February 10, 2015

US Army Corps of Engineers
Charleston District, Regulatory Division
69-A Hagood Avenue
Charleston, SC 29403-5107

Re: 2015/16 Fish Haul/Spa Beach Renourishment Project
Applicant: Town of Hilton Head Island, SC
Joint Federal and State Permit Application

Enclosed please find one (1) copy of the Joint Federal and State Permit Application for the above reference project on Hilton Head Island, South Carolina. The application package includes the following:

1. Joint Federal and State Permit Application Form
2. Permit Drawings
3. Attachment A_Project Description
4. Attachment B_Avoidance and Minimization Statement
5. Attachment C_ Beach Condition Summary and Recommendations for Fish Haul/Spa Shoreline
6. Attachment D_OCRM: Affidavit of Ownership or Control
7. Attachment E_ List of Adjacent Property Owners with Addresses
8. Attachment F_2013 Offshore Sand Search Investigation (CD)
9. Attachment G_ Description and Compatibility of Upland Sand Source Materials
10. Attachment H_ Supplemental Biological Assessment (BA)
11. Attachment I_ Essential Fish Habitat (EFH) Assessment

Thank you for your assistance in the processing of this permit application.

Sincerely yours,

Christopher G. Creed, P.E.
Agent – SC 23064
ccreed@olsen-associates.com

Enclosure/

cc: Debra King, USACE-Charleston District
Melissa Bimbi, USFWS
Jaclyn Daly, NMFS
Blair Williams, SCDHEC-OCRM
Paul Wojoski, SCDHEC-OCRM (w/ attachments)
Susan Davis, SC-DNR
Scott Liggett, P.E., Town of Hilton Head Island, SC
Cheryl Miller, Coastal Eco-Group

February 10, 2015

Mr. Blair Williams
S.C. Dept. of Health & Environmental Control
Office of Ocean and Coastal Resource Management
1362 McMillan Avenue, Suite 400
Charleston, SC 29405

olsen associates, inc.
Coastal Engineering

Re: 2015/16 Fish Haul/Spa Beach Renourishment Project
Applicant: Town of Hilton Head Island, SC
Joint Federal and State Permit Application

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Cheryl Miller, Coastal Eco-Group

Joint Federal and State
PERMIT APPLICATION

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

CONTENTS

Applicant:
Town of Hilton Head Island
One Town Center Court
Hilton Head Island, SC 29928

Agent:
Olsen Associates, Inc.
2618 Herschel Street
Jacksonville, FL 32204

February 10, 2015

Joint Federal and State
PERMIT APPLICATION

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

Enclosed:
- Joint Federal and State Permit Application
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Applicant:
Town of Hilton Head Island
One Town Center Court
Hilton Head Island, SC 29928

Agent:
Olsen Associates, Inc.
2618 Herschel Street
Jacksonville, FL 32204
(COA C00530)

February 10, 2015

Joint Federal and State Application Form
For Activities Affecting Waters of the United States
Or Critical Areas of the State of South Carolina

This Space for Official Use Only
Application No._____
Date Received_____
Project Manager_____
Watershed # _____

Authorities: 33 USC 401, 33 USC 403, 33 USC 407, 33 USC 408, 33 USC 1341, 33 USC 1344, 33 USC 1413 and Section 48-39-10 et. Seq of the South Carolina Code of Laws. These laws require permits for activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. The Corps of Engineers and the State of South Carolina have established a joint application process for activities requiring both Federal and State review or approval. Under this joint process, you may use this form, together with the required drawings and supporting information, to apply for both the Federal and/or State permit(s).

Drawings and Supplemental Information Requirements: In addition to the information on this form, you must submit a set of drawings and, in some cases, additional information. A completed application form together with all required drawings and supplemental information is required before an application can be considered complete. See the attached instruction sheets for details regarding these requirements. You may attach additional sheets if necessary to provide complete information.

1. Applicant Last Name: Liggett, P.E.	11. Agent Last Name (agent is not required): Creed, P.E. (SC 23064)
2. Applicant First Name: Scott	12. Agent First Name: Christopher
3. Applicant Company Name: Town of Hilton Head Island	13. Agent Company Name: Olsen Associates, Inc
4. Applicant Mailing Address: One Town Center Court	14. Agent Mailing Address: 2618 Herschel Street
5. Applicant City: Hilton Head Island	15. Agent City: Jacksonville
6. Applicant State: South Carolina 7. Applicant Zip: 29928	16. Agent State: Florida 17. Agent Zip: 32204
8. Applicant Area Code and Phone No.: (843) 341-4776	18. Agent Area Code and Phone No.: (904) 387-6114
9. Applicant Fax No.: (843) 842-8587	19. Agent Fax No.: (904 384-7368
10. Applicant E-mail: ScottL@hiltonheadislandsc.gov	20. Agent E-mail: ccreed@olsen-associates.com

21. Project Name: 2015/16 Fish Haul/Spa Beach Nourishment	22. Project Street Address: One Town Center Court, Hilton Head Island, SC
23. Project City: Hilton Head Island 24. Project County: Beaufort	25. Project Zip Code: 29928 26. Nearest Waterbody: Port Royal Sound
27. Tax Parcel ID: N/A	28. Property Size (acres): N/A
29. Latitude: 32º10' 00" N	30. Longitude: 80º42' 45" W

31. Directions to Project Site (Include Street Numbers, Street Names, and Landmarks and attach additional sheet if necessary):

I-95 to US 278 East to Hilton Head Island. Continue on Hwy 278 for about 10.5 miles. Turn Right onto Wexford Drive. Take first Right in to Town Hall Parking Lot.

32. Description of the Overall Project and of Each Activity in or Affecting U.S. Waters or State Critical Areas (attach additional sheets if needed)

See Attachment A

33. Overall Project Purpose and the Basic Purpose of Each Activity In or Affecting U.S. Waters (attach additional sheets if needed):

See Attachment A

34. Type and quantity of Materials to Be Discharged

Dirt or Topsoil:	_____	☐ cubic yards
Clean Sand:	60,000	■ cubic yards
Mud:	_____	☐ cubic yards
Clay:	_____	☐ cubic yards
Gravel, Rock, or Stone:	_____	☐ cubic yards
Concrete:	_____	☐ cubic yards
Other (describe):	_____	☐ cubic yards
TOTAL:	60,000	cubic yards

35. Type and Quantity of Impacts to U.S. Waters (including wetlands).

Filling:	6.9	■ acres ☐ sq.ft.	60,000	■	cubic yards
Backfill & Bedding:	_____	☐ acres ☐ sq.ft	_____	☐	cubic yards
Landclearing:	_____	☐ acres ☐ sq.ft	_____	☐	cubic yards
Dredging:	_____	☐ acres ☐ sq.ft.	_____	☐	cubic yards
Flooding:	_____	☐ acres ☐ sq.ft.	_____	☐	cubic yards
Draining/Excavation:	_____	☐ acres ☐ sq.ft.	_____	☐	cubic yards
Shading:	_____	☐ acres ☐ sq.ft.	_____	☐	cubic yards

TOTALS: 6.9 acres_____ sq.ft. 60,000 cubic yards

36. Individually list wetland impacts including mechanized clearing, fill, excavation, flooding, draining, shading, etc. and attach a site map with location of each impact (attach additional sheets if needed).

Impact No.	Wetland Type	Distance to Receiving Water body (LF)	Purpose of Impact (road crossing, impoundment, flooding, etc)	Impact Size (acres)
			Total Wetland Impacts (acres)	N/A

37. Individually list all seasonal and perennial stream impacts and attach a site map with location of each impact (attach additional sheets.)

Impact No.	Seasonal or Perennial Flow	Average Stream Width (LF)	Impact Type (road crossing, impoundment, flooding, etc)	Impact Length (LF)
			Total Stream Impacts (Linear Feet)	N/A

38. Have you commenced work on the project site? ☐ YES ■ NO If yes, describe all work that has occurred and provide dates.

39. Describe measures taken to avoid and minimize impacts to Waters of the United States

See Attachment B

40. Provide a brief description of the proposed mitigation plan to compensate for impacts to aquatic resources or provide justification as to why mitigation should not be required. (Attach a copy of the proposed mitigation plan for review).

N/A

41. See the attached sheet to list the names and addresses of adjacent property owners

See Attachment E

42. List all Corps Permit Authorizations and other Federal, State, or Local Certifications, Approvals Denials received for work described in this application

N/A

43. Authorization of Agent. I hereby authorize the agent whose name is given on page one of this application to act in my behalf in the processing of this application and to furnish supplemental information in support of this application.

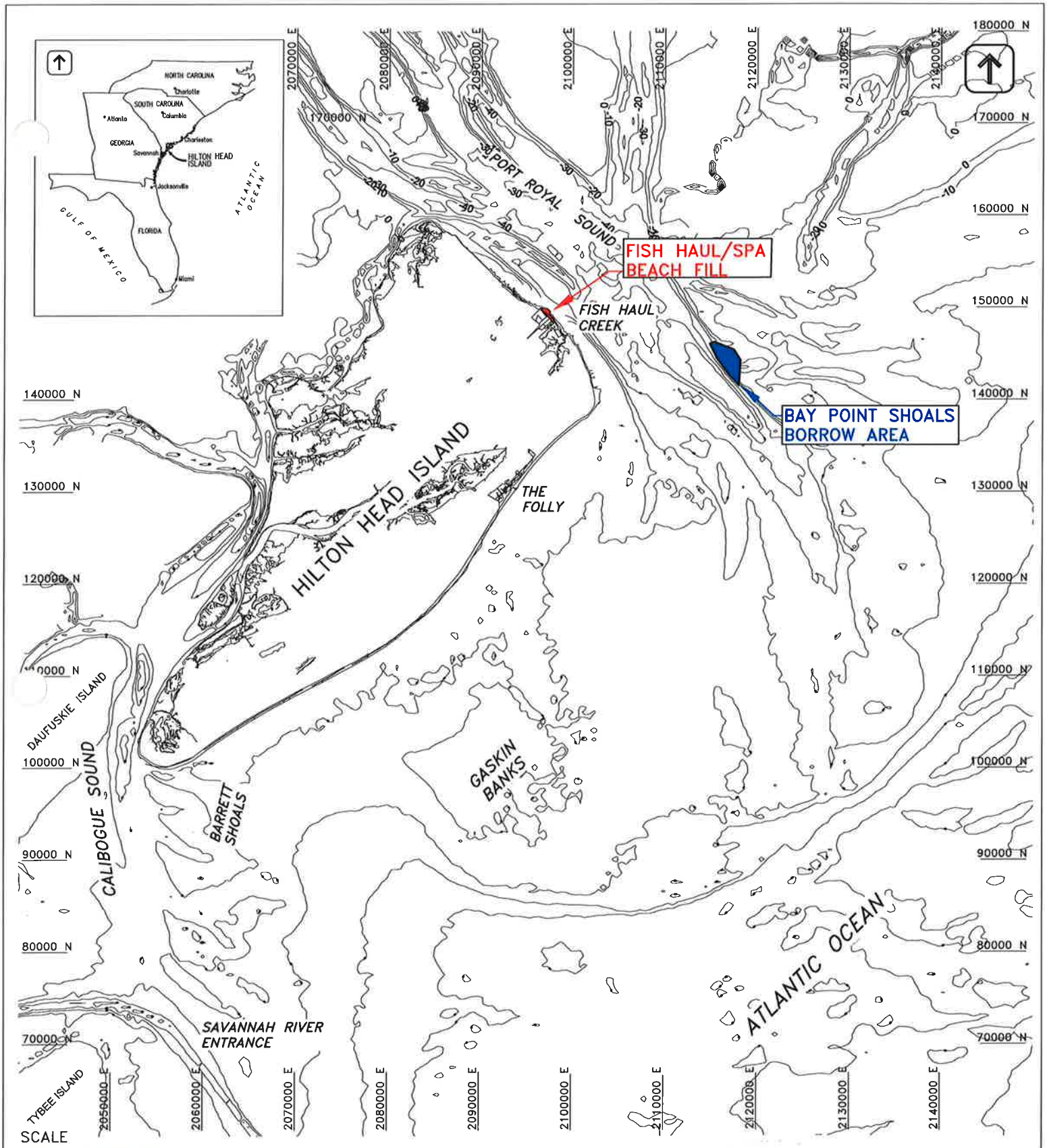
Applicant's Signature 12-15-14 Date

44. Certification. Application is hereby made for a permit or permits to authorize the work and uses of the work as described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent for the applicant.

Applicant's Signature 12-15-14 Date

Agent's Signature Date

The application must be signed by the person who desires to undertake the proposed activity or it may be signed by a duly authorized agent if the authorization statement in blocks 11 and 43 have been completed and signed. 18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.



CONTOUR DATUM – FT (NGVD29)
VEY – SEPT 2013

NOT FOR PURPOSES OF CONSTRUCTION

olsen associates, inc.
2618 Herschel Street
Jacksonville, FL. 32204
(904) 387-6114
COA No. C00530

TOWN OF HILTON HEAD ISLAND
2015/16 FISH HAUL/SPA
BEACH RENOURISHMENT PROJECT

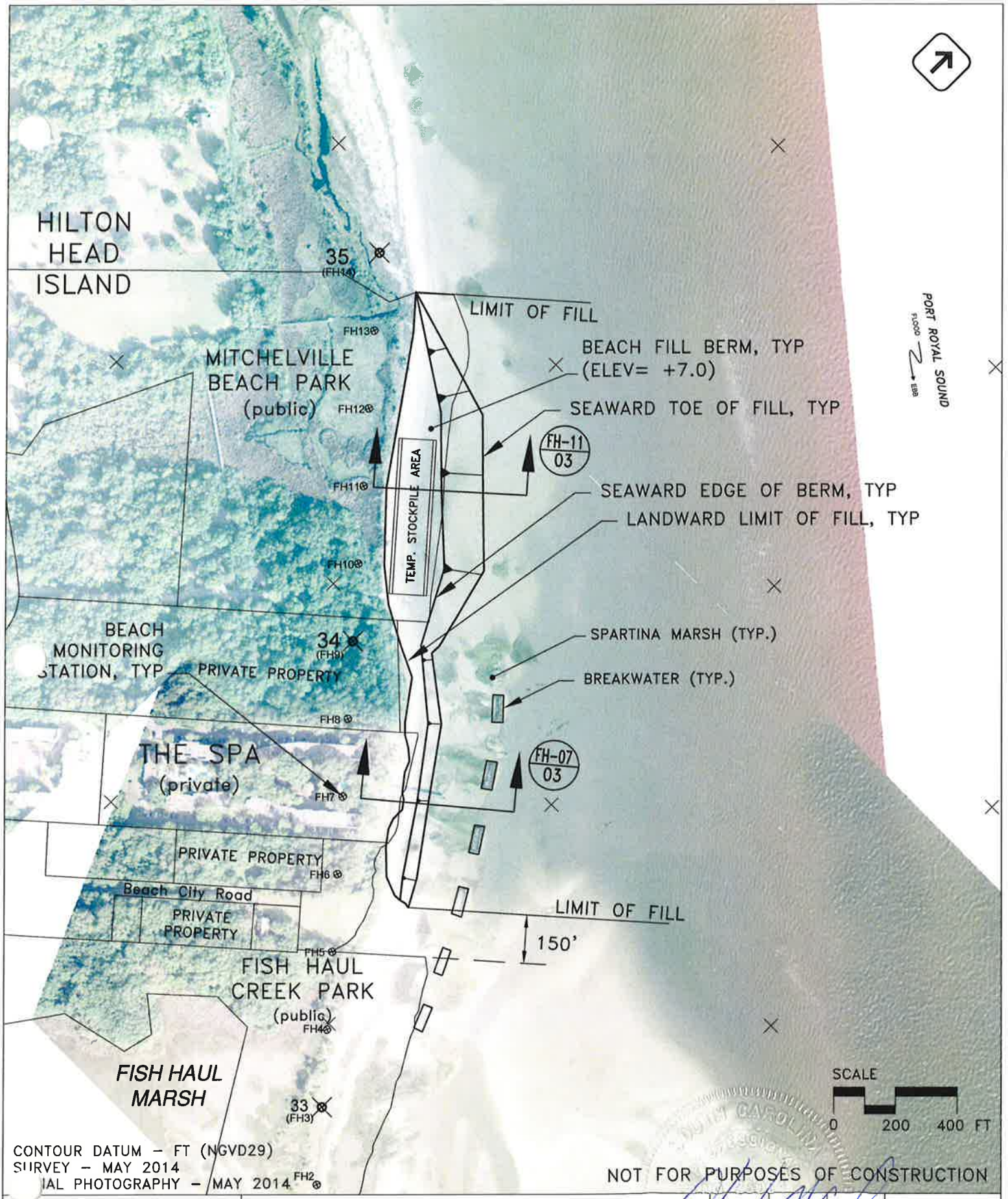
PROJECT LOCATION

2-10-2015

2/10/15

DRAWN BY: ML

SHEET 1 of 3



CONTOUR DATUM – FT (NGVD29)
SURVEY – MAY 2014
IAL PHOTOGRAPHY – MAY 2014

NOT FOR PURPOSES OF CONSTRUCTION

olsen associates, inc.
2618 Herschel Street
Jacksonville, FL. 32204
(904) 387-6114
COA No. C00530

