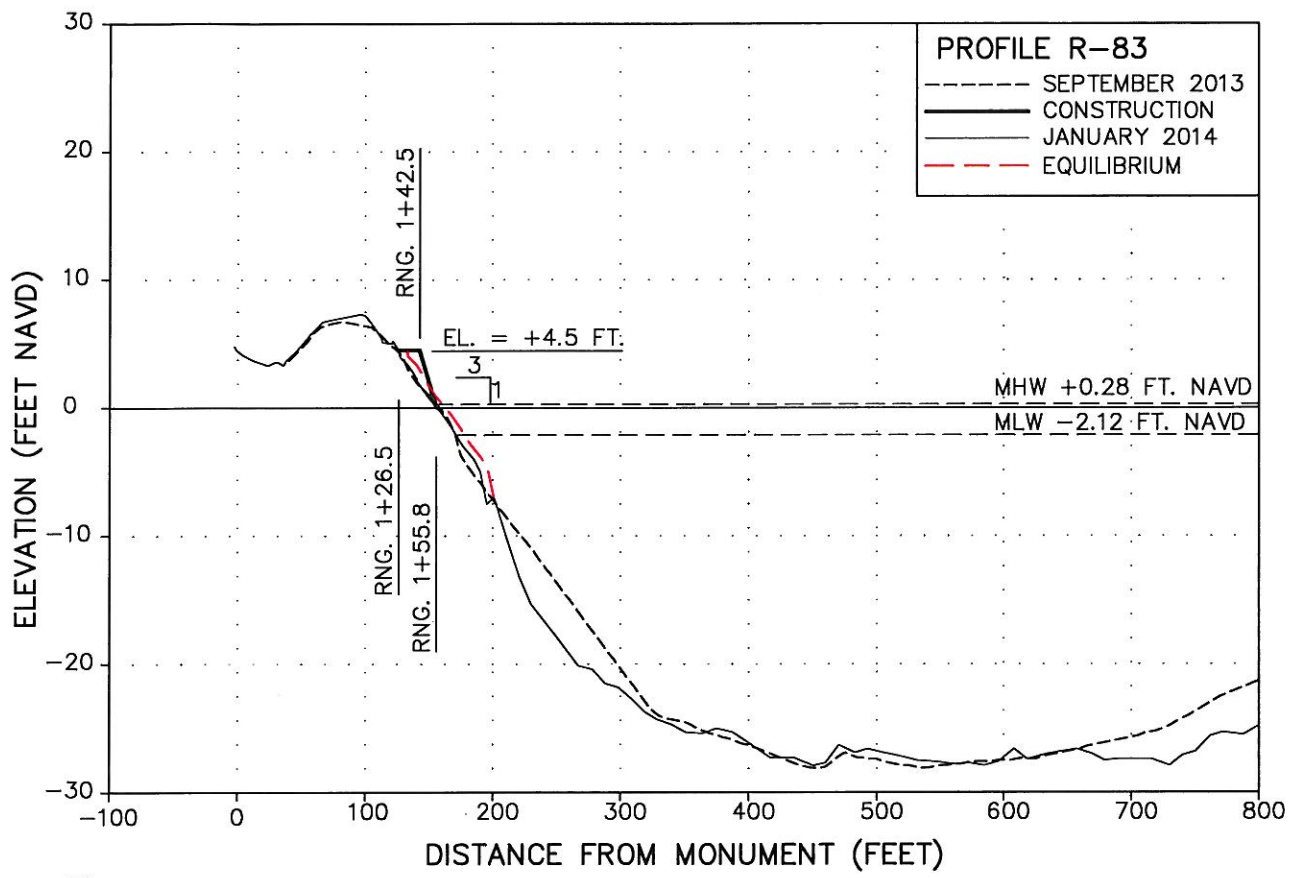
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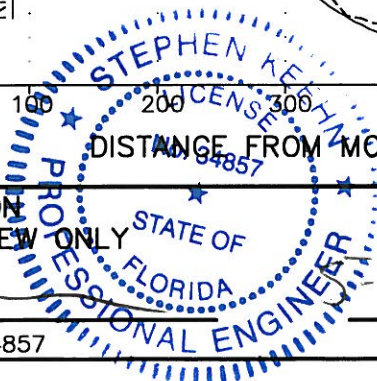


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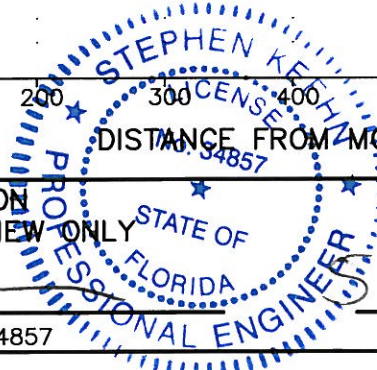
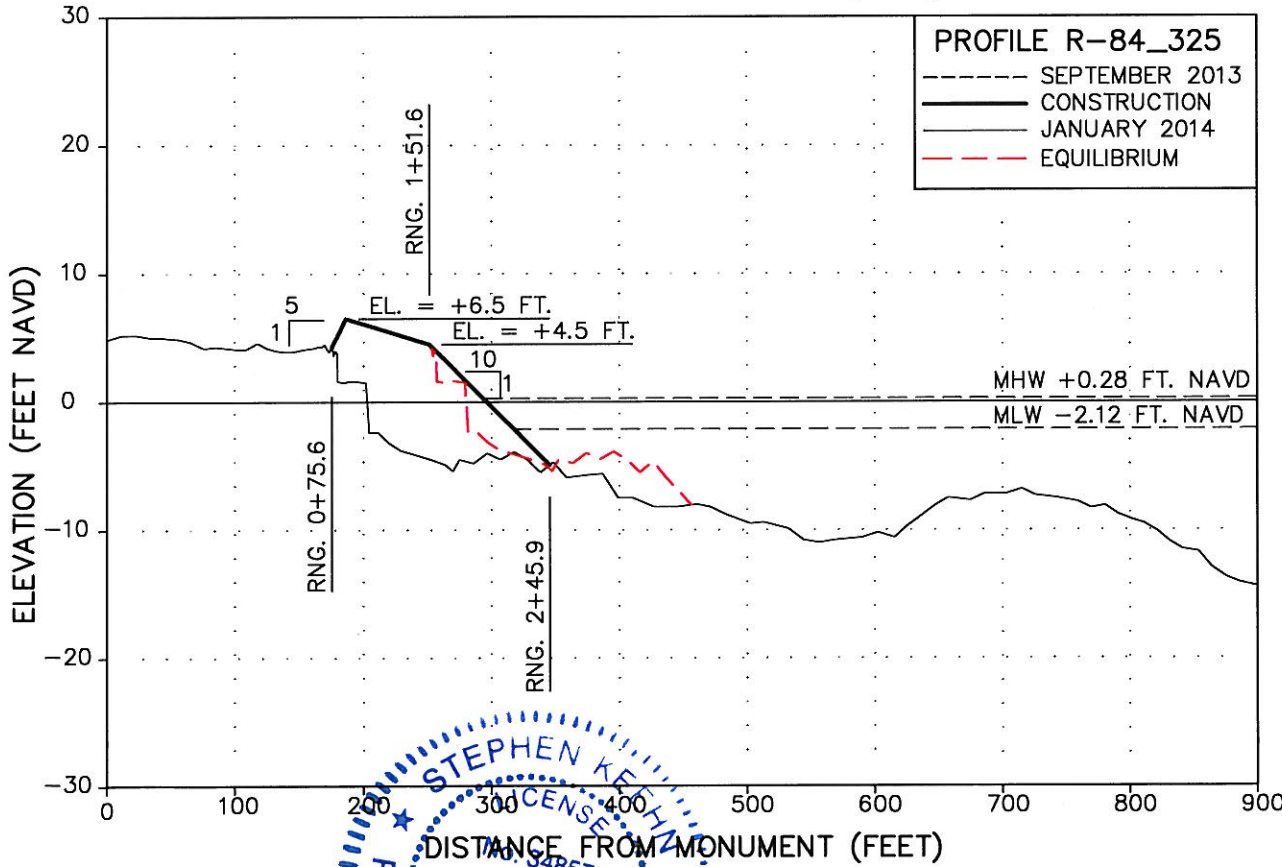
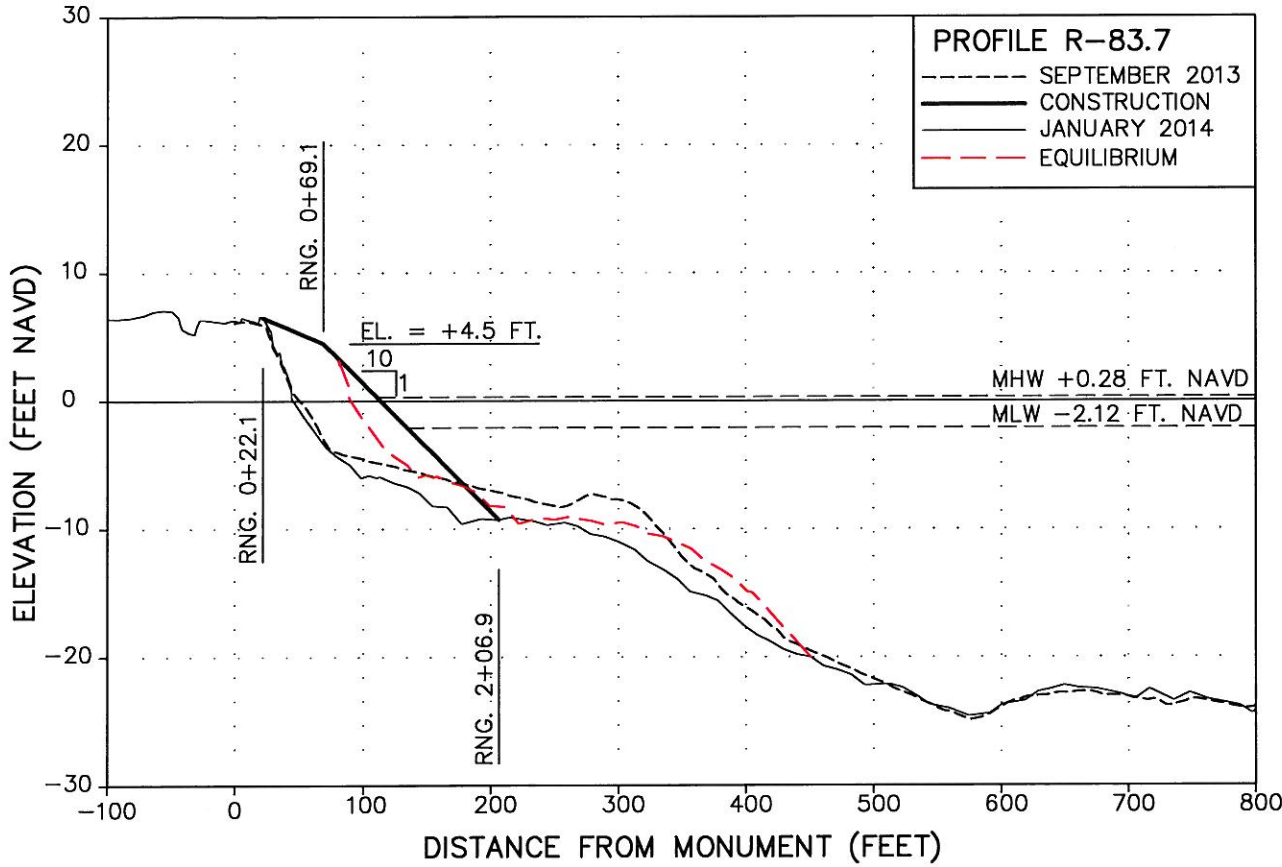


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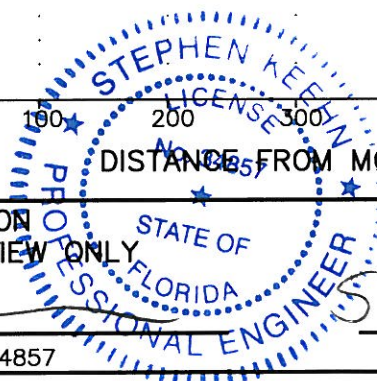
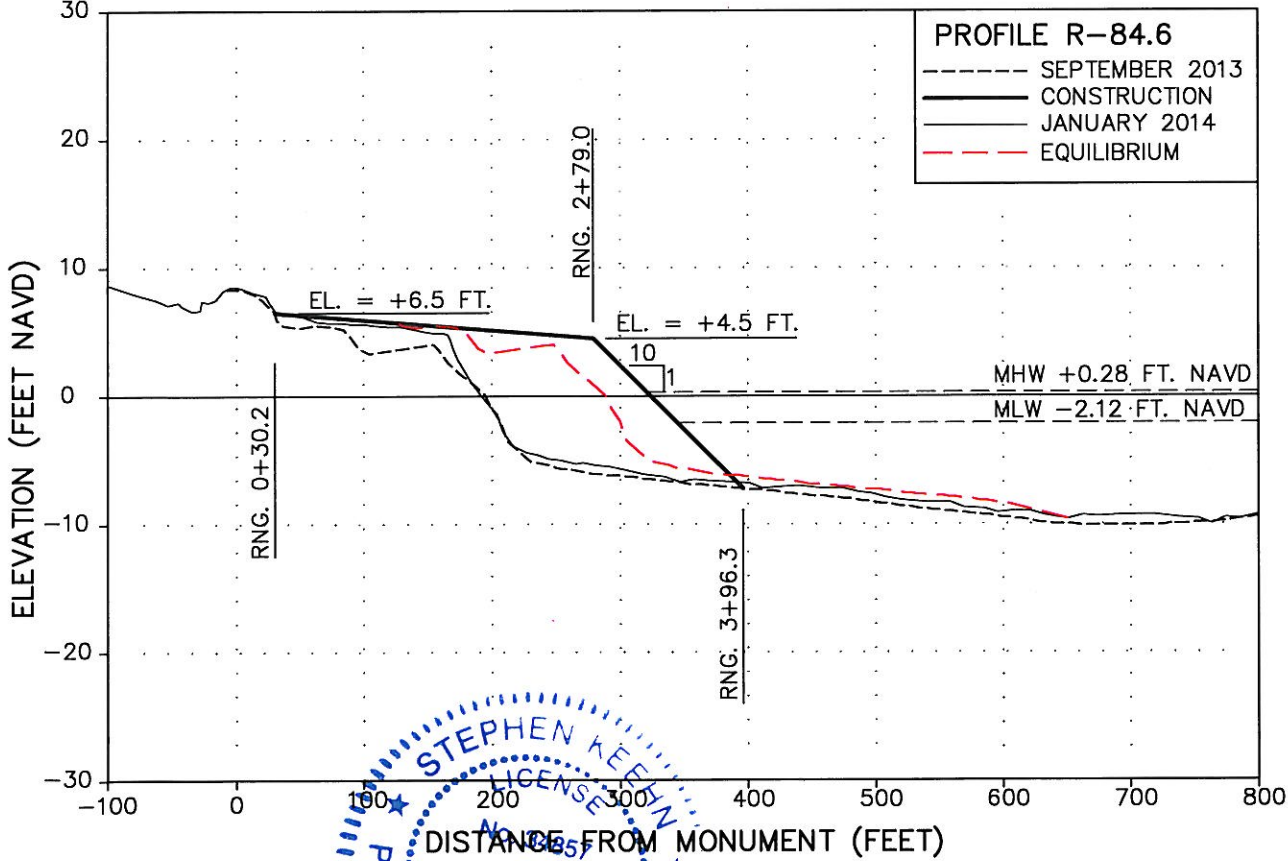
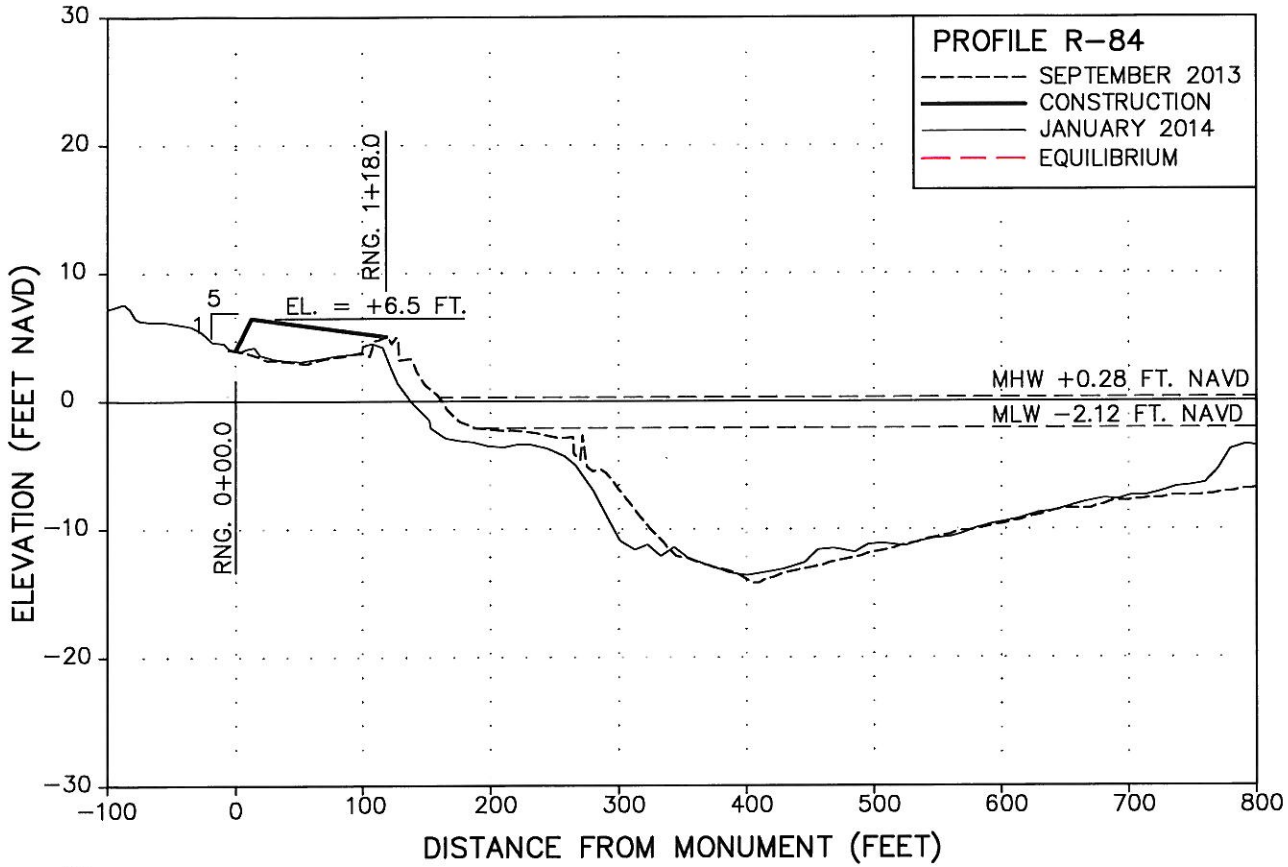
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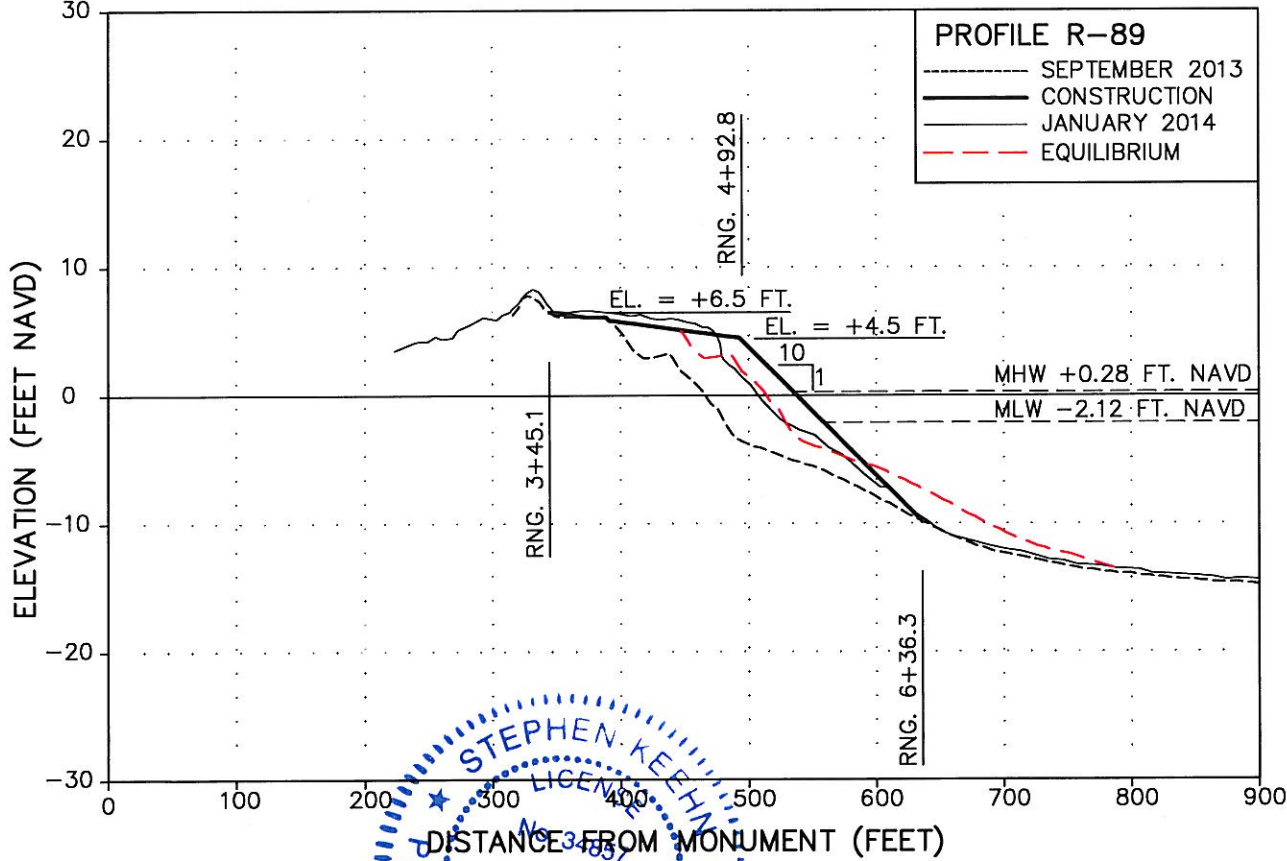
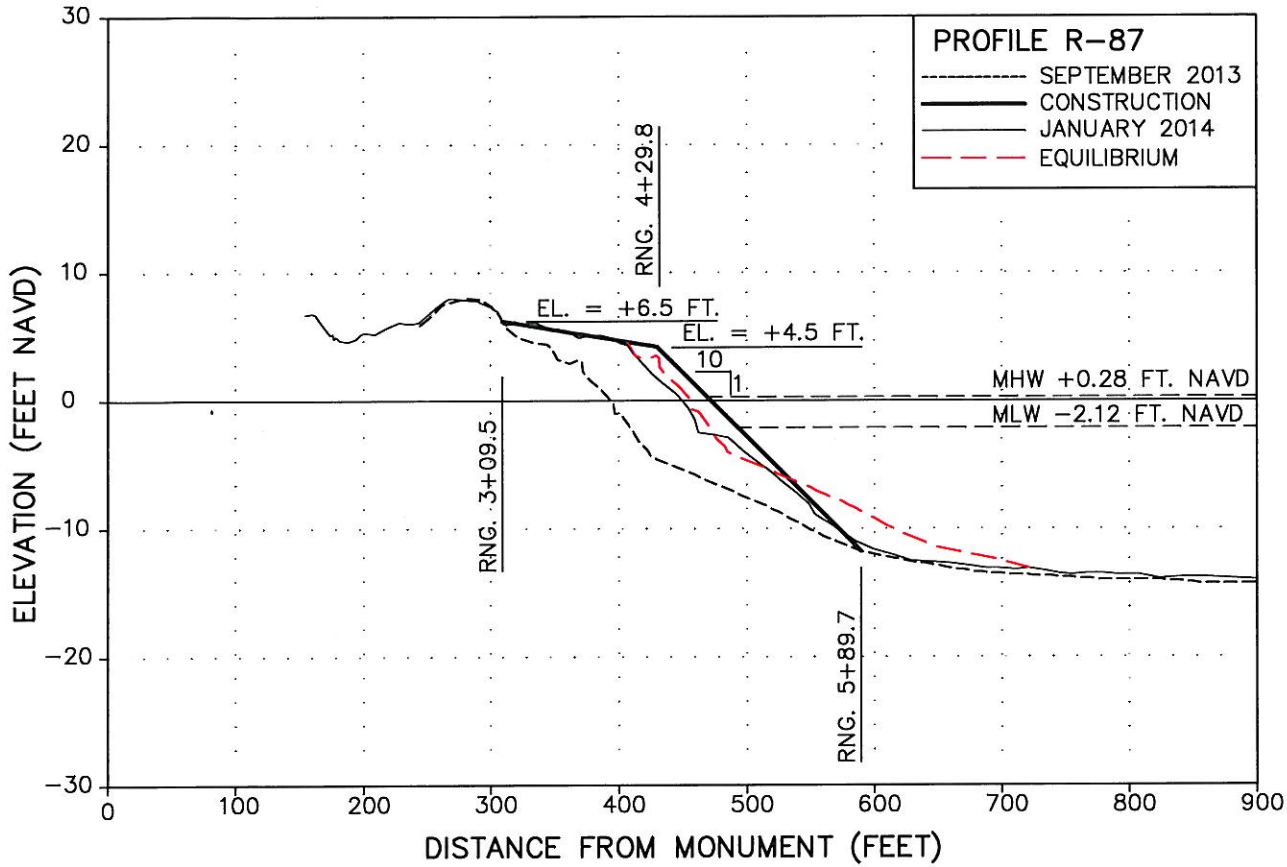
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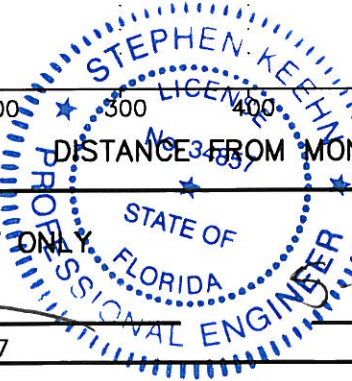
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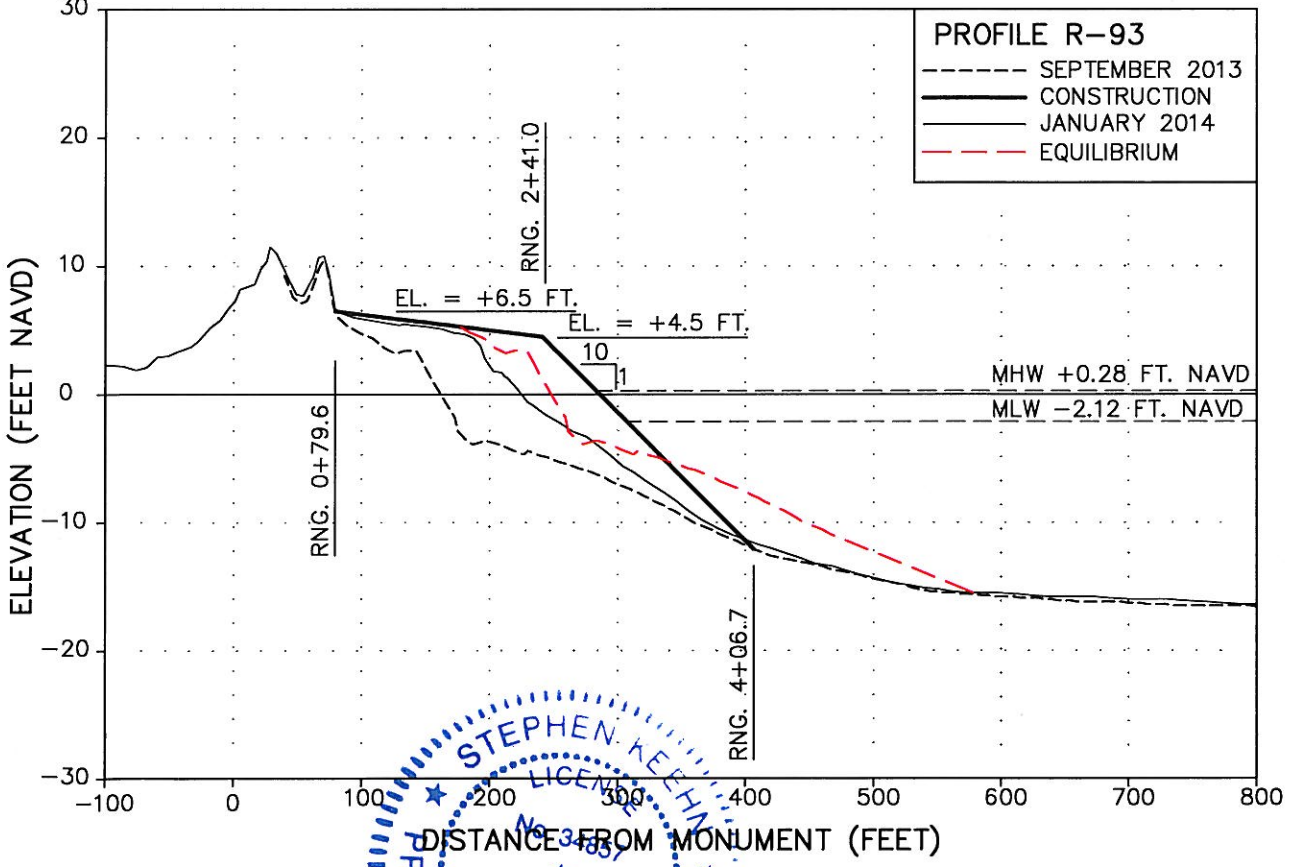
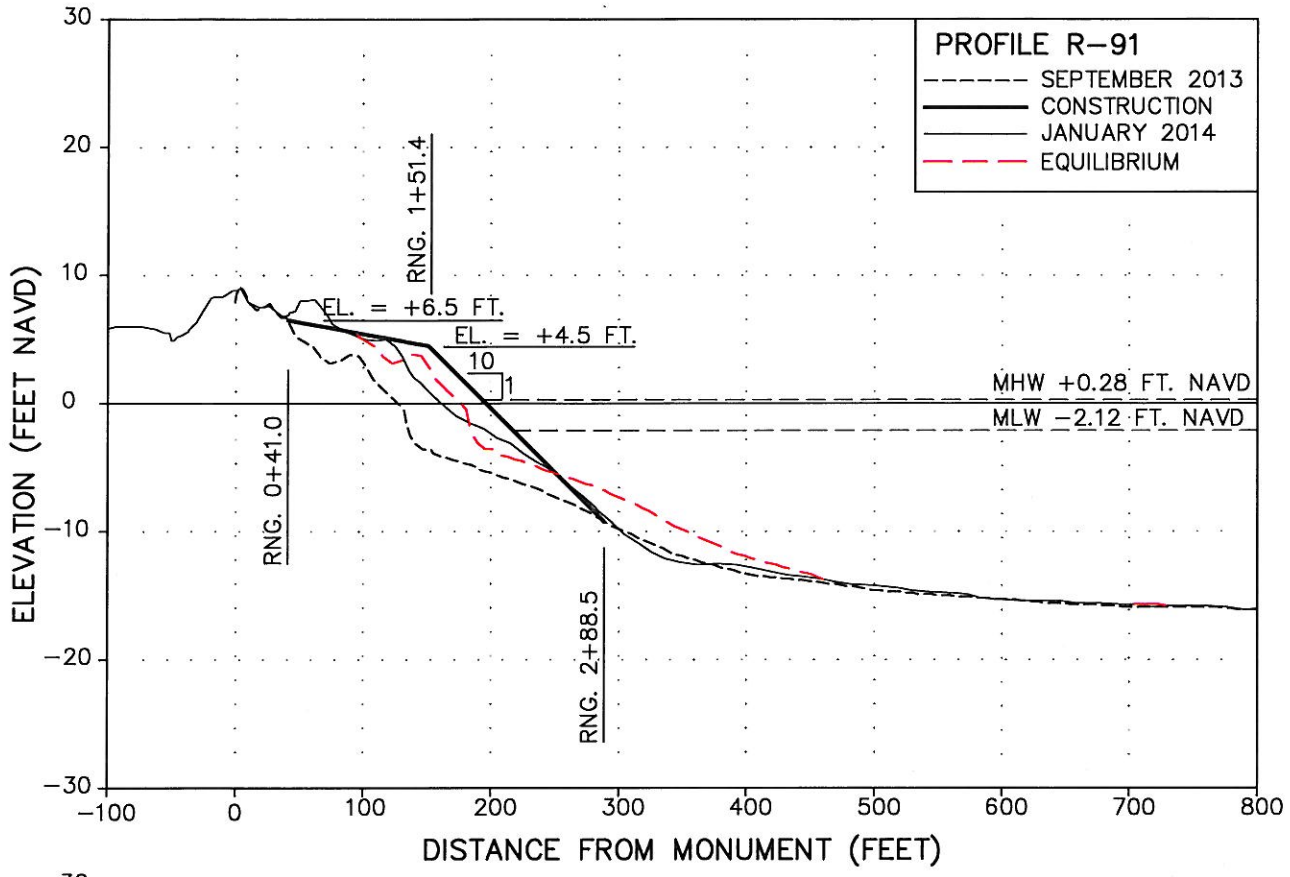
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STEPHEN KEEHN
 LICENSED PROFESSIONAL ENGINEER
 No. 34857
 STATE OF FLORIDA

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STEPHEN KEEHN P.E. No. 34857