TOWN OF HILTON HEAD ISLAND
2015/16 FISH HAUL/SPA
BEACH RENOURISHMENT PROJECT

PLAN

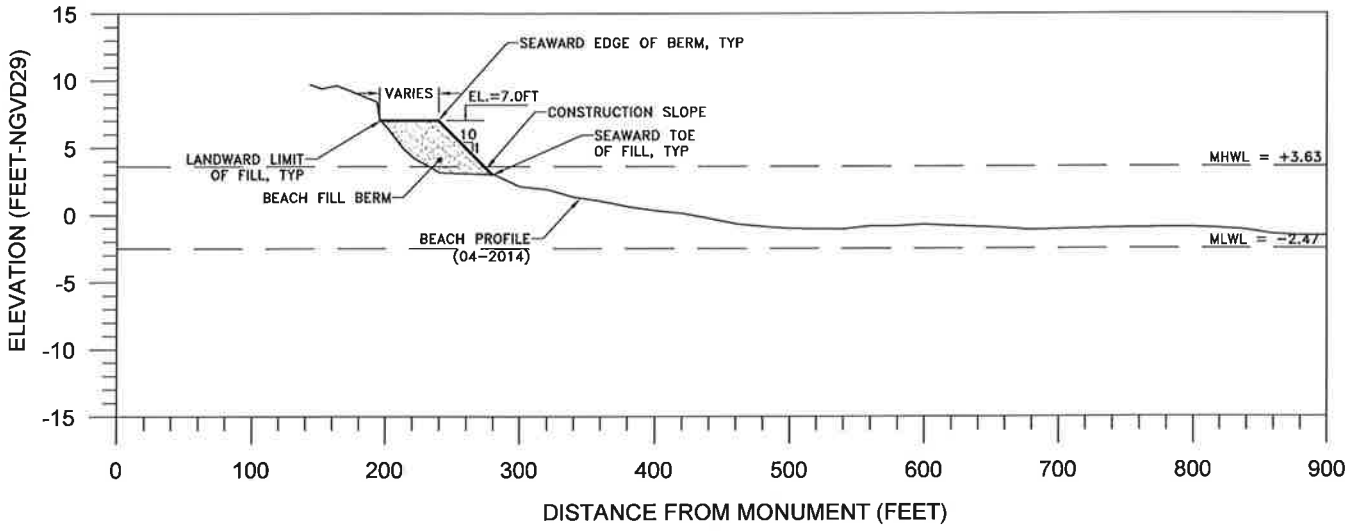
2-10-2015

2/10/15

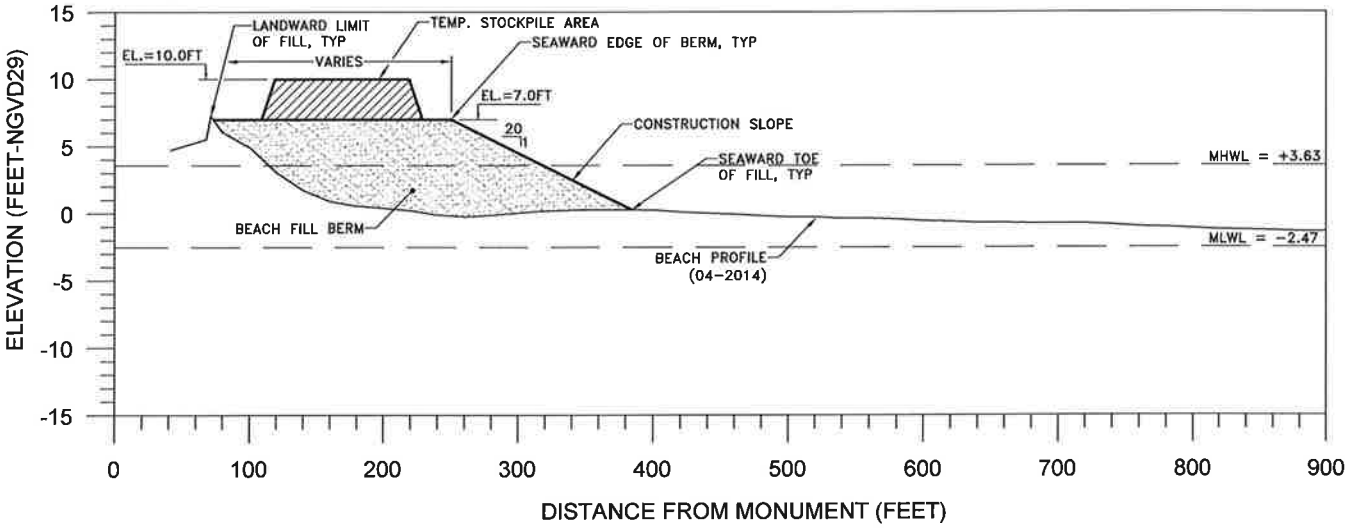
DRAWN BY: ML

SHEET 2 of 3

FH-07



FH-11



VEY – MAY 2014

NOT FOR PURPOSES OF CONSTRUCTION

2-10-2015

olsen associates, inc.
2618 Herschel Street
Jacksonville, FL. 32204
(904) 387-6114
COA No. C00530

TOWN OF HILTON HEAD ISLAND
2015/16 FISH HAUL/SPA
BEACH RENOURISHMENT PROJECT

TYPICAL SECTIONS

2/10/15

DRAWN BY: ML

SHEET 3 of 3

ATTACHMENT A

PROJECT DESCRIPTION

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

Applicant: Town of Hilton Head Island
Agent: Olsen Associates, Inc., Jacksonville, Florida

ATTACHMENT A - **PROJECT DESCRIPTION**

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

Applicant: Town of Hilton Head Island
Agent: Olsen Associates, Inc., Jacksonville, Florida

The proposed project will include the placement of up to 60,000 cubic yards (cy) of sand along about 2,000 ft of Port Royal Sound shorefront. The project will be the first renourishment of a portion of a reach of shoreline immediately north of Fish Haul Creek that was originally restored by the Town of Hilton Head Island in 2006/07 (P/N 2004-1W-319-P). The project, which is a component of the Town's ongoing comprehensive beach management program, is an anticipated and scheduled renourishment event.

The Town plans for renourishment of restored and maintained areas of the island's sandy shoreline to occur about every 8 to 10 years depending upon weather conditions and beach performance during the nourishment life. The last comprehensive, island-wide event on the island was completed in February 2007 and included initial restoration of the "Fish Haul/Spa" shoreline. The proposed project will include sand placement along a discrete reach of the shorefront located north of Fish Haul Creek and north of the Fish Haul Park (public Town park). The project will be sited seaward of The Spa on Port Royal Sound (a private development), and Mitchelville Beach Park (public Town park).

The purpose of the Fish Haul/Spa beach renourishment project is to reestablish beach conditions, sufficient to sustain an 8 to 10 year renourishment life following project completion, on a schedule consistent with island-wide beach management goals. The proposed plan was adapted based on current trends in erosional processes and an evaluation of previous nourishment events. Based on the success of past projects, the proposed plan will only involve placement of sand in areas that have been previously filled. Sand placement will be limited to only those areas of need within the project footprint of past sand placement activities.

The sand will be shaped into a typical beach fill construction berm configuration with a maximum upper berm elevation generally equivalent to the adjacent ambient beach elevations. Berm widths will vary. The seaward slope of the construction berm along the northwestern half of the project area will have a consistent and uniform initial slope of 1V:20H. Along the southeastern half of the project area, where significant vegetated areas exist, the uniform initial slope will be 1V:10H.

The <u>preferred sand source</u> for the project is the Bay Point Shoals borrow area identified for the 2015/16 island-wide beach renourishment project (P/N 2014-00680-1W). The Bay Point Shoals borrow area is located at the north end of the island within the limits of an area that has been

dredged for sand fill on Hilton Head Island. It was previously dredged for the last large-scale renourishment on the island in 2011/12 (P/N 2009-1056-1IW-P). There is a sufficient amount of sand available in the Bay Point Shoals borrow area (P/N 2014-00680-1W) to address the requirements of both the planned island-wide renourishment and the proposed Fish Haul/Spa renourishment project. Project construction using sand hydraulically dredged from the Bay Point borrow area will be completed in 20 days or less. Use of the Bay Point borrow area will need to occur during construction of the island-wide project (P/N 2014-00680-1W) while the dredge plant is mobilized to the island for the project.

Hydraulic fill placement will be limited to the northern half of the project to avoid impacts to marsh grasses adjacent to the southern area of the project. Sand for the southern area of the project will be placed hydraulically in a temporary stockpile along the northern half of the project and subsequently moved, placed, and shaped mechanically.

Upland Sand Source: In the event that the proposed project cannot be completed prior to dredge demobilization associated with the island-wide nourishment project, thereby making the use of offshore sand from the Bay Point Shoals borrow area unfeasible, the Fish Haul/Spa project would be constructed with beach-compatible sand from an upland mine in a manner similar to the Ocean Point Interim Beach Fill Project (P/N 2013-00695-1W). Sand would be trucked to the project site from the previously-permitted Deerfield Mine in Hardeeville, SC or the Murray Sand Pit near Summerville, SC, and an upland beach access point adjacent to the project site would be used for access to the shoreline. The anticipated duration for project construction using an upland sand source is much longer than if sand is used from the Bay Point borrow area; construction using an upland sand source would likely extend up to 90 days.

Schedule: In order to minimize potential disturbance of wintering piping plovers and red knots in the vicinity of the project area, the proposed construction window is between March 1 and October 31 in conjunction with the Port Royal and “The Heel” segments of the 2015/16 island-wide renourishment project.

ATTACHMENT B

AVOID AND MINIMAZATION STATEMENT

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

Applicant: Town of Hilton Head Island
Agent: Olsen Associates, Inc., Jacksonville, Florida

ATTACHMENT B - **AVOIDANCE AND MINIMIZATION STATEMENT**

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

Applicant: Town of Hilton Head Island
Agent: Olsen Associates, Inc., Jacksonville, Florida

The proposed project will include the placement of up to 60,000 cubic yards (cy) of sand along about 2,000 ft of Port Royal Sound shorefront as part of a continued beach maintenance and management program at Hilton Head Island, SC. The project is an anticipated and scheduled renourishment by the Town as part of its ongoing comprehensive beach management program and is planned to be constructed in conjunction with the 2015/16 Hilton Head Island Beach Renourishment Project (P/N SAC-2014-00680-1W). Renourishment events are planned to occur every 8 to 10 years depending upon weather conditions and beach performance during the nourishment life. The last comprehensive event on the island was completed in February 2007 and included breakwater construction and the original restoration of the "Fish Haul/Spa" shoreline. The proposed project will include sand placement along a discrete reach of the island shorefront generally located along a portion of the Port Royal Sound shoreline north of Fish Haul Creek including the reach of shoreline seaward of Fish Haul Park (public Town park), The Spa on Port Royal Sound (a private development), and Mitchelville Beach Park (public Town park).

The Fish Haul/Spa segment was not included in the permit application for the 2015/2016 Hilton Head Island Beach Nourishment Project because erosion along the project segment shoreline had not reached critical levels. The Town followed an avoidance/minimization approach to the island-wide project design to minimize potential short-term construction-related disturbances during the shorebird wintering season. Following initial consultation with the resource protection and regulatory agencies in spring 2014, the Fish Haul/Spa segment was removed from the island-wide project, and it was decided to pursue construction of the project in the winter of 2016/17. However, chronic erosion of the project shoreline has continued and degraded beach conditions such that areas of upland development and maritime forest are threatened. The current condition of the shoreline requires immediate action by the Town of Hilton Head to protect upland development and habitats.

The purpose of the project is to reestablish beach conditions, consistent with the proposed island-wide renourishment, sufficient to sustain an 8 to 10 year renourishment life following project completion. The proposed plan was adapted based on current trends in erosional processes and an evaluation of previous nourishment events. Based on the success of past projects, the proposed plan only involves placement of sand in areas that have been previously filled; no structures are proposed.

The no-action alternative would result in continued erosion – and possibly exacerbation of existing erosion – of the shoreline and a resulting decrease in the storm protection offered by the present day beach-dune system, a reduction in recreational space, and decreases in the amount and quality of vegetated habitat.

Beach Fill. Similar to that developed for the island-wide renourishment, the scope and scale of the proposed Fish Haul/Spa beach fill were identified to include the minimum volume necessary to maintain a protective design beach for erosion that is expected to occur over the 8 to 10 year period following project construction. Sand placement will be limited to only those areas of need within the project footprint of past sand placement activities.

When considering beach losses and shoreline erosion since completion of the 2006/07 project, re-filling the prior construction template, amounting to approximately 60,000 cy of fill, is the preferred alternative. However, significant areas of Spartina marsh have flourished in the lee of the breakwaters since project construction, particularly at the eastern limit of this segment. These tidal marsh habitats would be directly buried by fill placement if the entire 2006/07 design template is filled to capacity. To avoid and minimize potential impacts to marsh grass, the project fill length was reduced from 2,200 ft. to 2,000 ft., and the fill volume was reduced and steepened such that the toe of fill falls landward of the tidal marsh habitat in the south half of the project. The ultimate volume of sand will be based upon need and minimization of impacts to marsh grass at the time of construction.

Sand will be shaped into a typical beach fill construction berm configuration with a maximum upper berm elevation generally equivalent to the adjacent beach elevations with varying berm width. The seaward slope of the construction berm along the northwestern half of the project area will have a consistent and uniform initial slope of 1V:20H. The uniform initial slope will be 1V:10H along the southeastern half of the project in areas to avoid coverage of Spartina marsh.

Sand Source. The preferred sand source for the project is the Bay Point Shoals borrow area identified for the 2015/16 island-wide beach renourishment project (P/N 2014-00680-1W). The Bay Point Shoals borrow area is located at the north end of the island within the limits of an area that has been dredged for sand fill on Hilton Head Island. It was previously dredged for the last large-scale renourishment on the island in 2011/12 (P/N 2009-1056-1IW-P). There is a sufficient amount of sand available in the Bay Point Shoals borrow area (P/N 2014-00680-1W) to address the requirements of both the planned island-wide renourishment and the proposed Fish Haul/Spa renourishment project. Project construction using sand hydraulically dredged from the Bay Point borrow area will be completed in 20 days or less. Use of the Bay Point borrow area will need to occur during construction of the island-wide project (P/N 2014-00680-1W) while the dredge plant is mobilized to the island for the project.

Hydraulic fill placement will be limited to the northern half of the project to avoid impacts to marshes grasses adjacent to the southern area of the project. Sand for the southern area of the project will be placed hydraulically in a temporary stockpile along the northern half of the project and subsequently moved, placed, and shaped mechanically.

The identification and delineation of the area was based upon the application of three principal metrics which are intended to conserve available offshore sand resources and minimize the effects of sand borrowing to the environment. These are:

1) provide a suitable source of beach-compatible sand that is reasonably close to the sand placement area and accessible by an ocean-certified cutter-suction pipeline dredge,
2) delineate an area that minimizes the spatial extent of the area to be dredged, and,
3) site and configure the borrow area in such a manner as to avoid and/or minimize the creation of isolated depressions within a shoal feature that may prevent or limit the recovery of sand substrate and softbottom benthic communities. This has been accomplished previously at the proposed site where the dredged area is (1) exposed to relatively high tidal currents, (2) where the material in the surrounding shoals is similar in character to that removed from the borrow area and (3) there is a natural tendency of the ambient shoal material to migrate toward the excavated area. Sediment composition and biological community characteristics in the 2012 Bay Point Shoals borrow area showed minimal changes at 12-months following dredging.

Upland Sand Source: In the event that the proposed project cannot be completed prior to dredge demobilization associated with the island-wide nourishment project, making the use of offshore sand from the Bay Point Shoals borrow area unfeasible, the Fish Haul/Spa project would be constructed with beach-compatible sand from an upland mine in a manner similar to the Ocean Point Interim Beach Fill Project (P/N 2013-00695-1W). Sand would be trucked to the project site from the previously-permitted Deerfield Mine in Hardeeville, SC or the Murray Sand Pit near Summerville, SC, and an upland beach access point adjacent to the project site would be used for access to the shoreline. The anticipated duration for project construction using an upland sand source is much longer than if sand is used from the Bay Point borrow area; construction using an upland sand source would likely extend up to 90 days.

Project Schedule. In order to minimize potential disturbance of wintering piping plovers and red knots in the vicinity of the project area, the proposed construction window is between March

1 and October 31 in conjunction with the Port Royal and “The Heel” segments of the 2015/16 island-wide renourishment project.

More details regarding the project construction windows and the anticipated effects to Federally listed species and critical habitat is provided in the Biological Assessment (BA), which can be found in Appendix H of this package. Detailed information regarding potential impacts to Essential Fish Habitat (EFH) is provided in the EFH Assessment, attached as Appendix I.

ATTACHMENT C

Beach Condition and 2015/16 Beach Renourishment Scope Development Summary

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

Applicant: Town of Hilton Head Island
Agent: Olsen Associates, Inc., Jacksonville, Florida

MEMORANDUM

Date: October 28, 2014

To: Scott P. Liggett, P.E.
Town of Hilton Head Island
Director of Public Projects and Facilities and Chief Engineer

From: Christopher G. Creed, P.E.

Re: Town of Hilton Head Island
Beach Condition Summary and Recommendations for Fish Haul/Spa Shoreline

---

This memo presents a summary of current shoreline and beach conditions for a portion of the Port Royal Sound shoreline north of Fish Haul Creek including the reach of shoreline seaward of Fish Haul Park, The Spa on Port Royal Sound, and Mitchelville Beach Park that was originally restored in 2006, also known as the 'Fish Haul/Spa" shoreline. The purpose of this memo is to present a summary of current beach conditions, expected future conditions, and recommended action options to address an ongoing shoreline erosion project along this reach of shoreline. The review of beach conditions and possible action options focuses on four principal beach condition parameters. These are (1) the 2006 post-project beach conditions, (2) shoreline change rate, (3) beach volume change rate, and (4) beach width. It is anticipated that future action will be necessary along this reach of shoreline where the combined effects of narrowed beach widths and high shoreline change rates have resulted, or will result, in areas with problematic beach widths. Further, there does not appear to be sufficient sand volumes to the south of the area that could contribute to the natural recovery of suitable beach conditions over the next 5 to 10 years. More specific details of the beach conditions, future expectations, and possible project actions are discussed below.

2006 Fish Haul/Spa Beach Restoration and Stabilization Project. In the fall of 2006, the Town of Hilton Head Island implemented a shoreline restoration and stabilization project along approximately 2,400 feet of shoreline immediately north of Fish Haul Creek (**Figure 1**). The project included the placement of approximately 101,000 cy of sand from the Joiner Shoals offshore borrow area and construction of six detached breakwaters. Subsequently, the Town installed marsh grass plantings leeward of the six breakwaters as required by project permits across about 30,000 square feet of the intertidal flat.

The project increased the sand volume along the beach by 35 to 60 cy/ft, or about 45 cy/ft on average. This increased the beach width by between 120 and 200 feet, or about 160 feet, on average.

Shoreline and Beach Volume Change. Since completion of the Fish Haul/Spa restoration and stabilization project in 2006, the shoreline has experienced significant change that has consisted mostly of sand loss from within the project limits.

Figure 1: Location map of study area and 2006 Fish Haul/Spa project area.

Figure 2 illustrates shoreline and beach conditions along the Fish Haul/Spa project shoreline before, immediately after, and 7.5 years after completion of the 2006 project. The top panel shows conditions prior to construction (January 2005); the middle panel shows conditions immediately following construction (March 2007); and the bottom panel shows the conditions as of May 2014. Also shown overlaying the aerial images are lines representing the vegetation line as of the 2005 aerial and the wrack line as of the 2007 aerial. Both the vegetation line and wrack line can be considered rough estimates of the approximate shoreline location at the time of the photography. The figure demonstrates the shoreline widening effect of the 2006 project and the location of most significant sand losses since completion of that project.

As expected, most sand losses have been from the northern half of the project shoreline. This is principally due to the influence of the strong south to north net alongshore transport potential along this reach of shoreline and the shore-stabilizing effects of the six breakwaters and extensive marsh grass areas along the southern half of the project. It also appears that most of the sand loss from the project area has deposited north of the project area and continues to migrate northward, which again is an indicator of the south to north transport potential along this reach of shoreline.

Figure 2: Shoreline change along the Fish Haul/Spa shoreline segment of Hilton Head Island.

Tables 1 and **2** summarize the volume changes that have occurred along the 2006 Fish Haul/Spa project shoreline over two periods. The first, from March 2007 to April 2014, spans the entire post-construction monitoring period and, correspondingly, includes the significant post-construction changes associated with fill equilibration, both planform and cross-shore. The second, from May 2008 to April 2014, spans from a point in time after the majority of equilibration had likely occurred to the most recent survey. Of importance to future management of this shoreline is the expected annualized rate of change following sand placement. For the inter-survey period from March 2007 to April 2014, the annual rate of loss within the project area (FH-04 to FH-13) was about -8,200 cy/yr. For the period from May 2008 to April 2014, the annual rate of loss within the project area was about -6,100 cy/yr. Extrapolating these rates over the period between October 2006 and October 2014 (i.e., 8 years), suggests the project area may have lost between about 48,800 and 65,600 cy of sand, or between 49 and 66 percent of the volume placed, since completion of construction in 2006.

Figure 3 depicts the Mean High Water (MHW, +3.72' NGVD29) shoreline change over the post-construction period. The top panel shows the MHW shoreline position relative to the September 2006 (pre-project) condition, while the lower panel shows the annualized shoreline change rates over the same time periods as used in **Tables 1** and **2** (March 2007 to April 2014 and May 2008 to April 2014). Of particular note is the area of the shoreline that has very narrow beach conditions (less than 50 ft), including FH-10 and FH-11 in particular, which are at or landward of the pre-project condition. The lower panel shows that MHW shoreline erosion rates across most of the project shoreline are on the order of -20 ft/yr and as high as -30 ft/yr. Although the erosion is expected to continue as it reaches the higher elevation upland areas, this loss is not expected to be maintained at as high a rate as observed during the loss of fill sand. Some reduction in the erosion rate is expected to occur. Such erosion, however will impact areas with heavy organic cover including established trees and shrubs.

Construction of the breakwaters and installation of marsh plantings have served to mostly stabilize the southern half of the 2006 project area. However, there has been some loss of sand from this area since construction (comparing the middle and lower panel), particularly between beach monitoring stations FH-5 and FH-9. The beach is particularly narrow between beach monitoring stations FH-6 and FH-7. It is believed that current breakwater and grass conditions could support wider beach conditions along this reach of shoreline.

Table 1: Total and annualized volume change along the Fish Haul/Spa shoreline segment from March 2007 (post-construction) to April 2014.

	March 2007 to April 2014		Reach Distance (ft)		Volume Density Change		Volume Change		Cumulative Volume Change	
	Monument	Monument Range	Between Stations	Along-shore	Total Change (cy/ft)	Annualized Change (cy/ft/yr)	Total Change (cy)	Annualized Change (cy/yr)	Total Change (cy)	Annualized Change (cy/yr)
Fish Haul/Spa Shoreline	FH01			0	10.0	1.4			0	0
		FH01 to FH02	250				1,260	180		
	FH02			250	0.1	0.0			1,260	180
		FH02 to FH03	250				1,220	170		
	FH03 (HI33)			500	9.7	1.4			2,480	350
		FH03 to FH04	250				2,790	390		
Beach Fill Segment	FH04			750	12.7	1.8			5,270	740
		FH04 to FH05	250				1,050	150		
	FH05			1,000	-4.3	-0.6			6,320	890
		FH05 to FH06	250				-3,820	-540		
	FH06			1,250	-26.2	-3.7			2,500	350
		FH06 to FH07	250				-5,640	-800		
	FH07			1,500	-18.9	-2.7			-3,140	-450
		FH07 to FH08	250				-5,150	-730		
	FH08			1,750	-22.3	-3.1			-8,290	-1,180
		FH08 to FH09	250				-7,090	-1,000		
	FH09 (HI34)			2,000	-34.4	-4.9			-15,380	-2,180
		FH09 to FH10	250				-11,190	-1,580		
	FH10			2,250	-55.1	-7.8			-26,570	-3,760
		FH10 to FH11	250				-12,720	-1,800		
	FH11			2,500	-46.7	-6.6			-39,290	-5,560
		FH11 to FH12	250				-9,100	-1,280		
	FH12			2,750	-26.1	-3.7			-48,390	-6,840
		FH12 to FH13	250				-4,510	-640		
	FH13			3,000	-10.0	-1.4			-52,900	-7,480
		FH13 to FH14	250				-80	-10		
	FH14 (HI35)			3,250	9.3	1.3			-52,980	-7,490

Table 2: Total and annualized volume change along the Fish Haul/Spa shoreline segment from May 2008 (approximate post-equilibration) to April 2014.

	May 2008 to April 2014		Reach Distance (ft)		Volume Density Change		Volume Change		Cumulative Volume Change	
	Monument	Monument Range	Between Stations	Along-shore	Total Change (cy/ft)	Annualized Change (cy/ft/yr)	Total Change (cy)	Annualized Change (cy/yr)	Total Change (cy)	Annualized Change (cy/yr)
Fish Haul/Spa Shoreline	FH01			0	10.6	1.8			0	0
		FH01 to FH02	250				2,640	450		
	FH02			250	10.5	1.8			2,640	450
		FH02 to FH03	250				2,140	360		
	FH03 (HI33)			500	6.6	1.1			4,780	810
		FH03 to FH04	250				2,060	350		
Beach Fill Segment	FH04			750	9.9	1.7			6,840	1,160
		FH04 to FH05	250				2,150	360		
	FH05			1,000	7.3	1.2			8,990	1,520
		FH05 to FH06	250				-1,430	-240		
	FH06			1,250	-18.7	-3.2			7,560	1,280
		FH06 to FH07	250				-3,700	-630		
	FH07			1,500	-10.8	-1.8			3,860	650
		FH07 to FH08	250				-3,090	-520		
	FH08			1,750	-13.9	-2.4			770	130
		FH08 to FH09	250				-3,590	-610		
	FH09 (HI34)			2,000	-14.8	-2.5			-2,820	-480
		FH09 to FH10	250				-6,170	-1,040		
	FH10			2,250	-34.6	-5.8			-8,990	-1,520
		FH10 to FH11	250				-8,840	-1,490		
	FH11			2,500	-36.2	-6.1			-17,830	-3,010
		FH11 to FH12	250				-7,480	-1,260		
	FH12			2,750	-23.7	-4.0			-25,310	-4,270
		FH12 to FH13	250				-4,070	-690		
	FH13			3,000	-8.9	-1.5			-29,380	-4,960
		FH13 to FH14	250				-450	-80		
	FH14 (HI35)			3,250	5.3	0.9			-29,830	-5,040

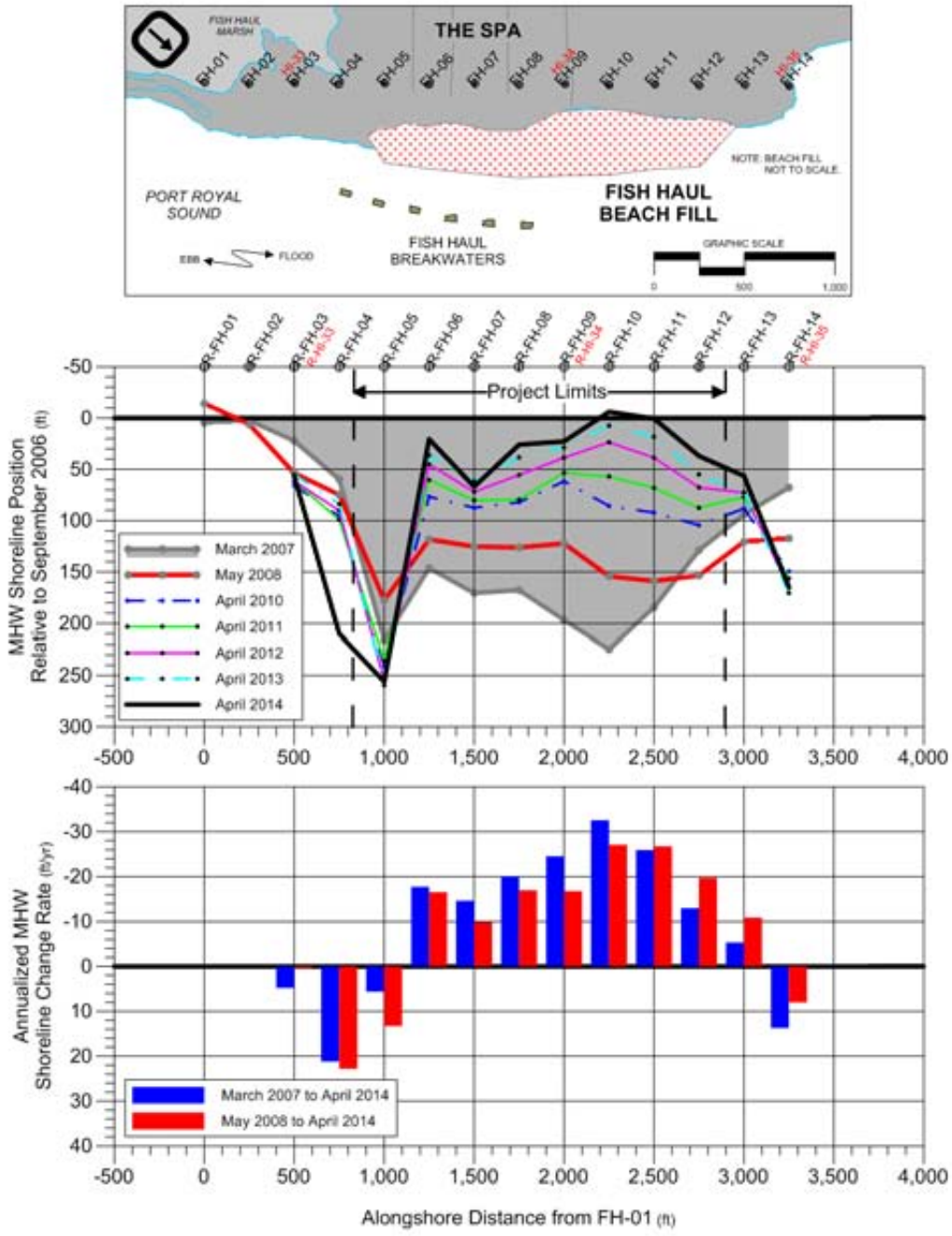


Figure 3: Shoreline positions and change rates along the Fish Haul/Spa project shoreline (2007-2014).

Current Beach Condition. Current beach conditions along the 2006 Fish Haul/Spa project shoreline and adjacent areas vary significantly. Within the project area (**Figures 2** and **4**), the remnants of the 2006 project remain along the southern 300 to 400 feet of shoreline. Immediately north thereof, in the lee of the northernmost 4 breakwaters, some of the original project sand volume remains but beach widths have decreased to levels such that some sand placement would improve conditions for both recreational use and shoreline protection. Along the northern half of the project area, almost all of the project related beach width improvement has been eliminated due to the sand losses from that area. Most of the material lost from the project shoreline has been transported northward to the area immediately beyond the northern project limits. North of the project, beach widths have increased since 2006 due to the movement of sand into that area.

It is noted that south of Fish Haul Creek a large sand spit is migrating northward and contributing to a large reconfiguration of the creek itself and the leeward shoreline along the Fish Haul/Spa area (**Figure 4**). This sand spit is similar to other large sand features that have migrated from north to south along this shoreline. Historical aerial photographs from the 1950's through the 1970's capture a similar feature. These sand spits, or sand waves, typically migrate from south to north often resulting in large fluctuations in beach widths. As seen in the past, the beach widths will increase as the wave approaches and subsequently decrease following its passage. Based upon review of historical aerial photos, the rate of movement of the sand waves and effects to any particular area of shoreline can range from years to decades. It is expected that the approaching sand spit south of Fish Haul Creek will eventually migrate to the Fish Haul/Spa shoreline, but it is not expected that any benefit of this event will be realized prior to the development of problematic beach conditions along the northernmost area of the Fish Haul/Spa project shoreline.

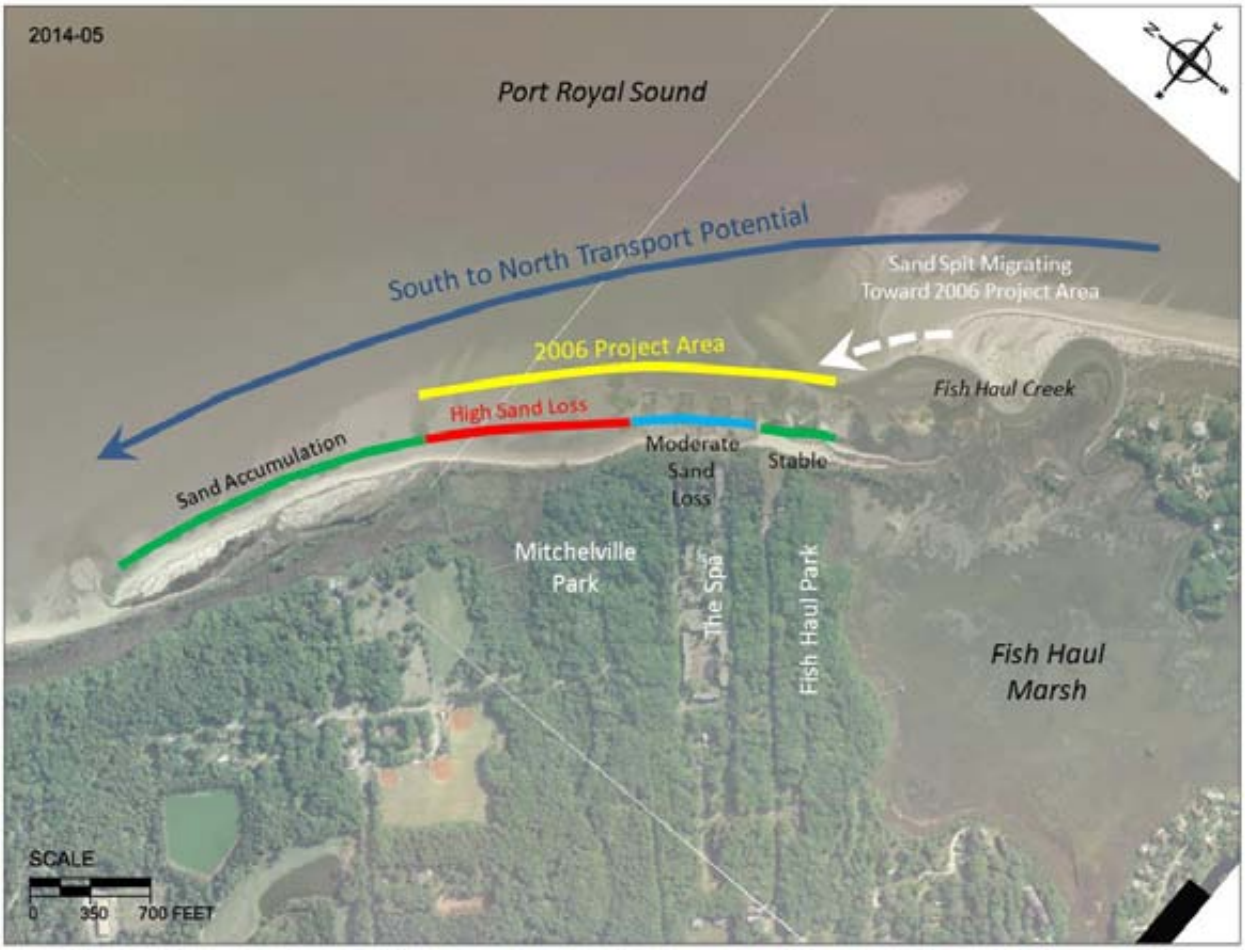


Figure 4: Summary of shoreline conditions and changes that have occurred since the 2006 Fish Haul/Spa shoreline restoration and stabilization project.

Recommendation. It is recommended that action by the Town of Hilton Head Island will be necessary to address the recent sand losses from the Fish Haul/Spa project shoreline and the expected continued erosion rates there along. Two approaches that should be considered by the Town include (1) direct sand placement from either an offshore borrow area or an upland sand mine and/or (2) the relocation of Fish Haul Creek to its historically more southern location (**Figure 5**). The latter would effectively release a large portion of the migrating sand spit from the shoreline south of Fish Haul Creek and accelerate the movement of that sand feature to the Fish Haul/Spa shoreline. Prior to pursing either of these projects, consultations with the resource agencies and an evaluation of the expected performance and possible adverse effects to the coastal environment should be conducted.