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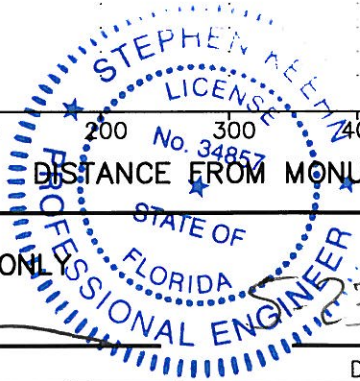
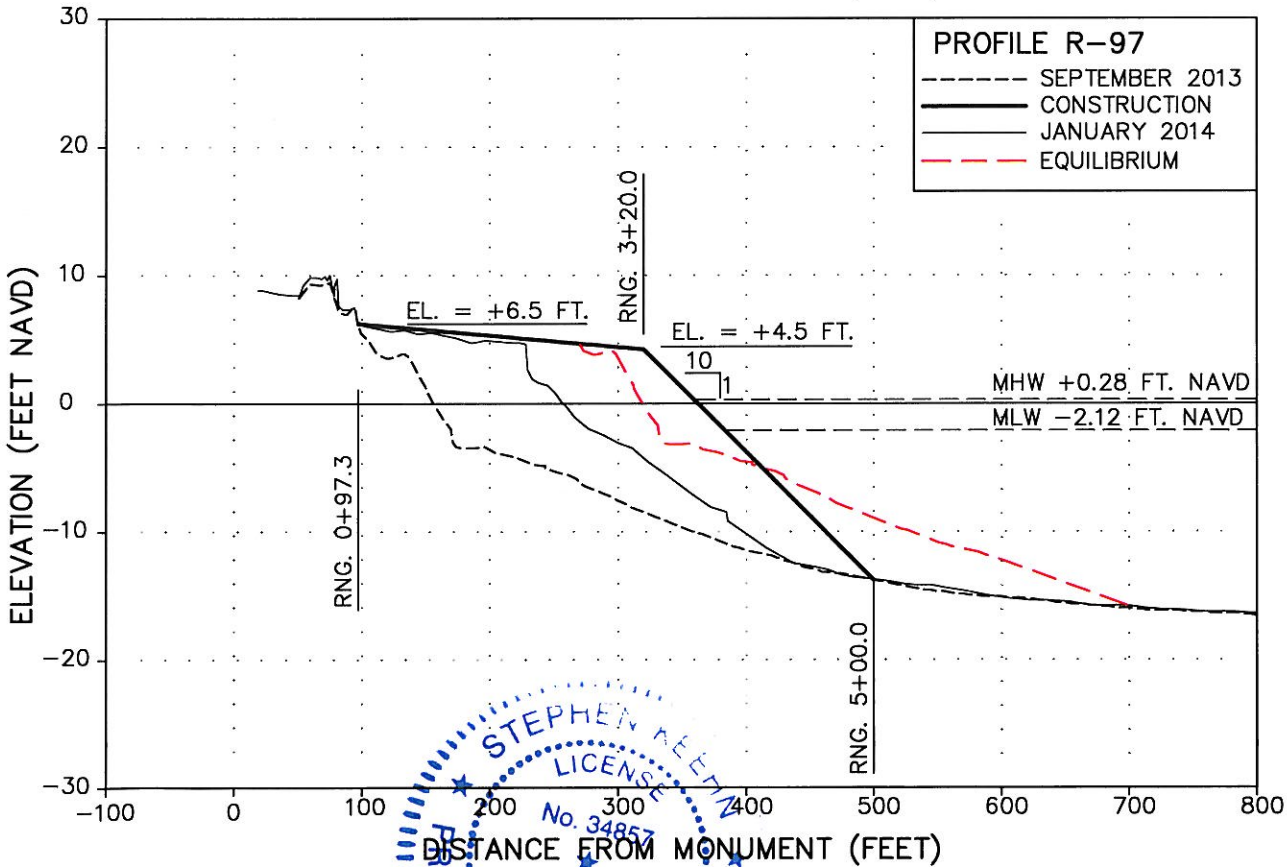
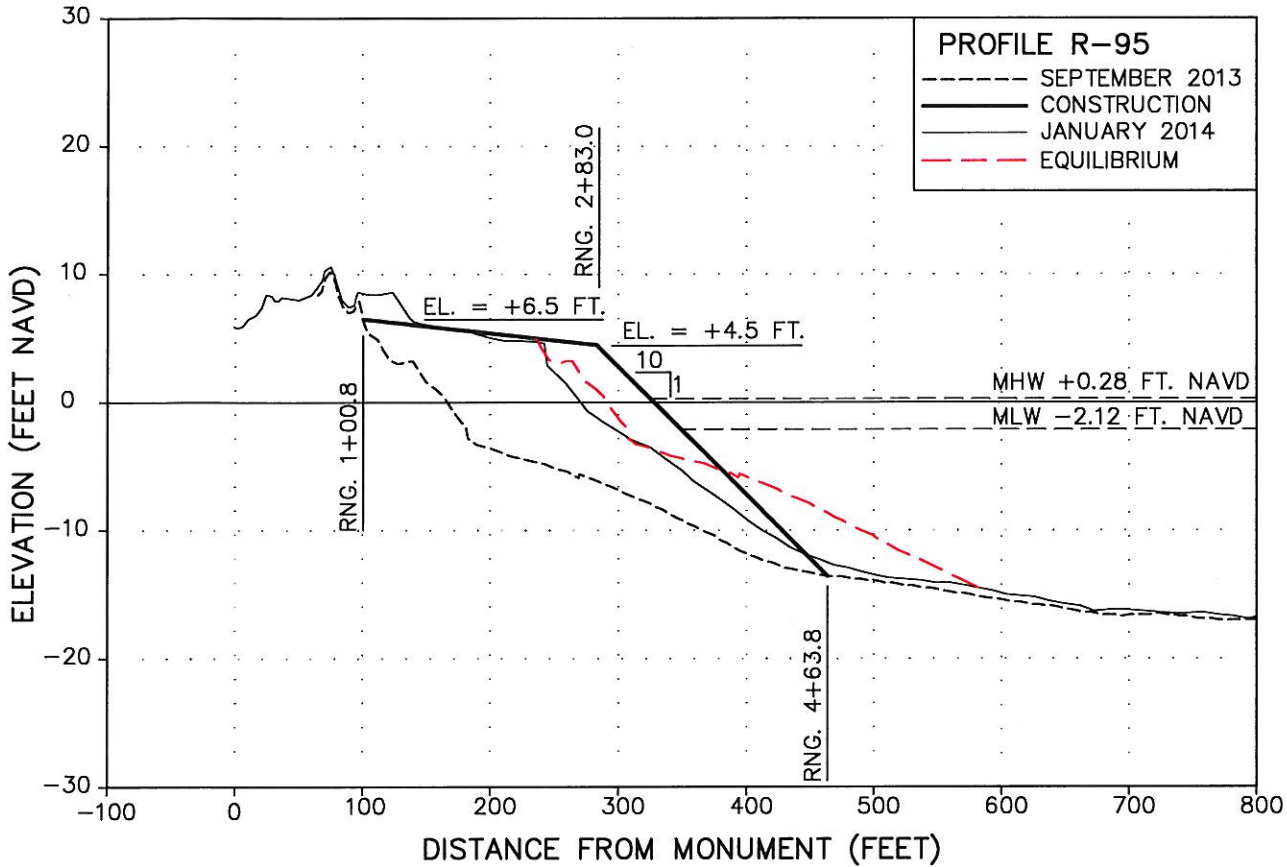
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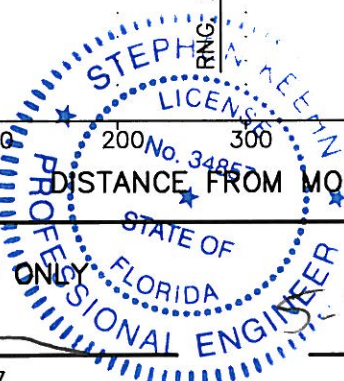
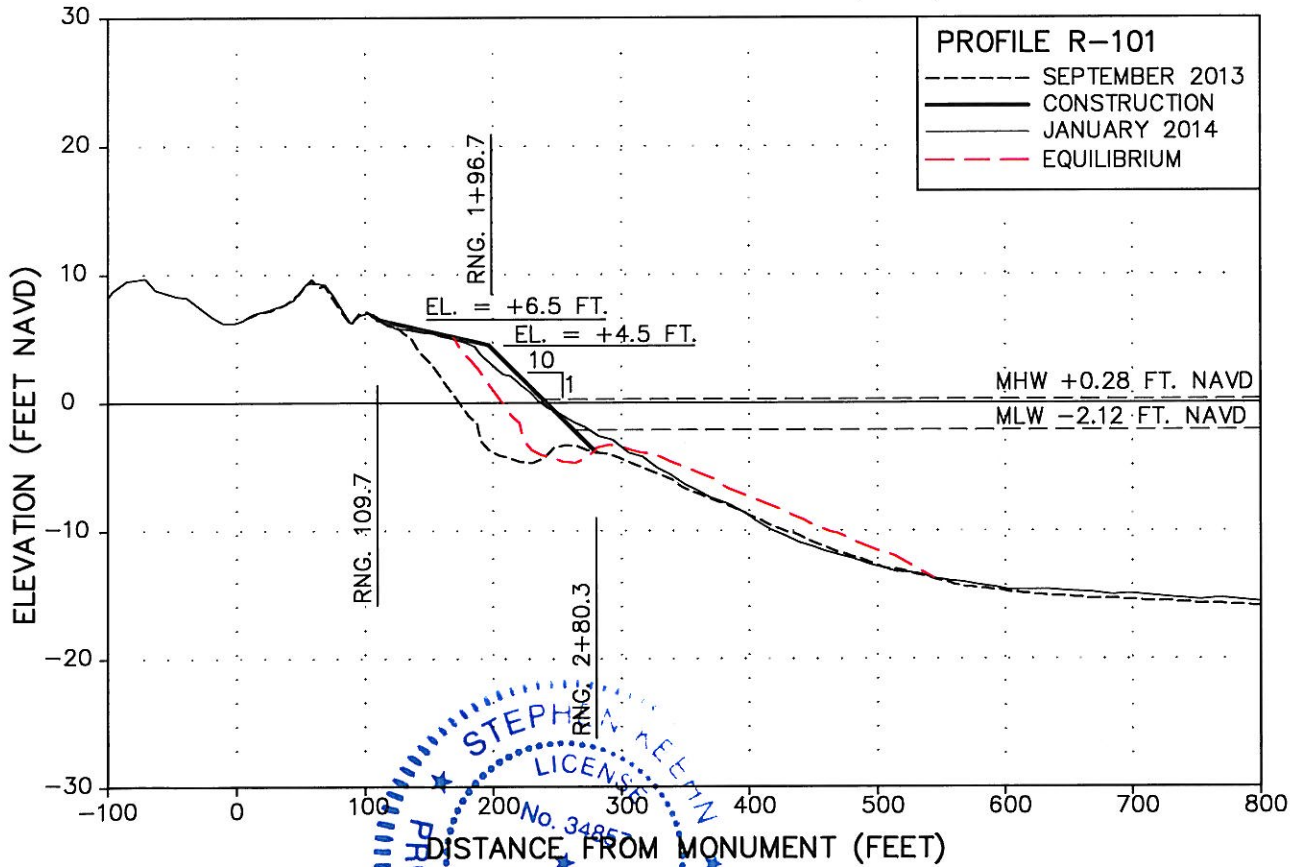
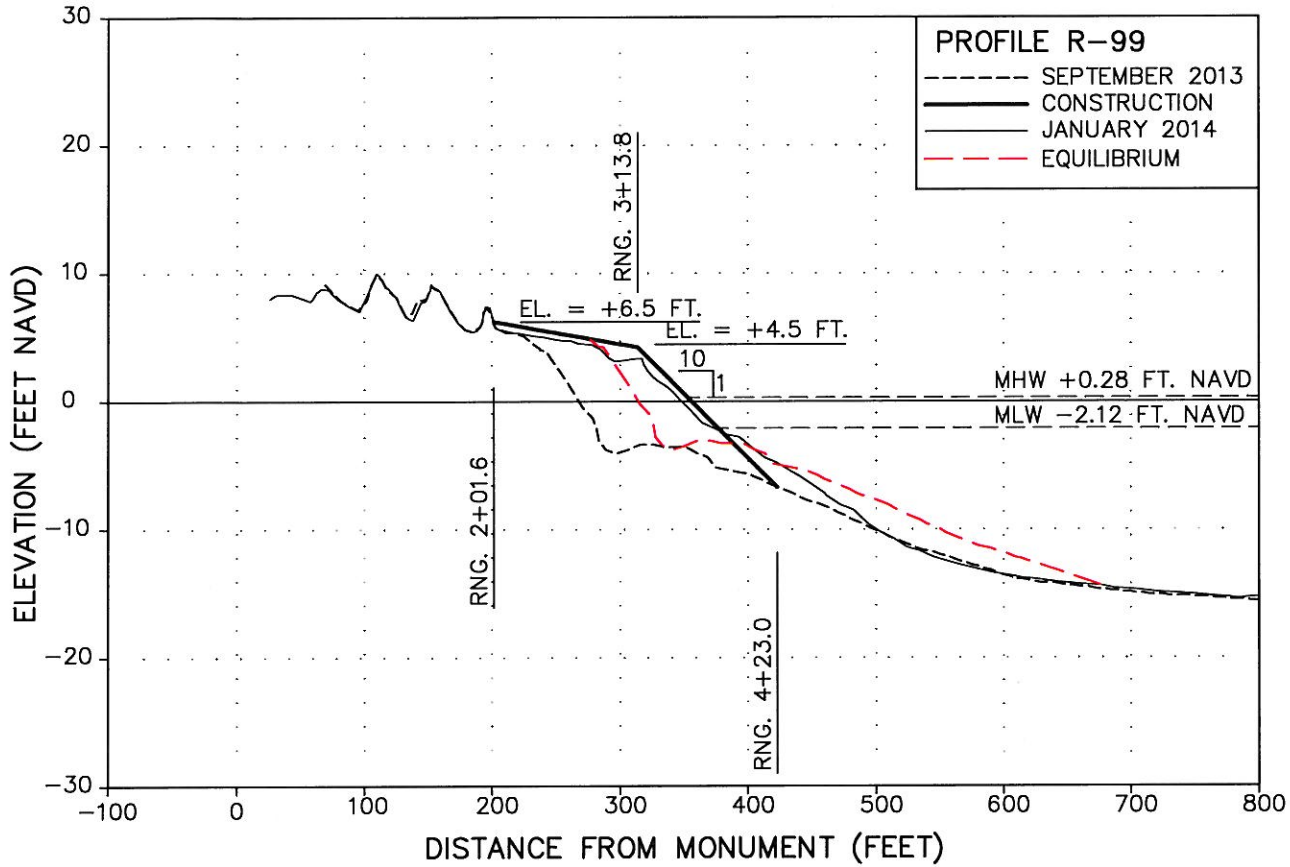
REVISIONS		
DATE	BY	DESCRIPTION

**CAPTIVA & SANIBEL ISLANDS
BEACH RENOURISHMENT PROJECT
FILL CROSS SECTIONS**

COASTAL PLANNING & ENGINEERING, INC.
A CB&I COMPANY
2485 N.W. BOCCA RATON BOULEVARD
BOCCA RATON, FLORIDA 33431
www.CPE.com
PH: (954) 394-4102
FAX: (954) 391-9115
C.S.A. #L-9429

DATE: 3/3/14
BY: GK
COMM NO.: 150455
SHEET: 12

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STEPHEN KEEHN P.E. No. 34857

DATE

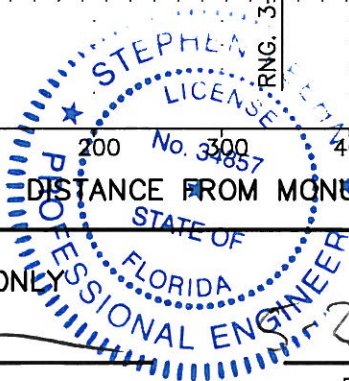
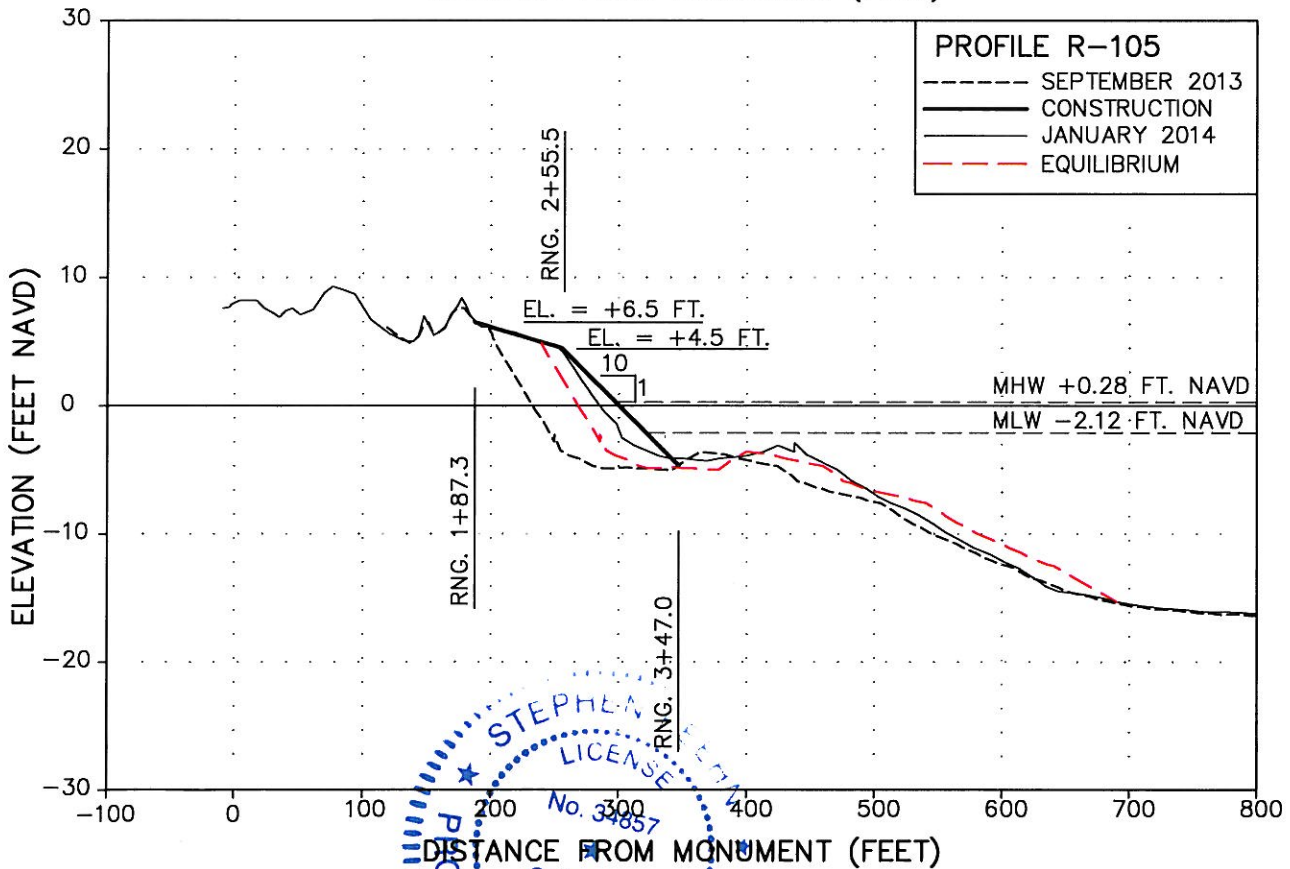
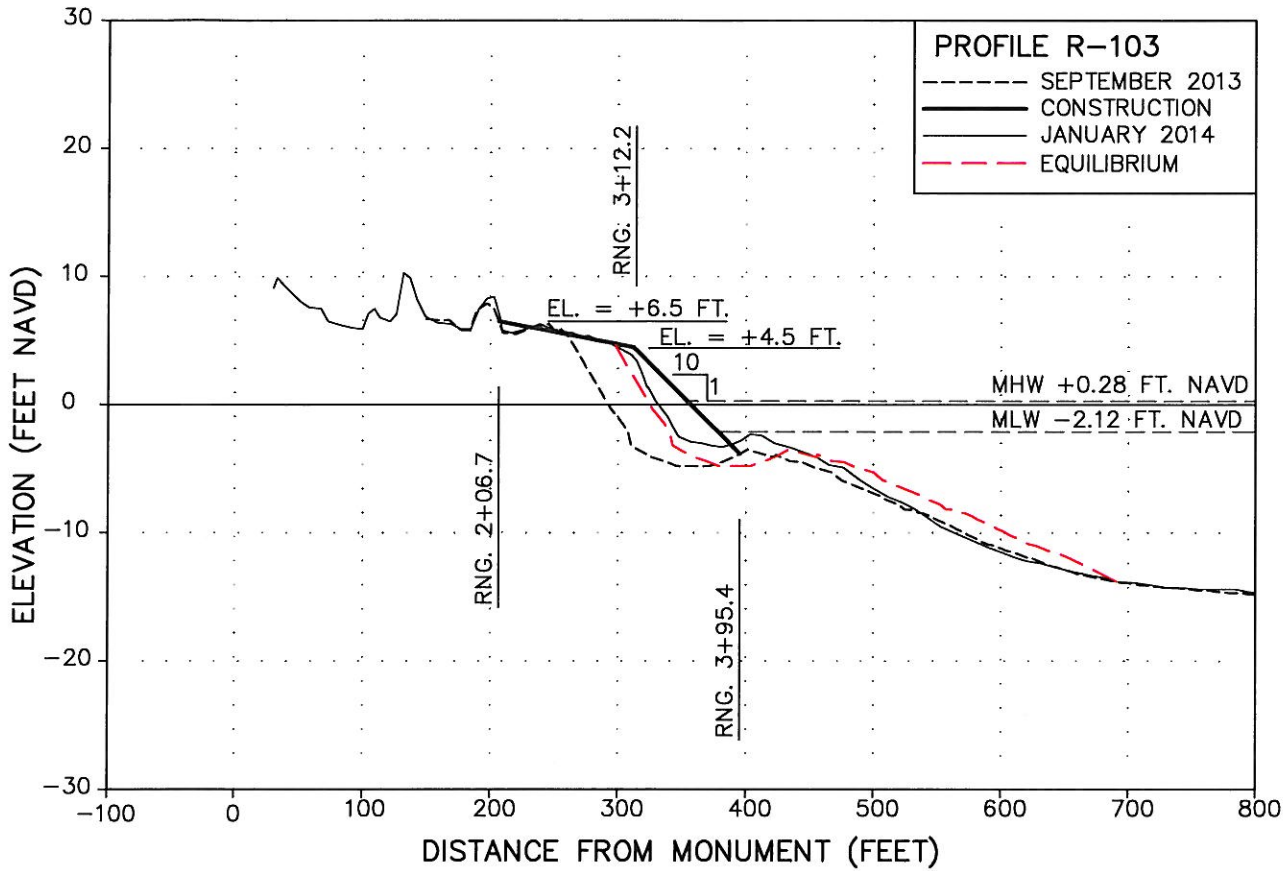
REVISIONS		
DATE	BY	DESCRIPTION

**CAPTIVA & SANIBEL ISLANDS
BEACH RENOURISHMENT PROJECT
FILL CROSS SECTIONS**

COASTAL PLANNING & ENGINEERING, INC.
A C&E COMPANY
2485 NW BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
www.CPE.com
PH: (954) 394-4102
FAX: (954) 394-4116
C.O.A. #L 84028

DATE: 3/3/14
BY: GK
COMM NO.: 150455
SHEET: 13

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STEPHEN KEEHN P.E. No. 34857 DATE 23-14

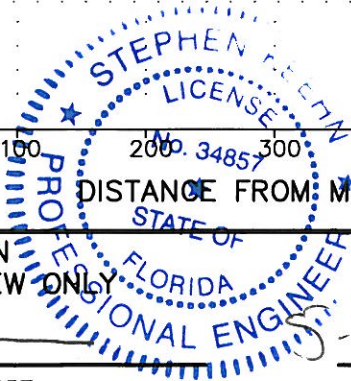
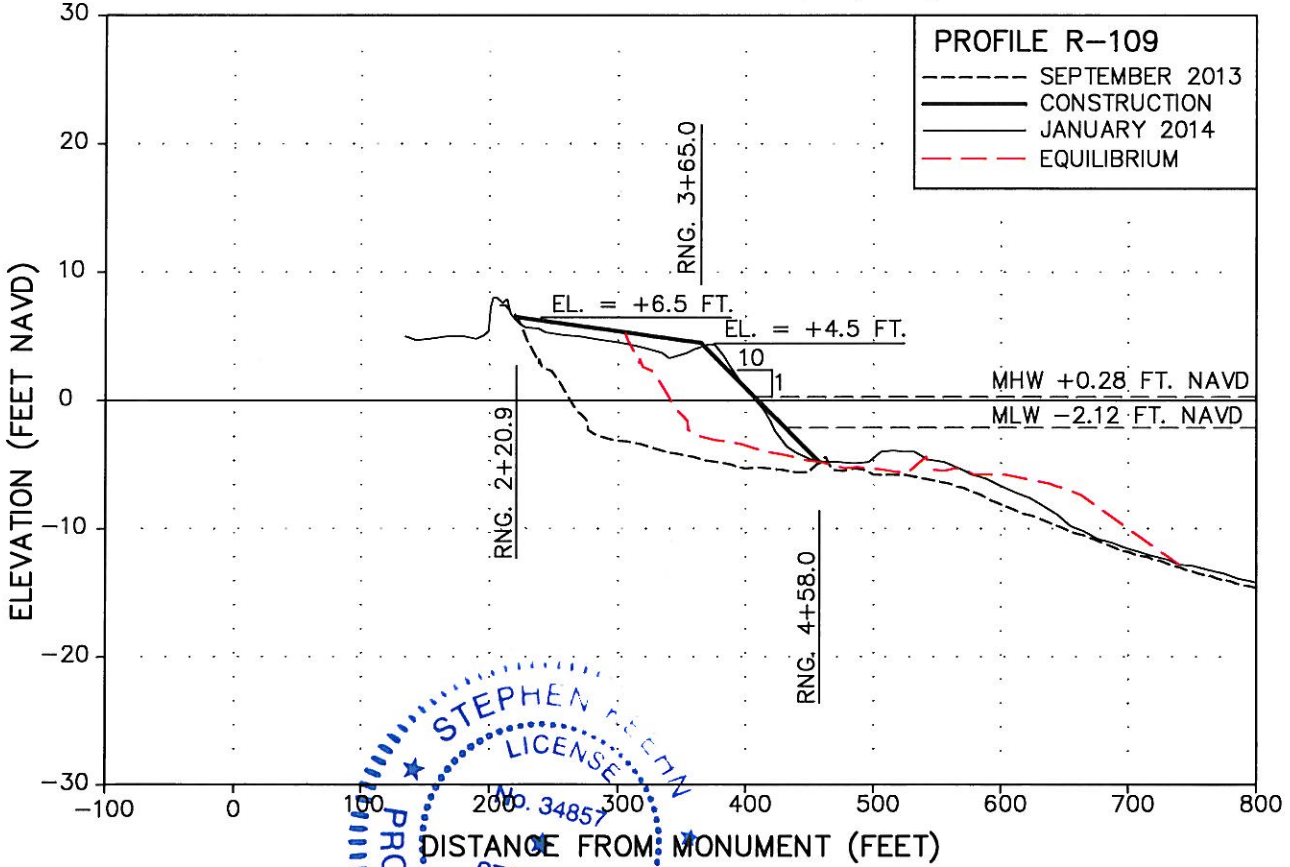
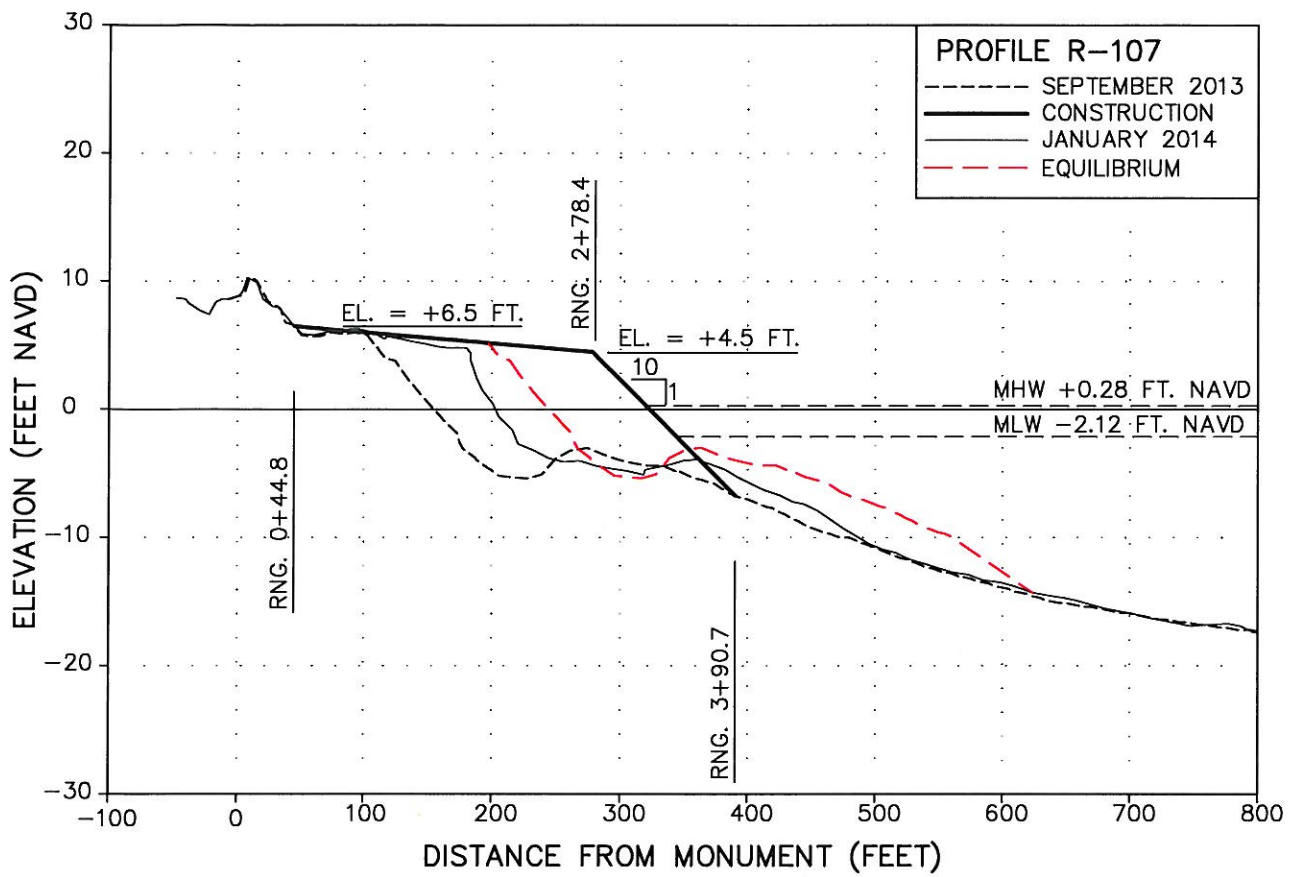
REVISIONS		
DATE	BY	DESCRIPTION

**CAPTIVA & SANIBEL ISLANDS
BEACH RENOURISHMENT PROJECT
FILL CROSS SECTIONS**

COASTAL PLANNING & ENGINEERING, INC.
A CBEI COMPANY
2481 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
www.CBEI.com
PH: (954) 391-9102
FAX: (954) 391-9116
C.O.A. #L 84028

DATE: 3/3/14
BY: GK
COMM NO.: 150455
SHEET: 14

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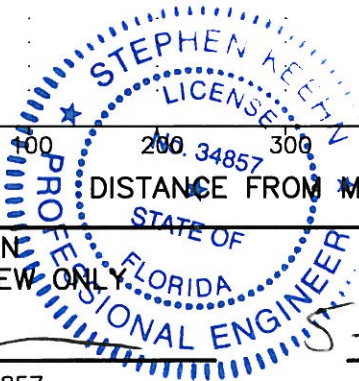
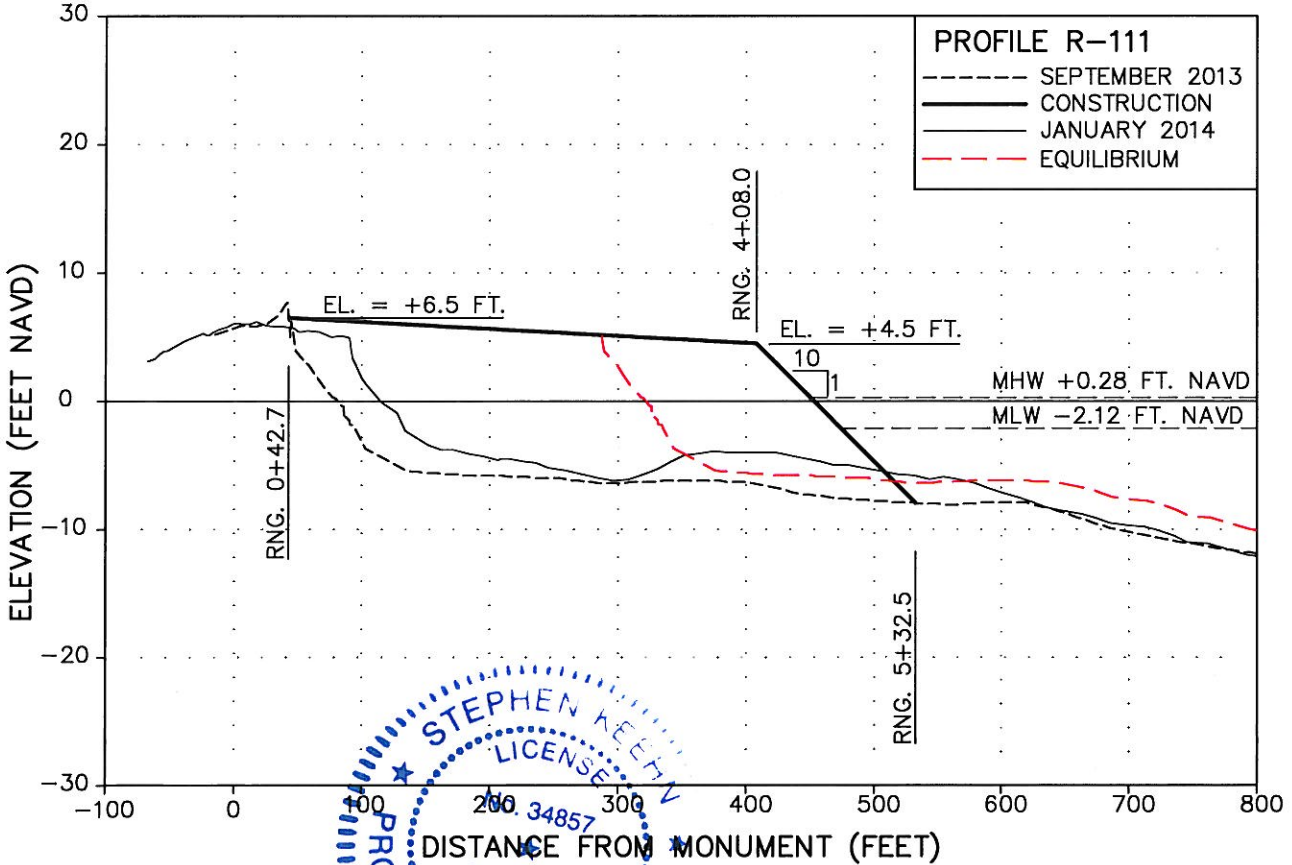
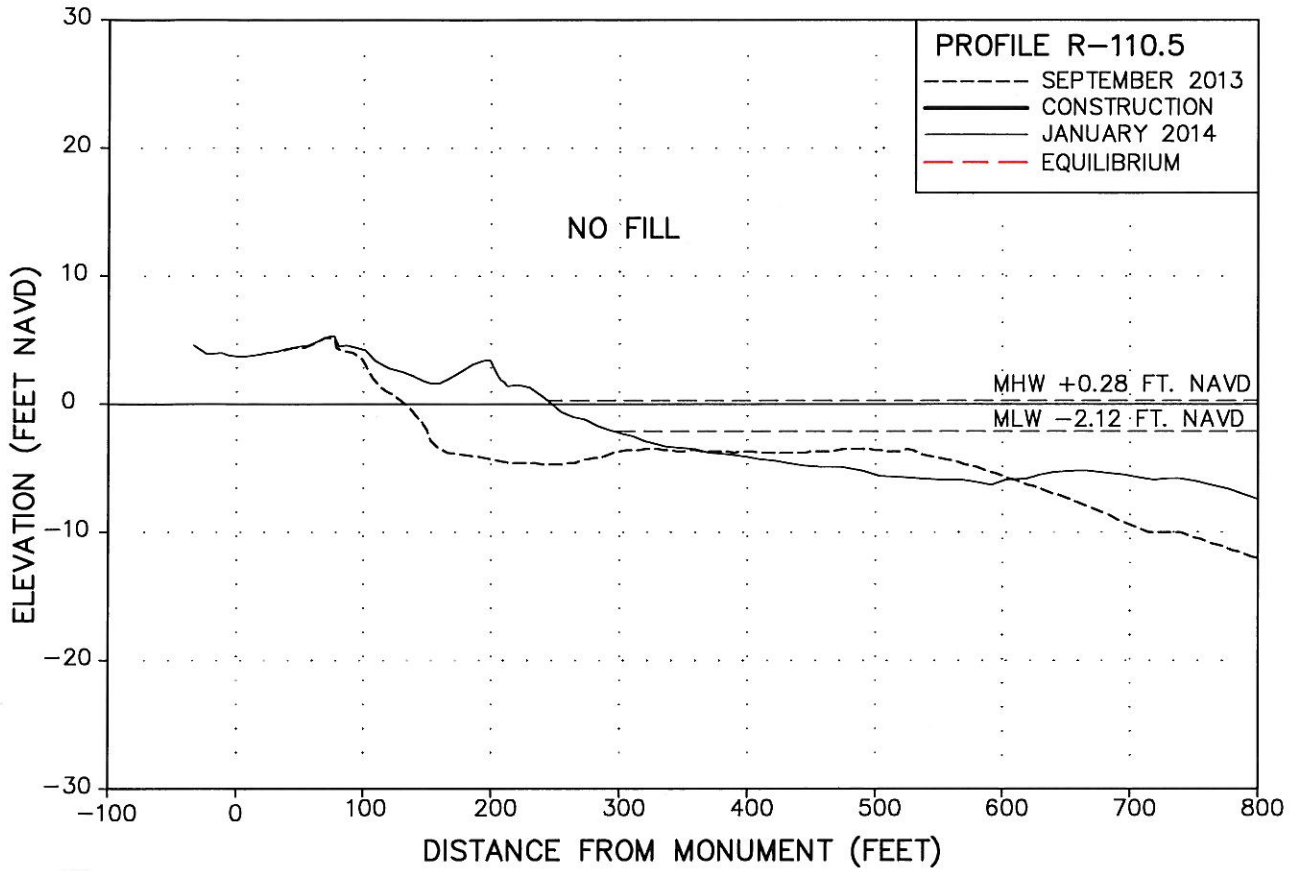
REVISIONS		
DATE	BY	DESCRIPTION