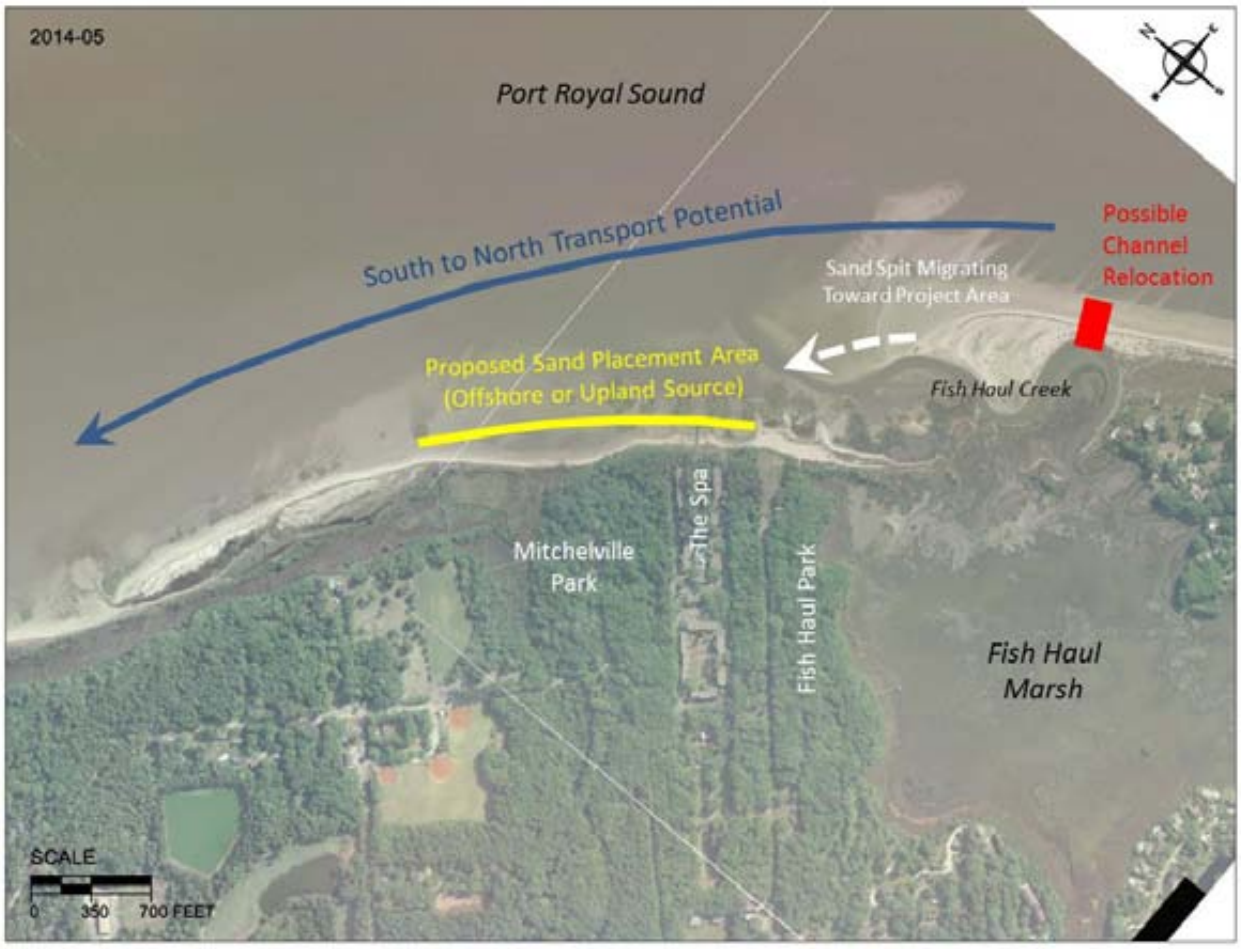


Figure 5: Summary of possible project actions to consider for future management of the Fish Haul/Spa shoreline.

ATTACHMENT D

OCRM: AFFIDAVIT OF OWNERSHIP OR CONTROL

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

Applicant: Town of Hilton Head Island
Agent: Olsen Associates, Inc., Jacksonville, Florida

D H E C
PROMOTE PROTECT PROSPER

AFFIDAVIT OF OWNERSHIP OR CONTROL

S. C. Department of Health and Environmental Control
Office of Ocean and Coastal Resource Management

Charleston	Beaufort	Myrtle Beach
953-0200	846-9400	238-4528
953-0201 (fax)	846-9810(fax)	238-4526(fax)

I hereby certify that I am the (check one):

- [X] Record Owner
- [ ] Lessee
- [ ] Record Easement Holder
- [ ] Applicant To Record Owner For Easement
- [ ] Contract To Purchase Property

of the below described property situated in BEAUFORT County, South Carolina; and that said property is all of that said property that is contiguous to and landward of the area in which the work proposed in the permit application is to be conducted. Furthermore, I certify that as record owner, lessee, or record easement holder, I have, or will have prior to undertaking the work, necessary approvals or permission from all other persons with a legal interest in said property to conduct the work proposed in the permit application.

WRITE LEGAL DESCRIPTION OF HIGHLAND (as described in deed, lease, etc.) BELOW OR WRITE "SEE ATTACHED" (in large bold letters) AND ATTACH A COPY OF THE DEED, LEASE, EASEMENT, OR MOST RECENT CERTIFIED PLAT OF THE PROPERTY. IF YOU ARE NOT THE RECORD OWNER, LESSEE OR EASEMENT HOLDER, YOU MUST ALSO SUBMIT WRITTEN PERMISSION FROM THE OWNER OF THE PROPERTY TO CARRY OUT THE PROPOSED ACTIVITY.

I also certify that the project as proposed does not cross any wetlands or areas below mean high water which is in the ownership of other private persons or public or private entities and that there is no disputed claim to the wetlands or areas below mean high water by private person or other entities due to a Kings Grant, State Grant, easement or conveyance or other legal document evidencing ownership of these areas.

Signature of Record Holder or Lessee

Sworn to and subscribed before me at HILTON Head Island, BEAUFORT County, South Carolina, this 5th day of JANUARY, 2015.

Notary Public

My commission expires: 10/31/2021

ATTACHMENT E

LIST OF ADJACENT PROPERTY OWNERS WITH ADDRESSES

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

Applicant: Town of Hilton Head Island
Agent: Olsen Associates, Inc., Jacksonville, Florida

Hilton Head Island, SC
2015/16 Fish Haul/Spa Beach Renourishment Project

Fish Haul/Spa Property Owners

PROPERTY PIN	OWNER	MAILING ADDRESS	CITY	STATE	ZIP
R510 005 000 0249 0000	WHITE GERALDINE JOHNNY O PERRY MOULT	203 BEACH CITY RD	HILTON HEAD ISL	SC	29928
R510 005 000 0007 0000	YOUNG CHARLES EDWARD	2627 MOORINGS PARKWAY	SNELLVILLE	GA	30039
R510 005 000 010H 0000	WHITE ANDRE J JASMINE B JTROS	PO BOX 23408	HILTON HEAD ISL	SC	29925
R510 005 000 0274 0000	WHITE JOHNNY O WILLIE MAE NIKOLA	118-77 129 STREET	JAMAICA	NY	11420

ATTACHMENT F

2013 Offshore Sand Search Investigation

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

Applicant: Town of Hilton Head Island
Agent: Olsen Associates, Inc., Jacksonville, Florida

ATTACHMENT G

Description and Compatibility of Upland Sand Source Materials

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

Applicant: Town of Hilton Head Island
Agent: Olsen Associates, Inc., Jacksonville, Florida

The following sheets summarize sand characteristics at the Deerfield Upland Sand Mine in Hardeeville, SC.

Figure 1: Location of the Deerfield sand mine relative to the project site (Image: Google).

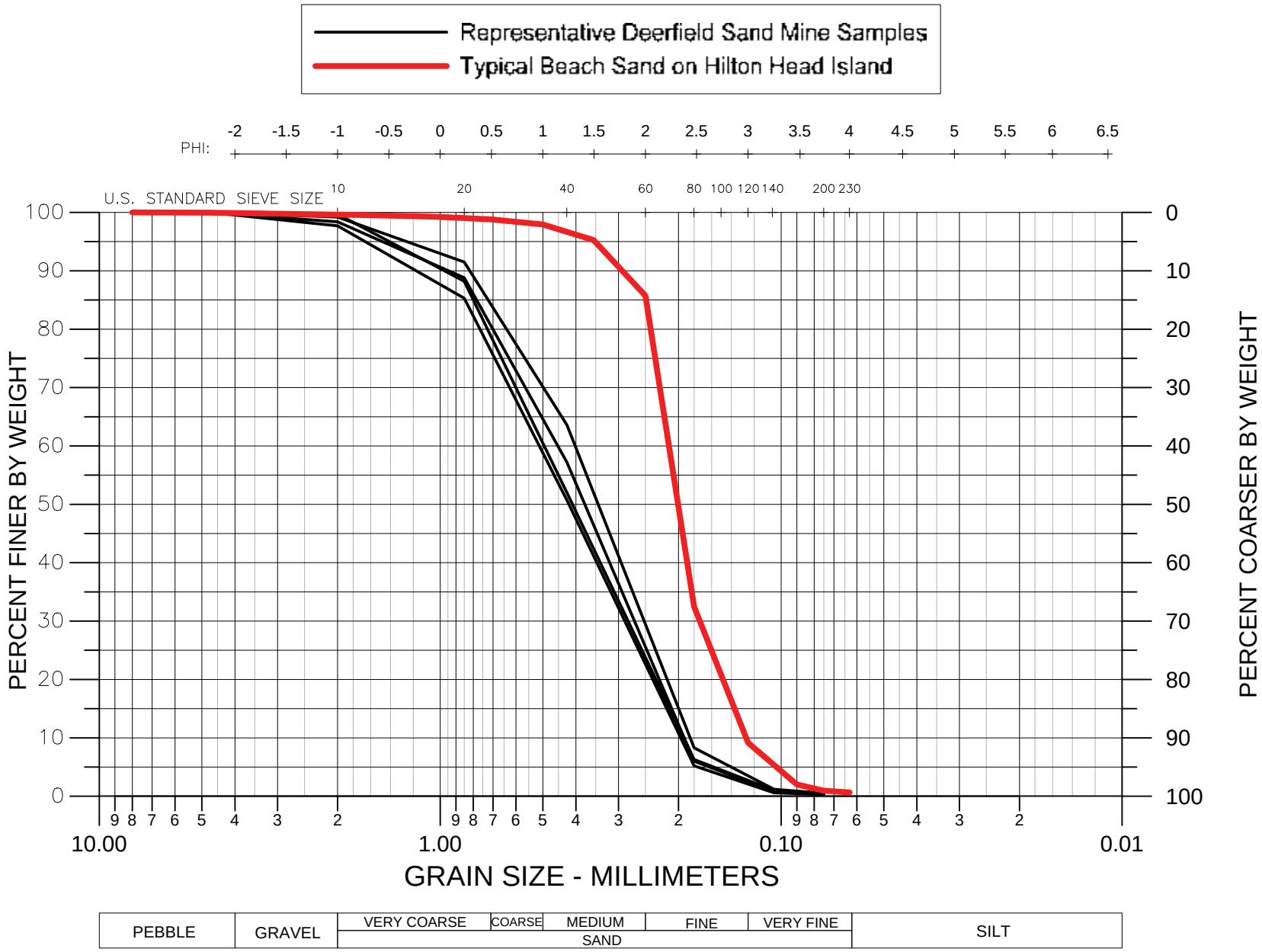
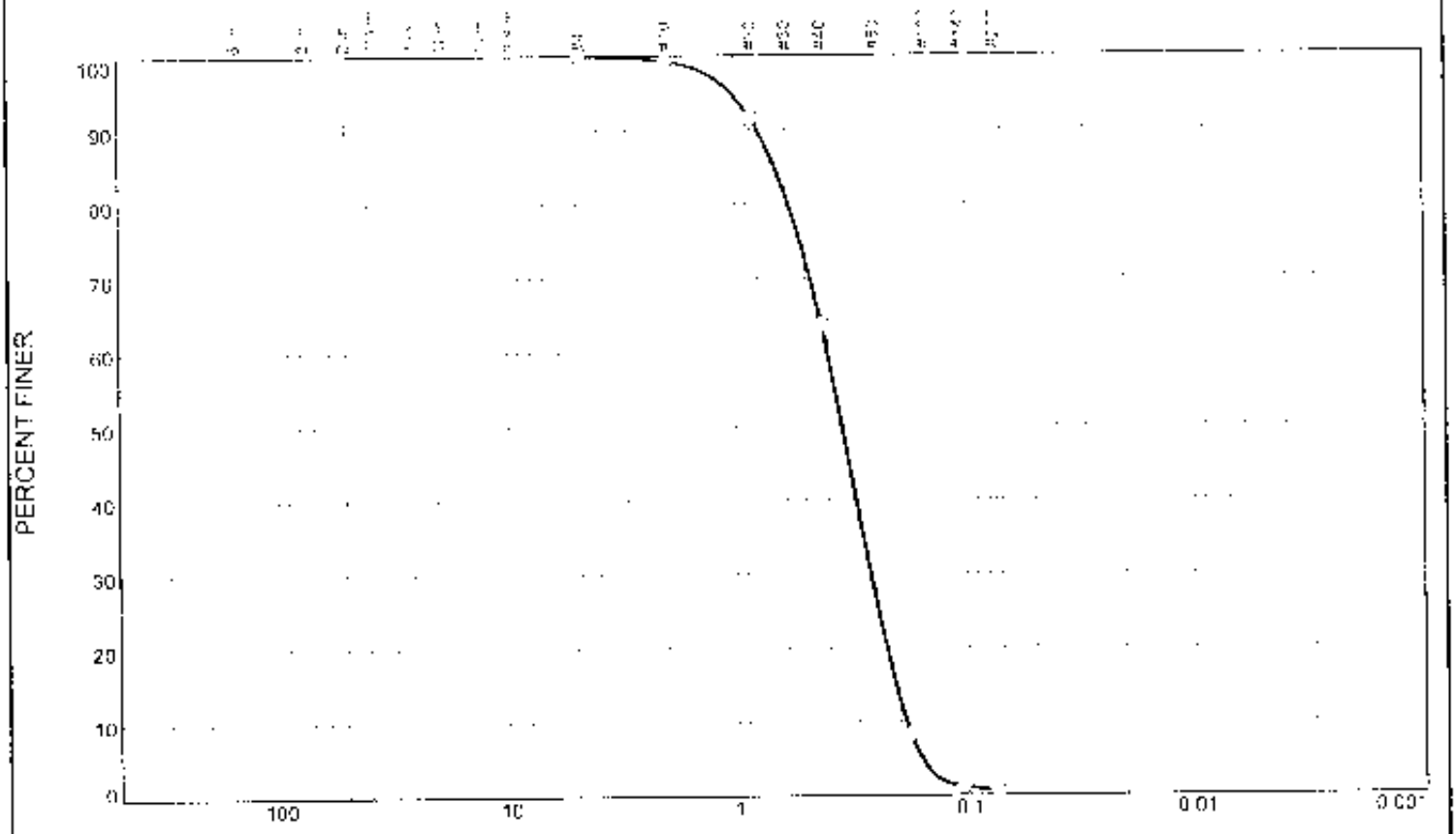


FIGURE 2: Grain size distributions for typical sediment from the Deerfield upland sand mine in Hardeedville, SC.

Grain Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.8	35.6	63.1	0.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.2		
#20	91.5		
#40	63.6		
#80	8.3		
#140	1.2		
#200	0.5		

* no specification provided

Material Description

SAND, poorly-graded, mostly fine to medium sand-sized quartz.
10YR 7/1

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7972 D_{85}= 0.6700 D_{60}= 0.4016
D_{50}= 0.3478 D_{30}= 0.2642 D_{15}= 0.2082
D_{10}= 0.1877 C_u= 2.14 C_c= 0.93

Classification

USCS= SP AASHTO=

Remarks

Source of Sample: Deerfield Stockpile
Sample Number: 1A

Date: 7/7/11

MACTEC ENGINEERING. AND CONSULTING, INC.

Client: Olsen Associates, Inc.
Project: Harbour Town 18th Green

Project No: 6738-09-4995.07

Figure

Tested By: CM

GRAIN SIZE DISTRIBUTION TEST DATA

7/8/2011

Client: Olsen Associates, Inc.
Project: Harbour Town 18th Green
Project Number: 6738-09-4995.07
Location: Deerfield Stockpile
Sample Number: 1A
Material Description: SAND, poorly-graded, mostly fine to medium sand-sized quartz, 10YR 7/1
Date: 7/7/11
USCS Classification: SP
Tested by: CM

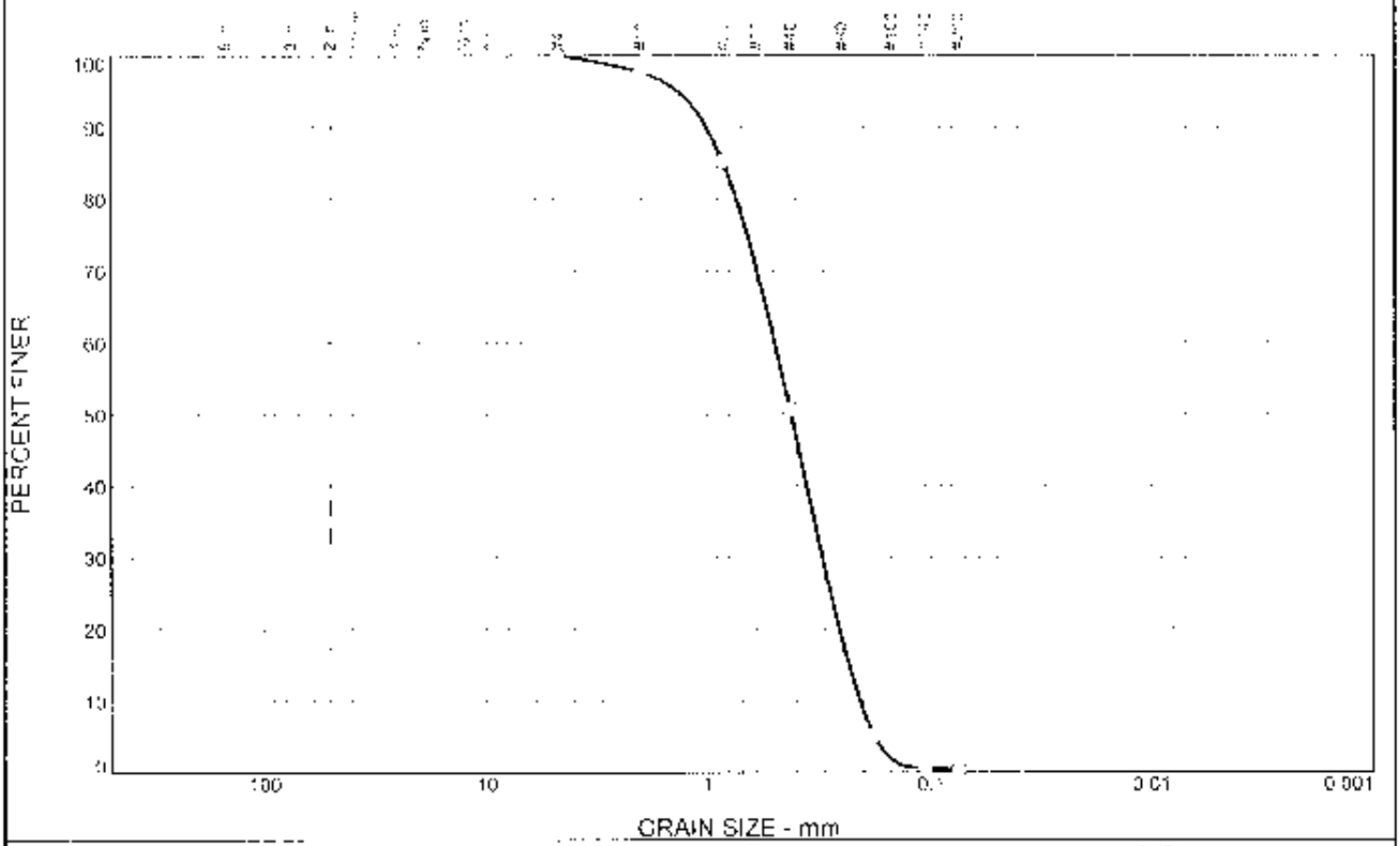
Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
171.30	50.23	0.00	#4	0.00	100.0
			#10	0.94	99.2
			#20	10.31	91.5
			#40	44.02	63.6
			#80	110.97	8.3
			#140	119.57	1.2
			#200	120.42	0.5

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.8	35.6	63.1	99.5			0.5

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1877	0.2082	0.2271	0.2642	0.3478	0.4016	0.5852	0.6700	0.7972	1.0353

Fineness Modulus	C_u	C_c
1.80	2.14	0.93

Grain Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	2.3	47.0	50.4	0.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	97.7		
#20	85.3		
#40	50.7		
#80	5.2		
#140	0.6		
#200	0.3		

* (no specification provided)

Material Description

SAND, poorly-graded, mostly fine to medium sand sized quartz, 10YR 7/1

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.0030 D_{85}= 0.8416 D_{60}= 0.4964
D_{50}= 0.4205 D_{30}= 0.3057 D_{15}= 0.2331
D_{10}= 0.2082 C_U= 2.38 C_C= 0.90

Classification

USCS= SP AASHTO=

Remarks

Source of Sample: Deerfield Stockpile
Sample Number: 2A

Date: 7/7/11

MACTEC ENGINEERING. AND CONSULTING, INC.

Client: Olsen Associates, Inc
Project: Harbour Town 18th Green

Project No: 6238-09-4995.07

Figure

Tested By: CM

GRAIN SIZE DISTRIBUTION TEST DATA

7/8/2011

Client: Olsen Associates, Inc.
Project: Harbour Town 18th Green
Project Number: 6738-09-4995.07
Location: Deerfield Stockpile
Sample Number: 2A
Material Description: SAND, poorly-graded, mostly fine to medium sand sized quartz, 10YR 7 1
Date: 7/7/11
USCS Classification: SP
Tested by: C M

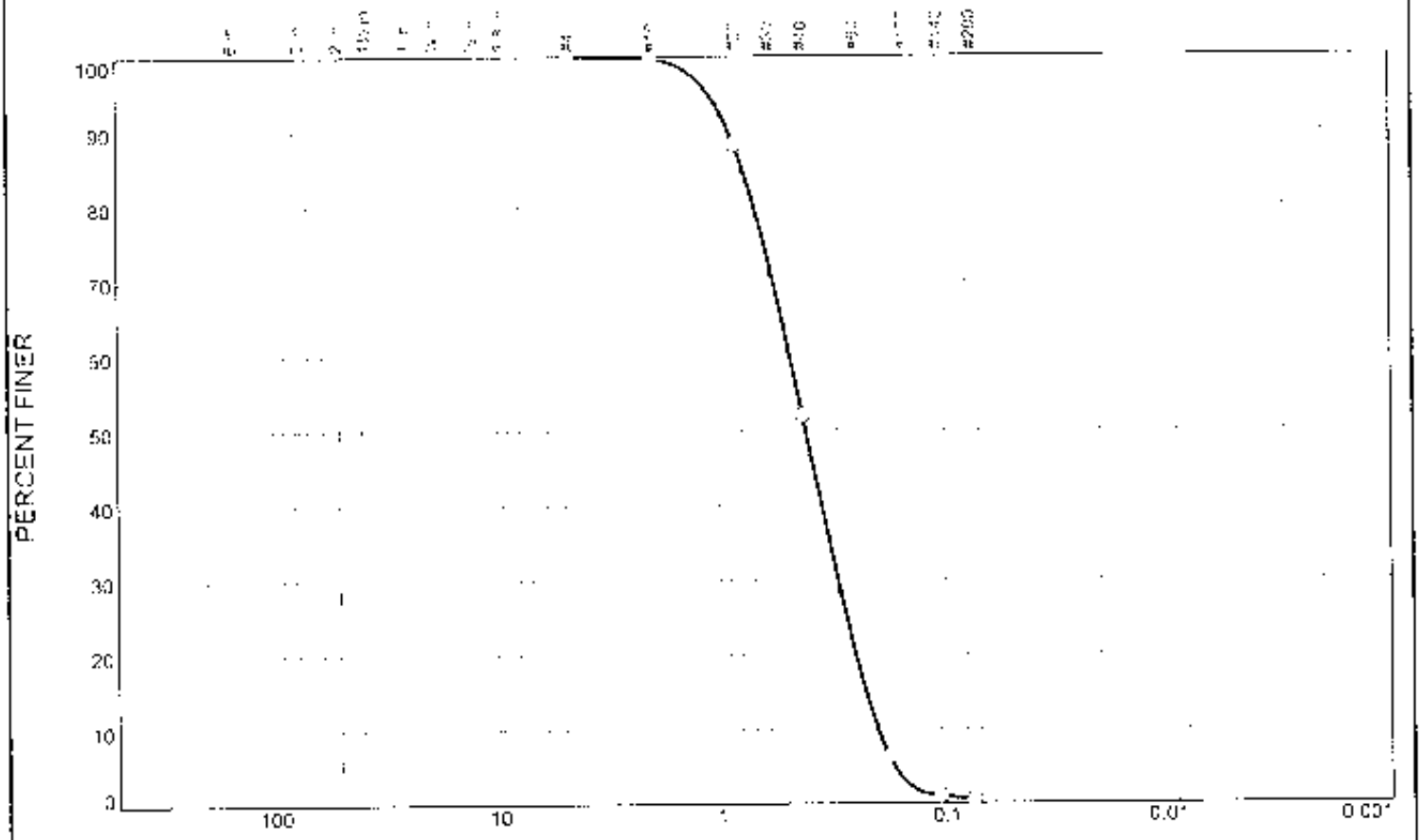
Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
169.77	52.92	0.00	#4	0.00	100.0
			#10	2.70	97.7
			#20	17.06	85.3
			#40	57.39	50.7
			#80	110.30	5.2
			#140	115.58	0.6
			#200	115.93	0.3

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	2.3	47.0	50.4	99.7			0.3

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.2082	0.2331	0.2571	0.3057	0.4205	0.4964	0.7371	0.8416	1.0030	1.3473

Fineness Modulus	C_U	C_C
2.07	2.38	0.90

Grain Size Distribution Report



GRAIN SIZE - mm.

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	47.7	51.5	0.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#20	88.3		
#40	52.0		
#80	6.3		
#140	1.0		
#200	0.5		

* (no specification provided)

Material Description

SAND, poorly-graded, mostly fine to medium sand-sized quartz, 10YR 7/1

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.8977 D_{85}= 0.7795 D_{60}= 0.4828
D_{50}= 0.4116 D_{30}= 0.2997 D_{15}= 0.2271
D_{10}= 0.2017 C_u= 2.39 C_c= 0.92

Classification

USCS= SP AASHTO=

Remarks

Source of Sample: Deerfield Stockpile
Sample Number: 1B

Date:

MACTEC ENGINEERING. AND CONSULTING, INC.

Client: Olsen Associates, Inc.
Project: Harbour Town 18th Green

Project No: 6238-09-4995.07

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

7/8/2011

Client: Olsen Associates, Inc.
Project: Harbour Town 18th Green
Project Number: 6738-09-4995.07
Location: Deerfield Stockpile
Sample Number: 1B
Material Description: SAND, poorly-graded, mostly fine to medium sand-sized quartz, 10YR 7/1
USCS Classification: SP

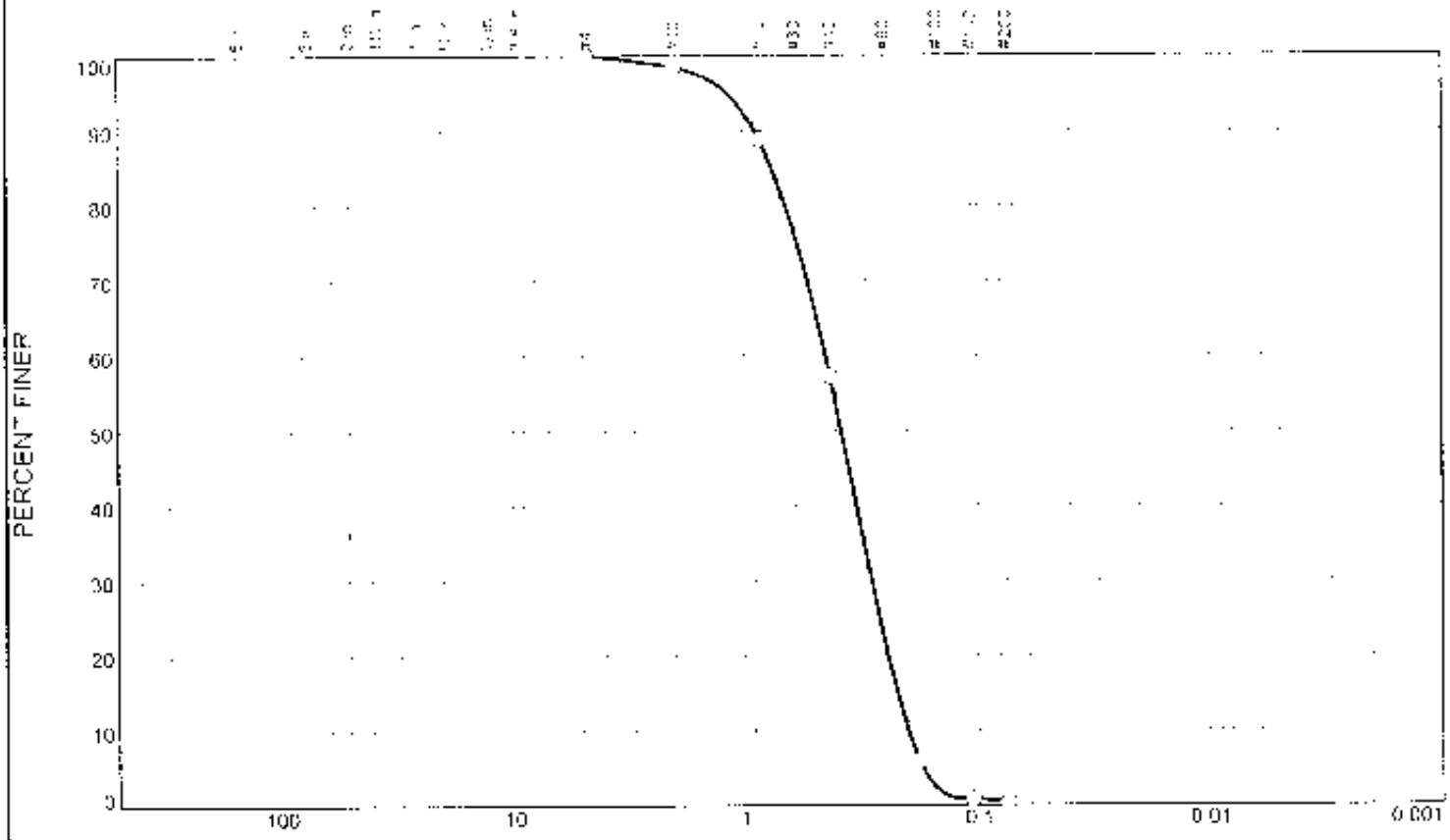
Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
361.46	52.11	0.00	#4	0.00	100.0
			#10	0.32	99.7
			#20	12.87	88.2
			#40	52.44	52.0
			#80	102.45	6.3
			#140	108.24	1.0
			#200	109.85	0.5

Gravel				Sand				Fines		
Cobbles	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.3	47.7	51.5	99.5			0.5

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.2017	0.2271	0.2517	0.2997	0.4116	0.4828	0.6950	0.7795	0.8977	1.1030

Fineness Modulus	C_u	C_c
1.99	2.39	0.92

Grain Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.6	41.2	56.8	0.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.4		
#20	88.8		
#40	57.2		
#80	6.0		
#140	0.8		
#200	0.4		

* No specification provided

Material Description

SAND, poorly-graded, mostly fine to medium sand-sized quartz. 10YR 7/2

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.8898 D_{85}= 0.7504 D_{60}= 0.4143
D_{50}= 0.3806 D_{30}= 0.2844 D_{15}= 0.2223
D_{10}= 0.2005 C_u= 2.22 C_c= 0.91

Classification

USCS= SP AASHTO=

Remarks

Source of Sample: Deerfield Stockpile **Date:** 7/7/11
Sample Number: 2B

MACTEC ENGINEERING. AND CONSULTING, INC.

Client: Olsen Associates, Inc.
Project: Harbour Town 18th Green
Project No: 6238-09-4995.07 Figure

Tested By: CM

GRAIN SIZE DISTRIBUTION TEST DATA

7/8/2011

Client: Olsen Associates, Inc.
Project: Harbour Town 18th Green
Project Number: 6738-09-4995.07
Location: Deerfield Stockpile
Sample Number: 28
Material Description: SAND, poorly-graded, mostly fine to medium sand-sized quartz, 10YR 7/3
Date: 7/7/11
USCS Classification: SP
Tested by: CM

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
168.64	51.79	0.00	#4	0.00	100.0
			#10	1.86	98.4
			#20	13.14	88.8
			#40	50.22	57.2
			#80	110.43	6.0
			#140	116.50	0.8
			#200	116.97	0.4

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	1.0	41.2	56.8	99.6			0.4

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.2005	0.2223	0.2430	0.2844	0.3856	0.4443	0.6567	0.7504	0.8898	1.3660

Fineness Modulus	C_u	C_c
1.94	2.22	0.91

The following sheets summarize sand characteristics at the

Ocean 3RLQWProject Site

Samples Collected 3 May 2013

Jacksonville, Florida

VISUAL SHELL CONTENT

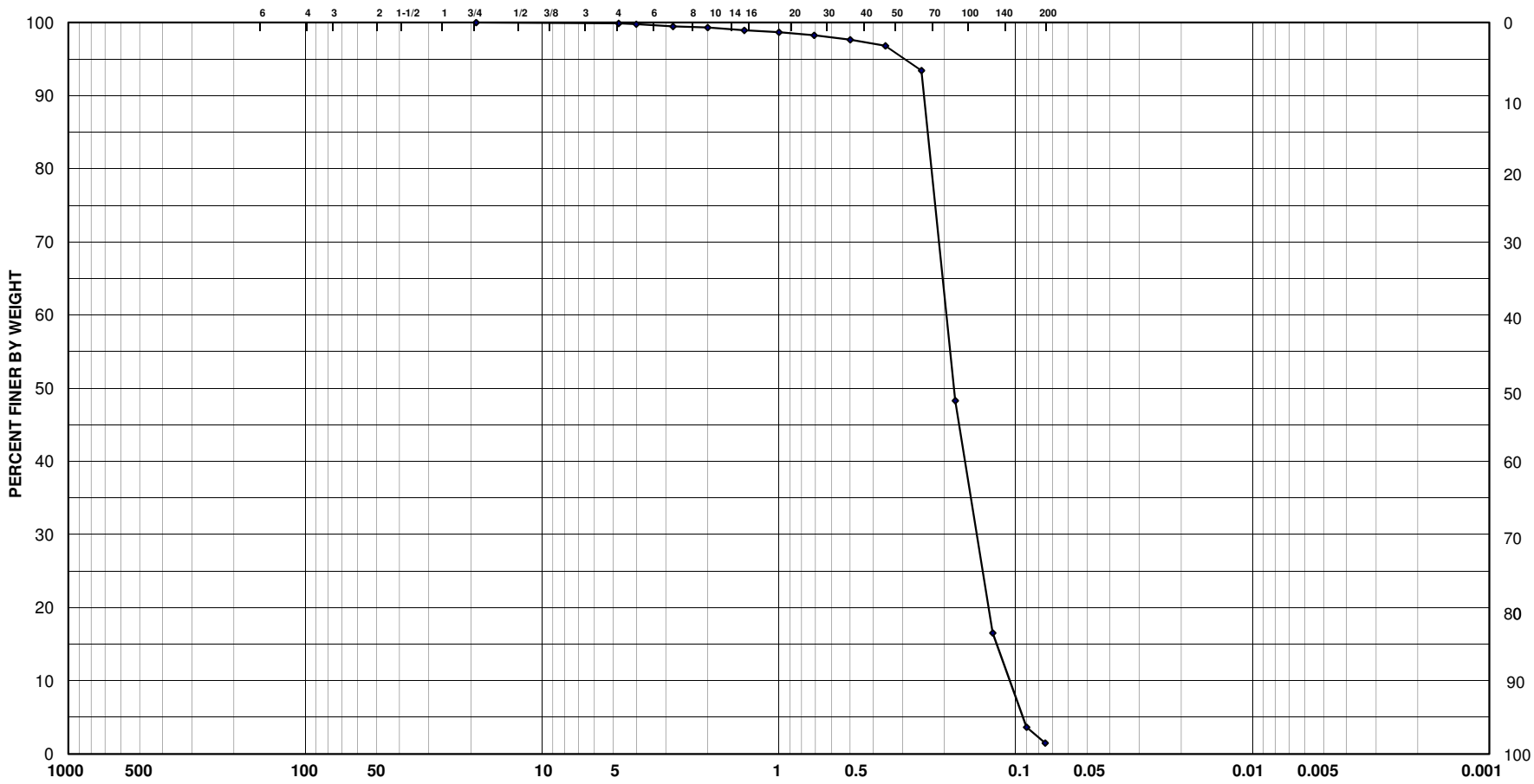
GRAIN SIZE AND VISUAL SHELL CONTENT

Project:	**Hilton Head Ocean Point Interim Beach Fill**	**Depth:**	**NA**
Project No.:	**6738-13-5265**	**Date:**	**5/14/2013**
Sample No.:	**NA**		
Boring No.:	**Low Water**		
Description:	**SAND, poorly-graded, mostly fine-grained quartz, trace silt, trace shell, gray (SP) 10YR 6/1**		

Tare Weight, (g):	50.42	
Dry Wt. Before Washing (g):	226.60	(with tare)
Dry Weight After Washing (g):	225.02	(with tare)