**CAPTIVA & SANIBEL ISLANDS
BEACH RENOURISHMENT PROJECT
FILL CROSS SECTIONS**

COASTAL PLANNING & ENGINEERING, INC.
A C&S&I COMPANY
 2481 N.W. BOCA RATON BOULEVARD
 BOCA RATON, FLORIDA 33431
 www.C&S&I.com
 PH: (954) 391-9102
 FAX: (954) 391-9118
 C.O.A. #4028

 DATE: 3/3/14
 BY: GK
 COMM NO.: 150455
 SHEET: 15

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STEPHEN KEEHN P.E. No. 34857

DATE

5-23-14

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**CAPTIVA & SANIBEL ISLANDS
 BEACH RENOURISHMENT PROJECT
 FILL CROSS SECTIONS**

COASTAL PLANNING & ENGINEERING, INC.
 A CB&I COMPANY
 2481 N.W. BOCA RATON BOULEVARD
 BOCA RATON, FLORIDA 33431
 www.CPE.com
 PH: (954) 361-4102
 FAX: (954) 361-4116
 C.O.A. FL #4628

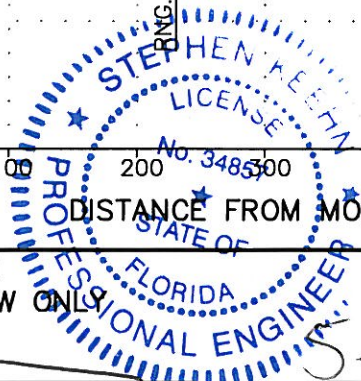
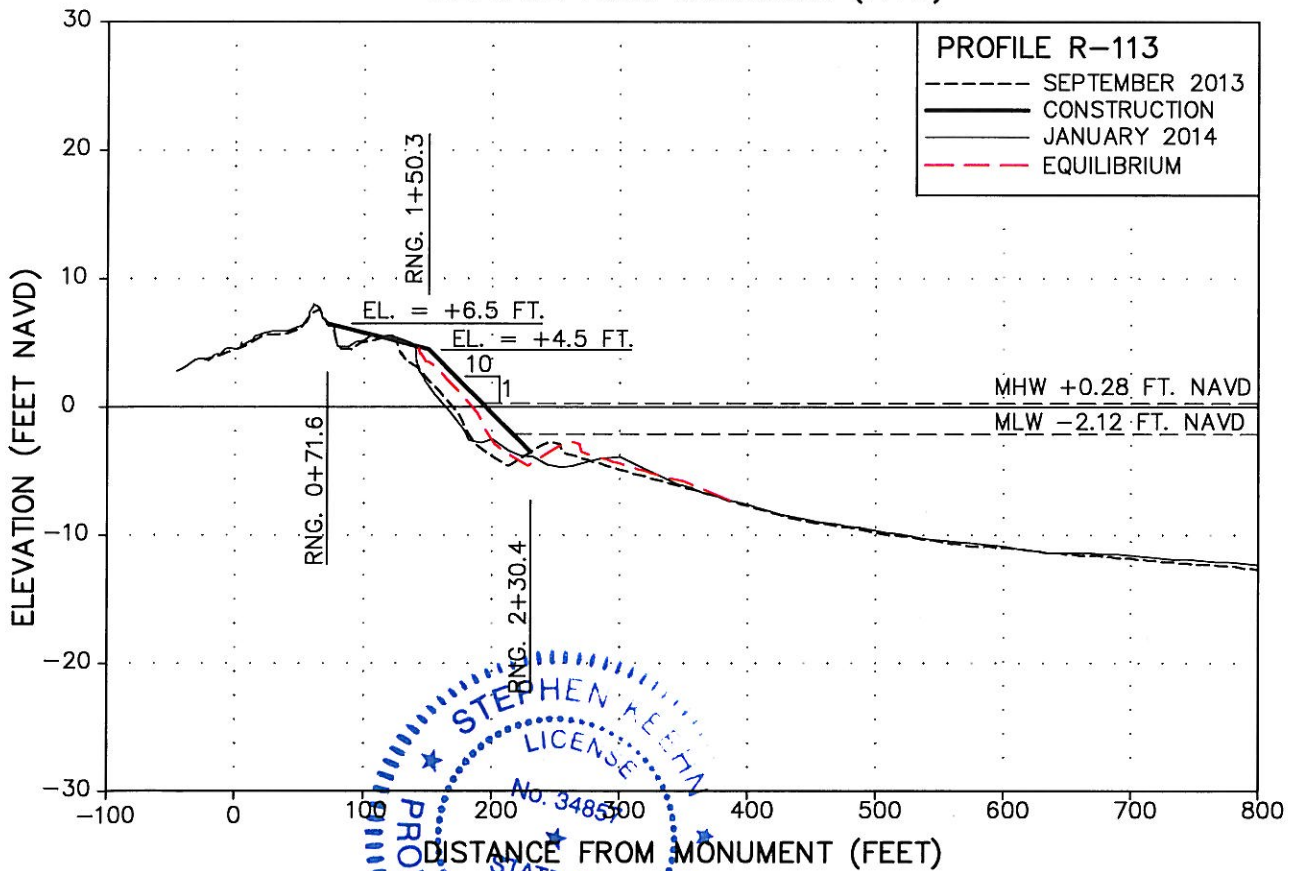
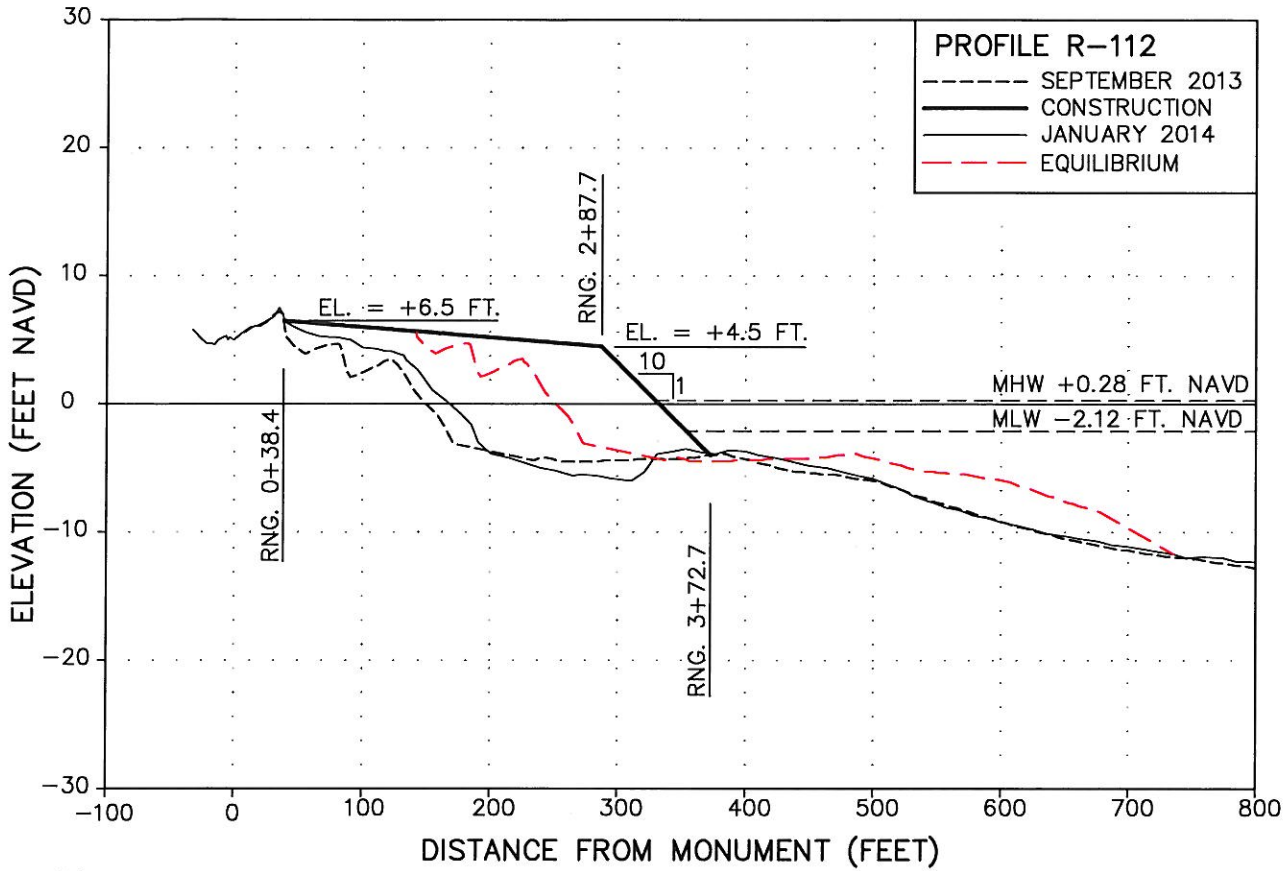
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COMM NO.:

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CAPTIVA & SANIBEL ISLANDS
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FILL CROSS SECTIONS

COASTAL PLANNING & ENGINEERING, INC.
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2481 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
www.CPE.com
PH: (954) 381-5102
FAX: (954) 381-5118
C.D.A. FL #4028

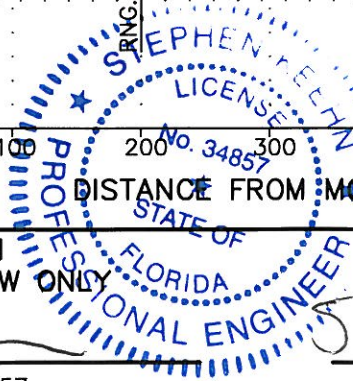
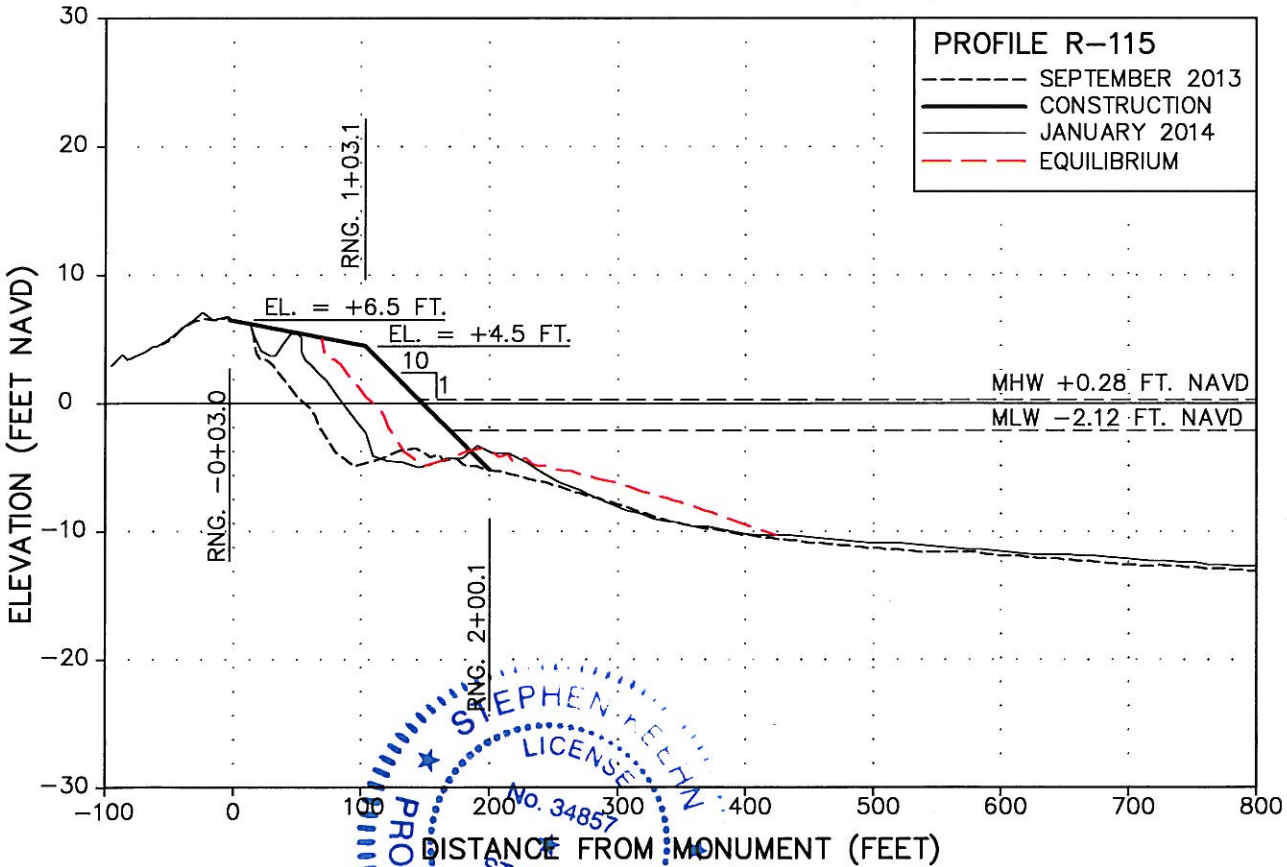
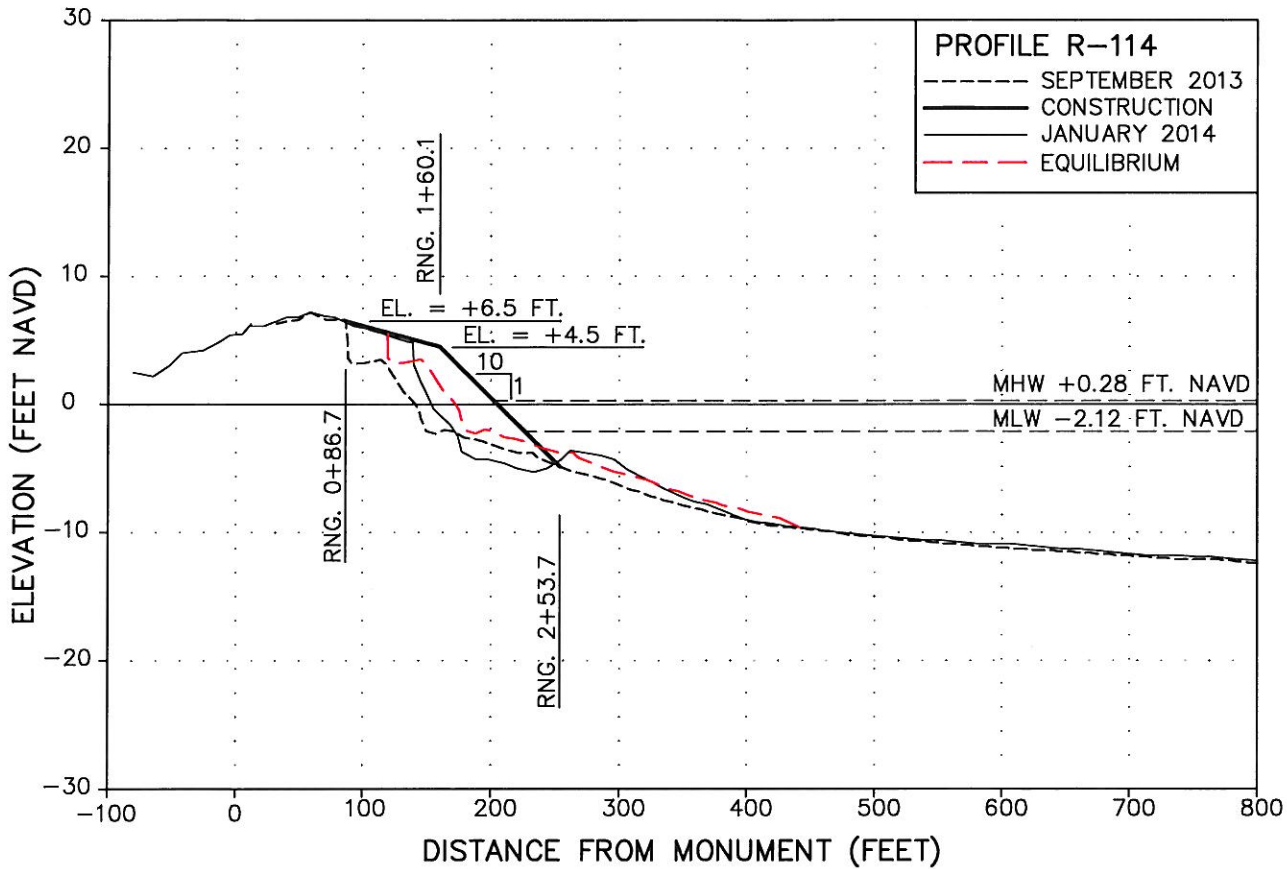
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GK

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150455

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STEPHEN KEENN P.E. No. 34857

5-23-14
DATE

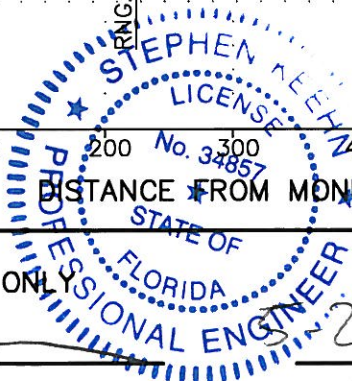
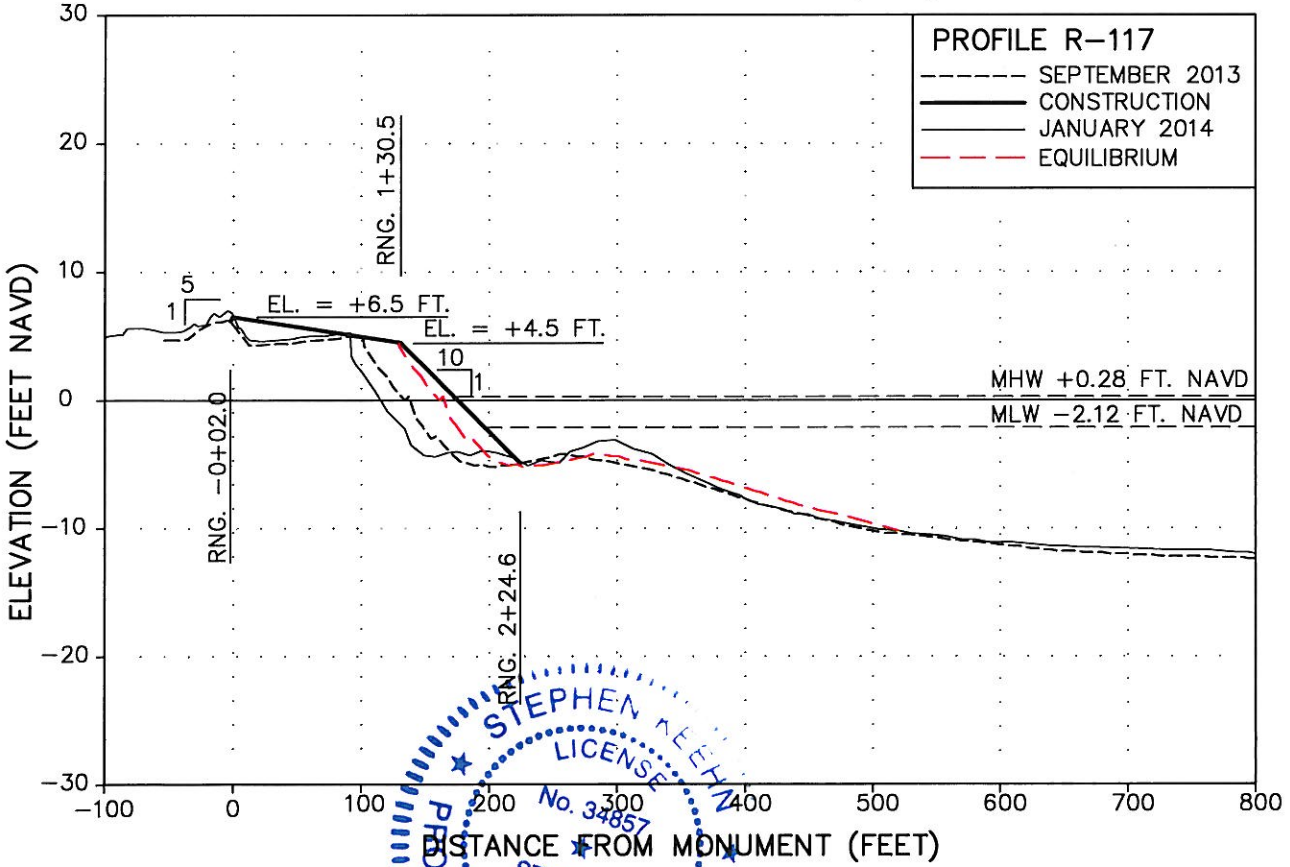
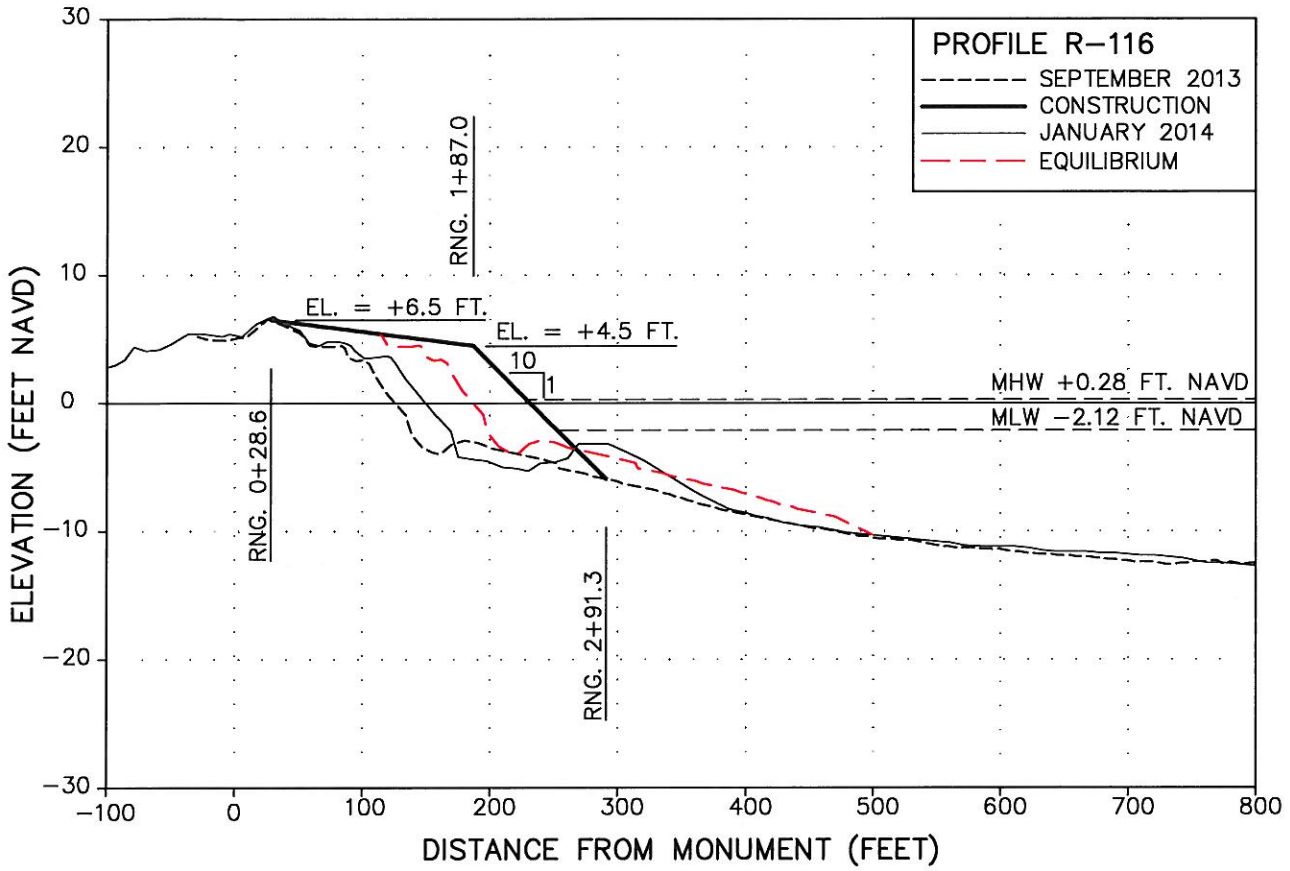
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DATE	BY	DESCRIPTION

**CAPTIVA & SANIBEL ISLANDS
BEACH RENOURISHMENT PROJECT
FILL CROSS SECTIONS**

COASTAL PLANNING & ENGINEERING, INC.
A CB&I COMPANY
2461 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
www.CPE.com
PH (954) 361-5102
FAX (954) 361-5116
C.O.A. FL. #4228

DATE: 3/3/14
BY: GK
COMM NO.: 150455
SHEET: 18

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DATE

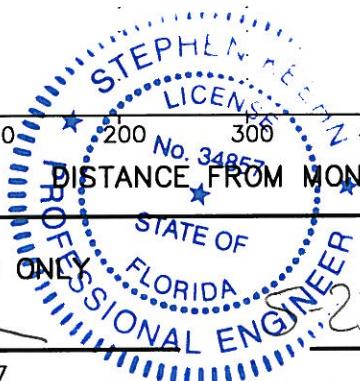
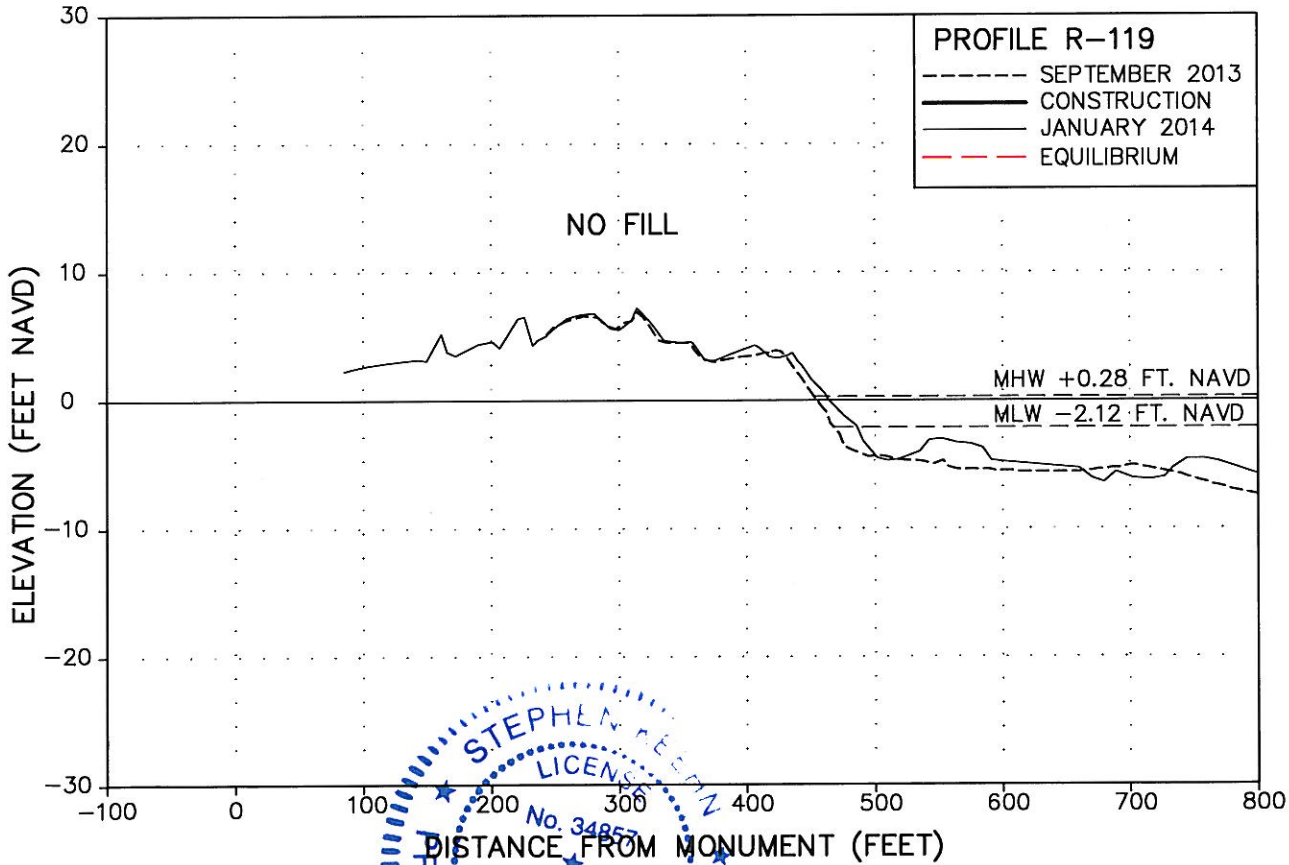
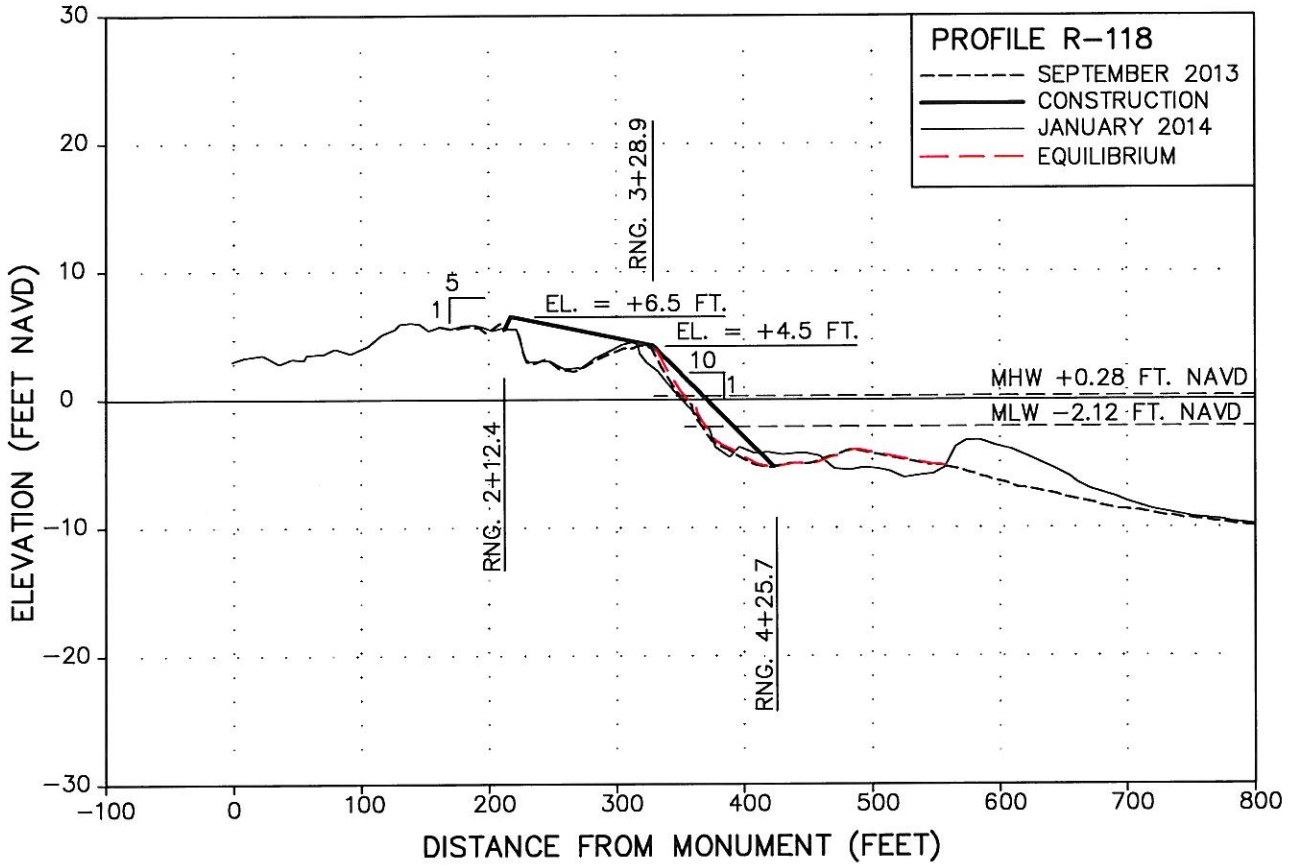
REVISIONS		
DATE	BY	DESCRIPTION

DATE:	3/3/14
BY:	GK
COMM NO.:	150455
SHEET:	19

CAPTIVA & SANIBEL ISLANDS
BEACH RENOURISHMENT PROJECT
FILL CROSS SECTIONS

COASTAL PLANNING & ENGINEERING, INC.
A C&E COMPANY
2461 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33491
www.cpe.com
PH: (954) 391-5152
FAX: (954) 391-9116
C.O.A. FL. #2028

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STEPHEN KEEHN P.E. No. 34857

DATE

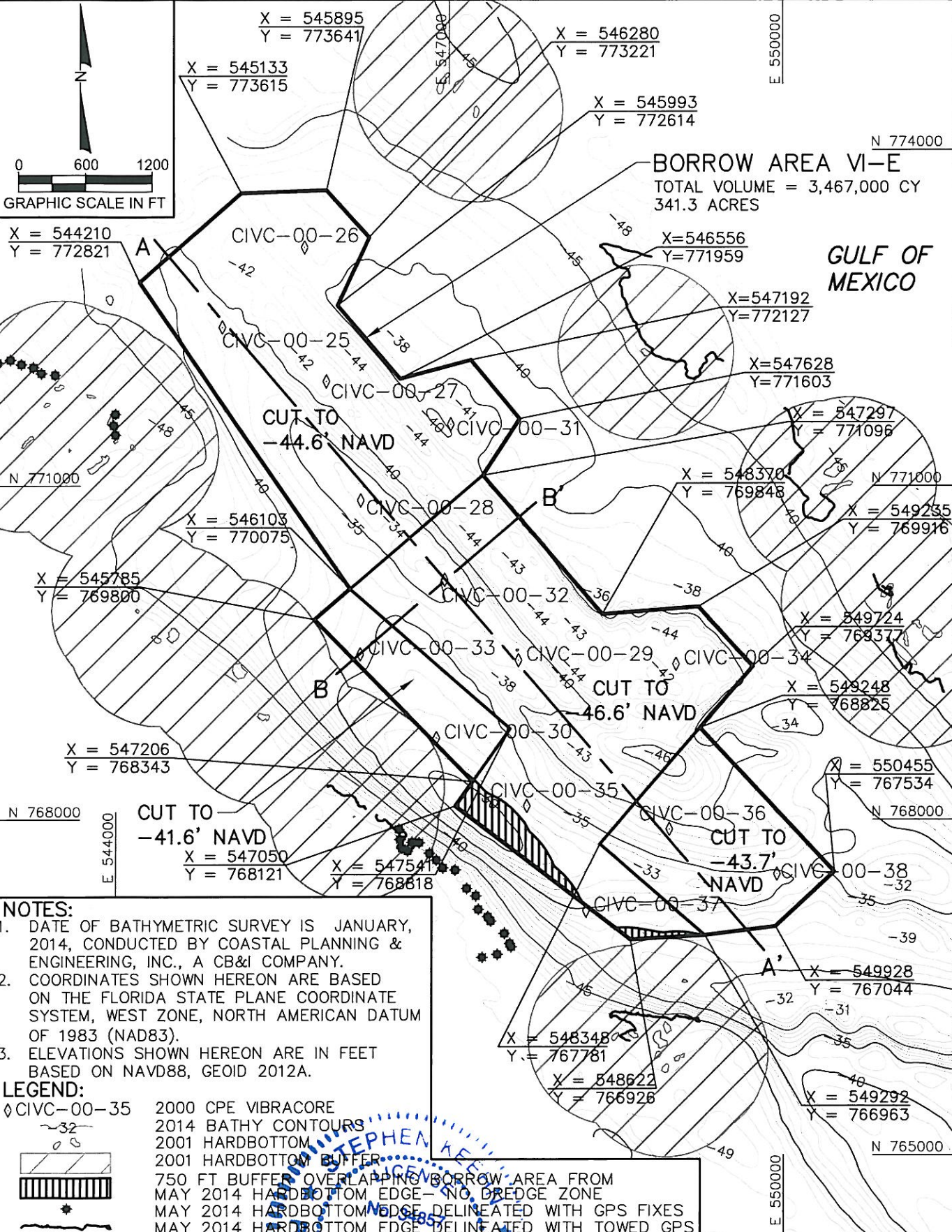
23-14

REVISIONS		
DATE	BY	DESCRIPTION

**CAPTIVA & SANIBEL ISLANDS
 BEACH RENOURISHMENT PROJECT
 FILL CROSS SECTIONS**

COASTAL PLANNING & ENGINEERING, INC.
A CB&I COMPANY
 5484 N.W. BOCA RATON BOULEVARD
 BOCA RATON, FLORIDA 33491
 PH. (561) 391-4102
 FAX (561) 391-4116
 www.CPEI.com
 C.O.A. FL. #4028

DATE: 3/3/14
 BY: GK
 COMM NO.: 150455
 SHEET: 20



**CAPTIVA & SANIBEL ISLANDS
 BEACH RENOURISHMENT PROJECT
 BORROW AREA VI-E BATHYMETRY PLAN VIEW**

**COASTAL PLANNING & ENGINEERING, INC.
 A CB&I COMPANY**
 2484 N.W. BOCA RATON BOULEVARD
 BOCA RATON, FLORIDA 33431
 WWW.CBI.COM
 PH: (561) 391-5102
 FAX: (561) 391-9116
 C.O.A. FL. #4028

TITLE:
 DATE:
 3/3/14
 BY:
 KM
 COMM NO.:
 150455
 SHEET:
 21

- NOTES:**
- DATE OF BATHYMETRIC SURVEY IS JANUARY, 2014, CONDUCTED BY COASTAL PLANNING & ENGINEERING, INC., A CB&I COMPANY.
 - COORDINATES SHOWN HEREON ARE BASED ON THE FLORIDA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
 - ELEVATIONS SHOWN HEREON ARE IN FEET BASED ON NAVD88, GEOID 2012A.