Sieve Size (Name)	Sieve Size (mm)	Cumulative Weight Retained (g)	Individual Weight Retained (gr)	% Passing	Approx. Visual Shell %	Approx. Visual Shell Wt. (g)
5/16"	19.000	0.00	0.00	100.00	0	0.00
#4	4.750	0.21	0.21	99.88	100	0.21
#5	4.000	0.39	0.18	99.78	100	0.18
#7	2.800	0.93	0.54	99.47	100	0.54
#10	2.000	1.22	0.29	99.31	100	0.29
#14	1.400	1.85	0.63	98.95	40	0.25
#18	1.000	2.36	0.51	98.66	30	0.15
#25	0.710	3.09	0.73	98.25	20	0.15
#35	0.500	4.16	1.07	97.64	7	0.07
#45	0.355	5.60	1.44	96.82	4	0.06
#60	0.250	11.52	5.92	93.46	3	0.18
#80	0.180	91.09	79.57	48.30	0	0.00
#120	0.125	147.03	55.94	16.55	0	0.00
#170	0.090	169.75	22.72	3.65	0	0.00
#200	0.075	173.50	3.75	1.52	0	0.00
#230	0.063	174.60	1.10	0.90	0	0.00
				100		

Total Shell Content: **1** **% of sample** **2.1** **grams of shell in sample**



Station	Boring No.	Classification	% CO_3	G_s	Nat w%	LL	PL	PI
◆ NA	Low Water	SAND, poorly-graded, mostly fine-grained quartz, trace silt, trace shell, gray (SP) 10YR 6/1	174.6					

Project Hilton Head Ocean Point Interim Beach Fill

Station NA

Boring No. Low Water

Date 5/14/2013

GRADATION CURVES

ENG FORM 2087

MAY 63

Jacksonville, Florida

VISUAL SHELL CONTENT

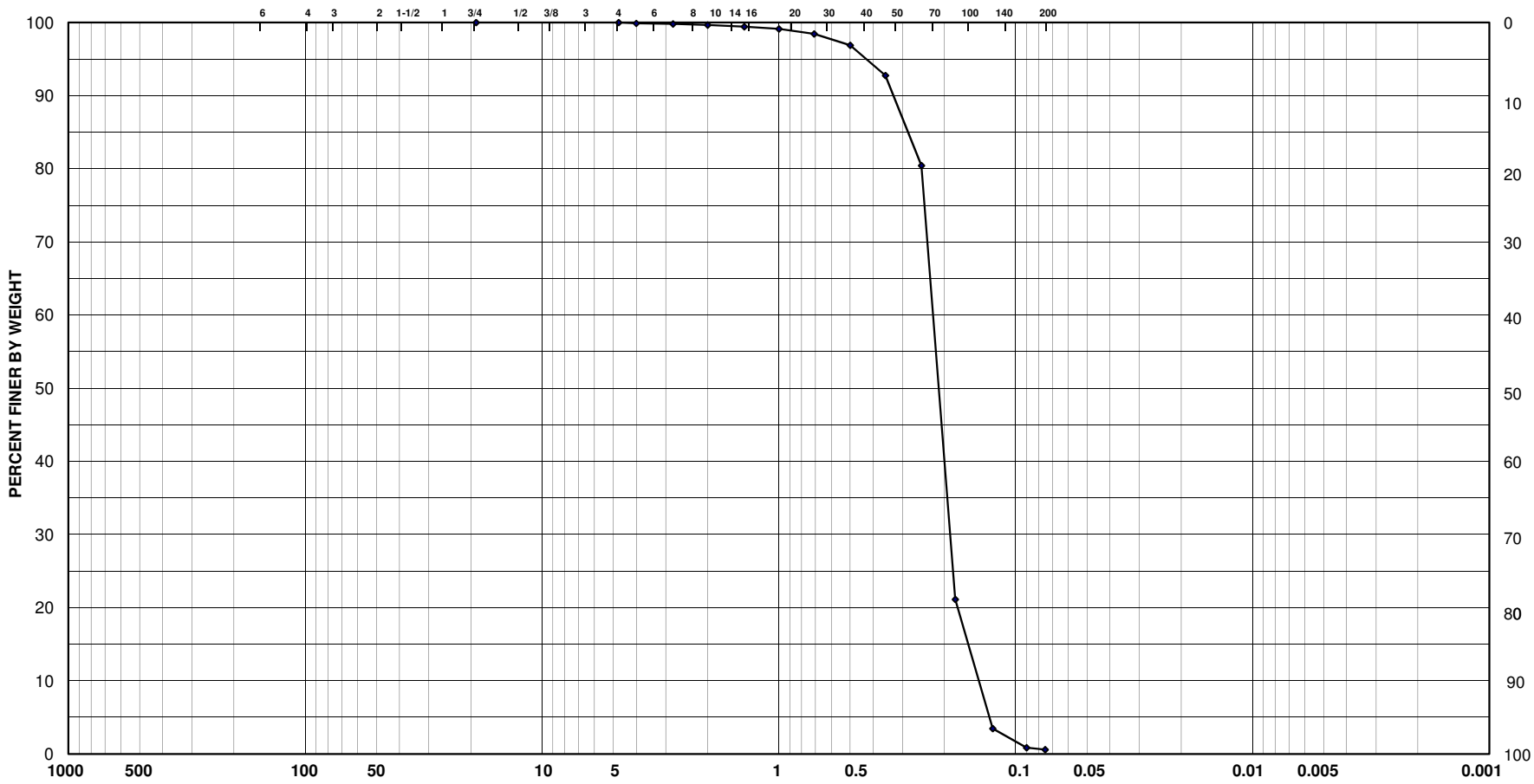
GRAIN SIZE AND VISUAL SHELL CONTENT

Project:	**Hilton Head Ocean Point Interim Beach Fill**	**Depth:**	**NA**
Project No.:	**6738-13-5265**	**Date:**	**5/14/2013**
Sample No.:	**NA**		
Boring No.:	**Mid Water**		
Description:	**SAND, poorly-graded, mostly fine-grained quartz, trace shell, light gray (SP) 10YR 7/1**		

Tare Weight, (g):	55.66	
Dry Wt. Before Washing (g):	214.11	(with tare)
Dry Weight After Washing (g):	213.30	(with tare)

Sieve Size (Name)	Sieve Size (mm)	Cumulative Weight Retained (g)	Individual Weight Retained (gr)	% Passing	Approx. Visual Shell %	Approx. Visual Shell Wt. (g)
5/16"	19.000	0.00	0.00	100.00	0	0.00
#4	4.750	0.00	0.00	100.00	0	0.00
#5	4.000	0.18	0.18	99.89	100	0.18
#7	2.800	0.31	0.13	99.80	100	0.13
#10	2.000	0.52	0.21	99.67	100	0.21
#14	1.400	0.88	0.36	99.44	100	0.36
#18	1.000	1.40	0.52	99.12	100	0.52
#25	0.710	2.45	1.05	98.45	10	0.11
#35	0.500	4.93	2.48	96.89	3	0.07
#45	0.355	11.44	6.51	92.78	3	0.20
#60	0.250	30.97	19.53	80.45	0	0.00
#80	0.180	124.97	94.00	21.13	0	0.00
#120	0.125	152.95	27.98	3.47	0	0.00
#170	0.090	157.07	4.12	0.87	0	0.00
#200	0.075	157.52	0.45	0.59	0	0.00
#230	0.063	157.64	0.12	0.51	0	0.00
				100		

Total Shell Content: **1** **% of sample** **1.8** **grams of shell in sample**



Station	Boring No.	Classification	% CO_3	G_s	Nat w%	LL	PL	PI
◆ NA	Mid Water	SAND, poorly-graded, mostly fine-grained quartz, trace shell, light gray (SP) 10YR 7/1	157.6					

Project Hilton Head Ocean Point Interim Beach Fill

Station NA

Boring No. Mid Water

Date 5/14/2013

GRADATION CURVES

ENG FORM 2087

MAY 63

Jacksonville, Florida

VISUAL SHELL CONTENT

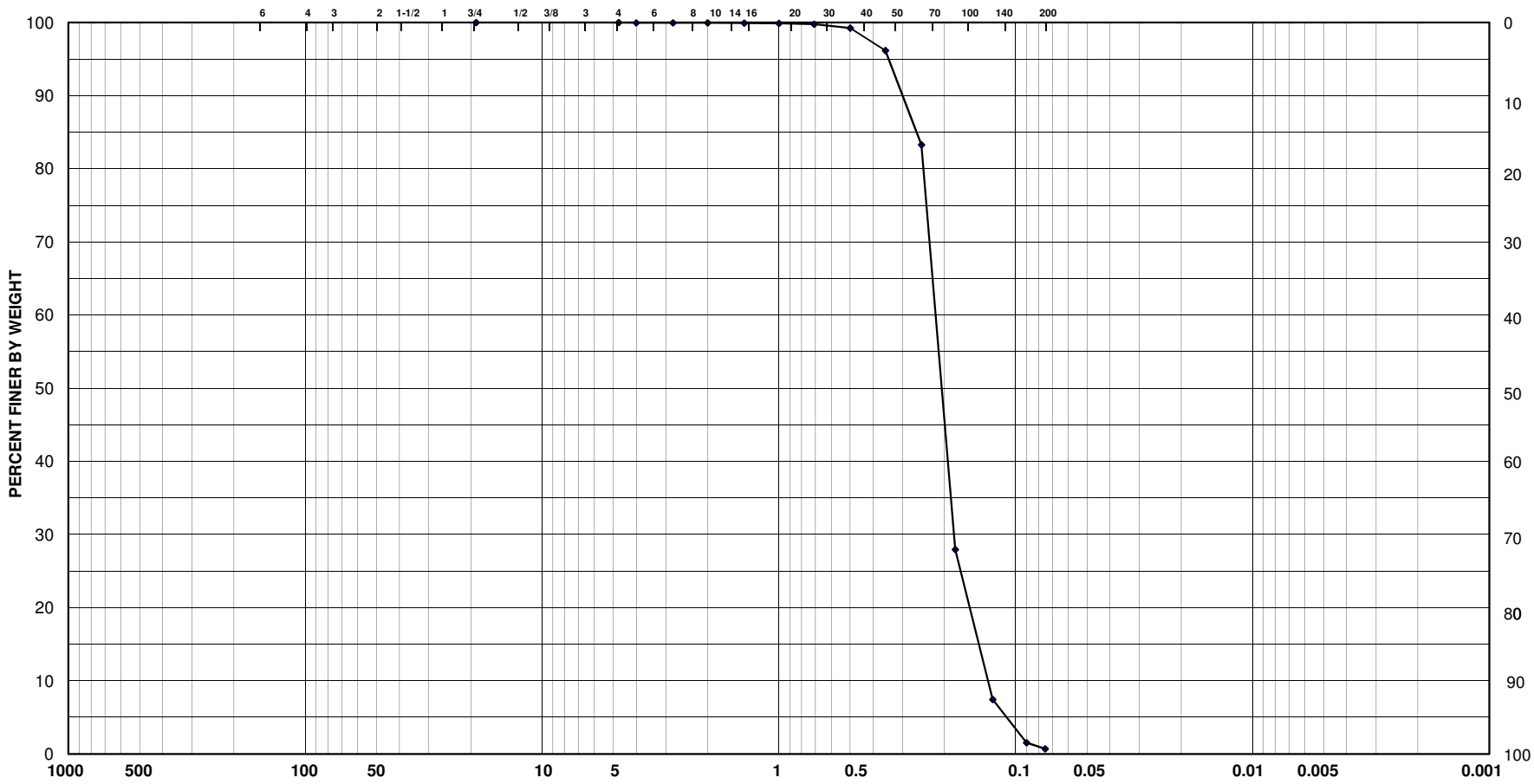
GRAIN SIZE AND VISUAL SHELL CONTENT

Project:	**Hilton Head Ocean Point Interim Beach Fill**	**Depth:**	**NA**
Project No.:	**6738-13-5265**	**Date:**	**5/14/2013**
Sample No.:	**NA**		
Boring No.:	**High Water**		
Description:	**SAND, poorly-graded, mostly fine-grained quartz, trace silt, gray (SP) 10YR 6/1**		

Tare Weight, (g):	50.23	
Dry Wt. Before Washing (g):	237.39	(with tare)
Dry Weight After Washing (g):	236.36	(with tare)

Sieve Size (Name)	Sieve Size (mm)	Cumulative Weight Retained (g)	Individual Weight Retained (gr)	% Passing	Approx. Visual Shell %	Approx. Visual Shell Wt. (g)
5/16"	19.000	0.00	0.00	100.00	0	0.00
#4	4.750	0.00	0.00	100.00	0	0.00
#5	4.000	0.05	0.05	99.97	100	0.05
#7	2.800	0.06	0.01	99.97	100	0.01
#10	2.000	0.07	0.01	99.96	100	0.01
#14	1.400	0.11	0.04	99.94	100	0.04
#18	1.000	0.22	0.11	99.88	100	0.11
#25	0.710	0.45	0.23	99.76	100	0.23
#35	0.500	1.43	0.98	99.24	10	0.10
#45	0.355	7.14	5.71	96.19	2	0.11
#60	0.250	31.30	24.16	83.28	0	0.00
#80	0.180	134.83	103.53	27.96	0	0.00
#120	0.125	173.23	38.40	7.44	0	0.00
#170	0.090	184.27	11.04	1.54	0	0.00
#200	0.075	185.83	1.56	0.71	0	0.00
#230	0.063	186.13	0.30	0.55	0	0.00
				100		

Total Shell Content: **0** **% of sample** **0.7** **grams of shell in sample**



Station	Boring No.	Classification	% CO_3	G_s	Nat w%	LL	PL	PI
◆ NA	High Water	SAND, poorly-graded, mostly fine-grained quartz, trace silt, gray (SP) 10YR 6/1	186.1					

Project Hilton Head Ocean Point Interim Beach Fill

Station NA

Boring No. High Water

Date 5/14/2013

GRADATION CURVES

ENG FORM 2087

MAY 63

MEMORANDUM

Date: March 21, 2014

To: Mr. Paul A. Wojoski

Cc: Ms. Debra King
Christopher G. Creed, P.E., Olsen Assoc,
Scott P. Liggett, P.E., Town of HHI

From: Steven C. Howard, P.E.

Re: Request for Approval of Additional Upland Sand Source, Ocean Point Interim Sand Fill Project; Permit 2013-00695-1W

By way of this memorandum we are hereby requesting authorization to make use of an additional upland sand source for the above noted project. Through visual inspection, laboratory testing and compatibility analyses, this sand has been identified as being suitable for use for the Ocean Point Interim Sand Fill Project, referenced above. The additional sand source is a commercial mine referred to as the 'Murray Sand Pit' located near Summerville, SC (**Figure A**). The Murray mine is proposed for use as a supplemental source to the previously approved Deerfield mine located in Hardeeville, also shown in **Figure A**.

The Murray Sand meets or exceeds the gradation and compatibility guidelines set forth in the permits and are beach compatible. Sand from the proposed Murray mine is extremely similar in gradation and color to that from the Deerfield mine. Based on the compatibility assessment method in the USACE Coastal Engineering Manual (CEM), which compares borrow and native mean sediment diameters and sorting values, sand obtained from the proposed upland sand mine has an overfill ratio of 1.0. An overfill ratio of 1.0 suggests that the proposed material will at least as stable as native beach sands. Qualitative assessment of color and the general texture of the Murray sand suggest that is very similar to native beach and Deerfield mine sands. Comparative grain size distribution and sand color information for the available upland sources and the native beach are attached as figures for your use in making a determination as to acceptability of the proposed mine.

Please do not hesitate to contact me at (904) 387-6114 or showard@olsen-associates.com should you have additional questions.

Thank you.

Figures follow.

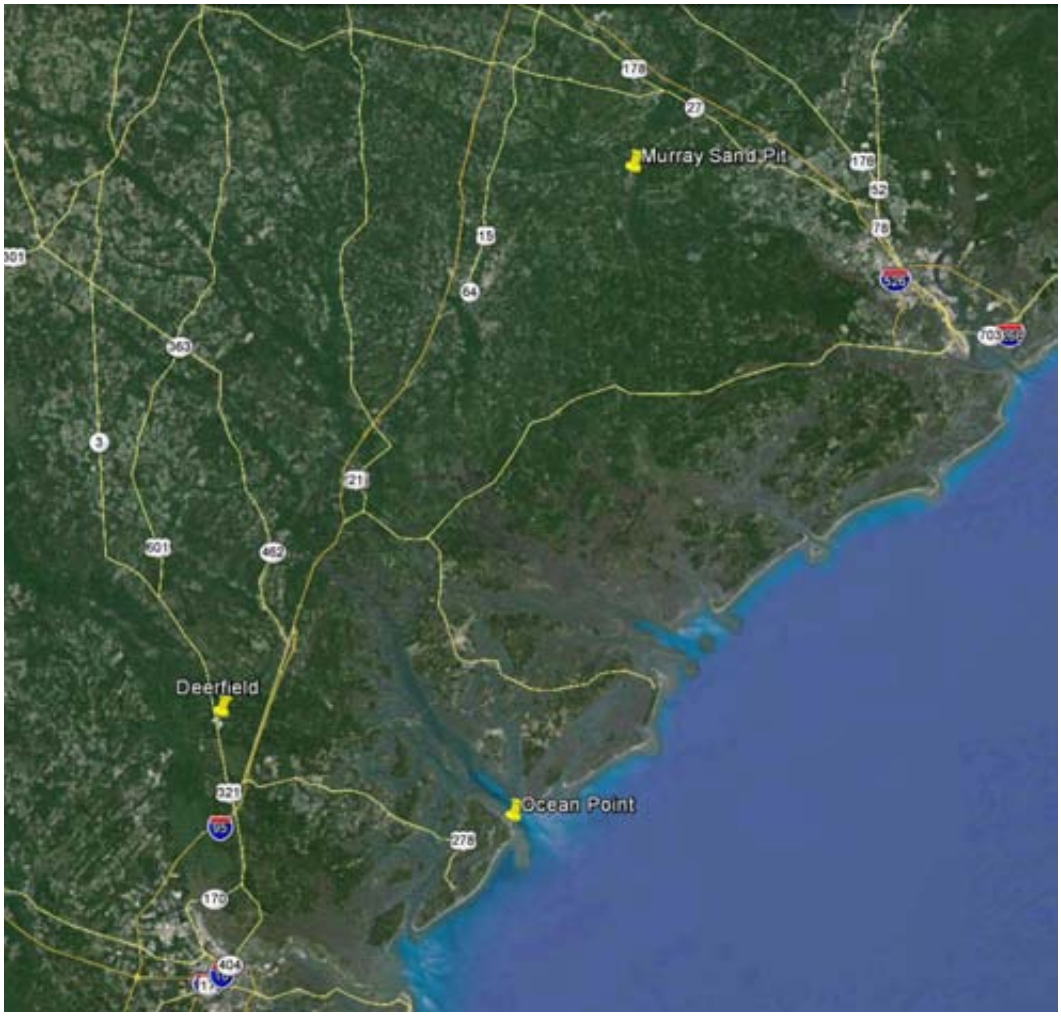


Figure 1: Location of proposed Murray Sand Pit and the permitted Deerfield upland source relative to the Ocean Point Project.