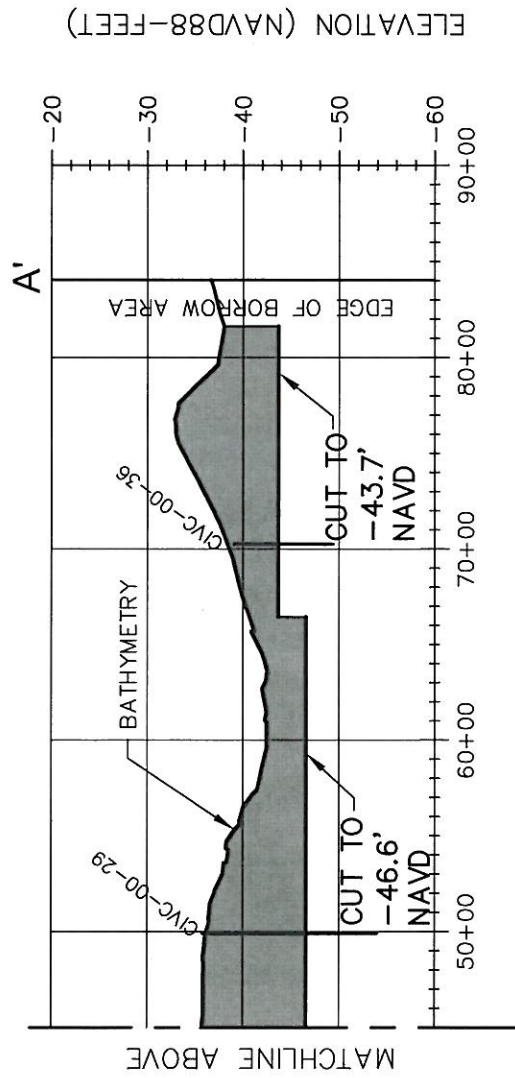
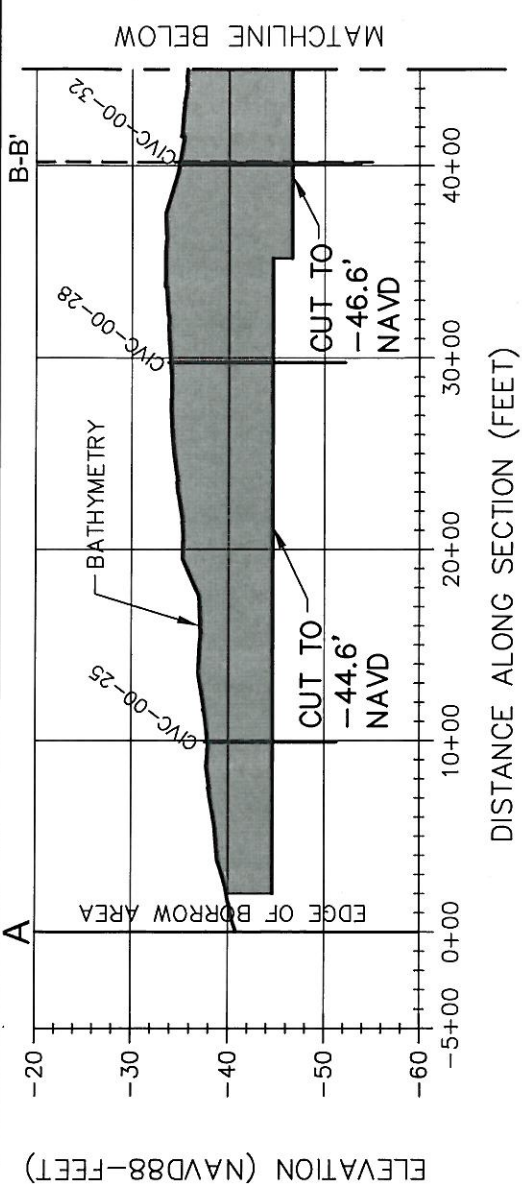
- LEGEND:**
- ◊ CIVC-00-35 2000 CPE VIBRACORE
 - ~ 32 2014 BATHY CONTOURS
 - 2001 HARDBOTTOM
 - 2001 HARDBOTTOM BUFFER
 - ▨ 750 FT BUFFER OVERLAPPING BORROW AREA FROM MAY 2014 HARDBOTTOM EDGE - NO DREDGE ZONE
 - ⋆ MAY 2014 HARDBOTTOM EDGE DELINEATED WITH GPS FIXES
 - ⋆ MAY 2014 HARDBOTTOM EDGE DELINEATED WITH TOWED GPS

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 STEPHEN KEEHN P.E. No. 34857
 DATE

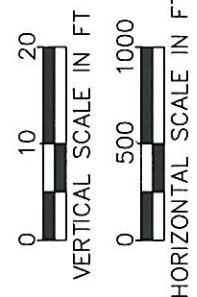
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DATE	BY	DESCRIPTION
5/22/14	KM	BA UPDATES RAI 1

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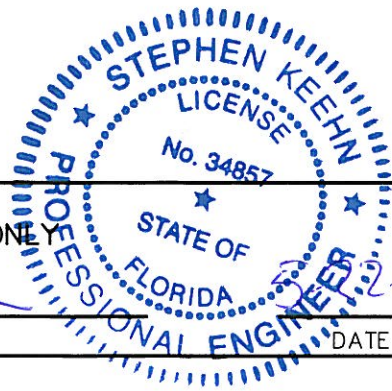


NOTES:

1. SEE SHEET 21 FOR LOCATION OF CROSS SECTION LINES.
2. ELEVATIONS SHOWN HEREON ARE IN FEET BASED ON NAVD88. GEOID 2012A.
3. DATE OF BATHYMETRIC SURVEY IS JANUARY, 2014, CONDUCTED BY COASTAL PLANNING & ENGINEERING, INC., A CB&I COMPANY.
4. CORES MAY NOT FALL DIRECTLY ON CROSS SECTION LINE, BUT ARE LOCATED SUFFICIENTLY CLOSE TO REPRESENT SIMILAR MATERIAL.
5. WIDTH OF LAYERS IS REPRESENTATIVE ONLY. MATERIAL MAY VARY.



DISTANCE ALONG SECTION (FEET)



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STEPHEN KEEHN P.E. No. 34857

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DATE	BY	DESCRIPTION

COASTAL PLANNING & ENGINEERING, INC.
A CB&I COMPANY
 2481 N.W. BOCA RATON BOULEVARD
 BOCA RATON, FLORIDA 33431
 WWW.CBIL.COM
 PH: (561) 391-8103
 FAX: (561) 391-9116
 C.O.A. FL #4028

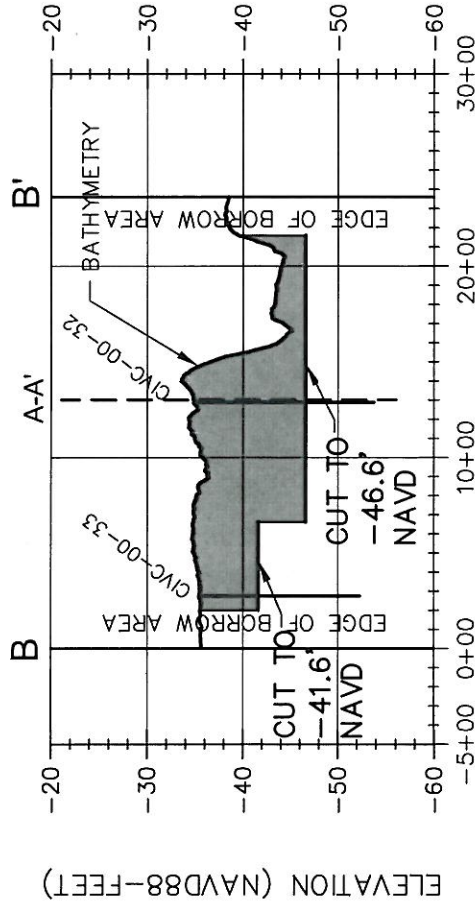
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 CAPTIVA & SANIBEL ISLANDS
 BEACH RENOURISHMENT PROJECT
 BORROW AREA VIE CROSS SECTION A-A

DATE: 3/3/14

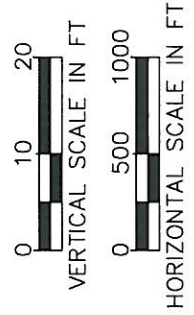
KM

COMM NO.: 150455

SHEET: 22

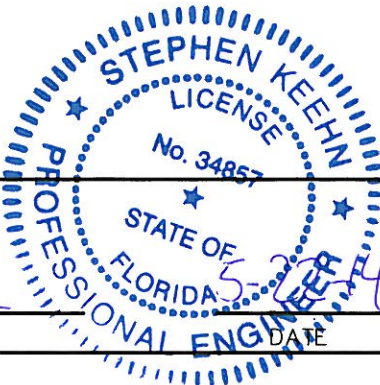


DISTANCE ALONG SECTION (FEET)



NOTES:

1. SEE SHEET 21 FOR LOCATION OF CROSS SECTION LINES.
2. ELEVATIONS SHOWN HEREON ARE IN FEET BASED ON NAVD88. GEOID 2012A.
3. DATE OF BATHYMETRIC SURVEY IS JANUARY, 2014, CONDUCTED BY COASTAL PLANNING & ENGINEERING, INC., A CB&I COMPANY.
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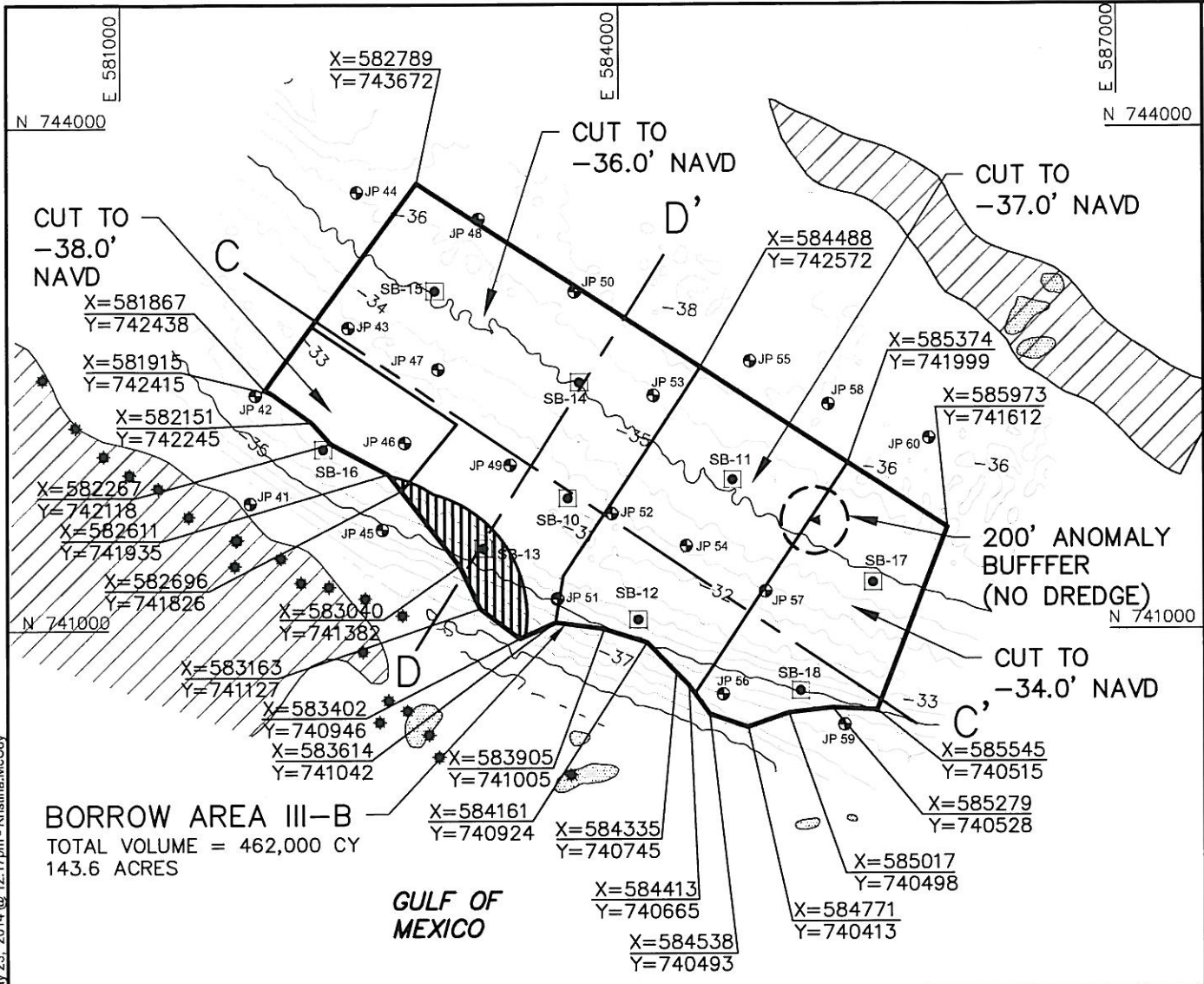
REVISIONS		
DATE	BY	DESCRIPTION

DATE:	3/3/14
BY:	KM
COMM NO.:	150455
SHEET:	23

COASTAL PLANNING & ENGINEERING, INC.
A CB&I COMPANY
 5454 NW BOCA RATON BOULEVARD
 BOCA RATON, FLORIDA 33491
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 C.O.A. EL. #4028

CAPTIVA & SANIBEL ISLANDS
BEACH RENOURISHMENT PROJECT
BORROW AREA VI-E CROSS SECTION B-B'

TITLE:



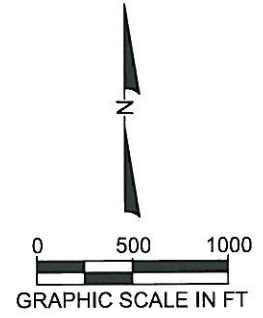
**CAPTIVA & SANIBEL ISLANDS
BEACH RENOURISHMENT PROJECT
BORROW AREA III-B BATHYMETRY PLAN VIEW**

NOTES:

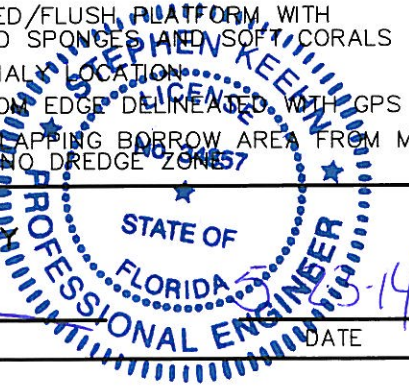
- DATE OF BATHYMETRIC SURVEY IS MARCH, 2013, CONDUCTED BY COASTAL PLANNING & ENGINEERING, INC., A CB&I COMPANY.
- COORDINATES SHOWN HEREON ARE BASED ON THE FLORIDA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
- ELEVATIONS SHOWN HEREON ARE IN FEET BASED ON NAVD88, GEOID 2012A.
- VIBRACORES WERE OBTAINED BY EXMAR, JAN. 1994 UNDER THE DIRECTION AND SUPERVISION OF CPE.
- DIVE (SCUBA) INSPECTION ON MAGNETOMETER ANOMALY ON 9/12/94 - NO OBJECT FOUND ON SURFACE.

LEGEND:

- SB-3 1993 VIBRACORES
- JP 37 1995 JET PROBES
- 32 2013 BATHYMETRIC CONTOURS
- DENOTES ROCK
- PREDOMINATELY BURIED/FLUSH PLATFORM, WITH NUMEROUS SCATTERED SPONGES AND SOFT CORALS
- MAGNETOMETER ANOMALY LOCATION
- MAY 2014 HARBOTTOM EDGE DELINEATED WITH GPS FIXES
- 750 FT BUFFER OVERLAPPING BORROW AREA FROM MAY 2014 HARBOTTOM EDGE - NO DREDGE ZONE



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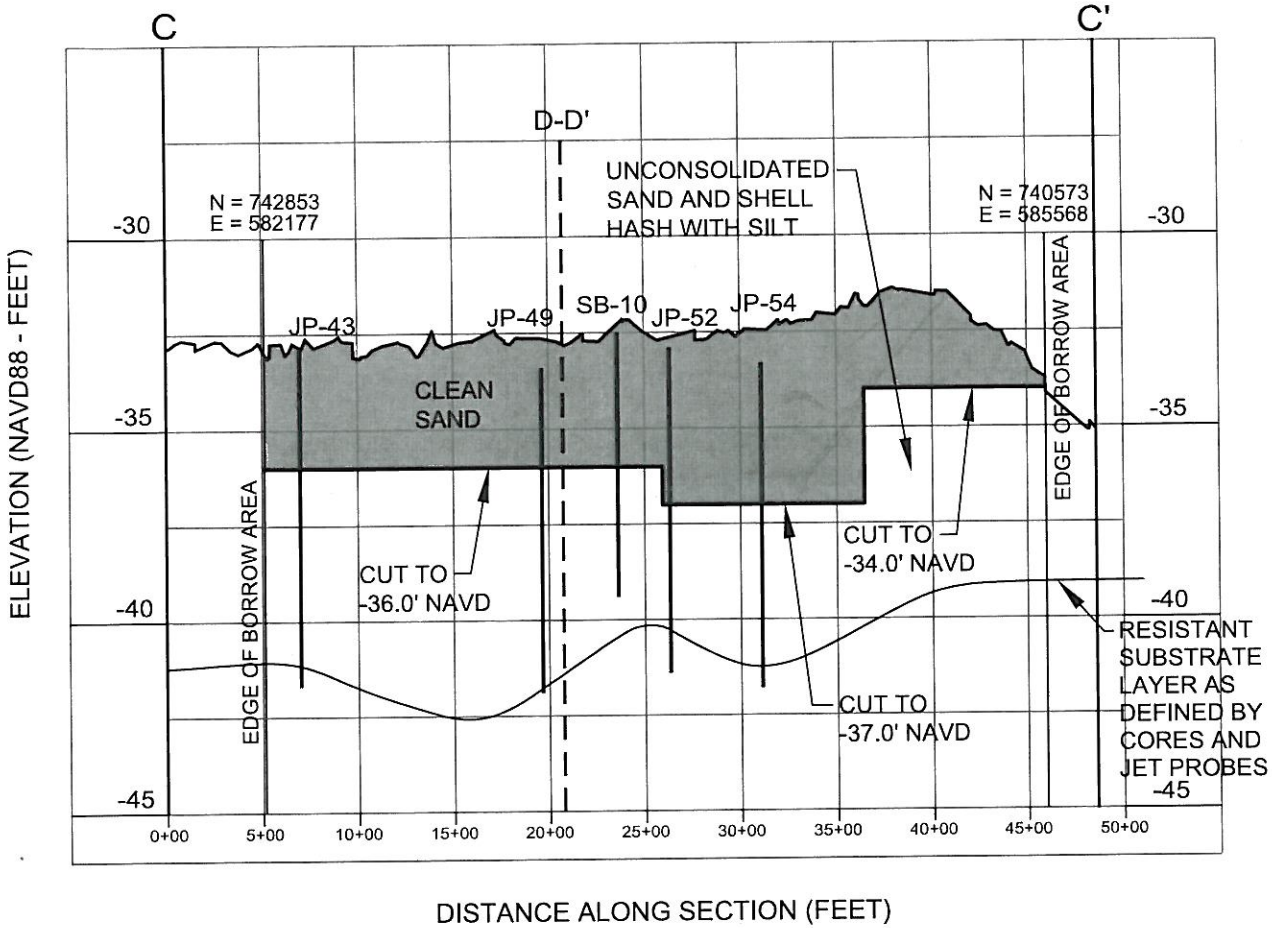
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DATE	BY	DESCRIPTION
5/22/14	KM	BA UPDATES RAI 1

**COASTAL PLANNING & ENGINEERING, INC.
A CB&I COMPANY**
 PH: (661) 391-8102
 FAX: (661) 391-8116
 2481 N.W. BOCA RATON BOULEVARD
 BOCA RATON, FLORIDA 33431
 WWW.CB&I.COM

TITLE:
 DATE: 3/3/14
 BY: KM
 COMM NO.: 150455
 SHEET: 24

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BORROW AREA III-B C-C'

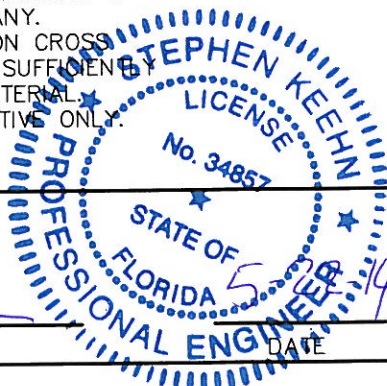
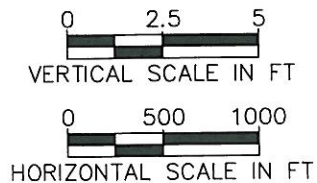


**CAPTIVA & SANIBEL ISLANDS
 BEACH RENOURISHMENT PROJECT
 BORROW AREA III-B CROSS SECTION C-C'**

**COASTAL PLANNING & ENGINEERING, INC.
 A CB&I COMPANY**
 2481 N.W. BOCCA RATON BOULEVARD
 BOCCA RATON, FLORIDA 33431
 www.CBEI.com
 PH: (951) 391-8102
 FAX: (951) 391-8116
 C.O.A. #L 14228

NOTES:

1. SEE SHEET 24 FOR LOCATION OF CROSS SECTION LINES.
2. ELEVATIONS SHOWN HEREON ARE IN FEET BASED ON NAVD88. GEOID 2012A.
3. DATE OF BATHYMETRIC SURVEY IS MARCH, 2013, CONDUCTED BY COASTAL PLANNING & ENGINEERING, INC., A CB&I COMPANY.
4. CORES MAY NOT FALL DIRECTLY ON CROSS SECTION LINE, BUT ARE LOCATED SUFFICIENTLY CLOSE TO REPRESENT SIMILAR MATERIAL.
5. WIDTH OF LAYERS IS REPRESENTATIVE ONLY. MATERIAL MAY VARY.



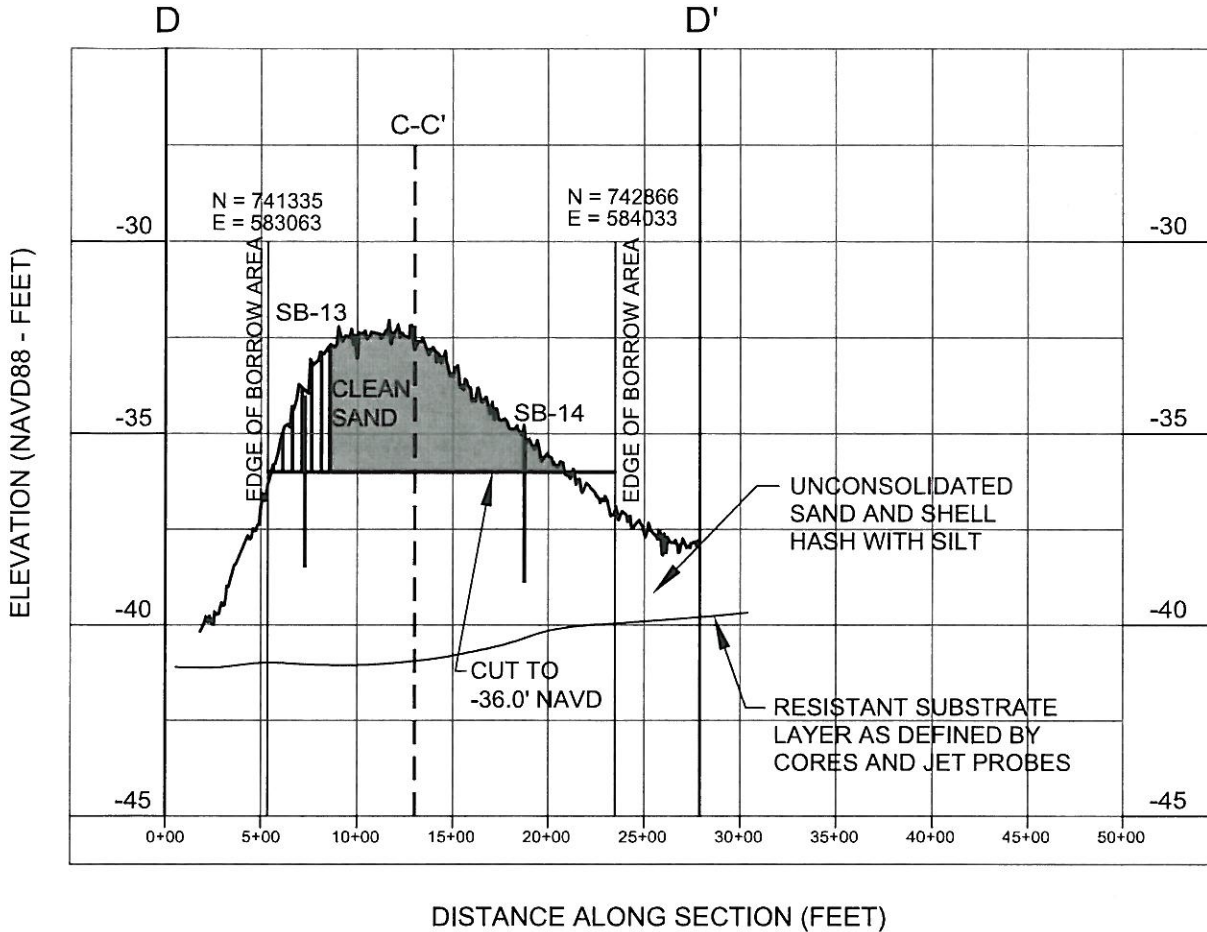
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 BY: KM
 COMM NO.: 150455
 SHEET: 25

BORROW AREA III-B D-D'



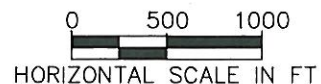
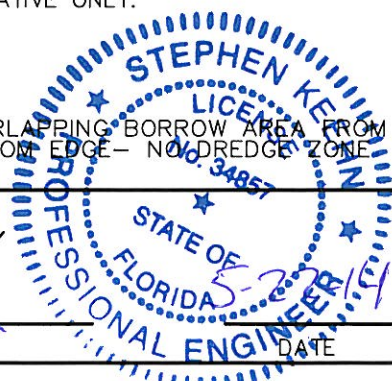
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LEGEND:



750 FT BUFFER OVERLAPPING BORROW AREA FROM MAY 2014 HARDBOTTOM EDGE - NO DREDGE ZONE



NOT FOR CONSTRUCTION
FOR REGULATORY REVIEW ONLY

STEPHEN KEEHN P.E. NO. 34857

REVISIONS		
DATE	BY	DESCRIPTION
5/22/14	KM	BA UPDATES RAI 1

CAPTIVA & SANIBEL ISLANDS
BEACH RENOURISHMENT PROJECT
BORROW AREA III-B CROSS SECTION D-D'

COASTAL PLANNING & ENGINEERING, INC.
A CB&I COMPANY
2481 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
www.CB&I.com

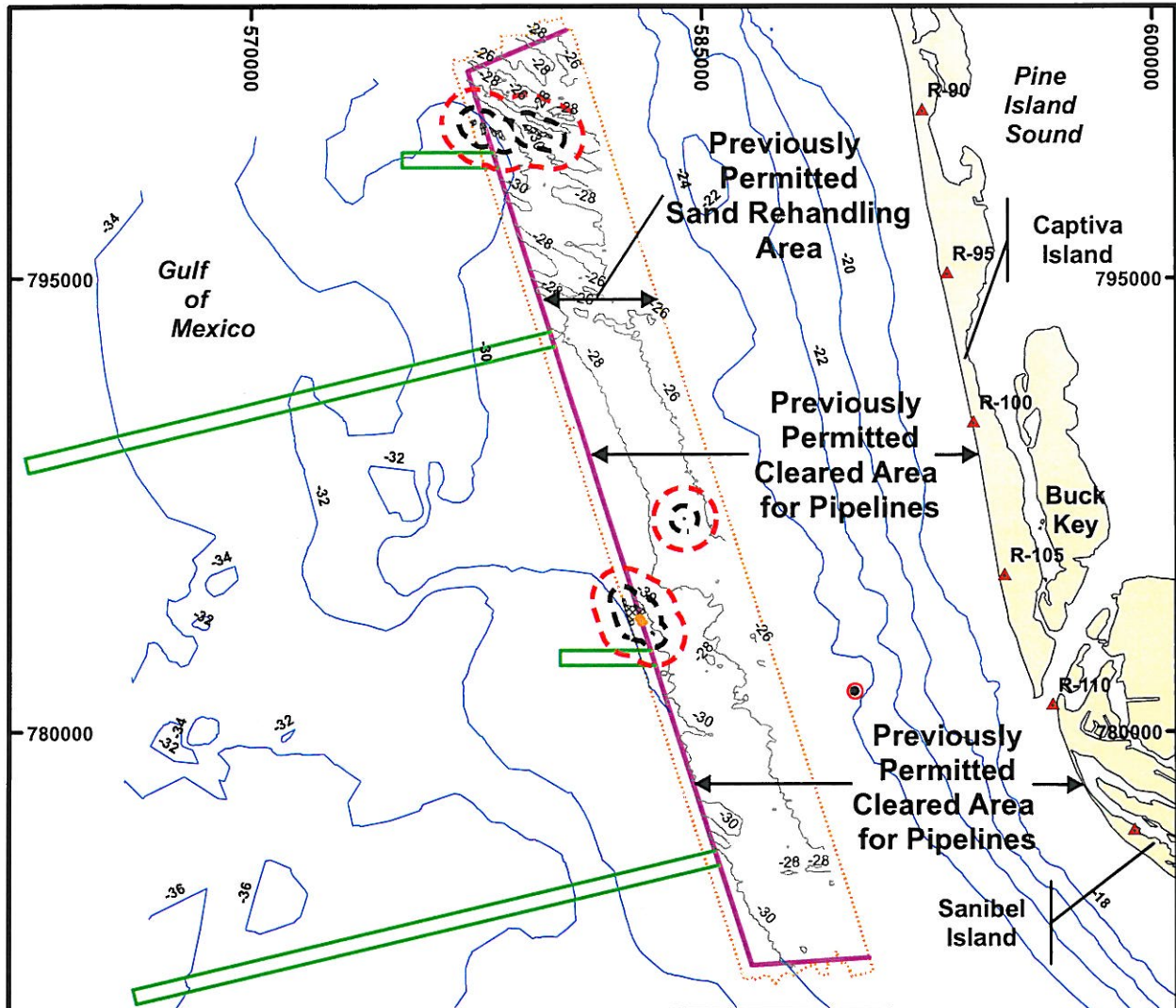
PH: (954) 394-5165
FAX: (954) 391-8116
C.O.A. FL #4028

DATE:
3/3/14

BY:
KM

COMM NO.:

150455
SHEET:
26

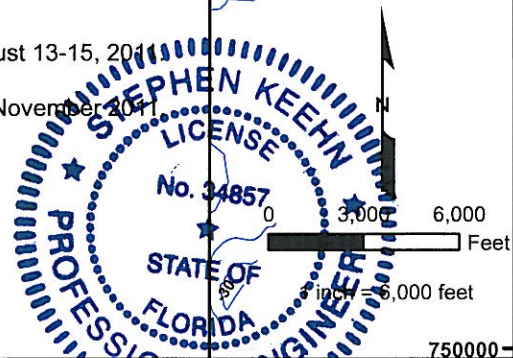


Legend:

- ▲ FDEP Monuments
- 2003 Diver Verified Hardbottom
- ▨ 2011 Sidescan Sonar Interpreted Hardbottom Features
- ⊖ 1,000' Buffer for No Sand Rehandling
- ⊖ 400' Buffer for No Pipeline Placement
- Sunken Barge with 250' Buffer
- Previously Permitted Pipeline Corridors
- ~ 2011 CPE Bathymetry
- ~ Historical Bathymetry
- Cleared Area Offshore Boundary
- ▨ Captiva 2011 Sidescan Area

Notes:

1. Coordinates are in feet based on the Florida State Plane Coordinate System, West Zone, North American Datum of 1983 (NAD 83).
2. Depths are referenced in feet to NAVD88.
3. Geophysical and bathymetric surveys performed by CPE on August 13-15, 2014.
4. Details of geophysical investigation can be found in *Geophysical Survey for Permitting/Expanding Pipeline Corridor*, November 2014.
5. Historical bathymetry shown is a combination of the following data sources:
 - A. Blind Pass Shoal Survey: October 1993.
 - B. Captiva/Sanibel 2 Year Surveys: October 1993.
 - C. Redfish Pass Shoal Survey: April 1991.
 - D. Captiva/Sanibel Offshore Survey: October 1993.
6. Except for the 400' buffered areas, the entire cleared area is open for pipeline placement.
7. Pipeline corridors will be used for pipeline placement seaward of the Cleared Area Offshore Boundary to transport material directly to the beach. The corridors will not be used for placement of material in the Sand Rehandling Area.
8. Material placed in the Sand Rehandling Area will be outside the 1000' buffers.