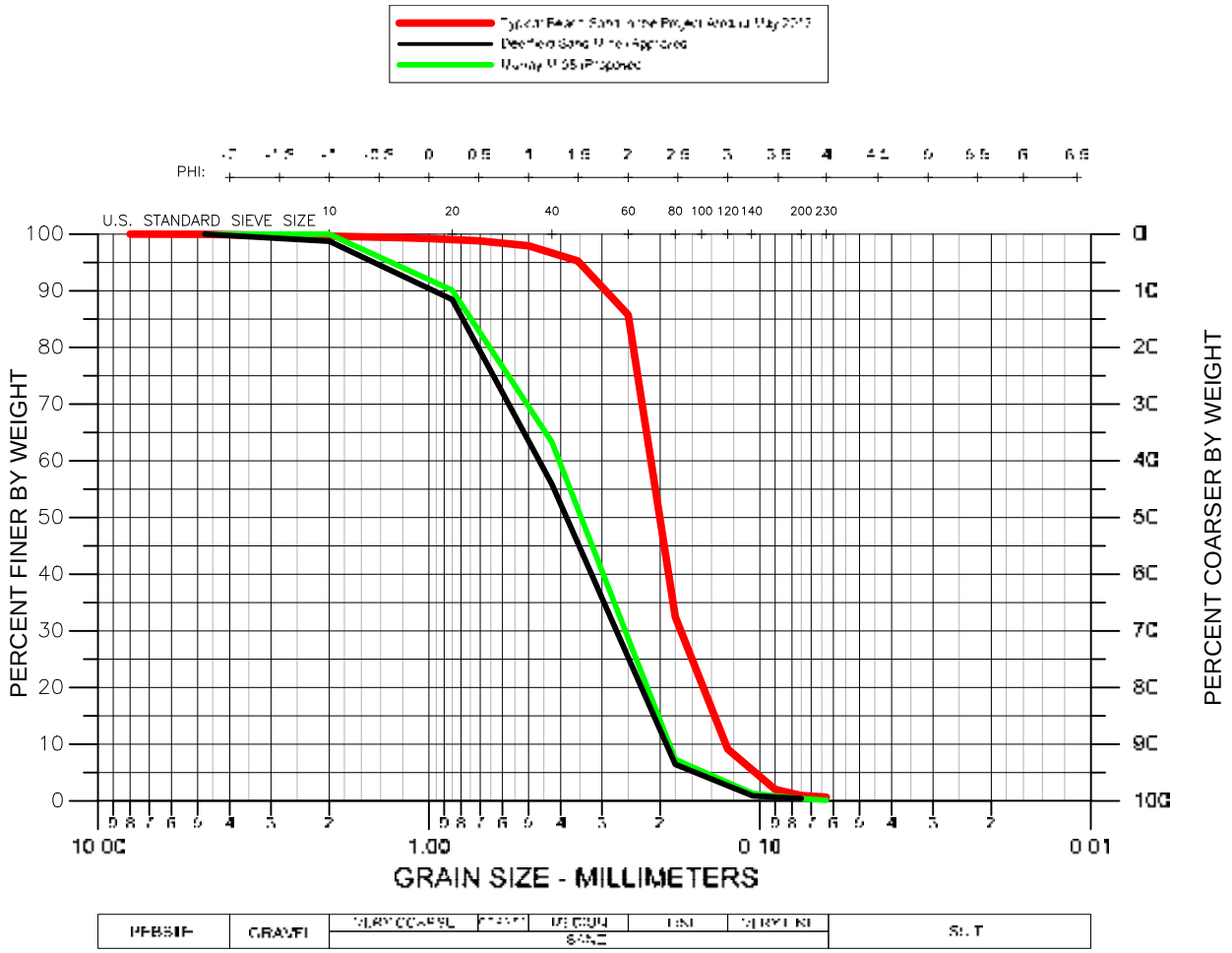


Figure 2: Representative grain size distributions of proposed, permitted, and native sediments.

Figure 3: Photograph of representative sand sample from the proposed sand mine (Murray) and the native beach.

ATTACHMENT H

SUPPLEMENTAL BIOLOGICAL ASSESSMENT (BA)

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

Applicant: Town of Hilton Head Island
Agent: Olsen Associates, Inc., Jacksonville, Florida

SUPPLEMENTAL BIOLOGICAL ASSESSMENT
2016 FISH HAUL/SPA BEACH RENOURISHMENT PROJECT

2015/2016 HILTON HEAD ISLAND
BEACH RENOURISHMENT PROJECT

TOWN OF HILTON HEAD ISLAND, SC

Prepared for:
Olsen Associates Inc.
4438 Herschel St.
Jacksonville, FL 32210

Prepared by:
Coastal Eco-Group Inc.
665 SE 10th St. Suite 104
Deerfield Beach, FL 33441

February 2015

2016 FISH HAUL/SPA BEACH RENOURISHMENT PROJECT TOWN OF HILTON HEAD ISLAND, SC

SUPPLEMENTAL BIOLOGICAL ASSESSMENT

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FIGURES

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PHOTOS

SUPPLEMENTAL BIOLOGICAL ASSESSMENT
2016 FISH HAUL/SPA BEACH RENOURISHMENT PROJECT

1.0 INTRODUCTION

1.1 PURPOSE OF BIOLOGICAL ASSESSMENT- CFR 402.12(a)

The Fish Haul/Spa Beach Renourishment Project is a segment of the Town's ongoing comprehensive beach management program and is proposed for construction in conjunction with the proposed 2015/16 Hilton Head Island Beach Renourishment Project (P/N SAC-2014-00680-1W). This Biological Assessment (BA) has been prepared as supplemental document to the Biological Assessment for the 2015/16 Hilton Head Island Beach Renourishment Project (CEG, 2014a). The proposed project has been modified from the original 2007 project design to eliminate sand placement at Fish Haul Creek Park. The avoidance, minimization and conservation measures proposed by the Town of Hilton Head Island are discussed in this document.

This BA evaluates the potential impacts of beach fill placement on federally listed endangered and threatened species and designated critical habitat within the project area and is offered to assist the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) in fulfilling their obligations under the Endangered Species Act [50 CFR 402.12(c)(f)]. Formal Section 7 consultation is required when a Federal action may affect listed species or destroy or adversely modify designated critical habitat (50 CFR 402.14). This BA should be reviewed in conjunction with the BA for the 2015/16 Hilton Head Island Beach Renourishment Project (CEG, 2014a).

1.2 PROPOSED ACTION- CFR 402.14(c)(1)

The proposed project will include placement of up to 60,000 cubic yards (cy) of sand along approximately 2,000 ft. of shorefront along Port Royal Sound as part of the continued beach maintenance and management program at Hilton Head Island. The last comprehensive project on the island was completed in February 2007 and included breakwater construction and the original restoration of the "Fish Haul/Spa" shoreline. Renourishment events are planned to occur every 8 to 10 years depending upon weather conditions and beach performance during the nourishment life.

The Fish Haul/Spa segment was not included in the permit application for the 2015/2016 Hilton Head Island Beach Nourishment Project because erosion along the project shoreline had not reached critical levels. The Town followed an avoidance/minimization approach to the island-wide project design to minimize construction disturbances during the shorebird wintering season. Following initial consultation with the resource protection and regulatory agencies in spring 2014, the Fish Haul/Spa segment was removed from the island-wide project, and it was decided to pursue construction of the project in the winter of 2016/17. However, chronic erosion of the project shoreline has continued and degraded beach conditions such that areas of upland development and maritime forest are threatened. The current condition of the

shoreline requires immediate action by the Town of Hilton Head to protect upland development and habitats.

The proposed project will include sand placement along a discrete reach of the island shorefront generally located along a portion of the Port Royal Sound shoreline north of Fish Haul Creek Park including The Spa on Port Royal Sound (a private development), and Mitchelville Beach Park (public Town park). Depending on the timing of the proposed project, the preferred sand source is the Bay Point borrow area identified for the 2015/16 island-wide project (preferred alternative) (**Figure 1**). An alternative sand source is from an upland mine (previously-permitted Deerfield Mine in Hardeeville, SC and/or the Murray Sand Pit near Summerville, SC).

The purpose of the project is to reestablish beach conditions, consistent with the originally restored beach, and sufficient to sustain an 8 to 10 year renourishment life following project completion. Sand placement will be limited to areas of need -- defined as those areas where there is a sand volume deficit in the previously constructed design beach.

1.3 ACTION AREA- CFR 402.14(c)(2)

The Project 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. Indirect impacts associated with turbidity and sand placement at the beach fill site are expected to be very minimal; therefore, the Project Action Area is limited to the area of direct impacts from beach fill placement and habitats immediately adjacent to the beach fill placement area within the footprint of the 2006/07 project area. These habitats may be minimally influenced by sand movement during project construction; however, impacts would be negligible and would not adversely affect listed species. Habitats for listed species within the vicinity of the project area on Hilton Head are presented and discussed in this BA as part of the cumulative effect assessment for the island-wide nourishment project.

The proposed project will directly impact 2,000 ft. of shoreline via direct placement of sand between the Town of Hilton Head Island beach monitoring stations HHI-33 and HHI-35 (**Figure 2**). Tidal flats seaward of the Fish Haul breakwaters will not be impacted by the proposed project. Benthic habitats within the project area include *Spartina* tidal marsh, intertidal mud/sand flats, and dry beach (**Figure 3**). Landward of and adjacent to the fill template, the project area is bordered by upland habitats and vegetation including developed upland, maritime forest, maritime shrub, limited dune vegetation, and high marsh. The offshore borrow area is located at Bay Point Shoals in Port Royal Sound at the north end of the island. Impacts to listed species associated with dredging of the offshore borrow area are evaluated in the Biological Assessment for the 2015/16 Hilton Head Nourishment Project (CEG, 2014a).

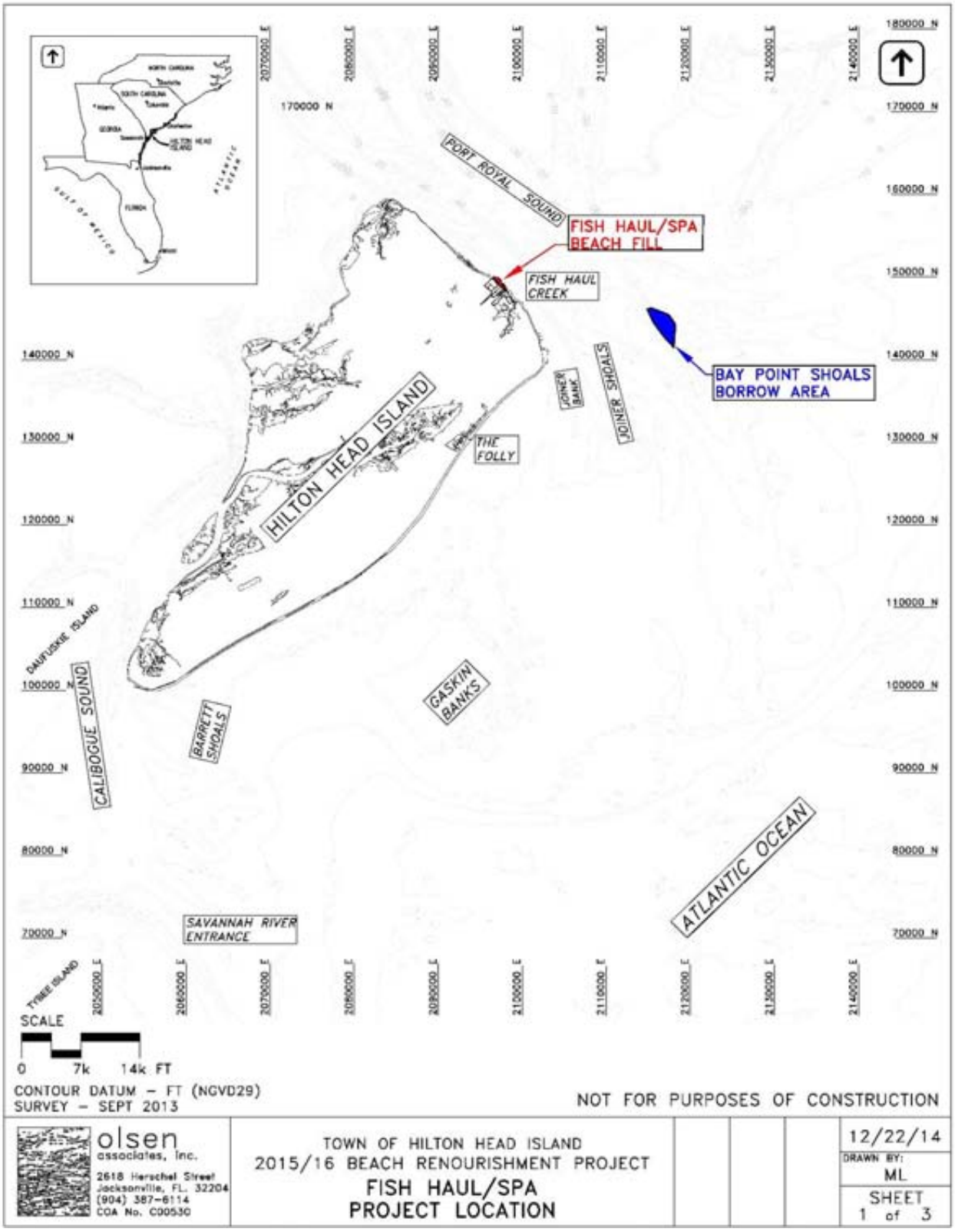


Figure 1. Location map of the 2016 Fish Haul/Spa Beach Renourishment Project and proposed Bay Point Shoals borrow area (OAI, 2014).

1.4 SUMMARY OF SHORELINE AND BEACH CONDITIONS

Benthic habitats within the Fish Haul/Spa Beach project area include dry beach; exposed peat deposits; tidal flats; and patches of cordgrass marsh (*Spartina alterniflora*) (**Photos 1** and **2**). Intertidal sand and mudflats make up the majority of habitat within the project area; these habitats are potential foraging habitat for shorebirds, particularly wintering piping plover and red knot. The sand and mudflats in the project area are characteristic of the tidal flats found on the barrier islands of South Carolina, North Carolina, and Georgia (Peterson and Peterson, 1979; Fox and Ruppert, 1985; DCA, 2004).

Post-construction monitoring for the 2006 Fish Haul/Spa Shoreline Restoration and Stabilization Project (Permit No. 2005-1W-051-P) revealed extensive expansion of *Spartina* beds seaward of the southern project area, both from plantings installed in May 2009 and natural expansion of existing grass patches (OAI, 2009). Limited dry sandy beach is present along portions of the project area, bordered by maritime forest and developed upland, and an extensive salt marsh to the south of the project area at Fish Haul Creek Park. The marsh habitats at Fish Haul Creek Park are not located within the influence of the proposed project.

1.5 ALTERNATIVES CONSIDERED- CFR 402.12(f)(5)

The purpose of the project is to reestablish island-wide beach conditions, relative to those renourished and maintained though past projects, sufficient to sustain an 8 to 10 year renourishment life following project completion. The proposed plan was adapted based on current trends in erosional processes and an evaluation of previous nourishment events. Based on the success of past projects, the proposed plan only involves sand re-placement; no structures are proposed.

When considering beach losses and shoreline erosion since completion of the 2006/07 project, re-filling the prior construction template, amounting to approximately 60,000 cy of fill, is the preferred alternative. However, significant areas of *Spartina* marsh have flourished in the lee of the breakwaters since project construction, particularly at the eastern limit of this segment. These tidal marsh habitats would be directly buried by fill placement if the entire 2006/07 design template is filled to capacity. To avoid and minimize potential impacts to marsh grass, the project fill length was reduced from 2,200 ft. to 2,000 ft., and the fill volume was reduced and steepened such that the toe of fill falls landward of the tidal marsh habitat in the south half of the project. **Figure 3** shows the 2006/07 fill template and the proposed project template overlaid on the 2014 benthic habitat map of the project area to demonstrate the avoidance of impacts to *Spartina* marsh. The ultimate volume of sand will be based upon need and minimization of impacts to marsh grass at the time of construction.