NOT FOR CONSTRUCTION
FOR REGULATORY REVIEW ONLY

[Signature] 10-29-2014
STEPHEN KEEHN P.E. NO. 34857 DATE

TITLE: CAPTIVA & SANIBEL ISLANDS BEACH RENOURISHMENT PROJECT
PIPELINE CORRIDOR & SAND REHANDLING AREA

COASTAL PLANNING & ENGINEERING, INC.
A CB&I COMPANY
2441 N. BOCA RATON BOULEVARD
BOCA RATON, FL 33431
WWW.CBI.COM
TEL: (561) 394-6100
FAX: (561) 394-4116
C.O.A., FL #4028

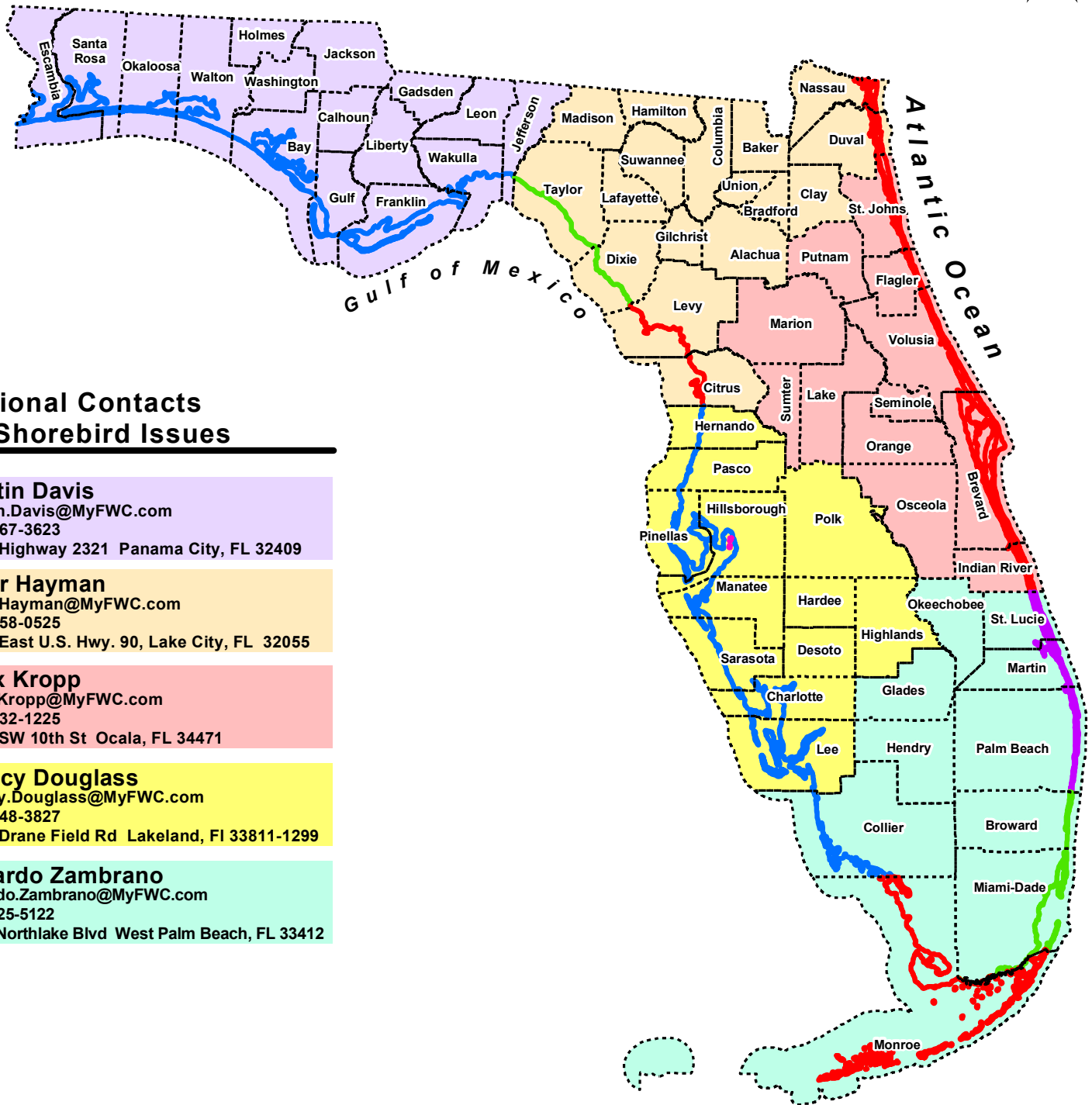
DATE: 10/28/14
BY: HMV
COMM NO.: 150455
SHEET: 27

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APPENDIX C2

FWC REGIONAL BIOLOGIST CONTACT INFORMATION

Shorebird Breeding Seasons and Regional Shorebird Contacts



Regional Contacts for Shorebird Issues

Justin Davis

Justin.Davis@MyFWC.com
850-767-3623
3911 Highway 2321 Panama City, FL 32409

Blair Hayman

Blair.Hayman@MyFWC.com
386-758-0525
3377 East U.S. Hwy. 90, Lake City, FL 32055

Alex Kropp

Alex.Kropp@MyFWC.com
352-732-1225
1239 SW 10th St Ocala, FL 34471

Nancy Douglass

Nancy.Douglass@MyFWC.com
863-648-3827
3900 Drane Field Rd Lakeland, FL 33811-1299

Ricardo Zambrano

Ricardo.Zambrano@MyFWC.com
561-625-5122
8535 Northlake Blvd West Palm Beach, FL 33412

Shorebird Breeding Season

-  February 15 - September 1
-  Spoil Islands Hillsborough Bay March 1 - September 1
-  March 15 - September 1
-  April 1 - September 1
-  Spoil Islands & Estuaries March 15 - September 1
Coastal Beaches April 1 - September 1



Florida Fish and Wildlife
Conservation Commission

MyFWC.com

620 South Meridian Street
Tallahassee, Florida 32399-1600

APPENDIX D

USACE PERMIT NO. SAJ-1994-03952 (SP-MMB) DECEMBER 9, 2015

DEPARTMENT OF THE ARMY PERMIT

December 9, 2015

Permittee: Captiva Erosion Prevention District
c/o Ms. Kathleen Rooker, Administrator
11513 Andy Rosse Lane, Unit #4
Captiva, Florida 33924

Permit No: SAJ-1994-03952 (SP-MMB)

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 to continue beach renourishment along the beaches in Sanibel and Captiva Islands and to include 2 additional beach fill locations at the north end of Captiva Island between FDEP monument R-83 to R-84 and a previous gap at Clam Bayou between FDEP monuments R-114 to R-115. The applicant also seeks a 15-year permit period for the subject work. The proposed work includes the following components:

- (1) Routine nourishment at 8-10 year intervals (estimated to start in 2021) using 2 existing offshore borrow areas (VI-E and III-B) and a sand rehandling area. It is estimated that nourishment between R-83 and R-109 on Captiva Island will require 750,000-900,000 cubic yards (cy) of sand and nourishment between R-110 and R-118 on Sanibel Island will require up to an additional 350,000 cy of sand. Of this total volume, it is anticipated that up to 712,150 cy will be placed waterward of the mean high water line (MHWL) for the entire project area. The project area includes the 2 additional beach fill locations between R-83 to R-84 and R-114-115.
- (2) Emergency nourishment (including large hot spots) in response to a major storm event and the ensuing erosion which would include approximately 1,000,000 cy of sand for the Captiva portion and 335,000 cy for Sanibel. Use of sand from borrow areas VI-E and III-B are also proposed for this work.
- (3) Nourishing of small hot spots using upland sand sources as needed during the permit period. The sand will be transported from upland sources located in Florida, specifically, Immokalee (Stewart Mining Industries), Moore Haven (Vulcan Materials

PERMIT NUMBER: SAJ-1994-03952
PERMITTEE: Captiva Erosion Prevention District
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Longitude: -82.220289014

Sand Rehandling Area: NE Corner Latitude: 26.543201600
Longitude: -82.231565501

SE Corner: Latitude: 26.458754634
Longitude: -82.200668728

SW Corner: Latitude: 26.458060678
Longitude: -82.212539128

NW Corner: Latitude: 26.539404914
Longitude: -82.241575085

Permit Conditions

General Conditions:

1. The time limit for completing the work authorized ends on December 9, 2030 . 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.

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PERMITTEE: Captiva Erosion Prevention District
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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 (Attachment 2).

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 the following address:

a. For standard mail: U.S. Army Corps of Engineers, Regulatory Division, Special Projects and Enforcement Branch, 1520 Royal Palm Square Blvd., Suite 310, Fort Myers, FL 33919.

b. For electronic mail CESAJ-ComplyDocs@usace.army.mil (not to exceed 10 MB). The Permittee shall reference this permit number, SAJ-1994-03952 (SP - MMB), on all submittals.

2. **Pre-Construction Meeting:** The Permittee will schedule a pre-construction meeting with the Enforcement Section representative no later than 30 days prior to the start of work to review the limitations and special conditions of the permit. During this meeting participants will be required to sign a form acknowledging knowledge and comprehension of what has been authorized and associated requirements. The Permittee should not start work prior to the pre-construction meeting without written approval by the Corps.

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

4. **Points of Contact:** The Permittee shall provide a list of all points of contact associated with the project at the same time the notice of commencement to the address identified in Reporting Address Special Condition. The list should include area of responsibility and contact information for each point of contact.

5. **Posting of Permit:** The Permittee shall have available and maintain for review a copy of this permit and approved plans at the construction site.

6. **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 3) 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.

7. **Fill Material:** The Permittee shall use only clean fill material for this project. The fill material shall be free from items such as trash, debris, automotive parts, asphalt, construction materials, concrete block with exposed reinforcement bars, and soils contaminated with any toxic substance, in toxic amounts in accordance with Section 307 of the Clean Water Act.

8. **Mean Grain Size and Silt content:** The sand utilized for the beach renourishment using the approved offshore borrow areas shall not exceed 3% silt content as measured with a #230 sieve; cannot exceed 5% shell content as measured on a #4 sieve; and, the Munsell color value must be 6 or lighter. The sand utilized for beach or dune restoration using an upland sand source (approved sand mines listed under proposed work above) shall not exceed 3% silt content as measured with a #230 sieve; cannot exceed 1% shell content as measured on a #4 sieve; and, the Munsell color value must be 6 or lighter.

HOPPER DREDGING (Special conditions 9-20)

9. Dredging methodologies: The permittee may use different dredging methodologies for the proposed work including: a) hopper dredge for standard beach fill placement; b) hydraulic cutterhead dredge for standard beach fill placement; and/or c) hydraulic cutterhead dredge using scows and offloaders. The permittee will be required to follow special conditions 10-20 should hopper dredging be utilized for the proposed work.

10. Reporting: The Permittee shall ensure all reports, notifications, documentation and correspondence required by the general or special conditions of this permit are submitted to the Corps at the following email address:

sajdredgenotice@usace.army.mil.

Requests for documents, forms or information should also be submitted to the Corps at this email address. The Permittee shall reference this permit number, SAJ-1994-03952, GARBO, and include the topic in the subject line of the email and on all submittals.

11. Deflector Device Submittal: No dredging shall be performed by a hopper dredge without the inclusion of an approved rigid sea turtle deflector device. The Permittee shall ensure drawings of the proposed sea turtle deflector device and the Hopper Dredge Deflector Device Checklist form (Attachment 4) are complete and all required documentation submitted to the Corps at least 30 days prior to initiating the authorized work. 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.

12. Pre-Dredging Inspection Submittal: The Permittee shall submit the completed Hopper Dredge Pre-Dredge Inspection Checklist form (Attachment 5) to the Corps, at least 5 days prior to initiating the authorized work.

13. Dredging Quality Management: 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 251-690-3011. Additional information

about the DQM System can be found at <http://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.

14. Commencement Notification: Within 3 days from the date of initiating the authorized work, the Permittee shall provide to the Corps, the completed Hopper Dredge Startup Inspection Checklist form (Attachment 6) with a written notification of the date of commencement of work authorized by this permit. An inspection of the hopper dredge will be scheduled and performed by the Corps after receipt of the notification of commencement.

15. Regional Biological Opinion: Hopper dredging is approved under the current National Marine Fisheries Service (NMFS) Gulf Regional Biological Opinion GRBO and its references which can be viewed on the following website:

<http://el.erdc.usace.army.mil/seaturtles/refs-bo.cfm>.

The Permittee is responsible for obtaining and complying with the GARBO. If the Permittee is unable to view the GARBO at this website, the Permittee shall contact the Corps to receive a copy of the GARBO. The Permittee shall implement all reasonable and prudent measures identified in the GARBO. NMFS has issued the GARBO to the Corps for hopper dredge projects that limit the take of listed turtles, whales, sturgeon, sawfish, and any other species listed in the GARBO. Authorization under this permit is conditional upon compliance with all of the mandatory terms and conditions associated with the GARBO, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with the GARBO, 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 GARBO issued to the Corps serve as the formal consultation for all hopper dredge projects in the area covered by the GARBO; however, where the terms and conditions of the GARBO differ from the special conditions of this permit, the special conditions of this permit will take precedence as the more stringent condition.

16. 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 GARBO. The GARBO 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 GARBO ITS and this permit, incidental take by the Permittee or other hopper dredging operations within the area covered by the GARBO 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.

17. Endangered Species Observers: During dredging operations, NMFS approved endangered species observers (Observer) shall be aboard each hopper dredge to monitor for the presence of endangered species including sea turtles, sturgeon, whales and manatees. Observers shall perform their observations 24hr/day and every day during dredging operation.

a. During transit to and from the disposal area, the Observer shall monitor from the bridge during daylight hours for the presence of endangered species, especially the Northern right whale, during the period December through March.

b. During dredging operations, while dragheads are submerged, the Observer shall continuously monitor the inflow and/or overflow screening for turtles and/or turtle parts and sturgeon and/or sturgeon parts.

c. Upon completion of each load cycle, dragheads should be monitored as the draghead is lifted from the sea surface and is placed on the saddle in order to assure sea turtles that may be impinged within the draghead are counted and recorded. The Observer shall physically inspect dragheads and inflow and overflow screening/boxes for threatened and endangered species take. The Observer shall identify, count, and record sea turtle or sturgeon parts during the inspection of the inflow and overflow screening/boxes. All debris shall be removed from the screening/boxes after the inspection is complete so as not to impede the functioning of the screens during the next load cycle.

d. The Observer shall maintain a log detailing all incidents, including sightings, collisions with, injuries to, or killing of endangered species during dredging operations. The data shall be recorded daily on the Observer forms which are located at the following web site under the heading "Turtle Information:"

<http://el.erdc.usace.army.mil/seaturtle>.

If the Permittee is unable to view the Observer forms at this website the Permittee shall contact the Corps to receive a copy of the Observer forms. Completed Observer forms shall be submitted to the Corps at the end of each day as identified in the reporting special condition. A summary report of the above incidents and sightings shall be submitted to the Corps within 15 days of project completion.

18. Observer Equipment: The Permittee shall provide a digital camera, with an image resolution capability of at least 300 dpi, in order to photographically report all incidental takes, without regard to species, during dredging operations. Immediately following the incidental take of any threatened or endangered species, images shall be submitted to the Corps in a .JPG or .TIF format and shall accompany incidental take forms. The nature of findings shall be fully described in the incidental take forms including references to photographs.

19. Incidental Take: The Permittee shall immediately cease all hopper dredging operations and notify the Corps upon discovery of an incidental take of a sea turtle or sturgeon. The Permittee shall not resume hopper dredging until notified by the District Engineer, or his designee. The Sea Turtle Incidental Take Data form which is located at the following web site under the heading "Turtle Information Observer Forms," <http://el.erdc.usace.army.mil/seaturtles>, will be filled out by the Observer and shall be submitted to the Corps with photographic documentation within 6 hours of the take event.

20. Sea Turtle Trawling: Sea turtle trawling shall be conducted following the take of two sea turtles, without regard to species, and continue until the end of dredging or as directed by the Corps. Trawling shall be conducted in accordance with the Sea Turtle Trawling requirements (Attachment 7). Hopper dredging shall not resume until trawling has been initiated and until notified by the District Engineer, or his designee. The results of each trawl shall be recorded on the Sea Turtle Trawling Report which is located at the following website under the heading "Turtle Information:"

<http://el.erdc.usace.army.mil/seaturtle>.

If you are unable to view the Trawling Report forms at this website you must contact the Corps to receive a copy of the forms. Interim trawling reports shall be submitted to the Corps by the end of each day. A final trawling report shall be prepared and submitted to the Corps after the completion of all trawling efforts. The final trawling report shall summarize the results of the trawling including total trawling times, number of trawls and number of captures. Any turtles captured during trawling shall be immediately release

21. Biological Opinions: This permit does not authorize the Permittee to take an endangered species, in particular the red knot, swimming sea turtles and the smalltooth sawfish. In order to legally take a listed species, the Permittee must have separate authorization under the Endangered Species Act (ESA) (e.g., an ESA Section 10 permit, or a BO under ESA Section 7, with “incidental take” provisions with which you must comply). The enclosed U.S. Fish and Wildlife Service (FWS) and NMFS Biological Opinions (BO) (Attachments 8 and 9) contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with “incidental take” that is also specified in the BOs. Authorization under this permit is conditional upon compliance with all of the mandatory terms and conditions associated with incidental take of the enclosed BOs, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute noncompliance with this permit. The FWS and NMFS are the appropriate authorities to determine compliance with the terms and conditions of their BOs, and with the ESA.

22. Revised Statewide Programmatic Biological Opinion (SPBO): The Permittee provided information to the U. S. Fish and Wildlife Service (FWS) during consultation for nesting sea turtles and critical habitat for the loggerhead sea turtle. 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 nesting sea turtles and loggerhead sea turtle critical habitat. The FWS provided concurrence the maintenance dredging activities and sand placement activities are consistent with the revised SPBO provided the Permittee follows the reasonable and prudent measures term and conditions contained therein.

23. Piping Plover Programmatic Biological Opinion (P³BO): The permittee provide provided information to the FWS during consultation for the piping plover. The Permittee has reviewed the Reasonable and Prudent Measures, Terms and Conditions of the, and agreed to follow the measures included to minimize impacts to piping plovers. The FWS provided concurrence the maintenance dredging activities and sand placement activities are consistent with the P³BO provided the Permittee follows the reasonable and prudent measures and term and conditions contained therein.

24. Manatee Conditions: The Permittee shall comply with the “Standard Manatee Conditions for In-Water Work – 2011” (Attachment 10).

25.. Sea Turtle and Smalltooth Sawfish Conditions: The Permittee shall comply with National Marine Fisheries Service’s “Sea Turtle and Smalltooth Sawfish Construction Conditions” (Attachment 11). In addition, should hopper dredging not be

utilized, the permittee is still required to comply with the reasonable and prudent measures and terms and conditions contained in the GARBO as discuss in special conditions 18 and 19 above.

26. Eastern Indigo Snake Protection Measures and Inspection: Permittee shall comply with the U.S. Fish and Wildlife Service's "Standard Protection Measures for the Eastern Indigo Snake" dated August 12, 2013, as provided in Attachment 12 of this permit. All gopher tortoise burrows, active or inactive, shall be evacuated prior to site manipulation in the vicinity of the burrow. If excavating potentially occupied burrows, active or inactive, individuals must first obtain state authorization via a Florida Fish and Wildlife Conservation Commission (FWC) Authorized Gopher Tortoise Agent permit. The excavation method selected shall minimize the potential for injury of an indigo snake. The Permittee shall follow the excavation guidance provided in the most current FWC Gopher Tortoise Permitting Guidelines found at <http://myfwc.com/gophertortoise>. If an indigo snake is encountered, the snake must be allowed to vacate the area prior to additional site manipulation in the vicinity. Holes, cavities, and snake refugia other than gopher tortoise burrows shall be inspected each morning before planned site manipulation of a particular area, and if occupied by an indigo snake, no work shall commence until the snake has vacated the vicinity of the proposed work.

27. Florida Panther condition: In order to be compliant with the U.S. Fish and Wildlife's concurrence for the Florida panther, the permittee shall restrict all truck traffic (loaded or unloaded) to daylight hours for all sections of road within a panther focus area.

28. 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

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PERMITTEE: Captiva Erosion Prevention District
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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.

e. If prehistoric or historic artifacts, such as pottery or ceramics, projectile points, dugout canoes, metal implements, historic building materials, or any other physical remains that could be associated with Native American, early European, or American settlement are encountered at any time within the project site are, the permitted project shall cease all activities involving subsurface disturbance in the immediate vicinity of the discovery. The applicant shall contact the Florida Department of State, Division of Historical Resources, Compliance Review Section at (850) 245-6333 and the Corps of Engineers. Project activities shall not resume without verbal and/or written authorization. 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, Florida Statutes.

e. In addition pursuant to the letter provided by the Division of Historical Resources and State Historic Preservation Office dated September 16, 2014, as shown in sheet #24 of the permit sketches, a 200-foot buffer shall be maintained around the anomaly in Borrow Area III-B during all work activities.

PERMIT NUMBER: SAJ-1994-03952
PERMITTEE: Captiva Erosion Prevention District
PAGE 13 of 17

29. Agency Changes/Approvals: Should any other agency require and/or approve changes to the work authorized or obligated by this permit, the Permittee is advised a modification to this permit instrument is required prior to initiation of those changes. It is the Permittee's responsibility to request a modification of this permit from the Fort Myers Permits Section. The Corps reserves the right to fully evaluate, amend, and approve or deny the request for modification of this permit.

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.

PERMIT NUMBER: SAJ-1994-03952
PERMITTEE: Captiva Erosion Prevention District
PAGE 15 of 17

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

Kathleen B. Booker
(PERMITTEE)

11/30/2015
(DATE)

Kathleen B. Booker
(PERMITTEE NAME-PRINTED)

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

for

(DISTRICT ENGINEER)
Jason A. Kirk, P.E.
Colonel, EN
Commanding

12/9/15
(DATE)

PERMIT NUMBER: SAJ-1994-03952
PERMITTEE: Captiva Erosion Prevention District
PAGE 16 of 17

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)

PERMIT NUMBER: SAJ-1994-03952
PERMITTEE: Captiva Erosion Prevention District
PAGE 17 of 17

***Attachments to Department of the Army
Permit Number SAJ-1994-03952***

1. PERMIT DRAWINGS: 27 sheets.
2. WATER QUALITY CERTIFICATION: Specific Conditions of the water quality permit/certification in accordance with General Condition number 5 on page 2 of this DA permit. 27 sheets.
3. AS-BUILT CERTIFICATION BY PROFESSIONAL ENGINEER: 2 sheets.
4. HOPPER DREDGE DEFLECTOR DEVICE CHECKLIST: 2 sheets.
5. HOPPER DREDGE PRE-DREDGE INSPECTION CHECKLIST: 2 sheets.
6. HOPPER DREDGE STARTUP INSPECTION CHECKLIST: 2 sheets.
7. SEA TURTLE TRAWLING REQUIREMENTS: 2 sheet.
8. FWS BIOLOGICAL OPINION: 62 sheets.
9. NMFS-PRD BIOLOGICAL OPINION: 47 sheets.
10. STANDARD MANATEE CONDITIONS FOR IN-WATER WORK – 2011: 2 sheets.
11. SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS: 1 sheet.
12. EASTERN INDIGO CONDITION: Standard Protection Measures for the Eastern Indigo Snake, August 12, 2013. 6 sheets.

ATTACHMENT 1

PERMIT DRAWINGS (27 Sheets)

SAJ-1994-03952 (SP-MMB) CAPTIVA EROSION PREVENTION DISTRICT

ATTACHMENT 2

WATER QUALITY CERTIFICATION – SPECIFIC CONDITIONS (27 Sheets)

SAJ-1994-03952 (SP-MMB) CAPTIVA EROSION PREVENTION DISTRICT

ATTACHMENT 3

AS-BUILT CERTIFICATION BY PROFESSIONAL ENGINEER (2 Sheets)

SAJ-1994-03952 (SP-MMB) CAPTIVA EROSION PREVENTION DISTRICT

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, Special Projects and Enforcement Branch, address of Enforcement PM, City, State zipcode.. If you have questions regarding this requirement, please contact the Special Projects and 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

Address

City State ZIP

(Affix Seal)

Date

Telephone Number

ATTACHMENT 4

HOPPER DREDGE DEFLECTOR DEVICE CHECKLIST (2 Sheets)

SAJ-1994-03952 (SP-MMB) CAPTIVA EROSION PREVENTION DISTRICT

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)

ATTACHMENT 5

HOPPER DREDGE PRE-DREDGE INSPECTION CHECKLIST (2 Sheets)

SAJ-1994-03952 (SP-MMB) CAPTIVA EROSION PREVENTION DISTRICT

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: _____

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)

ATTACHMENT 6

HOPPER DREDGE STARTUP INSPECTION CHECKLIST (2 Sheets)

SAJ-1994-03952 (SP-MMB) CAPTIVA EROSION PREVENTION DISTRICT

HOPPER DREDGE STARTUP INSPECTION CHECKLIST

Dept. of the Army Permit Number: SAJ-_____ - _____

Project Name: _____

Project Location: _____

Dredging Company Name (Contractor): _____

Vessel Name: _____

Inspector's Name and Title: _____

Date of Inspection: _____

Dredging contractor startup dredge inspection requirements:

1. _____ Is the Turtle Deflector Device submittal approved?
2. _____ Is the approved Turtle Deflector Device submittal being used to perform this startup-dredge inspection?
3. _____ Are the turtle observers onboard the vessel during dredging operations?
4. _____ Is dredging data recording system (DQM/Silent Inspector) turned on and recording draghead elevation, slurry density & velocity and is data being submitted?
5. _____ Was a paint test performed to assure the deflector is plowing at least 6" into the dredge material while the dragtender is consistently maintaining the submitted and approved approach angle to a tolerance of + 0 to - 4 degrees.

DATE: _____, TIME: _____

6. _____ Is the drag tender operating the dredge pump in accordance with the Hopper Dredging Terms and Conditions as follows:
 - a. _____ Starting the dredge pump only when the draghead is firmly on the bottom by watching the slurry specific gravity & swell compensator.
 - b. _____ Reducing the slurry velocity to less than 5 feet per second by reducing the dredge pump RPM to idle speed before raising the draghead off the bottom. Raising the draghead off the bottom to increase suction velocities is strictly prohibited.
 - c. _____ Consistently maintaining the approach angle to a tolerance of + 0 to - 4 degrees whenever the draghead is on the bottom and the dredge pump is operating

- d. _____ Watch the dragtender through one cycle minimum to see if the draghead is being raised off the bottom because:
 - i. _____ Plugging of the draghead.
 - ii. _____ Ship crabbing.
 - iii. _____ Draghead tracking under or away from the dredge.

COMMENTS: _____

(Dredging Contractor Signature)

(Date)

ATTACHMENT 7

SEA TURTLE TRAWLING REQUIREMENTS: 2 sheets.

SAJ-1994-03952 (SP-MMB) CAPTIVA EROSION PREVENTION DISTRICT

Sea Turtle Trawling Requirements - Non-Capture

- a. To reduce the chances of sea turtles becoming entangled and caught in the net webbing during non-capture trawl sweeping, use standard flat-style shrimp trawling nets. Nets shall have one to two-inch webbing holes, the webbing should be made of nylon material (preferably dipped.)
- b. The bag end of these nets shall be completely cut out so that the nets remaining on the rigging are approximately 30 to 50-feet long. The nets shall be long enough to provide a trailing length of net in the water to “stimulate turtles” to move but not be long enough to be able to twist when: 1) being pulled in the water; 2) being pulled up and onto the deck; 3) the vessel is stationary; or 4) the trawl vessel turns while trawling. This net length may be shorter or longer depending on the specific configurations of the trawler and its rigging, but must be set up to specifically prevent the twisting of the net. The nets should be installed and adjusted such that organisms are not being collected (turtles and other by-catch).
- c. The bag end of the nets shall be cut away to create a large open end in the nets. The webbing shall be monitored so that tears and rips do not occur in the remaining webbing that might entangle and capture organisms (particularly turtles).
- d. To ensure that the lead line and mouth of the trawl nets maintain contact with the seafloor as best as possible, the lead line of each net shall be rigged with weights, mud rollers, tickler chains and/or trawling cookies (as appropriate for the environmental conditions and sediment type).
- e. For the first 48 hours after beginning non-capture trawling operations, pull and check the nets every hour to evaluate and document the:
 - Status of the nets (particularly twisting of the tail end)
 - Net contents (turtles and other bycatch)

After the first 48-hours and appropriate net configuration has been established, gradually increase trawling times to a maximum of 2-3-hours.

- d. _____ Watch the dragtender through one cycle minimum to see if the draghead is being raised off the bottom because:
 - i. _____ Plugging of the draghead.
 - ii. _____ Ship crabbing.
 - iii. _____ Draghead tracking under or away from the dredge.

COMMENTS: _____

(Dredging Contractor Signature)

(Date)

ATTACHMENT 8

FWS BIOLOGICAL OPINION (62 Sheets)

SAJ-1994-03952 (SP-MMB) CAPTIVA EROSION PREVENTION DISTRICT



United States Department of the Interior



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

May 5, 2015

Alan M. Dodd
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Service CPA Code: FF04EF2000-2014-CPA-0324
Corps Application Number: SAJ-1994-03952 (SP-MMB)
Date Received: August 15, 2014
Formal Consultation Initiation Date: January 26, 2015
Project: Sand Placement
Applicant: Captiva Erosion Prevention District
County: Lee

Dear Colonel Dodd:

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion to the U.S. Army Corps of Engineers (Corps) based on our review of a proposed sand placement project along the shoreline of Sanibel and Captiva Islands in Lee County, Florida (Project). The Corps determined that the proposed Project "may affect" the endangered Florida panther (*Puma (=felis) concolor coryi*), the threatened piping plover (*Charadrius melodus*), and the threatened red knot (*Calidris canutus rufa*), "may affect, not likely to adversely affect" the threatened Northwest Atlantic Ocean (NWAO) Distinct Population Segment (DPS) population of the loggerhead sea turtle (*Caretta caretta*), the endangered leatherback sea turtle (*Dermochelys coriacea*), the endangered green sea turtle (*Chelonia mydas*), the endangered hawksbill sea turtle (*Eretmochelys imbricata*), the endangered Kemp's ridley sea turtle (*Lepidochelys kempii*), the endangered West Indian manatee (*Trichechus manatus*; manatee), the threatened eastern indigo snake (*Drymarchon corais couperi*), and "no affect" on the threatened roseate tern (*Sterna dougallii dougallii*) and the endangered aboriginal prickly-apple (*Harrisia aboriginum*). This document is provided in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*).

This Biological Opinion is based on information provided in the Corps' August 7, 2014, letter, August 5, 2014, Public Notice, and supplemental documents. A complete administrative record of this consultation is on file at the South Florida Ecological Services Office, Vero Beach, Florida.

Consultation History

On August 15, 2014, the Service received a copy of the Corps' letter dated August 7, 2014, and Public Notice dated August 5, 2014, requesting formal consultation on the proposed Project in Lee County, Florida.

On September 19, 2014, the Service emailed the Corps a request for additional information. In part, this email outlined the following critical elements:

1. The Service could not concur with their “may affect, but is not likely to adversely affect” determination for nesting sea turtles, and requested that it be revised to “may affect”.
2. Did the Captiva Erosion Prevention District (Applicant) want nesting sea turtles and terrestrial loggerhead sea turtle critical habitat covered under the revised Statewide Programmatic Biological Opinion (SPBO) (Service 2015)?
3. The Corps did not make a determination concerning terrestrial loggerhead sea turtle critical habitat
4. Did the Applicant want the piping plover covered under the Piping Plover Programmatic Biological Opinion (P³BO) (Service 2013a)?

On October 15, 2014, the Service received a response from the Corps concerning our request for additional information. In addition to supplying the requested Project-related information, the Corps provided the following:

1. The Corps revised their “may affect, not likely to adversely affect” determination for nesting sea turtles, to “may affect.”
2. The Applicant was willing to wait until the revised SPBO is completed so that both nesting sea turtle and terrestrial loggerhead sea turtle critical habitat are covered.
3. The Corps made a “may affect, but will not adversely modify” determination concerning terrestrial loggerhead sea turtle designated Critical Habitat Unit LOGG-T-FL-23 and LOGG-T-FL-24.
4. The Applicant agreed to implement the Conservation Measures, Reasonable and Prudent Measures, and Terms and Conditions as outlined in the P³BO.

On November 21, 2014, the Service emailed the Corps a request for additional traffic information to assist in determining whether the Service needed to proceed with a formal or informal consultation regarding the Florida panther.

On November 24, 2014, the Service received the requested Project/traffic information.

On December 3, 2014, the Service emailed the Corps a request for red knot data because the listing for red knots was to be published on December 11, 2014. Data was received later that day.

On December 22, 2014, the Service received an email from the Applicant’s consultant stating that the Applicant had agreed to restrict all truck traffic (loaded or unloaded) to daylight hours for all sections of road within a panther focus area.

On January 15, 2015, the Service emailed the Corps a request to change their “may affect” determination to “may affect, not likely to adversely affect” determination for the Florida panther, based on the Applicant’s agreement to restrict all truck traffic (loaded or unloaded) to daylight hours for all sections of road within a panther focus area.

On January 26, 2015, the Corps via email, revised their “may affect” determination for the Florida panther to “may affect, not likely to adversely affect.”

On January 26, 2015, the Service completed their review of the Project and initiated formal consultation with the Corps concerning the potential effects of the Project on sea turtles and designated terrestrial loggerhead sea turtle critical habitat, piping plovers, and red knots.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The Applicant proposes to place beach compatible sand on 1.5 and 4.9 miles (mi) of shoreline along Sanibel and Captiva Island, respectively, Lee County, Florida (Figure 1). The intent of the Project is to continue the cyclical renourishment of the shoreline. There is no dune component to the Project. The proposed design fill profile will consist of a berm with a slope of 1 vertical foot (ft): 3 horizontal ft at the Florida Department of Environmental Protection (DEP) reference monuments R-83 and R-85, and 1 vertical foot: 10 horizontal ft, within the remaining fill template. The berm elevation will vary between +4.5 and +6.5 ft North American Vertical Datum (NAVD).

Dune and vegetation restoration

If a major storm impacts the Project area, dune and vegetation losses will be replaced to the greatest extent practical, subject to upland owner permission, similar to the 2013 project. Dune vegetation will be the primary method for restoring dune height, as it is cost effective compared to direct placement of sand on the dunes. When the opportunity occurs, direct rebuilding of dune height and filling gaps for a continuous dune line will be an option. In 1988-89, the dunes were constructed to an elevation varying between +8.0 and +12.0 ft NGVD. A +7.7 ft NAVD dune height will provide protection from approximately a 50-year storm (CPE, 2010). To compensate for sea level rise, this height will be increase to 8.5 ft NAVD near the end of the permit period. The constructed dunes will be similar in size to those constructed in 1988-1989.

No upland habitat impacts associated with the beach access corridors, pipeline corridors, and stockpile area are anticipated. If impacts are incurred, all impacted areas and vegetation will be restored to preconstruction condition and elevation. The next Project event is tentatively scheduled for 2021, based upon the 8-year design life of the 2013 event, but could be required earlier in response to a major storm.

The Project includes three nourishment components.

Routine nourishment

Approximately 750,000 – 900,000 cubic yards (cy) of sand will be placed between the DEP reference monuments R-83 and R-109 on Captiva Island, and approximately 350,000 cy between DEP reference monuments R-110 and R-118 on Sanibel Island. The sand placement design interval for this component is 8-10 years.

Emergency nourishment

This sand placement event would be in response to a major storm and would include approximately 335,000 and 1,000,000 cy of sand to be placed within the Sanibel and Captiva Island fill template, respectively.

For both sand placement components referenced above, beach compatible sand will be dredged from two existing offshore borrow areas (VI-E and III-B) and a sand stockpile area, using either a hopper or hydraulic cutterhead dredge. All dredging related sand placement activities will proceed 24 hours per day, 7 days a week. The previously permitted stockpile area and pipeline corridor are proposed for use in the Project. Once the beach compatible material is discharged on the beach, the contractor will grade the sand to the authorized profile using bulldozers, front-end loaders, and other heavy equipment. In order to control turbidity, containment dikes will be constructed within the discharge area and relocated along the shoreline as the contractor advances within the sand fill template. All loose debris will be removed and properly disposed of prior to sand placement.

Hot spot nourishment

This Project will involve using an upland sand source to nourish small hot spots as needed during the 15-year permit period. Sand will be transported from one of four upland sand mines located in Immokalee (Stewart Mining Industries), Moore Haven (Vulcan Materials Company), Lake Wales (CEMEX), and Davenport (CEMEX). It is estimated that a maximum of 50,000 cy of sand would be necessary for a single upland mine sand placement event. The expected hot spots are located at Sunset Beach (between DEP reference monument R-85 and R-86), along an evacuation route (between DEP reference monument R-96 and R-97), and north of Blind Pass (between DEP reference monument R-107 and R-108). The truck route will transit over the Sanibel Causeway and through Sanibel Island to reach Captiva Island. The upland sand will be transported by dump truck to a sand stockpile location at the fill template or near the beach access location. Once deposited, the sand be transported using all terrain dump trucks to or near the fill template. A front end-loader will assist in trans-loading the sand between the street and all terrain equipment, and in berm construction. Grading will be conducted using a bulldozer. All truck traffic, whether loaded or unloaded, will be restricted to daylight hours if traveling inside or immediately adjacent to a panther focus area (Figure 2).

Minimization measures

To minimize impacts to the eastern indigo snake from the Project, the Applicant will implement the Standard Protection Measures for the Indigo Snake (Service 2013b).

The Applicant will follow and implement the minimization measures, Reasonable and Prudent Measures, and the Terms and Conditions of the revised SPBO and the P³BO that apply to the Project concerning sea turtles and piping plovers, respectively.

To minimize impacts to manatees from the Project, the Applicant will implement the Standard Manatee Conditions for In-Water Work (FWC 2011a) and the minimization measures outlined in the revised SPBO.

Action Area is defined as all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action. The Service identifies the action area for the Project to include the staging, discharge, and stockpile areas; pipeline corridors; beach access corridors; sand placement fill template; offshore borrow areas, upland sand mines, and upland sand mine truck routes. The Project is located along the Gulf of Mexico, Lee County, Florida, between latitude 26.495242 and longitude -82.187569 (Figure 1).

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

The red knot is a medium-sized shorebird about 9 to 11 inches (in) (23 to 28 centimeters (cm)) in length. The red knot is easily recognized during the breeding season by its distinctive rufous (red) plumage (feathers). The face, prominent stripe above the eye, breast, and upper belly are a rich rufous-red to a brick or salmon red, sometimes with a few scattered light feathers mixed in. The feathers of the lower belly and under the tail are whitish with dark flecks. Upperparts are dark brown with white and rufous feather edges; outer primary feathers are dark brown to black (Davis 1983; Harrington 2001). Females are similar in color to males, though the rufous colors are typically less intense, with more buff or light gray on the dorsal (back) parts (Niles et al. 2008). Red knots have a proportionately small head, small eyes, and short neck, and a black bill that tapers from a stout base to a relatively fine tip. The bill length is not much longer than head length. Legs are short and typically dark gray to black, but sometimes greenish in juveniles or older birds in nonbreeding plumage (Harrington 2001). Nonbreeding plumage is dusky gray above and whitish below. Juveniles resemble nonbreeding adults, but the feathers of the scapulars (shoulders) and wing coverts (small feathers covering base of larger feathers) are edged with white and have narrow, dark bands, giving the upperparts a scalloped appearance (Davis 1983).

There are six recognized subspecies of red knots (*C. canutus*), and on December 11, 2014, the Service listed the *rufa* subspecies of red knot as a threatened species in the Federal Register and afforded it protection under the Act (Service 2014). The Service accepts the characterization of *C.c. rufa* as a subspecies because each recognized subspecies is believed to occupy separate breeding areas, in addition to having distinctive morphological traits (*i.e.*, body size and plumage characteristics), migration routes, and annual cycles. The Service has determined the *rufa* red knot is threatened due to loss of both breeding and nonbreeding habitat; potential for disruption of natural predator cycles on the breeding grounds; reduced prey availability throughout the nonbreeding range; and increasing frequency and severity of asynchronies (“mismatches”) in the timing of the birds’ annual migratory cycle relative to favorable food and weather conditions. Main threats to the *rufa* red knot in the United States (U.S.) include: reduced forage base at the Delaware Bay migration stopover; decreased habitat availability from beach erosion, sea level rise, and shoreline stabilization in Delaware Bay; reduction in or elimination of forage due to shoreline stabilization, hardening, dredging, beach replenishment, and beach nourishment in Massachusetts, North Carolina, and Florida; and beach raking which diminishes red knot habitat suitability.

Critical habitat has not been proposed or designated for the red knot at this time; however, critical habitat will be addressed during development of a proposed critical habitat rule for the red knot. That said, important habitat characteristics for the red knot are discussed further in the Life history section below.

Life history

Breeding

Based on estimated survival rates for a stable population, few red knots live for more than about 7 years (Niles et al. 2008). Age of first breeding is uncertain, but for most birds it is probably at least 2 years (Harrington 2001). Red knots generally nest in the Canadian Arctic in dry, slightly elevated tundra locations, often on windswept slopes with little vegetation. Breeding territories are located inland, but near Arctic coasts, and foraging areas are located near nest sites in freshwater wetlands (Harrington 2001; Niles et al. 2008). Breeding occurs in June (Niles et al. 2008), and flocks of red knots sometimes arrive at breeding latitudes before snow-free habitat is available. Upon arrival or as soon as favorable conditions exist, male and female red knots occupy breeding habitat, and territorial displays begin (Harrington 2001). In red knots, pair bonds form soon after arrival on the breeding grounds and remain intact until shortly after the eggs hatch (Niles et al. 2008). Female red knots lay only one clutch (group of eggs) per season, and, as far as is known, do not lay a replacement clutch if the first is lost. The usual clutch size is four eggs, though three-egg clutches have been recorded. The incubation period lasts approximately 22 days from the last egg laid to the last egg hatched, and both sexes participate equally in egg incubation. Young are precocial, leaving the nest within 24 hours of hatching and forage for themselves (Niles et al. 2008). No information is available regarding chick survival rates (Niles et al. 2008). Females are thought to leave the breeding grounds and start moving south soon after the chicks hatch in mid-July. Thereafter, parental care is provided solely by the males, but after about 25 days (around August 10) they also abandon the newly fledged juveniles and move south. Not long after, they are followed by the juveniles (Niles et al. 2008).

Breeding success of High Arctic shorebirds such as red knots varies dramatically among years in a somewhat cyclical manner. Two main factors seem to be responsible for this annual variation: weather that affects nesting conditions and food availability, and predation rates which fluctuate annually. Production of shorebird young is sensitive to adverse weather during the breeding season. Red knot chicks grow poorly during cold weather due to higher rates of energy expenditure, shorter foraging periods, and reduced prey availability (Schekkerman et al. 2003; Piersma and Lindström 2004). Growth rate of red knot chicks is very high compared to similarly sized shorebirds nesting in more temperate climates and is strongly correlated with weather-induced and seasonal variation in availability of invertebrate prey (Schekkerman et al. 2003). Second, successful shorebird reproduction occurs almost exclusively during peak lemming (*Dicrostonyx torquatus* and *Lemmus sibericus*) years when snowmelt is early (Summers and Underhill 1987; Blomqvist et al. 2002; Piersma and Lindström 2004). Arctic fox (*Alopex lagopus*) and snowy owl (*Nyctea scandiaca*) feed largely on lemmings, which are easily caught when their abundance is high. However, in years when lemming numbers are low, the predators turn to alternative prey, such as shorebird eggs, chicks, and adults. Lemming abundance is often cyclical, and the variation in shorebird production closely follows variations in lemming abundance due to their affected predation rates.

Nonbreeding birds

Little information is available about nonbreeding red knots. Unknown numbers of nonbreeding red knots remain south of the breeding grounds during the breeding season, and many, but not all, of these knots are 1-year-old (*i.e.*, immature) birds (Niles et al. 2008). Nonbreeding knots, usually individuals or small groups, have been reported during June along the U.S. Atlantic and Gulf coasts, with smaller numbers around the Great Lakes and Northern Plains in both the U.S. and Canada (eBird.org 2012). There is also little information on where juvenile red knots spend their winter months (Service and Conserve Wildlife Foundation of New Jersey 2012), and there may be at least partial segregation of juvenile and adult red knots on the wintering grounds. All juveniles of the Tierra del Fuego wintering region are thought to remain in the Southern Hemisphere during their first year of life, possibly moving to northern South America, but their distribution is largely unknown (Niles et al. 2008). Because there is a lack of specific information on juvenile red knots, the Service uses the best available data from adult red knots to draw conclusions about juvenile foraging and habitat use.

Migration

The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast U.S., the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. Departure from the breeding grounds begins in mid-July and continues through August. Red knots tend to migrate in single-species flocks with departures typically occurring in the few hours before twilight on sunny days. Based on the duration and distance of migratory flight segments estimated from geolocator results, red knots are inferred to migrate during both day and night (Normandeau Associates. Inc. 2011). The size of departing flocks tends to be large (greater than 50 birds) (Niles et al. 2008), and females are thought to leave first followed by males and then juveniles (Harrington 2001; Niles et al. 2008).

Red knots make one of the longest distance migrations known in the animal kingdom, traveling up to 19,000 miles annually, and may undertake long flights that span thousands of miles without stopping. As red knots prepare to depart on long migratory flights, they undergo several physiological changes. Before takeoff, the birds accumulate and store large amounts of fat to fuel migration and undergo substantial changes in metabolic rates. In addition, leg muscles, gizzard (a muscular organ used for grinding food), stomach, intestines, and liver all decrease in size, while pectoral (chest) muscles and heart increase in size. Due to these physiological changes, red knots arriving from lengthy migrations are not able to feed maximally until their digestive systems regenerate, a process that may take several days. Because stopovers are time-constrained, red knots require stopovers rich in easily digested food to achieve adequate weight gain (Piersma et al. 1999; van Gils et al. 2005a, 2005b; Niles et al. 2008;) to fuel the next leg of migratory flight and, upon arrival in the Arctic, to fuel the body transformation to breeding condition (Morrison 2006). At each stopover, the adults gradually replace their red breeding plumage with white and gray, but generally they do not molt their flight or tail feathers until they reach their wintering areas (Morrison and Harrington 1992; Niles et al. 2008).

During both the northbound (spring) and southbound (fall) migrations, red knots use key staging and stopover areas to rest and feed. Major spring stopover areas along the Atlantic coast include Río Gallegos, Península Valdés, and San Antonio Oeste (Patagonia, Argentina); Lagoa do Peixe (eastern Brazil, State of Rio Grande do Sul); Maranhão (northern Brazil); the Virginia barrier islands (U.S.); and Delaware Bay (Delaware and New Jersey, U.S.) (González 2005; Niles et al. 2008; Cohen et al. 2009). Important fall stopover sites include southwest Hudson Bay (including the Nelson River delta), James Bay, the north shore of the St. Lawrence River, the Mingan Archipelago, and the Bay of Fundy in Canada; the coasts of Massachusetts and New Jersey and the mouth of the Altamaha River in Georgia, U.S.; the Caribbean (especially Puerto Rico and the Lesser Antilles); and the northern coast of South America from Brazil to Guyana (Spaans 1978; Morrison and Harrington 1992; Antas and Nascimento 1996; Niles et al. 2008; Schneider and Winn 2010; Niles et al. 2010; Niles 2012; Newstead et al. in press). However, large and small groups of red knots, sometimes numbering in the thousands, may occur in suitable habitats all along the Atlantic and Gulf coasts from Argentina to Canada during migration (Niles et al. 2008).

Red knots are restricted to the ocean coasts during winter, and occur primarily along the coasts during migration. However, small numbers of red knots are reported annually across the interior U.S. (*i.e.*, greater than 25 miles from the Gulf or Atlantic Coasts) during spring and fall migration. Such reported sightings are concentrated along the Great Lakes, but multiple reports have been made from nearly every interior State (eBird.org 2012). For example, Texas red knots follow an inland flyway to and from the breeding grounds, using spring and fall stopovers along western Hudson Bay in Canada and in the northern Great Plains (Skagen et al. 1999; Newstead et al. in press). Some red knots wintering in the southeastern U.S. and the Caribbean migrate north along the U.S. Atlantic coast before flying over land to central Canada from the mid-Atlantic, while others migrate over land directly to the Arctic from the southeastern U.S. coast (Niles et al. in press). These eastern red knots typically make a short stop at James Bay in Canada, but may also stop briefly along the Great Lakes, perhaps in response to weather conditions (Morrison and Harrington 1992; Niles et al. 2008). Thus, red knots from different wintering areas appear to employ different migration strategies, including differences in timing, routes, and stopover areas. However, full segregation of migration strategies, routes, or stopover areas does not occur among red knots from different wintering areas.

Wintering

Red knots occupy all known wintering areas from December to February, but may be present in some wintering areas as early as September or as late as May. In the Southern Hemisphere, these months correspond to the austral summer (*i.e.*, summer in the Southern Hemisphere). Wintering areas for the red knot include the Atlantic coasts of Argentina and Chile (particularly the island of Tierra del Fuego that spans both countries), the north coast of Brazil (particularly in the State of Maranhão), the Northwest Gulf of Mexico from the Mexican State of Tamaulipas through Texas (particularly at Laguna Madre) to Louisiana, and the Southeast U.S. from Florida (particularly the central Gulf coast) to North Carolina (Niles et al. 2008; Newstead et al. in press). Smaller numbers of red knots winter in the Caribbean, and along the central Gulf coast (Alabama, Mississippi), the mid-Atlantic, and the Northeast U.S. Red knots are also known to winter in Central America and northwest South America, but it is not yet clear if those birds are

the *rufa* subspecies. Little information exists on where juvenile red knots spend the winter months (Service and Conserve Wildlife Foundation of New Jersey 2012), and there may be at least partial segregation of juvenile and adult red knots on the wintering grounds.

Examples of red knots changing wintering regions do exist, but are few. Generally red knots are thought to return to the same wintering region each year. Re-sightings of marked birds indicate few or no inter-annual movements of red knots between the Brazil and Tierra del Fuego wintering areas, or between the Southeast and Tierra del Fuego wintering areas (Baker et al. 2005; Harrington 2005).

Migration and wintering habitat

Long-distance migrant shorebirds are highly dependent on the continued existence of quality habitat at a few key staging areas. These areas serve as stepping stones between wintering and breeding areas. Habitats used by red knots in migration and wintering areas are generally coastal marine and estuarine habitats with large areas of exposed intertidal sediments. In many wintering and stopover areas, quality high-tide roosting habitat (*i.e.*, close to feeding areas, protected from predators, with sufficient space during the highest tides, free from excessive human disturbance) is limited. The supra-tidal (above the high tide) sandy habitats of inlets provide important areas for roosting, especially at higher tides when intertidal habitats are inundated (Harrington 2008). In some localized areas, red knots will use artificial habitats that mimic natural conditions, such as nourished beaches, dredged spoil sites, elevated road causeways, or impoundments; however, there is limited information regarding the frequency, regularity, timing, or significance of red knots' use of such artificial habitats.

In South American wintering areas, red knots are found in intertidal marine habitats, especially near coastal inlets, estuaries, and bays. Habitats include sandy beaches, mudflats, mangroves, saltwater and brackish lagoons, and "restinga" formations (an intertidal shelf of densely packed dirt blown by strong, offshore winds) (Harrington 2001; Niles et al. 2008). Red knots were recently observed using rice fields in French Guiana (Niles 2012) and in Trinidad (eBird.org 2012). In Suriname in the early 1970s, small numbers of red knots were observed on firm and tough clay banks emerging from the eroding coastline and in shallow lagoons, but knots were never found on soft tidal flats (Spaans 1978). Those observations suggest a deviation from the red knot's typical nonbreeding habitats.

In North America, red knots are commonly found along sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, shallow coastal impoundments and lagoons, and peat banks (Harrington 2001; Truitt et al. 2001; Niles et al. 2008; Cohen et al. 2009; Cohen et al. 2010). In Massachusetts, red knots use sandy beaches and tidal mudflats during fall migration. In New York and the coast of New Jersey, red knots use sandy beaches during spring and fall migration (Niles et al. 2008). In Delaware Bay, red knots are found primarily on beaches of sand or peat at the mouths of tidal creeks, along the edge of tidal marshes dominated by salt marsh cordgrass (*Spartina alterniflora*) and saltmeadow cordgrass (*S. patens*), and in salt pannes (shallow, high salinity, mud-bottomed depressions on the marsh surface) and shallow coastal ponds or embayments (Burger et al. 1997; Meyer et al. 1999; Karpanty et al. 2006; Niles et al. 2008;

Cohen et al. 2009). In the southeastern U.S., red knots forage along sandy beaches during spring and fall migration from Maryland through Florida. During migration, knots also use tidal mudflats in Maryland and along North Carolina's barrier islands. In addition to the sandy beaches, red knots forage along peat banks for mussel spat in Virginia and along small pockets of peat banks where the beach is eroding in Georgia (Niles et al. 2008). In Florida, the red knots also use mangrove and brackish lagoons. Along the Texas coast, red knots forage on beaches, oyster reefs, and exposed bay bottoms and roost on high sand flats, reefs, and other sites protected from high tides. Red knots also show some fidelity to particular migration staging areas between years (Harrington 2001; Duerr et al. 2011).

Foraging

The red knot is a specialized molluscivore, eating hard-shelled mollusks, sometimes supplemented with easily accessed softer invertebrate prey, such as shrimp- and crab-like organisms, marine worms, and horseshoe crab (*Limulus polyphemus*) eggs (Harrington 2001; Piersma and van Gils 2011). Mollusk prey are swallowed whole and crushed in the gizzard (Piersma and van Gils 2011). From studies of other subspecies, Zwarts and Blomert (1992) concluded that the red knot cannot ingest prey with a circumference greater than 1.2 in (30 millimeters). Foraging activity is largely dictated by tidal conditions, as the red knot rarely wades in water more than 0.8 to 1.2 in (2 to 3 cm) deep (Harrington 2001). Due to bill morphology, the red knot is limited to foraging on only shallow-buried prey, within the top 0.8 to 1.2 in (2 to 3 cm) of sediment (Zwarts and Blomert 1992; Gerasimov 2009).

On the breeding grounds, the red knot's diet consists mostly of terrestrial invertebrates such as insects (Harrington 2001). In non-breeding habitats, the primary prey of the red knot include blue mussel (*Mytilus edulis*) spat (juveniles); *Donax* and *Darina* clams; snails (*Littorina spp.*), and other mollusks, with polychaete worms, insect larvae, and crustaceans also eaten in some locations. A prominent departure from typical prey items occurs each spring when red knots feed on the eggs of horseshoe crabs, particularly during the key migration stopover within the Delaware Bay of New Jersey and Delaware. Delaware Bay serves as the principal spring migration staging area for the red knot because of the availability of horseshoe crab eggs (Morrison and Harrington 1992; Harrington 1996; Harrington 2001; Clark et al. 2009), which provide a superabundant source of easily digestible food.

Red knots and other shorebirds that are long-distance migrants, must take advantage of seasonally abundant food resources at intermediate stopovers to build up fat reserves for the next nonstop, long distance flight (Clark et al. 1993). Although foraging red knots can be found widely distributed in small numbers within suitable habitats during the migration period, birds tend to concentrate in those areas where abundant food resources are consistently available from year to year.

Population dynamics

Localized and regional red knot surveys have been conducted across the subspecies' range with widely differing levels of geographic, temporal, and methodological consistency. Population surveys are available in the November 2014 Rufa Red Knot Background Information and

Threats Assessment (Supplemental Document), located at www.regulations.gov under Docket Number FWS-R5-ES-2013-0097. Some general characterizations of the available data are noted as follows:

1. No population information exists for the breeding range because, in breeding habitats, red knots are thinly distributed across a huge and remote area of the Arctic. Despite some localized survey efforts, (*e.g.*, Niles et al. 2008; Bart and Johnston 2012), there are no regional or comprehensive estimates of breeding abundance, density, or productivity (Niles et al. 2008).
2. Few regular surveys are conducted in the fall because southbound red knots tend to be less concentrated than during winter or spring.
3. Some survey data are available for most wintering and spring stopover areas. For some areas, long-term data sets have been compiled using consistent survey methodology. Because there can be considerable annual fluctuations in red knot counts, longer-term trends are more meaningful. At several key sites, the best available data show that numbers of red knots declined and remain low relative to counts from the 1980s, although the rate of decline appears to have leveled off since the late 2000s.
4. Inferring long-term population trends from various national or regional datasets derived from volunteer shorebird surveys and other sources, Morrison et al. (2006) and Andres (2009) concluded that red knot numbers declined, probably sharply, in recent decades.

Wintering areas

Counts in wintering areas are particularly useful in estimating red knot populations and trends because the birds generally remain within a given wintering area for a longer period of time compared to the areas used during migration. This eliminates errors associated with turnover or double-counting that can occur during migration counts.

The North American Atlantic coast

Small numbers of wintering red knots have been reported from Maryland, U.S., to Nova Scotia, Canada (BandedBirds.org 2012; Burger et al. 2012; eBird.org 2012), but no systematic winter surveys have been conducted in these northern areas. In surveys of five sites within North Carolina's Outer Banks in 1992 and 1993, Dinsmore et al. (1998) found over 500 red knots per year.

Southeastern U.S. and Caribbean

Extensive data for Florida are available from the International Shorebird Survey and other sources. However, geographic coverage has been inconsistent, ranging from 1 to 29 sites per year from 1974 to 2004. Statewide annual totals ranged from 5 knots (1 site in 1976) to 7,764 knots (7 sites in 1979). The greatest geographic coverage occurred in 1993 (4,265 knots at 25 sites) and 1994 (5,018 knots at 29 sites) (Niles et al. 2008). Harrington et al. (1988) reported that the mean count of birds wintering in Florida was 6,300 birds ($\pm 3,400$, one standard deviation) based on four aerial surveys conducted from October to January in 1980 to 1982. These surveys covered the Florida Gulf coast from Dunedin to Sanibel-Captiva, sometimes going as far south as Cape Sable). Based on those surveys and other work, the Southeast wintering group was estimated at roughly 10,000 birds in the 1970s and 1980s (Harrington 2005).

Sprandel et al. (1997) identified the top 60 sites for wintering shorebirds in Florida and surveyed those areas in 1994. Red knots were found at 27 sites, mainly on the central Gulf coast. Adding the average number of birds counted at each site, these authors estimated a statewide total of 1,452 red knots across three sites in the Florida Panhandle, 18 sites in southwest Florida, four sites in the Everglades, and two sites in Northeast Florida (Sprandel et al. 1997). During frequent surveys of nine sites along about 55 miles of the central Florida Panhandle, Smith (2010) found a mean of about 84 wintering red knots in the winter of 2007. Smith (2010) covered roughly 25 percent of the Panhandle region as delineated by Sprandel et al. (1997), with the survey sites clustered on the eastern end of that region.

Niles (2009) conducted winter aerial and ground counts along Florida's Gulf coast from 2006 to 2010, covering essentially the same area in which Harrington et al. (1988) had reported an average of 6,300 red knots ($\pm 3,400$) in the winters of 1980 to 1982. As the more recent aerial counts were lower, red knot numbers may have decreased in western Florida, perhaps due to birds shifting elsewhere within the larger Southeast wintering region (Harrington 2005). However, a comparison of the geographic coverage of Sprandel et al. (1997) with Niles (2009) suggests red knot numbers did not change much from 1994 to 2010.

Based on re-sightings of birds banded in South Carolina and Georgia from 1999 to 2002, the Southeast wintering population was estimated at $11,700 \pm 1,000$ (one standard error) red knots. Although there appears to have been a gradual shift by some of the southeastern knots from the Florida Gulf coast to the Atlantic coasts of Georgia and South Carolina, population estimates for the Southeast region in the 2000s were at about the same level as during the 1980s (Harrington 2005). Based on recent modeling using re-sightings of marked birds staging in Georgia in fall, as well as other evidence, the Southeast wintering group may number as high as 20,000, but field survey data are not available to corroborate this estimate.

Two recent winter estimates are available for the central Gulf of Mexico. During the International Piping Plover Census in 2006 and 2011, 250 to 500 knots were counted from Alabama to Louisiana. From work related to the Deepwater Horizon oil spill, an estimated 900 red knots were reported from the Florida Panhandle to Mississippi. Older surveys recorded similar numbers from the central Gulf coast, with peak counts of 752 red knots in Alabama (1971) and 40 knots in Mississippi (1979) (Morrison and Harrington 1992). Numbers of red knots wintering in the Caribbean are essentially unknown, but in the course of piping plover surveys in February 2011 in the Bahamas, 70 red knots were observed on the Joulters Cays just north of Andros Island, and 7 knots were observed on the Berry Islands. In December 2012 (*i.e.*, winter 2013), 52 red knots were observed in the Green Turtle Cay flats in Abaco, Bahamas. Roughly 50 red knots occur annually on Green Turtle Cay (eBird.org 2012).

Northwest Gulf of Mexico

Except for localized areas, there have been no long-term systematic surveys of red knots in Texas or Louisiana, and no information is available about the number of red knots that winter in northeastern Mexico. From survey work in the 1970s, Morrison and Harrington (1992) reported peak winter counts of 120 red knots in Louisiana and 1,440 in Texas, although numbers in Texas

between December and February were typically in the range of 100 to 300 birds. Records compiled by Skagen et al. (1999) give peak counts of 2,838 and 2,500 red knots along the coasts of Texas and Louisiana, respectively, between January and June over the period 1980 to 1996, but these figures could include spring migrants. Morrison et al. (2006) estimated only about 300 red knots wintering along the Texas coast, based on surveys in January 2003 (Niles et al. 2008). Higher counts of roughly 700 to 2,500 red knots have recently been made on Padre Island, Texas, during October, which could include wintering birds (Niles et al. 2009; Newstead et al. in press).

Foster et al. (2009) found a mean daily abundance of 61.8 red knots on Mustang Island, Texas, based on surveys every other day from 1979 to 2007. Similar winter counts were reported by Dey et al. (2011b) for Mustang Island from 2005 to 2011. From 1979 to 2007, mean abundance of red knots on Mustang Island decreased 54 percent, but this may have been a localized response to increasing human disturbance, coastal development, and changing beach management practices (Foster et al. 2009; Newstead et al. in press).

There are no current estimates for the size of the Northwest Gulf of Mexico wintering group as a whole (Mexico to Louisiana). The best available current estimates for portions of this wintering region are about 2,000 in Texas (Niles 2012) or approximately 3,000 in Texas and Louisiana, with about half in each State and movement between them.

Spring stopover areas

Records of migrating red knots have been collected at many sites along the Atlantic coast. Not all migration areas are well surveyed, and considerable turnover of individuals occurs as birds migrate through an area. Consequently, using counts of migrating red knots as a basis for population estimates may lead to inaccuracies due to errors associated with turnover or double-counting. However, long-term counts made at a specific location are good indicators of usage trends for that area and, considered together, may reflect trends in the overall population of the red knot.

Virginia

Aerial surveys of the entire chain of barrier island beaches in Virginia have been conducted since 1995 using consistent methods and observers. Although the number of surveys has varied from one to six per year, the aerial survey effort has consistently covered the peak period during the last week of May. Since 2007, Karpenty et al. (2012) have estimated total red knots based on ground counts at 100 to 150 randomly selected points throughout Virginia's barrier island beaches including peat banks, with each location visited from one to three times per stopover season. Although the recent ground surveys show an upward trend, the aerial counts have been relatively steady since the mid-1990s. Because of differences in methodology and timing, the two data sets are not comparable.

Delaware Bay

Aerial surveys have been conducted in Delaware Bay since 1981. Methods and observers were consistent from 1986 to 2008. The methodology during this period involved weekly counts; thus, it was possible the absolute peak number of birds was missed in some years. However, since most shorebirds remain in Delaware Bay at least a week, it is likely that the true peak was

captured in most years (Clark et al. 1993). The surveys covered consistent areas of New Jersey and Delaware from the first week of May to the second week of June. All flights were conducted 3 to 4 hours after high tide, a period when birds are usually feeding on the beaches (Clark et al. 2009).

Methodologies and observers changed several times from 2009 to 2012. Flights are now flown only during the end of May. In addition, aerial counts for 2010 and 2011 were adjusted with ground counts from Mispillion Harbor, Delaware, to more accurately reflect large concentrations of birds at this key site (Dey et al. 2011b). Further, problems in 2009 and 2012 prevented accurate aerial counts, and ground counts have been substituted. Caution should be used in comparing ground and aerial counts (Laurson et al. 2008). Differences between the two methods may account for markedly higher counts in 2009 and 2012. Although aerial counts had typically been higher than ground counts prior to 2009, this was likely because many areas that could be surveyed by air were inaccessible on the ground. Since 2009, ground survey crews have attempted to minimize the access problem by using boats in remote areas.

As with other stopover areas, it is impossible to separate population-wide trends from trends in usage of a particular spring site. Because birds pass in and out of a stopover area, the peak count for a particular year is lower than the total passage population. Thus, differences in the number of birds in Delaware Bay may reflect stopover patterns rather than (or in addition to) trends in the overall red knot population (Clark et al. 1993). Using re-sightings of marked birds, several attempts have been made to estimate the total passage population of Delaware Bay through mathematical modeling. However, the pattern and timing of these declines in Delaware Bay relative to Tierra del Fuego and other stopovers is suggestive of a decrease in the overall population. Comparing four different time periods, average red knot counts in Delaware Bay declined by approximately 70 percent from 1981 to 2012.

Other areas along the U.S. Atlantic Coast

Beginning in 2006, coordinated red knot surveys have been conducted from Florida to Delaware Bay during two consecutive days from May 20 to 24. This period is thought to represent the peak of the red knot migration. There has been variability in methods, observers and areas covered. From 2006 to 2010, there was no change in counts that could not be attributed to varying geographic survey coverage (Dey et al. 2011b); thus, we do not consider any apparent trends in these data before 2010. Because red knot numbers peak earlier in the Southeast than in the mid-Atlantic, the late-May coast-wide survey data likely reflect the movement of some birds north along the coast, and may miss other birds that depart for Canada from the Southeast along an interior (overland) route prior to the survey window. Thus, greater numbers of red knots may utilize southeastern stopovers than suggested by the data.

Fall stopover areas

Fall peak counts from International Shorebird Survey sites along the U.S. Atlantic coast ranged from 6,000 to 9,000 red knots during the mid- to late-1970s (Morrison and Harrington 1992). In a review of numbers and distribution of red knots on the Massachusetts coast during southward migration, Harrington et al. (2010a) found overall red knot numbers increased from the late

1940s to the early 1970s, especially on the mainland (western Cape Cod Bay), with a smaller increase on outer Cape Cod. After 1975, counts declined significantly on the mainland, but increased significantly on outer Cape Cod (Harrington et al. 2010b). Evidence suggests both the mainland and the Cape Cod areas were historically used by red knots having Argentina-Chile destinations, but recently the Cape Cod locations have increasingly been used by red knots with wintering destinations in the Southeast U.S., thus, balancing out the declining numbers of red knots with Argentina-Chile wintering destinations (Harrington et al. 2010b). By 2008, peak counts of Argentina-Chile red knots in Massachusetts had fallen to about 1,000 birds, while birds from the Southeast group increased to about 800 (Harrington et al. 2010a).

No regular counts are currently conducted in Massachusetts, but flocks of over 100 knots are routinely reported from Monomoy National Wildlife Refuge (eBird.org 2012). About 1,500 red knots were present in Avalon on the coast of New Jersey in the fall of 2011 (Service 2011a). Also, on the coast of New Jersey, hundreds of red knots are regularly reported from North Brigantine and Stone Harbor, sometimes in flocks of over 500 (eBird.org 2012). Islands at the mouth of the Altamaha River, Georgia, support the only known late summer and fall staging site on the east coast of the U.S., attracting as many as 12,000 knots at one time (Schneider and Winn 2010).

Summary

After a careful review of available survey data from areas regularly used by substantial numbers of red knots in spring, fall, and winter, the Service has determined that:

1. For some areas, available data are insufficient to substantiate any conclusions regarding population trends over time.
2. For other areas, there are apparent trends, but they are associated with relatively low confidence.
3. For a few key areas, the consistency of geographic coverage, methodologies, and surveyors lead us to greater confidence in apparent trends. Those population data are summarized as follows:
 - a. Northwest Gulf of Mexico wintering region: There are insufficient data for trend analysis.
 - b. Southeast wintering region: There is an apparent decline on Florida's Gulf coast when comparing aerial surveys from 1980 to 1982, with similar surveys (using different surveyors) of approximately the same area from 2006 to 2010, which are associated with lower confidence because birds may have simply shifted elsewhere within this large wintering region. The two region-wide survey efforts to date (from the 2006 and 2011 piping plover surveys) are associated with lower confidence inherent in the methodology (red knots are not the focus of this survey), but do tend to support the perception that knots shift from state to state within this region among years. A long-term data set from Georgia, showing wide inter-annual fluctuations, also supports this perception. Data from the Caribbean are insufficient to infer any trends. Comparing ground surveys of Florida's Gulf coast in 1994 to aerial surveys of about this same area from 2006 to 2010, red knot counts were roughly the same over this time period.

- c. Virginia barrier islands spring stopover area: There is no apparent trend based on aerial surveys since 1995, which is associated with high confidence. A newer data set based on ground surveys suggests an increase since 2007.
- d. Delaware Bay spring stopover area: There is a highly variable data set showing possible declines in the 1990s, and more consistent and substantial declines through the mid-2000s, which are associated with high confidence during the core years of 1986 to 2008. Numbers may have stabilized from 2009 to 2012, but we have lower confidence in trends over this later period due to multiple shifts in methodology and surveyors.
- e. Atlantic coast spring window survey: There is an apparent increase from 2010 to 2012, but it is associated with lower confidence because, despite improvements, methodology and geographic coverage are still stabilizing and because only 3 years of (relatively consistent) data are available.
- f. Fall stopover areas: There are insufficient data for trend analysis in most areas. Since the 1970s, there were probable declines in some parts of eastern Canada and changes in red knot usage of Massachusetts (mainland versus Cape Cod, proportion of birds bound for Southeast versus Argentina-Chile wintering destinations).

Status and distribution

The red knot's range spans 40 states, 24 countries, and their administrative territories or regions extending from their breeding grounds in the Canadian Arctic to migration stopover areas along the Atlantic and Gulf coasts of North America, to wintering grounds throughout the southeastern U.S., the Gulf coast, and South America (reaching as far south as Tierra del Fuego at the southern tip of South America). In Delaware Bay and Tierra del Fuego, the era of modern surveys for the red knot and other shorebird species began in the early 1980s. Systematic red knot surveys of other areas began later, and for many portions of the knot's range, available survey data are patchy. Prior to the 1980s, numerous natural history accounts are available, but provide mainly qualitative or localized population estimates. Nonetheless, a consistent narrative emerges across many historical accounts that red knots were extremely abundant in the early 1800s, decreased sharply starting in the mid-1800s, and may have begun to recover by the mid-1900s. Most writers agree the cause of that historical decline was intensive sport and market hunting. It is unclear whether the red knot population fully recovered its historical numbers (Harrington 2001) following the period of unregulated hunting.

The current geographic distribution of the red knot has not changed relative to that recorded in historical writings with the notable exception of Delaware Bay (discussed in detail below). Several early writers reported that red knots breed in the Arctic and winter along the U.S. Gulf coast and in South America including Brazil and Tierra del Fuego (Audubon 1844; Mackay 1893; Shriner 1897; Eaton 1910; Forbush 1912; Ridgway 1919; Bent 1927; Hellmayr and Conover 1948; Lowery 1974). Bent (1927) included Jamaica and Barbados as part of the possible wintering range of red knots, and described knots as "rarely" wintering in parts of Louisiana and Florida. Hellmayr and Conover (1948) noted the use of the West Indies (Jamaica, Barbados, and Trinidad) during migration. Several writers described the red knot as occurring primarily along the coasts with relatively few sightings inland, but interior migration routes through the central U.S. were also known (Audubon 1844; Eaton 1910; Forbush 1912; Ridgway

1919; Bent 1927; Hellmayr and Conover 1948; Lowery 1974). As with the geographic distribution, a number of historical accounts suggest that the timing of the red knot's spring and fall migrations along the Atlantic coast was generally the same in the past as it is today (Wilson 1829; Roosevelt 1866; Stearns and Coues 1883; Mackay 1893; Dixon 1895 in Barnes and Truitt 1997; Shriner 1897; Forbush 1912; Bent 1927; Stone 1937; Urner and Storer 1949; Myers and Myers 1979; Giraud 1944).

Although the large-scale geographic distribution of migration stopover habitats does not seem to have changed, some authors have noted regional changes in the patterns of red knot stopover habitat usage along the U.S. Atlantic coast. For example, based on a review of early literature, Cohen et al. (2008c) suggest that red knots had a more extensive spring stopover range a century ago than now, with thousands of birds noted in Massachusetts, New York, New Jersey, and Virginia during the spring. Harrington et al. (2010a) found changes in the regional patterns of stopover habitat usage in Massachusetts, as well as a shift in the wintering destination of birds stopping in Massachusetts during fall migration.

Delaware Bay

Delaware Bay was not recognized as a major shorebird stopover area until the early 1980s, despite detailed shorebird studies (*e.g.*, Stone 1937; Urner and Storer 1949) in the South Jersey region (Clark et al. 1993; Clark in Farrell and Martin 1997; Botton et al. in Shuster et al. 2003; Clark et al. 2009). There were some early anecdotal reports involving horseshoe crabs, as summarized by Botton et al. (in Shuster et al. 2003). Wilson (1829) noted ruddy turnstones in the bay fed “almost wholly on the eggs, or spawn, of the great king crab,” but no similar accounts were made of red knots. Forbush (1912) noted red knots “are fond of the spawn of the horsefoot crab, which, often in company with the Turnstone, they dig out of the sand...” Stone (1937) observed ruddy turnstones and black-bellied plovers regularly feeding on dead horseshoe crabs in Delaware Bay. Stone (1937) also mentions flights of ruddy turnstones across the Cape May Peninsula in the spring, as happens today when they go to roost at night along the Atlantic coastal marshes (Botton et al. in Shuster et al. 2003). Interestingly, no mention of horseshoe crab eggs as food is found in Stone's (1937) accounts of any shorebird in the Cape May area, or in the decade-long study by Urner and Storer (1949) and Botton et al. in Shuster et al. (2003). During his early studies of horseshoe crabs in 1951, Shuster observed many shorebirds feeding along Delaware Bay beaches, including red knots. However, another 30 years elapsed before scientists began to study the shorebird/horseshoe crab relationship in detail, and documented the very large numbers of shorebirds using the bay as a stopover (Botton et al. in Shuster et al. 2003). Lack of earlier scientific documentation cannot be attributed to remoteness. Delaware Bay is located within a few hours' drive of millions of people, and university marine laboratories were established many years ago on both shores of the bay (Botton et al. in Shuster et al. 2003).

It is unclear if the large magnitude of the shorebird-horseshoe crab phenomenon was simply missed by science until 1981, or if the distribution of the red knot and other shorebird species changed over the period of the historical record. For much of the 20th century, this phenomenon in Delaware Bay may have been much reduced (relative to 1980s levels), and therefore, easier to miss, due to the occurrence of low points in the abundance of both shorebirds (caused by hunting) and horseshoe crabs (caused by intensive harvest) (Clark in Farrell and Martin 1997;

Botton et al. in Shuster et al. 2003). Alternatively, it may be that the red knot did not make extensive use of Delaware Bay prior to its population decline a century ago. Under this scenario, red knots came to rely on Delaware Bay because their populations were recovering at the same time that Atlantic-side stopover habitats in the region were becoming developed and the shorelines stabilized (Cohen et al. 2008c). We have no means to determine how long shorebirds have been reliant on horseshoe crab eggs in Delaware Bay (Botton et al. in Shuster et al. 2003) prior to the early 1980s.

Threats to red knots and their habitat

In this section, we provide an analysis of threats to red knots and their habitat in their migration and wintering range, with some specific references to their breeding range. Because we lack information on threats to red knots for many countries outside the U.S. (with a few exceptions), this analysis is mainly focused on threats to red knots within the continental U.S. portion of their migration and wintering range, unless otherwise noted.

Climate change

The natural history of Arctic-breeding shorebirds makes this group of species particularly vulnerable to global climate change (*e.g.*, Lindström and Agrell 1999; Piersma and Baker 2000; Zöckler and Lysenko 2000; Rehfisch and Crick 2003; Piersma and Lindström 2004; Meltofte et al. 2007). Relatively low genetic diversity, which is thought to be a consequence of survival through past climate-driven population bottlenecks, may put shorebirds at more risk from human-induced climate variation than other avian taxa (Meltofte et al. 2007); low genetic diversity may result in reduced adaptive capacity as well as increased risks when population sizes drop to low levels.

In the short term, red knots may benefit if warmer temperatures result in fewer years of delayed horseshoe crab spawning in Delaware Bay (Smith and Michaels 2006) or fewer occurrences of late snow melt in the breeding grounds (Meltofte et al. 2007). However, there are indications that changes in the abundance and quality of red knot prey are already under way (Jones et al. 2010; Escudero et al. 2012), and prey species face ongoing climate-related threats from warmer temperatures (Philippart et al. 2003; Rehfisch and Crick 2003; Fabry et al. 2008; Jones et al. 2010), ocean acidification (National Research Council (NRC) 2010), and possibly increased prevalence of disease and parasites (Ward and Lafferty 2004). In addition, red knots face imminent threats from loss of habitat caused by sea level rise (Titus 1990; Galbraith et al. 2002; NRC 2010), and increasing asynchronies (“mismatches”) between the timing of their annual breeding, migration, and wintering cycles and the windows of peak food availability on which the birds depend (Baker et al. 2004; van Gils et al. 2005a; Meltofte et al. 2007; McGowan et al. 2011; Smith et al. 2011).

Several threats are related to the possibility of changing storm patterns. While variation in weather is a natural occurrence and is normally not considered a threat to the survival of a species, persistent changes in the frequency, intensity, or timing of storms at key locations where red knots congregate (*e.g.*, key stopover areas) can pose a threat. Storms impact migratory shorebirds like the red knot both directly and indirectly. Direct impacts include energetic costs

from a longer migration route as birds avoid storms, blowing birds off course, and outright mortality (Niles et al. 2010). Indirect impacts include changes to habitat suitability, storm-induced asynchronies between migration stopover periods and the times of peak prey availability, and possible prompting of birds to take refuge in areas where shorebird hunting is still practiced (Dey et al. 2011a; Nebel 2011; Niles et al. 2012).

With Arctic warming, vegetation conditions in the red knot's breeding grounds are expected to change, causing the zone of nesting habitat to shift and perhaps contract, but this process may take decades to unfold (Kaplan et al. 2003; Meltofte et al. 2007; Feng et al. 2012). That said, ecological shifts (*e.g.*, changes in predation patterns and pressures) in the Arctic may appear sooner than predicted. High uncertainty exists about when and how changing interactions among vegetation, predators, competitors, prey, parasites, and pathogens may affect the red knot, but the impacts are potentially profound (Ims and Fuglei 2005; Meltofte et al. 2007; Schmidt et al. 2012; Fraser et al. 2013).

Due to background rates of sea level rise and the naturally dynamic nature of coastal habitats, we conclude that red knots are adapted to moderate (although sometimes abrupt) rates of habitat change in their wintering and migration areas. However, rates of sea level rise are accelerating beyond those that have occurred over recent millennia. In most of the red knot's nonbreeding range, shorelines are expected to undergo dramatic reconfigurations over the next century as a result of accelerating sea level rise. Extensive areas of marsh are likely to become inundated, which may reduce foraging and roosting habitats. Marshes may be able to establish farther inland, but the rate of new marsh formation (*e.g.*, intertidal sediment accumulation, development of hydric soils, colonization of marsh vegetation) may be slower than the rate of deterioration of existing marsh, particularly under higher sea level rise scenarios. The primary red knot foraging habitats (*i.e.*, intertidal flats and sandy beaches) will likely be locally or regionally inundated, but replacement habitats are likely to reform along the shoreline in its new position. However, if shorelines experience a decades-long period of high instability and landward migration, the formation rate of new beach habitats may be slower than the inundation rate of existing habitats. In addition, low-lying and narrow islands (*e.g.*, in the Caribbean and along the Gulf and Atlantic coasts) may disintegrate rather than migrate, representing a net loss of red knot habitat. Superimposed on these changes are widespread human attempts to stabilize the shoreline, which are known to exacerbate losses of intertidal habitats by blocking their landward migration. The cumulative loss of habitat across the nonbreeding range could affect the ability of red knots to complete their annual cycles, possibly affecting fitness and survival, and is thereby likely to negatively influence the long-term survival of the red knot.

In summary, climate change is expected to affect red knot fitness and, therefore, survival through direct and indirect effects on breeding and nonbreeding habitat, food availability, and timing of the birds' annual cycle. Ecosystem changes in the Arctic (*e.g.*, changes in predation patterns and pressures) may also reduce reproductive output. Together, these anticipated changes will likely negatively influence the long-term survival of the red knot.

Reduced food availability

Commercial harvest of horseshoe crabs has been implicated as a causal factor in the decline of the red knot populations in the 2000s, by decreasing the availability of horseshoe crab eggs in the Delaware Bay stopover (Niles et al. 2008). Due to harvest restrictions and other conservation

actions, horseshoe crab populations showed some signs of recovery in the early 2000s, with apparent signs of red knot stabilization (survey counts, rates of weight gain) occurring a few years later (as might be expected due to biological lag times). Since about 2005, however, horseshoe crab population growth has stagnated for unknown reasons. Under the current management framework, the present horseshoe crab harvest is not considered a threat to the red knot. However, it is not yet known if the horseshoe crab egg resource will continue to adequately support red knot populations over the next 5 to 10 years. In addition, implementation of the current management framework could be impeded by insufficient funding.

The causal role of reduced Delaware Bay food supplies in driving red knot population declines shows the vulnerability of red knots to declines in the quality or quantity of their prey. This vulnerability has also been demonstrated in other *C. canutus* subspecies, although not to the severe extent experienced by the *rufa* subspecies. In addition to the fact that horseshoe crab population growth has stagnated, red knots now face several emerging threats to their food supplies throughout their nonbreeding range. These threats include: small prey sizes (from unknown causes) at two key wintering sites on Tierra del Fuego; warming water temperatures that may cause mollusk population declines and range contractions (including the likely loss of a key prey species from the Virginia spring stopover within the next decade); ocean acidification to which mollusks are particularly vulnerable; physical habitat changes from climate change affecting invertebrate communities; possibly increasing rates of mollusk diseases due to climate change; invasive marine species from ballast water and aquaculture; and the burial and crushing of invertebrate prey from sand placement and recreational activities. Although threats to food quality and quantity are widespread, red knots in localized areas have shown some adaptive capacity to switch prey when the preferred prey species became reduced (Musmeci et al. 2011; Escudero et al. 2012), suggesting some adaptive capacity to cope with this threat. Nonetheless, based on the combination of documented past impacts and a spectrum of ongoing and emerging threats, we conclude that reduced quality and quantity of food supplies is a threat to the *rufa* red knot at the subspecies level, and the threat is likely to continue into the future.

Asynchronies (“mismatches”) in the red knot’s annual cycle

The red knot’s life history strategy makes this species inherently vulnerable to mismatches in timing between its annual cycle and those periods of optimal food and weather conditions upon which it depends. For unknown reasons, more red knots arrived late in Delaware Bay in the early 2000s, which is generally accepted as a key causative factor (along with reduced supplies of horseshoe crab eggs) behind red knot population declines that were observed over this same time frame. Thus, the red knot’s sensitivity to timing asynchronies has been demonstrated through a population-level response. Both adequate supplies of horseshoe crab eggs and high-quality foraging habitat in Delaware Bay, can serve to partially mitigate minor asynchronies at this key stopover site. However, the factors that caused delays in the spring migrations of red knots from Argentina and Chile are still unknown, and we have no information to indicate if this delay will reverse, persist, or intensify.

Superimposed on this existing threat of late arrivals in Delaware Bay are new threats of asynchronies emerging due to climate change. Climate change is likely to affect the reproductive timing of horseshoe crabs in Delaware Bay, mollusk prey species at other stopover sites, or both, possibly pushing the peak seasonal availability of food outside of the windows

when red knots rely on them. In addition, both field studies and modeling have shown strong links between the red knot's reproductive output and conditions in the Arctic including insect abundance and snow cover. Climate change may also cause shifts in the period of optimal Arctic conditions relative to the time period when red knots currently breed.

The red knot's adaptive capacity to deal with numerous changes in the timing of resource availability across its geographic range is largely unknown. A few examples suggest some flexibility in migration strategies. However, available information suggests that the timing of the red knot's annual cycle is controlled at least partly by celestial and endogenous cues, while the reproductive seasons of prey species, including horseshoe crabs and mollusks, are largely driven by environmental cues such as water temperature. These differences between the timing cues of red knots and their prey suggest limitations on the adaptive capacity of red knots to deal with numerous changes in the timing of resource availability across their geographic range. Based on the combination of documented past impacts and a spectrum of ongoing and emerging threats, we conclude that asynchronies (mismatches between the timing of the red knot's annual cycles and the periods of favorable food and weather upon which it depends) are likely to cause deleterious subspecies-level effects.

Shoreline stabilization and coastal development

Much of the U.S. coast within the range of the red knot is already extensively developed. Direct loss of shorebird habitats occurred over the past century as substantial commercial and residential developments were constructed in and adjacent to ocean and estuarine beaches along the Atlantic and Gulf coasts. In addition, red knot habitat was also lost indirectly, as sediment supplies were reduced and stabilization structures were constructed to protect developed areas. Sea level rise and human activities within coastal watersheds can lead to long-term reductions in sediment supply to the coast. The damming of rivers, bulk-heading of highlands, and armoring of coastal bluffs have reduced erosion in natural source areas and consequently the sediment loads reaching coastal areas. Although it is difficult to quantify, the cumulative reduction in sediment supply from human activities may contribute substantially to the long-term shoreline erosion rate. Along coastlines subject to sediment deficits, the amount of sediment supplied to the coast is less than that lost to storms and coastal sinks (inlet channels, bays, and upland deposits), leading to long-term shoreline recession (Greene 2002; Herrington 2003; Morton 2003; Morton et al. 2004; Defeo et al. 2009; Climate Change Science Program [CCSP] 2009; Florida Oceans and Coastal Council 2010; Coastal Protection and Restoration Authority of Louisiana 2012).

The mid-Atlantic coast from New York to Virginia is the most urbanized shoreline in the country, except for parts of Florida and southern California. In New York and New Jersey, hard structures and beach nourishment programs cover much of the coastline. The U.S. southeastern coast from North Carolina to Florida is the least urbanized along the Atlantic coast, although both coasts of Florida are urbanizing rapidly. Texas has the most extensive sandy coastline in the Gulf, and much of the area is sparsely developed (Leatherman 1989). Region-wide, about 40 percent of the southeast and Gulf coast is already developed (Rice 2012a; Service 2012). Not all of the remaining 60 percent in the "undeveloped" category, however, is still available for

development because about 43 percent (about 910 miles) of beaches across this region are considered preserved. Preserved beaches include those in public or nongovernmental conservation ownership and those under conservation easements.

Past and ongoing stabilization projects fundamentally alter the naturally dynamic coastal processes that create and maintain beach strand and bayside habitats, including those habitat components that red knots rely upon. Past loss of stopover and wintering habitat likely reduce the resilience of the red knot by making it more dependent on those habitats that remain, and more vulnerable to threats (*e.g.*, disturbance, predation, reduce quality or abundance of prey, increased intraspecific and interspecific competition) within those restricted habitats.

Hard structures

Hard shoreline stabilization projects are typically designed to protect property (and its human inhabitants) not beaches (Pilkey and Howard 1981; Kana 2011). Structural development along the shoreline and manipulation of natural inlets upset the naturally dynamic coastal processes and result in loss or degradation of beach habitat (Melvin et al. 1991). As beaches narrow, the reduced habitat can directly lower the diversity and abundance of biota (life forms), especially in the upper intertidal zone. Shorebirds may be impacted both by reduced habitat area for roosting and foraging, and by declining intertidal prey resources, as has been documented in California (Dugan and Hubbard 2006; Defeo et al. 2009).

In Delaware Bay, hard structures also cause or accelerate loss of horseshoe crab spawning habitat (Botton et al. 1988; Botton et al. in Shuster et al. 2003; CCSP 2009), and shorebird habitat has been, and may continue to be, lost where bulkheads have been built (Clark in Farrell and Martin 1997). In addition to directly eliminating red knot habitat, hard structures interfere with the creation of new shorebird habitats by interrupting the natural processes of over-wash and inlet formation. Where hard stabilization is installed, the eventual loss of the beach and its associated habitats is virtually assured (Rice 2009) in the absence of beach nourishment, and therefore, may impact red knots as discussed below. Where they are maintained, hard structures are likely to significantly increase the amount of red knot habitat lost as sea levels continue to rise.

In a few isolated locations, however, hard structures may enhance red knot habitat, or may provide artificial habitat. In Delaware Bay, for example, Botton et al. (1994) found that creek mouths, jetties and other artificial obstructions can act to concentrate drifting horseshoe crab eggs and thereby attract shorebirds. Another example comes from the Delaware side of the bay, where a seawall and jetty at Mispillion Harbor protect the confluence of the Mispillion River and Cedar Creek. These structures create a low energy environment in the harbor, which seems to provide highly suitable conditions for horseshoe crab spawning over a wider variation of weather and sea conditions than anywhere else in the bay. Horseshoe crab egg densities at Mispillion Harbor are consistently an order of magnitude higher than at other bay beaches (Dey et al. 2011b), and this site consistently supports upwards of 15 to 20 percent of all red knots recorded in Delaware Bay (Lathrop 2005). In Florida, red knots have been observed on multiple instances using artificial structures such as docks, piers, jetties, causeways, and construction barriers. The Service does not have any information regarding the frequency, regularity, timing, or significance of this use of artificial habitats.

Mechanical sediment transport

Several types of sediment transport are employed to stabilize shorelines, protect development, maintain navigation channels, and provide for recreation (Corps 2002; Kana 2011; Gebert 2012). The effects of these projects are typically expected to be relatively short in duration, usually less than 10 years, but often these actions are carried out every few years in the same area, resulting in a more lasting impact on habitat suitability for shorebirds. Mechanical sediment transport practices include beach nourishment, sediment back-passing, sand scraping, and dredging. Since the 1970s, 90 percent of the Federal appropriation for shore protection has been for beach nourishment (Corps 2002), which has become the preferred course of action to address shoreline erosion in the U.S. (Greene 2002; Morton and Miller 2005; Kana 2011).

Where shorebird habitat has been severely reduced or eliminated by hard stabilization structures, beach nourishment may be the only means available to replace any habitat for as long as the hard structures are maintained (Nordstrom and Mauriello 2001), although such habitat will persist only with regular nourishment episodes (typically on the order of every 2 to 6 years). In Delaware Bay, beach nourishment has been recommended to prevent loss of spawning habitat for horseshoe crabs (ASMFC 1998; Carter et al. in Guilfoyle et al. 2007; Kalasz 2008), and is being pursued as a means of restoring shorebird habitat in Delaware Bay following Hurricane Sandy (Corps 2012; Niles et al. 2013). Beach nourishment was part of a 2009 project to maintain important shorebird foraging habitat at Mispillion Harbor, Delaware (Siok and Wilson 2011). However, red knots may be directly disturbed if beach nourishment takes place while the birds are present. On New Jersey's Atlantic coast, beach nourishment has typically been scheduled for the fall, when red knots are present, because of various constraints at other times of year. In addition to causing disturbance during construction, beach nourishment often increases recreational use of the widened beaches that, without careful management, can increase disturbance of red knots. Beach nourishment can also temporarily depress, and sometimes permanently alter, the invertebrate prey base on which shorebirds depend.

In addition to disturbing the birds and impacting the prey base, beach nourishment can affect the quality and quantity of red knot habitat (Greene 2002). The artificial beach created by nourishment may provide only suboptimal habitat for red knots, as a steeper beach profile is created when sand is stacked on the beach during the nourishment process. In some cases, nourishment is accompanied by the planting of dense beach grasses, which can directly degrade habitat, as red knots require sparse vegetation to avoid predation. By precluding over-wash and Aeolian transport, especially where large artificial dunes are constructed, beach nourishment can also lead to further erosion on the bayside and promote bayside vegetation growth, both of which can degrade the red knot's preferred foraging and roosting habitats (sparsely vegetated flats in or adjacent to intertidal areas). Preclusion of over-wash also impedes the formation of new red knot habitats. Beach nourishment can also encourage further development, bringing further habitat impacts, reducing future alternative management options such as a retreat from the coast, and perpetuating the developed and stabilized conditions that may ultimately lead to inundation where beaches are prevented from migrating (Greene 2002).

Following placement of sediments much coarser than those native to the beach, Peterson et al. (2006) found that the area of intertidal-shallow sub-tidal shorebird foraging habitat was reduced by 14 to 29 percent at a site in North Carolina. Presence of coarse shell material armored the

substrate surface against shorebird probing, further reducing foraging habitat by 33 percent, and probably also inhibiting manipulation of prey when encountered by a bird's bill (Peterson et al. 2006). In addition to this physical change from adding coarse sediment, nourishment that places sediment dissimilar to the native beach also substantially increases impacts to the red knot's invertebrate prey base.

Many of the effects of sediment back-passing (a technique that reverses the natural migration of sediment by mechanically [via trucks] or hydraulically [via pipes] transporting sand from accreting, downdrift areas of the beach to eroding, up-drift areas of the beach) and beach scraping (mechanically redistributing beach sand from the littoral zone [along the edge of the sea] to the upper beach to increase the size of the primary dune or to provide a source of sediment for beaches that have no existing dune) are similar to those for beach nourishment (Lindquist and Manning 2001; Service 2011b), including disturbance during and after construction, alteration of prey resources, reduced habitat area and quality, and precluded formation of new habitats. Relative to beach nourishment, sediment back-passing and beach scraping can involve considerably more driving of heavy trucks and other equipment on the beach including areas outside the sand placement footprint, potentially impacting shorebird prey resources over a larger area (Service 2011b). In addition, these practices can directly remove sand from red knot habitats, as is the case in one red knot concentration area in New Jersey (Service 2011b). Back-passing and sand scraping can involve routine episodes of sand removal or transport that maintain the beach in a narrower condition, indefinitely reducing the quantity of back-beach roosting habitat.

The common practice of inlet and nearshore dredging can affect red knot habitats. Dredging often involves removal of sediment from sand bars, shoals, and inlets in the near-shore zone, directly impacting optimal red knot roosting and foraging habitats (Winn and Harrington in Guilfoyle et al. 2006; Harrington in Guilfoyle et al. 2007; Harrington 2008). These ephemeral habitats are even more valuable to red knots because they tend to receive less recreational use than the main beach strand. In addition to causing this direct habitat loss, the dredging of sand bars and shoals can preclude the creation and maintenance of red knot habitats by removing sand sources that would otherwise act as natural breakwaters and weld onto the shore over time (Morton 2003; Hayes and Michel 2008). Further, removing these sand features can cause or worsen localized erosion by altering depth contours and changing wave refraction (Hayes and Michel 2008), potentially degrading other nearby red knot habitats indirectly because inlet dynamics exert a strong influence on the adjacent shorelines. Studying barrier islands in Virginia and North Carolina, Fenster and Dolan (1996) found inlet influences extend 3.4 to 8.1 mi (5.4 to 13.0 kilometer [km]), and that inlets dominate shoreline changes for up to 2.7 mi (4.3 km). Changing the location of dominant channels at inlets can create profound alterations to the adjacent shoreline (Nordstrom 2000).

Wrack removal and beach cleaning

Wrack on beaches and baysides provides important foraging and roosting habitat for red knots and many other shorebirds on their winter, breeding, and migration grounds. Because shorebird numbers are positively correlated with wrack cover and biomass of their invertebrate prey that feed on wrack (Tarr and Tarr 1987; Dugan et al. 2003; Hubbard and Dugan 2003), beach

grooming will lower bird numbers (Defeo et al. 2009). Beach cleaning or grooming can result in abnormally broad unvegetated zones that are inhospitable to dune formation or plant colonization, thereby enhancing the likelihood of erosion (Defeo et al. 2009).

The Service estimates 240 of 825 miles (29 percent) of sandy beach shoreline in Florida are cleaned or raked on various schedules (*i.e.*, daily, weekly, monthly) (DEP 2008). Service biologists estimate South Carolina mechanically cleans approximately 34 of its 187 shoreline miles (18 percent), and Texas mechanically cleans approximately 20 of its 367 shoreline miles (5.4 percent). In Louisiana, beach raking occurs on Grand Isle (the State's only inhabited island) along approximately 8 miles of shoreline, roughly 2 percent of the state's 397 sandy shoreline miles.

Tilling beaches to reduce soil compaction, as sometimes required by the Service for sea turtle protection after beach nourishment activities, also has similar impacts. Recently, the Service improved sea turtle protection provisions in Florida; these provisions now require tilling, when needed, to be above the primary wrack line, not within it.

Invasive vegetation

A recently identified threat to red knot is the spread of coastal invasive plants into suitable red knot habitat. Like most invasive species, coastal exotic plants reproduce and spread quickly and exhibit dense growth habits, often outcompeting native plant species. If left uncontrolled, invasive plants cause a habitat shift from open or sparsely vegetated sand to dense vegetation, resulting in the loss or degradation of red knot roosting habitat, which is especially important during high tides and migration periods.

Beach vitex (*Vitex rotundifolia*) is a woody vine introduced into the southeastern U.S. as a dune stabilization and ornamental plant (Westbrooks and Madsen 2006). It currently occupies a very small percentage of its potential range in the U.S.; however, it is expected to grow well in coastal communities throughout the southeastern U.S. from Virginia to Florida, and west to Texas (Westbrooks and Madsen 2006).

Unquantified amounts of crowfoot grass (*Dactyloctenium aegyptium*) grow invasively along portions of the Florida coastline. It forms thick bunches or mats that may change the vegetative structure of coastal plant communities and alter shorebird habitat. The Australian pine (*Casuarina equisetifolia*) also changes the vegetative structure of the coastal community in south Florida and islands within the Bahamas. Shorebirds prefer foraging in open areas where they are able to see potential predators, and tall trees provide good perches for avian predators. Australian pines potentially impact shorebirds, including the red knot, by reducing attractiveness of foraging habitat and/or increasing avian predation.

The propensity of these exotic species to spread, and their tenacity once established, make them a persistent threat, partially countered by increasing landowner awareness and willingness to undertake eradication activities.

Aquaculture and agriculture

In some localized areas within the red knot's range, aquaculture or agricultural activities are impacting habitat quality and quantity. Those impacts, however, occur mainly in Canada, Brazil,

Río Gallegos (southern Argentina), and Bahía Lomas (Chilean Tierra del Fuego). In the U.S., Luckenbach (2007) found that aquaculture of clams (*Mercenaria mercenaria*) in the lower Chesapeake Bay occurs in close proximity to shorebird foraging areas. The current distribution of clam aquaculture in the very low intertidal zone minimizes the amount of direct overlap with shorebird foraging habitats, but if clam aquaculture expands farther into the intertidal zone, more shorebird impacts (*e.g.*, habitat alteration) may occur. However, these Chesapeake Bay intertidal zones are not considered the primary habitat for red knots (Cohen et al. 2009), and red knots were not among the shorebirds observed in this study (Luckenbach 2007). Likewise, oyster aquaculture is practiced in Delaware Bay (New Jersey Department of Environmental Protection [NJDEP] 2011), but we have no information to indicate that this activity is affecting red knots.

Hunting

Since the late 19th century, hunters concerned about the future of wildlife and the outdoor tradition have made countless contributions to conservation. In many cases, managed hunting is an important tool for wildlife management. However, unregulated or illegal hunting can cause population declines, as was documented in the 1800s for red knots in the U.S. While no longer a concern in the U.S., under-regulated or illegal hunting of red knots and other shorebirds is ongoing in parts of the Caribbean and South America.

Scientific study

Considerable care is taken to minimize disturbance caused to shorebirds from these research activities. Numbers of birds per catch and total numbers caught over the season are limited, and careful handling protocols are followed, including a 3-hour limit on holding times (Niles et al. 2008; Niles et al. 2010). Despite these measures, hundreds of red knots are temporarily stressed during the course of annual research, and mortality, though rare, does occasionally occur (Taylor 1981). However, we conclude that these research activities are not a threat to the red knot because evaluations have shown no effects of these short-term stresses on red knot survival. Further, the rare, carefully documented, and properly permitted mortality of an individual bird in the course of well-founded research does not affect red knot populations or the overall subspecies.

Disease

Red knots are exposed to parasites and disease throughout their annual cycle. Susceptibility to disease may be higher when the energy demands of migration have weakened the immune system. Studying red knots in Delaware Bay in 2007, Buehler et al. (2010) found several indices of immune function were lower in birds recovering protein after migration than in birds storing fat to fuel the next leg of the migration. These authors hypothesized fueling birds may have an increased rate of infection or may be bolstering immune defense, or recovering birds may be immuno-compromised because of the physical strain of migratory flight or as a result of adaptive energy tradeoffs between immune function and migration, or both (Buehler et al. 2010). A number of known parasites (*e.g.*, sporozoans, hookworms, flatworms, and ectoparasites) and viruses (*e.g.*, avian influenza and avian paramyxovirus) have been documented in red knots, but we have no evidence disease is a current threat to the red knot.

Predation

In wintering and migration areas, the most common predators of red knots are peregrine falcons (*Falco peregrinus*), harrier hawks (*Circus* spp.), accipiters (*Accipiter* spp.), merlins (*Falco columbarius*), short-eared owls (*Asio flammeus*), and greater black-backed gulls (*Larus marinus*) (Niles et al. 2008). In addition to greater black-backed gulls, other large gulls (e.g., herring gulls [*Larus* spp.]) are anecdotally known to prey on shorebirds (Breese 2010). Predation by a great horned owl (*B. virginianus*) has been documented in Florida. Nearly all documented predation of wintering red knots in Florida has been by avian, not terrestrial, predators. However in migration areas like Delaware Bay, terrestrial predators such as red foxes (*V. vulpes*) and feral cats may be a threat to red knots by causing disturbance, but direct mortality from these predators may be low (Niles et al. 2008).

Raptor predation has been shown to be an important mortality factor for shorebirds at several sites (Piersma et al. 1993). However, Niles et al. (2008) concluded that increased raptor populations have not been shown to affect the size of shorebird populations. Based on studies of other red knot subspecies in the Dutch Wadden Sea, Piersma et al. (1993) concluded that the chance for an individual to be attacked and captured is small, as long as the birds remain in the open and in large flocks so that approaching raptors are likely to be detected. Although direct mortality from predation is generally considered relatively low in nonbreeding areas, predators also impact red knots by affecting habitat use and migration strategies (Stillman et al. 2005; Niles et al. 2008) and by causing disturbance, thereby potentially affecting red knots' rates of feeding and weight gain.

In wintering and migration areas, predation is not directly impacting red knot populations despite some direct mortality. At key stopover sites, however, localized predation pressures are likely to exacerbate other threats to red knot populations, such as habitat loss, food shortages, and asynchronies between the birds' stopover period and the occurrence of favorable food and weather conditions. Predation pressures worsen these threats by pushing red knots out of otherwise suitable foraging and roosting habitats, causing disturbance, and possibly causing changes to stopover duration or other aspects of the migration strategy.

Although little information is available from the breeding grounds, the long-tailed jaeger (*Stercorarius longicaudus*) is prominently mentioned as a predator of red knot chicks in most accounts. Other avian predators include parasitic jaeger (*S. parasiticus*), pomarine jaeger (*S. pomarinus*), herring gull, glaucous gull (*L. hyperboreus*), gyrfalcon (*F. rusticolus*), peregrine falcon, and snowy owl. Mammalian predators include arctic fox and sometimes arctic wolves (*Canis lupus arctos*) (COSEWIC 2007; Niles et al. 2008). Predation pressure on Arctic-nesting shorebird clutches varies widely regionally, inter-annually, and even within each nesting season, with nest losses to predators ranging from close to 0 percent to near 100 percent (Meltofte et al. 2007), depending on ecological factors. In the Arctic, 3-to 4-year lemming cycles give rise to similar cycles in the predation of shorebird nests. When lemmings are abundant, predators concentrate on the lemmings, and shorebirds breed successfully. When lemmings are in short supply, predators switch to shorebird eggs and chicks (Summers and Underhill 1987; Blomqvist et al. 2002; Service 2003; COSEWIC 2007; Meltofte et al. 2007; Niles et al. 2008).

In addition to affecting reproductive output, these cyclic predation pressures have been shown to influence shorebird nesting chronology and distribution. Studying 12 shorebird species, including red knot, over 11 years at four sites in the eastern Canadian Arctic, Smith et al. (2010) found that both snow conditions and predator abundance have significant effects on the chronology of breeding. Higher predator abundance resulted in earlier nesting than would be predicted by snow cover alone (Smith et al. 2010). Based on the adaptations of various species to deal with predators, Larson (1960) concluded that the distribution and abundance of red knots and other Arctic-breeding shorebirds were strongly influenced by arctic fox and rodent cycles, such that birds were in low numbers or absent in areas without lemmings because foxes preyed predominately on birds in those areas (Fraser et al. 2013). Unsuccessful breeding seasons contributed to at least some of the observed reductions in the red knot population in the 2000s. However, rodent-predator cycles have always affected the productivity of Arctic-breeding shorebirds and have generally caused only minor year-to-year changes in otherwise stable populations (Niles et al. 2008).

Human disturbance

Red knots are exposed to disturbance from recreational and other human activities throughout their nonbreeding range because red knots and recreational users (*e.g.*, pedestrians, offroad vehicles, dog walkers, boaters) are concentrated on the same beaches (Niles et al. 2008; Tarr 2008). Recreational activities affect red knots both directly and indirectly. These activities can cause habitat damage (Anders and Leatherman 1987; Schlacher and Thompson 2008), cause shorebirds to abandon otherwise preferred habitats, negatively affect the birds' energy balances, and reduce the amount of available prey. In Florida, the most immediate and tangible threat to migrating and wintering red knots is chronic disturbance (Niles et al. 2006, 2008), which may affect the ability of birds to maintain adequate weights in some areas (Niles 2009). These effects are likely to exacerbate other threats to the red knot, such as habitat loss, asynchronies in the annual cycle, and competition with gulls.

Harmful algal blooms

A harmful algal bloom (HAB) is the proliferation of a toxic or nuisance algal species (which can be microscopic or macroscopic, such as seaweed) that negatively affects natural resources or humans (Florida Fish and Wildlife Conservation Commission [FWC] 2011b). For shorebirds, shellfish are a key route of exposure to algal toxins. When toxic algae are filtered from the water as food by shellfish, their toxins accumulate in those shellfish to levels that can be lethal to animals that eat the shellfish (Anderson 2007).

Algal toxins may be a direct cause of death in seabirds and shorebirds via an acute or lethal exposure, or birds can be exposed to chronic, sub-lethal levels of a toxin over the course of an extended bloom. Sub-acute doses may contribute to mortality due to an impaired ability to forage productively, disrupted migration behavior, reduced nesting success, or increased vulnerability to predation, dehydration, disease, or injury (van Deventer 2007).

Sick or dying birds often seek shelter in dense vegetation; thus, those that succumb to HAB exposure are not often observed or documented. Birds that are debilitated or die in exposed areas are subject to predation or may be swept away in tidal areas. When extensive fish kills

occur from HABs, the carcasses of smaller birds such as shorebirds may go undetected. Some areas affected by HABs are remote and rarely visited. Thus, mortality of shorebirds associated with HABs is likely underreported.

To date, direct impacts to red knots from HABs have been documented only in Texas, although a large die-off in Uruguay may have also been linked to an HAB. We conclude some level of undocumented red knot mortality from HABs likely occurs most years, based on probable underreporting of shorebird mortalities from HABs and the direct exposure of red knots to algal toxins (particularly via contaminated prey) throughout the knot's nonbreeding range. We have no documented evidence that HABs were a driving factor in red knot population declines in the 2000s. However, HAB frequency and duration have increased and do not show signs of abating over the next few decades. Combined with other threats, ongoing and possibly increasing mortality from HABs may affect the red knot at the population level.

Environmental contaminants

Although red knots are exposed to a variety of contaminants across their nonbreeding range, we have no evidence that such exposure is impacting health, survival, or reproduction at the subspecies level. Exposure risks exist in localized red knot habitats in Canada, but best available data suggest shorebirds in Canada are not impacted by background levels of contamination. Levels of most metals in red knot feathers from the Delaware Bay have been somewhat high, but generally similar to levels reported from other studies of shorebirds. One preliminary study suggests organochlorines and trace metals are not elevated in Delaware Bay shorebirds, although this finding cannot be confirmed without updated testing. Levels of metals in horseshoe crabs are generally low in the Delaware Bay region and not likely impacting red knots or recovery of the crab population.

Horseshoe crab reproduction does not appear impacted by the mosquito control chemical methoprene (at least through the first juvenile molt) or by ambient water quality in mid-Atlantic estuaries. Shorebirds have been impacted by pesticide exposure, but use of the specific chemical that caused a piping plover death in Florida has subsequently been banned in the U.S. Exposure of shorebirds to agricultural pollutants in rice fields may occur regionally in parts of South America, but red knot usage of rice field habitats was low in the several countries surveyed. Finally, localized urban pollution has been shown to impact South American red knot habitats, but we are unaware of any documented health effects or population-level impacts. Thus, we conclude that environmental contaminants are not a threat to the red knot.

Oil spills

The red knot has the potential to be exposed to oil spills and leaks throughout its migration and wintering range. Red knots are exposed to large-scale petroleum extraction and transportation operations in many key wintering and stopover habitats including Tierra del Fuego, Patagonia, the Gulf of Mexico, Delaware Bay, and the Gulf of St. Lawrence. To date, the documented effects to red knots from oil spills and leaks have been minimal; however, information regarding any oiling of red knots during the Deepwater Horizon spill has not yet been released. We

conclude that high potential exists for small or medium spills to impact moderate numbers of red knots or their habitats, such that one or more such events is likely over the next few decades, based on the proximity of key red knot habitats to high-volume oil operations. Risk of a spill may decrease with improved spill contingency planning, infrastructure safety upgrades, and improved spill response and recovery methods. However, these decreases in risk (*e.g.*, per barrel extracted or transported) could be offset if the total volume of petroleum extraction and transport continues to grow. A major spill affecting habitats in a key red knot concentration area (*e.g.*, Tierra del Fuego, Gulf coasts of Florida or Texas, Delaware Bay, Mingan Archipelago) while knots are present is less likely, but would be expected to cause population-level impacts.

Wind energy development

Within the red knot's U.S. wintering and migration range, substantial development of offshore wind facilities is planned, and the number of wind turbines installed on land has increased considerably over the past decade. The rate of wind energy development will likely continue to increase into the future as the U.S. looks to decrease reliance on the traditional sources of energy (*e.g.*, fossil fuels). Wind turbines can have a direct (*e.g.*, collision mortality) and indirect (*e.g.*, migration disruption, displacement from habitat) impact on shorebirds. We have no information on wind energy development trends in other countries, but risks of red knot collisions would likely be similar wherever large numbers of turbines are constructed along migratory pathways, either on land or offshore.

We are not aware of any documented red knot mortalities at any wind turbines to date, but low levels of red knot mortality from turbine collisions may be occurring now based on the number of turbines along the red knot's migratory routes and the frequency with which red knots traverse these corridors. Based on the current number and geographic distribution of turbines, if any such mortality is occurring, it is likely not causing subspecies-level effects. However, as build-out of offshore, coastal, and inland wind energy infrastructure progresses, increasing mortality from turbine collisions may contribute to a subspecies-level effect due to the red knot's vulnerability to direct human-caused mortality. We anticipate the threat to red knots from wind turbines will be primarily related to collision or behavioral changes during migratory or daily flights. Unless facilities are constructed at key stopover or wintering habitats, we do not expect wind energy development to cause significant direct habitat loss or degradation or displacement of red knots from otherwise suitable habitats.

Threats summary

The Service has assessed the best scientific and commercial data available regarding past, present, and future threats to the red knot. The primary threats to the red knot are from habitat loss and degradation due to sea level rise, shoreline stabilization, and Arctic warming; and reduced food availability and asynchronies in the annual cycle. Other threats are moderate in comparison to the primary threats; however, cumulatively, they could become significant when working in concert with the primary threats if they further reduce the species' resiliency. Such secondary threats include hunting, predation, human disturbance, harmful algal blooms, oil spills, and wind energy development, all of which affect red knots across their range. Although

conservation efforts (*e.g.*, management of the horseshoe crab population and regulatory mechanisms for the species and its habitat) are being implemented in many areas of the red knot's range and reduce some threats, significant risks to the subspecies remain.

Analysis of the species/critical habitat likely to be affected

Eastern indigo snake

According to Corps documents, there are no gopher tortoise (*Gopherus polyphemus*) burrows, holes, cavities or other refugia suitable for snakes that could be buried, trapped or injured during Project activities. The Corps provided a determination of “may affect, not likely to adversely affect” for the eastern indigo snake. The Corps reached this determination using the Eastern Indigo Snake Programmatic Effect Determination Key dated January 25, 2010 (amended August 13, 2013; Service 2013b), based on the following sequential determination: A->B->C. As previously indicated, the Applicant has agreed to follow and implement the Standard Protection Measures for the Indigo Snake (Service 2013b). Based on this information, the Service concurs with the Corps' determination of “may affect, not likely to adversely affect” for the eastern indigo snake.

Florida panther

The Project's sand placement template is not located in the Service's Focus Area for the Florida panther and does not provide habitat for the species. The Focus Area is based on the scientific information on panther habitat usage provided in Kautz et al. 2006 and Thatcher et al. 2006, and denotes areas in Florida where development projects could potentially affect the panther. That said, existing roads associated with the four proposed upland mines for use in hotspot sand placement events, pass through or are adjacent to the Florida panther primary, secondary, dispersal, and/or primary dispersal/expansion zone; and/or dispersal pathways (Figure 2). Although new road construction is not part of the Project, Florida panthers can be injured or killed due to collisions with motorized vehicles when attempting to cross highways, and the potential for collisions increases as traffic increases. A single truck haul sand placement event would entail a maximum of 3,410 truckloads, which would translate to 175 round trip events per day, for 20 days. According to our GIS database, from 1998 to 2014, 11 vehicular collisions with panthers have occurred along the truck corridors outlined in the Project.

The Corps has determined the Project “may affect, but is not likely to adversely affect” the Florida panther. As previously indicated, the Applicant has agreed to restrict all truck traffic (loaded or unloaded) inside or immediately adjacent to panther focus areas, to daylight hours to reduce the potential for panther collisions. Based on this information, the Service concurs with the Corps' determination of “may affect, not likely to adversely affect” for the Florida panther.

Piping plover

Piping plovers do not breed in Florida, but spend the winter along the southern Atlantic, Gulf Coast, and Caribbean beaches and barrier islands. The primary constituent elements (PCEs) for piping plover wintering habitat are those habitat components that are essential for the primary biological needs of foraging, sheltering, and roosting. The PCEs include intertidal beaches and

flats (between annual low tide and annual high tide) and associated dune systems and flats above the annual high tide. Although the Project is not located in piping plover critical habitat, piping plover PCEs are present, and therefore, the Corps has determined the Project “may affect” the piping plover. As previously indicated, the Applicant has agreed to follow and implement the Reasonable and Prudent Measures and Terms and Conditions outlined in the P³BO that apply to the Project. Therefore, the Service has determined the Project is consistent with the P³BO and the Service concurs with the Corps’ “may affect” determination.

All sand placement events could impact nesting shorebirds protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 701 *et seq.*). In order to comply with the MBTA and address the potential for the Project to impact nesting shorebirds, the Applicant shall comply with the FWC standard shorebird protection guidelines to protect against impacts to nesting shorebirds during implementation of the Project on the Gulf Coast.

Red knot

The proposed action has the potential to adversely affect migrating and wintering red knots and their habitat within the Project area. The construction activities may lead to temporarily diminished quantity and quality of intertidal foraging and roosting habitats within the Project area, resulting in decreased survivorship of migrating and wintering knots and temporary adverse effects to suitable foraging and roosting habitat. The length of construction activities may delay the recovery of prey species due to the prolonged disturbance of the benthic fauna. The Project goal is to continue the cyclical renourishment of the shoreline, but the temporary effects of construction will require time for natural recovery and would extend beyond more than one migration and wintering season. The detailed effects of the proposed action on red knots and their habitat will be considered further in the Environmental Baseline, Effects of the Action, and Cumulative Effects sections of this Biological Opinion.

Sea Turtles

The Service has determined the sand placement portion of the Project is covered by the revised SPBO. As previously stated, the Applicant has agreed to follow and implement the minimization measures, Reasonable and Prudent Measures, and the Terms and Conditions that apply to the Project. Therefore, the Service will not discuss the effects of the sand placement portion of the Project on sea turtles further in this Biological Opinion.

The Service and the National Oceanic and Atmospheric Administration’s National Marine Fisheries Service (NOAA Fisheries) share Federal jurisdiction for sea turtles under the Act. The Service has the responsibility for sea turtles on the nesting beaches and NOAA Fisheries has jurisdiction for sea turtles in the marine environment. Our analysis will only address activities that may impact nesting sea turtles, their nests and eggs, and hatchlings as they emerge from the nest and crawl to the sea.

If potential impacts to sea turtles in the marine environment are anticipated, NOAA Fisheries should be contacted with a request for assessment and consultation on potential impacts to swimming sea turtles. For further information on Act compliance with the NOAA Fisheries, please contact Rachel Sweeney, Chief of the Interagency Cooperation Branch, by e-mail at rachel.sweeney@noaa.gov or by phone at 727-209-5953.

Terrestrial loggerhead sea turtle critical habitat

The Project encompasses two designated terrestrial loggerhead sea turtle critical habitat units that span the Gulf of Mexico shoreline. Unit LOGG-T-FL-23 – Captiva Island, Lee County, is located between Redfish Pass, south to Blind Pass, a length of 4.7 miles. Unit LOGG-T-FL-24 – Sanibel Island West, Lee County, is located between Blind Pass, south to Tarpon Bay Road, a length of 7.6 miles. Both units include lands from the mean high water line to the toe of the secondary dune or developed structures.

The Project will temporarily directly and/or indirectly impact biological and physical features (BPFs) of critical habitat for the NWAO DPS of the loggerhead sea turtle along 1.5 and 4.9 miles of beach on Sanibel and Captiva Islands, respectively. Both adverse and beneficial affects to designated critical habitat are anticipated. The 1.5 miles of beach along Sanibel Island includes 19.7 percent of Critical Habitat Unit LOGG-T-FL-24, and 0.2 percent of all designated critical habitat in the NWAO DPS. The 4.9 miles of beach along Captiva Island includes 100 percent of Critical Habitat Unit LOGG-T-FL-23, and 0.7 percent of all designated critical habitat in the NWAO DPS. The Service concurs with the Corps' determination that the Project "may affect, but will not adversely modify" terrestrial loggerhead sea turtle designated Critical Habitat Unit LOGG-T-FL-23 and LOGG-T-FL-24.

West Indian manatee

The Project occurs within the geographic range of the manatee. As previously indicated, the Applicant has agreed to follow and implement the Standard Manatee Conditions for In-Water Work (FWC 2011a) and the minimization measures outlined in the revised SPBO to avoid potential impacts on manatees. Based on the proposed protection measures, the Service concurs with the Corps' determination that the Project "may affect, but is not likely to adversely affect" the species; therefore, the manatee will not be considered further in this consultation.

ENVIRONMENTAL BASELINE

Status of the species within the action area

Assessing the number of red knots within the Project area during winter and migration periods is difficult because the number of birds utilizing the shoreline varies from year to year and throughout each migration and wintering season.

The Sanibel-Captiva Conservation Foundation was contracted by the Applicant to conduct non-breeding piping plover surveys for the recent sand placement event conducted from October through December 2013. The non-breeding piping plover season is considered from July 15th until May 15th of the following year. Although the purpose of the surveys was to determine the presence or absence of piping plovers in the Project area, the presence or absence of all shore and water birds was recorded. During the 2013-2014, non-breeding piping plover season, a total of 20 surveys were conducted twice monthly between DEP reference monuments R-84 and R-119. Red knots were documented during 10 of the 20 surveys, with 1 and 236 red knots recorded in

the Project area in 2013 and 2014, respectively. In addition, red knots were observed on Captiva Island in areas that fronted seasonal residences with low to zero human traffic. Red knots were typically observed in the Project area on both islands during the late winter/early spring and Fall/early winter months.

Factors affecting the species habitat within the action area

Coastal development

Shoreline development throughout the wintering range poses a threat to all populations of red knots. 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.

Recreational management techniques, such as vehicle restrictions, pet restrictions, and symbolic fencing (usually sign posts and string) of roosting and foraging habitats, can help to address anthropogenic disturbances to wintering red knots. 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. Low elevations and proximity to the coast make all nonbreeding coastal red knot 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 (Environmental Protection Agency [EPA] 2009).

Inundation of red knot 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 red knot, the Service acknowledges the potential for changes to occur in the Project area.

Sand placement activities

Sand placement projects have the potential to alter red knot 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. 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 shorebirds 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 red knot foraging and roosting habitat. 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 shorebirds, much of this research is focused on beaches in the northern U.S. where breeding occurs (Melvin et al. 1991). 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 red knots 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 red knots within the Project 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 action. An interdependent activity is an activity that has no independent utility apart from the action.

Factors to be considered

The Project will occur within habitat that is used by wintering/migrating (mid-July to late April) red knots. Since red knots 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 red knot 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 red knots 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

Lack of regular surveys, fluctuation of use by red knots from year to year, and differences in numbers of birds migrating through versus those over-wintering, make it difficult to estimate the number of birds actually using the Project area. Based on 2013-2014 survey data, as many as 236 red knots have been observed over-wintering within the Project area; those estimates, however, are a snapshot in time and do not include peak numbers of migrating birds.

Distribution

We expect direct effects to migrating and wintering red knots along the 6.5 miles of existing sandy beach as a result of human activity and ground disturbance. Although studies have shown that plovers tend to remain within a 2-mile wintering home range, it is unknown how far red knots will travel within specific areas during migration stopovers and within wintering areas due to local disturbance or to find a more abundant food source. The next nearest suitable habitat consists of sandy beaches along North Captiva Island and southern Sanibel Island, and Pine Island Sound intertidal waters.

Timing

Construction of the Project may overlap with multiple red knot wintering/migrating seasons (mid-July to late April) pending the time of year construction is initiated, the duration of construction activities, logistical challenges, and weather conditions.

Nature of the adverse effect

The effects to red knots may be direct, indirect, and/or short-term. Activities that impact or alter the use of optimal habitat or increase disturbance to the species may directly decrease the survival and recovery potential of the red knot by limiting the ability of birds to rest and replenish their fat reserves for spring migration and summer breeding. We expect direct, short-term impacts from human disturbance during project construction to both the birds and their habitat. We anticipate a temporary (*i.e.*, up to 2 years post-construction) decrease in benthic prey species within all existing red knot foraging habitat within the Project area as a result of sand placement and loss of natural wrack. Until the benthic community recovers, a temporary decrease in prey items and roosting habitat may result in a decrease in the survival of birds on migrating or wintering grounds due to lack of optimal habitat. That situation can contribute to decreased survival rates and may indirectly result in decreased productivity on the breeding grounds. Such effects may temporarily result in increased vulnerability to the red knot population.

Duration

The activities associated with the Project are expected to occur up to two times per decade concerning the nourishment of hotspots, whereas routine nourishment is on a 6-8 year interval. Timing of construction activities may vary in duration depending on the amount of work needed (routine nourishment, emergency nourishment, hot spot nourishment), weather conditions, and equipment mobilization and maintenance. The Service does not expect long-term, permanent alteration of the natural coastal processes. The addition of sand within the fill template is expected to temporarily decrease the quality of that existing foraging habitat for 6 months up to 2 years until the intertidal benthic fauna recovers to normal population levels and natural wrack returns to the newly created island shoreline.

Disturbance frequency, intensity, and severity

We anticipate that construction activities would have short-term, temporary effects on red knot populations. We expect short-term disturbance to the birds and their habitats from construction activities and temporary effects to the beach habitat due to sand placement. We anticipate:

1. Red knots located within the construction area would move outside of the construction zone due to disturbance.
2. Natural wrack would be deposited on the island shoreline following normal tidal events.
3. The intertidal benthic fauna would recover within 6 months up to 2 years following completion of sand placement.
4. All exposed habitat (*e.g.*, existing and newly created) suitable for roosting red knots, may not be available during both daylight and nighttime hours because some work may be conducted 24 hours per day.
5. There would be a lack of human disturbance during any weather-related shut-downs and/or delays throughout the duration of the project.
6. Over the long-term, the additional sediment would allow for recovery of red knot habitat as natural processes rework the sediment.

Analyses for effects of the action

Direct effects

Direct effects are those direct or immediate effects of a project on the species and/or its habitat. Implementation of the Project is not likely to directly kill red knots since the birds are highly mobile and can quickly move out of harm's way. The construction window will likely extend through one red knot wintering season and more than one migration season. Heavy machinery and equipment (*e.g.*, off road vehicles and bulldozers) operating within the Project area, placement of the dredge pipeline along the shoreline, and sand disposal, may directly affect migrating and wintering red knots in the Project area by disturbance and disruption of normal activities such as roosting and foraging, and possibly forcing birds to expend valuable energy reserves to seek available habitat elsewhere.

Direct effects consist of sand placement along up to 6.5 miles of existing sand habitat which would result in temporary loss of wrack and burial and suffocation of intertidal benthic prey species. The natural wrack would be restored following normal tidal events. Burial and suffocation of invertebrate intertidal prey species will occur during initial sand placement throughout the Project area. Timeframes projected for benthic recruitment and re-establishment following sand placement are from 6 months up to 2 years.

We expect direct short-term effects in the form of:

1. Disturbance due to human presence and equipment noise during pipeline construction activities, sediment placement, and dune/beach construction.
2. A temporary loss of food base within the sand placement template for up to 2 years following completion of sediment placement until the benthic community re-colonizes the Project area.

Indirect effects

Indirect effects are those that are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. The short-term increase in human disturbance to normal red knot foraging and roosting behavior, as well as to suitable foraging and roosting habitat, during construction and immediately post-construction, is likely to result in indirect effects via increased energy expenditure and a potential lack of adequate food supplies which can then lead to temporarily reduced fitness, fecundity, and over-wintering survival. However, such effects would be temporary for those birds wintering in or migrating through the Project area over the course of several wintering and migration seasons.

Beneficial effects

Beneficial effects are wholly positive without any adverse effects. The Project will introduce sediment into the system that will be reworked and redistributed through the natural processes of wind, wave action and storm events. The additional sediment will allow for natural reformation of red knot habitat through natural processes, thus maintaining and/or enhancing the features for suitable red knot habitat. The renourishment and maintenance of such coastal habitats are important for the restoration of red knot populations to healthy levels.

Species response to the proposed action

This Biological Opinion addresses the direct and indirect effects that are anticipated to wintering and migrating red knots, as a result of renourishing 6.5 miles of beach along Captiva and Sanibel Islands. Although survey data for 2013-2014, indicate that up to 236 red knots could be using the Project area in any given year, it is difficult for the Service to estimate the number of birds migrating through or wintering within the Project area because red knot numbers fluctuate daily, seasonally, and from year to year. Therefore, the Service anticipates all migrating and wintering red knot utilizing the 6.5 miles of beach will be impacted by:

1. Disturbance due to human activity and equipment noise during construction within the Project area.

2. Temporary habitat loss within the sand placement template for the duration of construction activities, and up to 2 years post-construction during the recovery of intertidal benthic prey species.

It is unknown how far red knots would move into nearby habitats due to disturbance or a lack of food source. The nearest available and suitable habitat for foraging and roosting red knots is the sandy beaches along North Captiva Island and southern Sanibel Island, and Pine Island Sound intertidal waters.

The Project would involve up to several months of disturbance activities for the construction period, plus an additional 2 years of recovery for the intertidal benthic community following sand placement. Daily tidal processes and occasional storm events would re-work the additional sediment to maintain and enhance suitable red knot 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 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. The Service is not aware of any specific activities that would be considered cumulative effects.

CONCLUSION

The survival and recovery of all breeding populations of red knots are fundamentally dependent on the continued availability of sufficient habitat in their coastal migration and wintering ranges, where those species spend more than two-thirds of their annual cycle. All red knot populations are inherently vulnerable to even small declines in their most sensitive vital rates (*i.e.*, survival of adults and fledged juveniles).

Implementation of the Project is not likely to directly kill any red knots since they are highly mobile and can move out of harm's way. The increased disturbance to normal red knot foraging/roosting behaviors and suitable habitat would likely result in increased energy expenditure and a potential reduction of food supply, which may indirectly affect fitness, fecundity, and over-wintering survival. Such effects to migrating and wintering red knots would be sporadic and temporary over the course of the construction window and the 2-year recovery of benthic prey populations. After reviewing the current status of the red knot population; the environmental baseline for the action area; the effects of the Project; and cumulative effects, it is the Service's biological opinion that implementation of the Project, as proposed, is not likely to jeopardize the continued existence of the red knot. As noted previously, the Project-related effects to the red knot would be temporary and are not anticipated to affect the status of the overall wintering/migrating population.

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 must be implemented by the Applicant 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 Applicant has a continuing duty to regulate the activity covered by this incidental take statement. If the Applicant (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 Applicant must 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 TAKE

The Service expects incidental take of red knot will be difficult to detect for the following reasons:

1. Migration and wintering bird survey data indicate that anywhere from 1 to 236 red knots could be within the Project area at any point in time. The number of birds within the Project area for the duration of project construction and intertidal benthic recovery is difficult to detect because wintering red knot numbers within the Project area vary from year to year, and migrating red knot numbers vary between both fall and spring migrations from year to year.
2. Harassment to the level of harm may only be apparent on the breeding grounds the following year as a result of reduced fitness or fecundity, or as lack of over-wintering survival. It would be difficult to detect because of our inability to track individual birds from their wintering grounds to their breeding grounds.
3. Over-wintering survival would be difficult to detect because it is hard to detect birds that do not survive migration back to the breeding grounds. This is also problematic because we would need to track individually marked birds between wintering and breeding grounds.

However, the following level of take of red knots can be expected by disturbance to the affected length of beach because disturbance to suitable habitat within the Project area would affect the ability of red knots to find foraging and roosting habitat throughout the migrating and wintering periods for the duration of Project construction and intertidal benthic recovery. The Service anticipates that directly and indirectly all red knots using the affected 6.5 miles of suitable habitat on Captiva and Sanibel Islands could be taken in the form of harm and harassment as a result of the proposed action.

The level of take of red knots utilizing the 6.5 miles of sandy beach can be anticipated by the Project because:

1. Red knots are known to winter in and migrate through the Project area.
2. The placement of sand is expected to temporarily affect (*e.g.*, in the form of increased human disturbance during construction, temporary loss of benthic prey, and temporary loss of wrack) 6.5 miles of beach habitat over multiple migrating and wintering seasons until construction is complete and until the benthic fauna recover.
3. Temporarily increased levels of human disturbance are expected for the duration of construction activities which would make the 6.5 miles of sandy beach habitat less desirable to red knots, which may cause increased energy expenditure as birds move away from construction activities.
4. A temporary reduction of food base (up to 2 years following construction) will occur due to sand placement which would affect the red knot's ability to forage and store enough fat reserves for migration back to the breeding grounds for multiple wintering seasons. Such an effect could result in reduced fitness or fecundity.

The Service has reviewed the biological information and other information relevant to this action. The take is expected in the form of harm and harassment because of:

1. Temporarily decreased fitness and survivorship of wintering red knots.
2. Temporarily decreased fitness and survivorship of red knots attempting to migrate to breeding grounds, due to temporary loss of and disturbance to foraging and roosting habitat.
3. An indirect temporary reduction of fecundity on the breeding grounds due to the temporary decrease in fitness and survivorship of wintering and migrating and red knots.

This Incidental Take Statement covers take of the red knot within the Project area. If the Applicant expands the Project outside of the action area, the amount or extent of incidental take for red knots will be considered exceeded. This incidental take statement will expire in 2030, 15 years after issuance of the Corps permit. 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 (RPMs) 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 RPMs.

EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined this level of anticipated take is not likely to result in jeopardy to the red knot. Incidental take of red knots utilizing the affected 6.5 miles of beach is anticipated to occur during Project construction, and up to 2 years following construction until the intertidal benthic community recovers.

REASONABLE AND PRUDENT MEASURES

The Service believes the following RPMs are necessary and appropriate to monitor and minimize take on non-breeding red knots during implementation of the Project within the action area.

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 Applicant will notify the Service of the commencement of the Project for the purposes of tracking incidental take of the species.
3. The Applicant shall protect habitat features considered preferred by red knots outside of the Project sand placement template.
4. The Applicant will facilitate awareness of red knot habitat by educating the public on ways to minimize disruption to the species.
5. The Applicant shall provide the mechanisms necessary to monitor impacts to red knots within the Project area.
6. The Applicant shall facilitate an annual meeting with the Service to assess the effectiveness of the protection and minimization measures outlined in this Biological Opinion.

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 the DEP 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 Applicant must provide the following information to the Service's South Florida Ecological Services Office (1339 20th Street, Vero Beach, Florida 32960-3559; 772-562-3909) at least 10 business days prior to the commencement of work:
 - a. Project location (include the DEP 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.
 - d. Names and qualifications of personnel involved in red knot surveys.
3. The Applicant will protect habitat features by implementing the following:
 - a. Prior to construction, the Applicant shall delineate preferred red knot habitat (intertidal portions of Gulf beaches, ephemeral pools, washover areas, wrack lines) adjacent to or outside of the Project area that might be impacted by construction activities. Obvious identifiers shall be used (*e.g.*, pink flagging on metal poles) to clearly mark the beginning and end points to prevent accidental impacts to use areas.
 - b. Red knot habitat delineated adjacent to or outside of the Project area shall be avoided to the maximum extent practicable when staging equipment, establishing travel corridors, and aligning pipeline.

- c. 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.
 - d. Predator-proof trash receptacles shall be installed and maintained during construction at all beach access points used for Project construction to minimize the potential for attracting predators of red knots. Workers shall be briefed on the importance of not littering and keeping the Project area trash and debris free.
4. 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 red knots, and minimizing human disturbance. If the Project area has a pet or dog regulation, the provisions of the regulation shall be included on the educational signs.
5. The Applicant shall monitor impacts to red knots within the Project area as follows:
- a. For one full red knot migration and winter season (beginning July 15 to May 15) prior to construction, and 2 years following each sand placement event, bimonthly (twice-monthly) surveys for red knots 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 Project events, the surveys will begin as soon as possible prior to, and up to implementing the Project.
 - b. The person(s) conducting the survey must demonstrate their qualifications and ability to identify shorebird species and be able to provide the information listed below. The following will be collected, mapped, and reported:
 - i. Date, location, time of day, weather, and tide cycle when survey was conducted.
 - ii. Latitude and longitude of observed red knot locations (decimal degrees preferred).
 - iii. Any color bands observed on red knots.
 - iv. Behavior of red knots (*e.g.*, foraging, roosting, preening, bathing, flying, aggression, walking).
 - v. Landscape features(s) where red knots are located (*e.g.*, inlet spit, tidal creeks, shoals, lagoon shoreline).
 - vi. Habitat features(s) used by red knots when observed (*e.g.*, intertidal, fresh wrack, old wrack, dune, mid-beach, vegetation).
 - vii. Substrata used by red knots (*e.g.*, sand, mud/sand, mud, algal mat).
 - viii. The amount and type of recreational use (*e.g.*, people, dogs on or off leash, vehicles, kite-boarders) within the survey area.
 - ix. 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 South Florida Ecological Services 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.

6. The Applicant will contact the Service annually after initiating the project to schedule a meeting to discuss and assess the minimization measures in this Biological Opinion and the monitoring results outlined in Term and Condition 5.

Upon locating a dead, injured, or sick threatened red knot specimen, initial notification shall be made to the Service's Office of Law Enforcement (Groveland, Florida; 352-429-1037). Additional notification shall be made to FWC at 1-888-404-3922 and the Service's South Florida Ecological Services Office (1339 20th Street, Vero Beach, Florida 32960-3559; 772-562-3909). Care should be taken in handling sick or injured specimens to ensure effective treatment and care and in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure evidence intrinsic to the specimen is not unnecessarily disturbed.

COORDINATION OF INCIDENTAL TAKE STATEMENT WITH OTHER LAWS, REGULATIONS, AND POLICIES

Migratory Bird Treaty Act

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.

All sand placement events have the potential to impact nesting shorebirds protected under the MBTA (16 U.S.C. 701 et seq.). In order to comply with the MBTA and address the potential for the Project to impact nesting shorebirds, the Applicant shall comply with the FWC standard shorebird protection guidelines to protect against impacts to nesting shorebirds during implementation of the Project on the Gulf Coast.

The Service will not refer the incidental take of red knots associated with this Project for prosecution under the MBTA, as amended (16 U.S.C. 703-712), if such take is in compliance with the terms and conditions specified here.

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 FWC, Service and the Applicant to discuss steps for the long-term protection of wrack within the Project area.
2. The Corps will avoid dredging submerged and emergent shoals to preserve beach dynamics and shorebird habitat.

3. The Corps will support pre-and postconstruction benthic invertebrate surveys.
4. The Corps will consider the creation of habitat features such as ephemeral tide pools, irregular shorelines and extended flats to enhance feeding and roosting habitats.
5. The Corps will work with the Service, FWC and the Applicant to reduce human disturbance to red knots (*e.g.*, symbolic fencing around important roosting areas, enactment and enforcement of dog regulations, signage, outreach materials regarding red knots and beaches, bird stewards where high human use and red knots overlap).

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting 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 Biological 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 Biological Opinion; and
4. A new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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

Sincerely yours,

for Constance L Cassler

Donald (Bob) Progulske
Everglades Program Supervisor
South Florida Ecological Services Office

cc: electronic only

Corps, Fort Myers, Florida (Muriel Blaisdell)
DEP, Tallahassee, Florida (Tom Jacobs)
EPA, West Palm Beach, Florida (Ron Miedema)
FWC, Tallahassee, Florida (Nancy Douglas)
Service, Jacksonville, Florida (Billy Brooks)
Service, Panama City, Florida (Patty Kelly)
Service, St. Petersburg, Florida (Ann Marie Lauritsen , Peter Plage)
USGS, Gainesville, Florida (Susan Walls)

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Figure 1. Location of the sand placement Project along Captiva and Sanibel Island, Lee County, Florida.

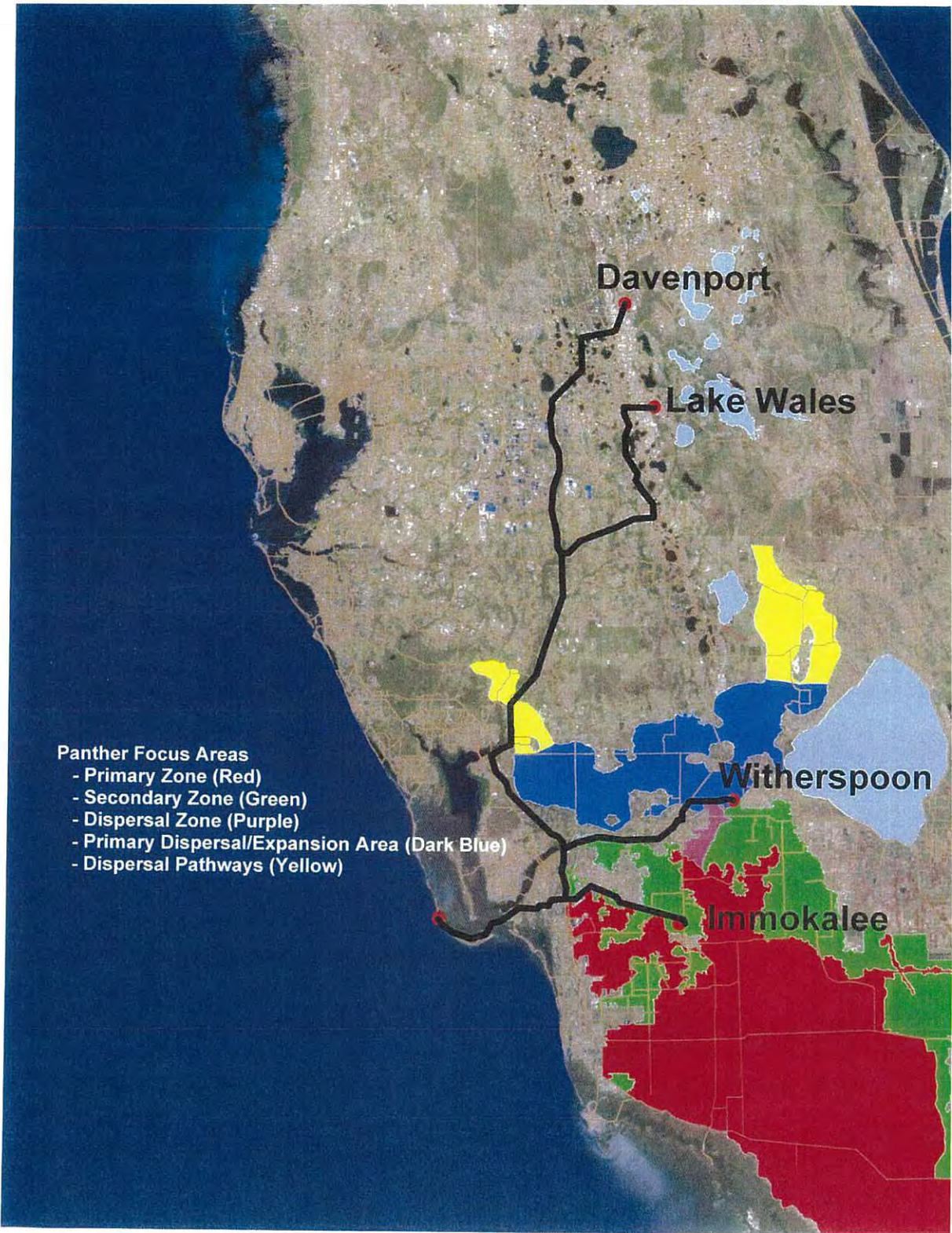


Figure 2. Panther Focus Areas adjacent to upland mines and corridors.

ATTACHMENT 9

NMFS-PRD BIOLOGICAL OPINION (47 Sheets)

SAJ-1994-03952 (SP-MMB) CAPTIVA EROSION PREVENTION DISTRICT



UNITED STATES DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office

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St. Petersburg, Florida 33701-5505

<http://sero.nmfs.noaa.gov>

F/SER31: JC
SER-2014-14902

Ms. Stephanie Madson, Ph.D.
Regional Environmental Officer
U.S. Department of Homeland Security
FEMA Region IV
3003 Chamblee Tucker Rd - Hollins Bldg.
Atlanta, GA 30341-4130

NOV 10 2015

Chief, Fort Myers Section
Jacksonville District, Corps of Engineers
Department of the Army
1520 Royal Palm Square Boulevard, Suite 310
Fort Myers, Florida 33919

Ref.: USACE - SAJ-1994-3952 (SP-MMB); FEMA Identifier - PA-04-FL-4068-PW-0 1095;
Captiva Erosion Prevention District, Sanibel and Captiva Islands, Lee County, Florida

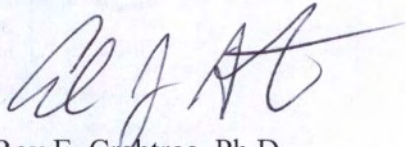
Dear Sir or Madam:

The enclosed Biological Opinion ("Opinion") was prepared by the National Marine Fisheries Service (NMFS) pursuant to Section 7(a)(2) of the Endangered Species Act. The Opinion considers the effects of a proposal by the Jacksonville District of the U.S. Army Corps of Engineers to authorize, and the Federal Emergency Management Agency to fund in large part, a beach nourishment project. The project applicant seeks a 15-year permit to nourish approximately 6.5 miles of shoreline on Sanibel and Captiva Islands, Lee County, Florida. This project analyzes the effects on 5 species of sea turtles (loggerhead, leatherback, green, Kemp's ridley, and hawksbill), smalltooth sawfish, smalltooth sawfish critical habitat, and loggerhead critical habitat. NMFS concludes that the proposed action is not likely to adversely affect sea turtles and smalltooth sawfish, and loggerhead critical habitat, and is likely to adversely affect, but is not likely to destroy or adversely modify, smalltooth sawfish critical habitat.

We look forward to further cooperation with you on other projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions regarding this consultation, please contact Joseph Cavanaugh, Consultation Biologist, by email at Joseph.Cavanaugh@noaa.gov, or (727) 551-5097.



Sincerely,



FW Roy E. Crabtree, Ph.D.
Regional Administrator

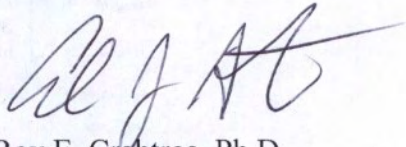
Enclosures:

Biological Opinion

Sea Turtle and Smalltooth Sawfish Construction Conditions, dated March 23, 2006

File: 1514-22 F.4

Sincerely,



FW Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosures:

Biological Opinion

Sea Turtle and Smalltooth Sawfish Construction Conditions, dated March 23, 2006

File: 1514-22 F.4