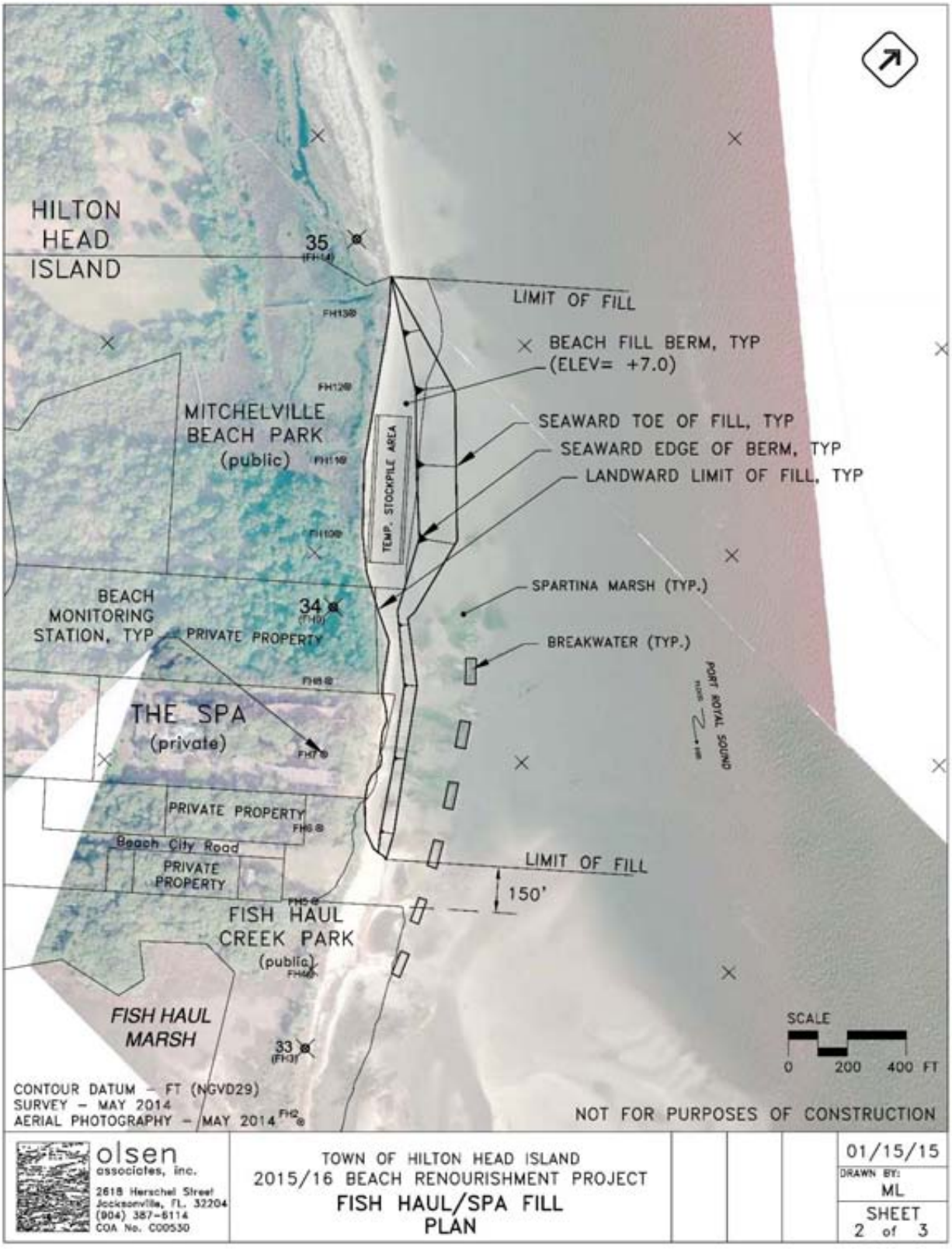
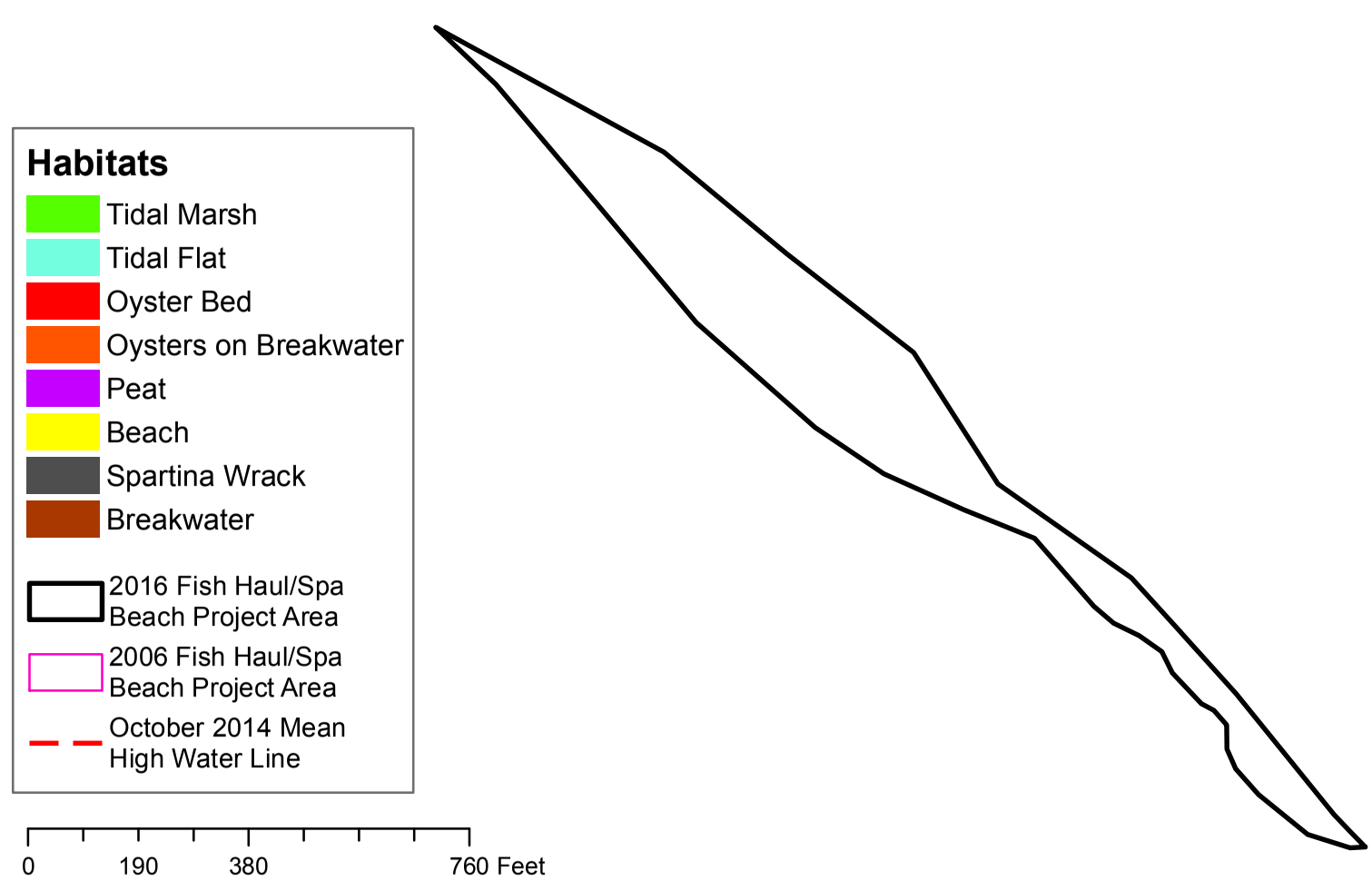


Figure 2. Proposed fill placement for the Fish Haul/Spa segment of the 2015/16 Hilton Head Island Beach Nourishment Project (OAI, 2014).



Fish Haul Creek / Spa Beach Beach Renourishment Project

2014 Essential Fish Habitat Map

Aerial Date: May 2014

Coastal Eco-Group Inc.

Figure 3

Photo 1. View of the eroded shoreline and peat deposits in the project area. Photo taken on December 21, 2014.

Photo 2. *Spartina alterniflora* landward of the breakwaters in the project Area. Photo taken on October 8, 2014.

1.5.1 No Action Alternative

If no action is taken, erosion of the project area shoreline will continue, resulting in a decrease in the storm protection afforded by the existing beach/dune system, potential loss of maritime forest, reduction in recreational space, and potential decreases in shorebird roosting habitat and sea turtle nesting habitat.

1.5.2 Beach Fill

The scope and scale of the proposed beach fill were developed to provide the minimum volume necessary to maintain a protective design beach for expected erosion over the 8 to 10 year period following project construction while minimizing direct burial of tidal marsh habitat. Sand will only be placed within areas of need within the footprint of the original 2006/07 project. Sand will be shaped into a typical beach fill construction berm configuration with a maximum upper berm elevation generally equivalent to the adjacent beach elevations with varying berm width. The seaward slope of the construction berm along the northwestern half of the project area will have a consistent and uniform initial slope of 1V:20H. The uniform initial slope will be 1V:10H along the southeastern half of the project in areas with significant *Spartina* marsh.

1.5.3 Borrow Area

The sand source for the project is the Bay Point Shoals borrow area identified for the 2015/16 island-wide project (the preferred alternative) or upland sand from previously authorized mines (P/N 2013-00695-1W). In order to minimize potential disturbance of wintering piping plovers and red knots in the vicinity of the project area, the proposed construction window is between March 1 and October 31 in conjunction with the Port Royal and “The Heel” segments of the 2015/16 island-wide renourishment project.

Offshore Borrow Area: The Bay Point Shoals borrow area is located at the north end of the island within the limits of an area that has been dredged for sand fill on Hilton Head Island. It was previously dredged for the last large-scale renourishment on the island in 2011/12 (P/N 2009-1056-1IW-P). This borrow area is currently being re-permitted under application P/N SAC-2014-00680-1W for the proposed 2015/16 Hilton Head Nourishment Project. However, only a fraction of the sand identified at Bay Point Shoals is needed for the proposed Fish Haul/Spa nourishment project. Project construction using sand hydraulically dredged from the Bay Point borrow area will be completed in 20 days or less, minimizing the construction window and potential direct disturbance of shorebirds during the wintering seasons.

Sand for the southeastern half of this project, where the construction template has been altered to avoid impacts to vegetation, will be stockpiled, as necessary, on the western half of the segment for mechanical transport across the site (**Figure 2**).

Upland Sand Source: In the event that offshore sand from the Bay Point Shoals borrow area is not feasible for the proposed project due to weather delays and timing of the island-wide nourishment project, the Fish Haul/Spa project would be constructed with beach-compatible sand from an upland mine in a manner similar to the Ocean Point Interim Beach Fill Project (P/N 2013-00695-1W). Sand would be trucked to the

project site from the previously-permitted Deerfield Mine in Hardeeville, SC or the Murray Sand Pit near Summerville, SC, and an upland beach access point adjacent to the project site would be used for access to the shoreline. The anticipated duration for project construction using an upland sand source is much longer than if sand is used from the Bay Point borrow area; construction using an upland sand source would likely extend up to 90 days.

1.6 CONSIDERATION OF DREDGING METHODS- CFR 402.12(f)(5)

The preferred sand source is sand dredged from the Bay Point borrow area. Sand would be dredged with an ocean-certified hydraulic cutter-suction pipeline dredge and pumped hydraulically through a pipeline to the beach for eventual placement, grading, and shaping. This is identical to the approach that has been used to construct all previous projects along Hilton Head Island. Pipeline/cutterhead dredges typically provide high dredging and sand placement rates, particularly in projects where the sand borrow site is relatively close (< 5 miles) to the fill site. These dredges are also best for shallow (<20 ft. deep) sand borrow sites. The sand will be shaped into a typical beach fill construction berm configuration with a maximum upper berm elevation generally equivalent to the adjacent ambient beach elevations.

2.0 STATUS OF LISTED SPECIES AND HABITAT IN THE ACTION AREA– CFR 402.12(c)(f) & 402.14(c)(2)(3)

In the assessment of potential impacts of the proposed project on federally listed endangered and threatened species, marine scientists from Coastal Eco-Group, Inc, an environmental consulting firm located in Deerfield Beach, FL: 1) conducted a review of databases and websites developed by the South Carolina Division of Natural Resources (SCDNR), USFWS, and NMFS, and searched for other scientific data, literature, and unpublished reports to determine species distributions and habitat requirements; 2) reviewed the piping plover distribution surveys and benthic macroinvertebrate monitoring data for the 2011/12 Port Royal Sound Shoreline Restoration and Stabilization Project and 2006/07 island-wide nourishment project on Hilton Head Island; and 3) conducted a site inspection of the project area on December 21 & 22, 2014 and February 2, 2015. Literature sources consulted during preparation of this BA include Federal status reports and recovery plans, peer-reviewed journals, and environmental documents.

Table 1 provides a list of state and federally protected species with the potential to occur within the vicinity of the project area [50 CFR 402.12(c) and 50 CFR 404.14(c)]. The Town of Hilton Head believes that the following species and designated critical habitat may be potentially affected by the proposed project and submits this list for Service approval [50 CFR 402.12(c)]:

Piping plover (*Charadrius melodus*)
Rufa red knot (*Calidris canutus rufa*)
Wood Stork (*Mycteria americana*)
Least tern (*Sterna antillarum*)
Wilson's plover (*Charadrius wilsonia*)
Loggerhead sea turtle (*Caretta caretta*)
Green sea turtle (*Chelonia mydas*)
Leatherback sea turtle (*Dermochelys coriacea*)
Kemp's ridley sea turtle (*Lepidochelys kempii*)
Shortnose sturgeon (*Acipenser brevirostrum*)
West Indian manatee (*Trichechus manatus*)

Table 1. State and federally protected species with the potential to occur within the vicinity of the Fish Haul/Spa segment of the 2015/2016 Hilton Head Island Nourishment Project.

Common Name	Scientific Name	State	Federal
Fish			
Shortnose sturgeon	*Acipenser brevirostrum*	E	E
Reptiles			
Loggerhead turtle	*Caretta caretta*	T	T
Leatherback turtle	*Dermochelys coriacea*	E	E
Green sea turtle	*Chelonia mydas*	T	E
Kemp's ridley sea turtle	*Lepidochelys kempii*	E	E
Birds			
Piping plover	*Charadrius melodus*	T	T/CH
Rufa red knot	*Calidris canutus rufa*	n/a	T
Eastern brown pelican	*Pelecanus occidentalis*	SSC	NL
Bald eagle	*Haliaeetus leucocephalus*	T	T
Least tern	*Sterna antillarum*	T	NL*
Wood stork	*Mycteria americana*	E	T
Wilson's plover	*Charadrius wilsonia*	T	NL
American swallow-tail kite	*Elanoides forficatus*	E	SSC
Mammals			
West Indian manatee	*Trichechus manatus*	E	E

State listings are taken from the South Carolina Department of Natural Resources. Federal listings are taken from the NOAA Fisheries Service and the USFWS - State and Federal Threatened, Endangered, and Other Species of Concern likely to occur in Beaufort County, SC, Compiled June 2014.
E = Endangered; T = Threatened; SSC = Species of Special Concern; CH=Critical Habitat; n/a = information not available or no designation listed. *Denotes other portions of population are federally listed

2.1 PIPING PLOVER

2.1.1 Status and Threats

The piping plover (*Charadrius melodus*) is a migratory shorebird endemic to North America. The piping plover was listed as threatened throughout its range, except in the Great Lakes watershed where it is listed as endangered by the USFWS on December 11, 1985 (50 FR 50726-50734).

Several factors have contributed to the decline in the population of piping plovers. The most common threats to wintering piping plovers include loss of foraging and roosting habitat as a result of erosion or development; human and pet disturbance; and predation.

2.1.2 Distribution and Range

The wintering range for piping plovers is along the Atlantic Coast from North Carolina south along the Gulf Coast to Mexico. Breeding occurs along the Atlantic Coast from its northern limit in Maritime Canada south to North Carolina, as well as along the Great Lakes, and in the northern Great Plains of Canada and the United States (Johnsgard, 1981; Haig and Oring, 1985). The piping plover is a federally listed endangered species in the Great Lakes watershed, and the birds breeding on the Atlantic Coast and northern Great Plains are federally listed as threatened. Piping plovers generally depart their breeding grounds for their wintering ground from July through late August and return in late March or early April.

Known wintering sites occur along the portion of Hilton Head Island locally referred to as "The Heel" (the northeastern end of Hilton Head Island at the intersection of the Atlantic Ocean and Port Royal Sound shorelines). The period from July 15 through May 15 is considered the migratory and wintering season for piping plover in South Carolina.

2.1.3 Critical Habitat

USFWS designated critical habitat for the piping plover in its wintering range on July 10, 2001 (66 FR 17; 36038-36143). Critical Habitat Unit SC-15 is located on Hilton Head Island. This unit includes the northeastern tip (Atlantic Ocean side) of Hilton Head Island. The current critical habitat boundaries begins at the shoreline east of northern Planters Row and ends at the shoreline east of Donax Road. It includes the area from the MLLW shoreline of Port Royal Sound and the Atlantic Ocean to where densely-vegetated upland habitat, not used by the piping plover, begins and where the primary constituent elements no longer occur (Federal Register, Vol. 66, No. 132, July 10, 2001). The proposed Fish Haul/Spa Shoreline Renourishment Project is not located within Critical Habitat Unit SC-15.

2.1.4 Presence in the Project Area

Hilton Head Island has supported a wintering population of 16 to 18 piping plovers since 2006 with abundance increasing to 22 individuals during migration (USFWS, 2010). Piping plover surveys conducted by Town of Hilton Head Island environmental staff between 2010 and 2014 documented a maximum abundance of 22 individuals in November 2012. The wintering population currently observed during the 2014-2015 season is 15 individuals.

Christmas bird counts conducted by the Hilton Head Island Audubon Society between 2003 and 2013 recorded observations of piping plovers on Hilton Head Island ranging from 11 in 2003 to 61 observations in 2012 (**Table 2**). Additional surveys were conducted by the Audubon Society to satisfy the monitoring requirements of the USFWS Biological Opinion for the 2006/07 Fish Haul/Spa Shoreline Restoration Project. **Figure 4** shows the results of these surveys conducted from 2006 through 2009 (USFWS, 2010). Piping plovers were recorded along "The Heel" shoreline within Critical Habitat Unit 15, north along the Port Royal Plantation shoreline to Fish Haul Creek with a few observations on the tidal flats offshore of the proposed project area

(**Figure 5**). The greatest number of birds observed during a single survey was 19 birds on November 30, 2006; the lowest number was 8 on November 8, 2008.

Table 2. Island-wide observations of wintering piping plovers on Hilton Head Island during Audubon Christmas bird counts, 2003-2013.

Year	No. of Observations
2003	11
2004	13
2005	14
2006	32
2007	28
2008	16
2009	29
2010	15
2011	39
2012	61
2013	40

Source: Hilton Head Island Audobon Society

Piping plover observations reported to the eBird database (eBird.org, 2014) indicate suitable habitat for wintering piping plovers on the tidal flats within the vicinity of the project area. Thirty seven (37) observations of piping plovers were reported to eBird in the vicinity of the project area shoreline between January 2013 and October 2014. Within or immediately adjacent to the project area (exact GPS coordinates not provided), 8 piping plovers were observed at Mitchelville Beach Park on October 17, 2013 (**Figure 6**). To the south of the project area, a maximum of 4 piping plovers were observed on all survey days at Fish Haul Creek Park (October 3, 2013), and 1 piping plover was reported on October 12, 2014. The highest daily count on the Port Royal mudflats during this period was on March 11, 2014 (8 birds). The Port Royal mudflat observations are in the vicinity of the control site for the piping plover macroinvertebrate foraging study for 2011/2012 Port Royal Sound Shoreline Restoration and Stabilization Project; this area is located outside of the influence of the proposed Fish Haul/Spa segment and Port Royal Sound beach fill segment of the 2015/16 island-wide nourishment project (**Figure 7a**)**.**

Figures 7a and **7b** provide the locations of the piping plover macroinvertebrate monitoring sites and foraging/roosting plovers for the 2010/11 pre-construction surveys in relation to the 2015/16 Hilton Head Beach Nourishment Project fill segments. **Figure 7a** shows the sighting data on the May 2011 aerial photograph, and **Figure 7b** provides the observations on the May 2014 aerial photograph to show changes in the shoreline condition between pre-construction and Year 2 post-construction.

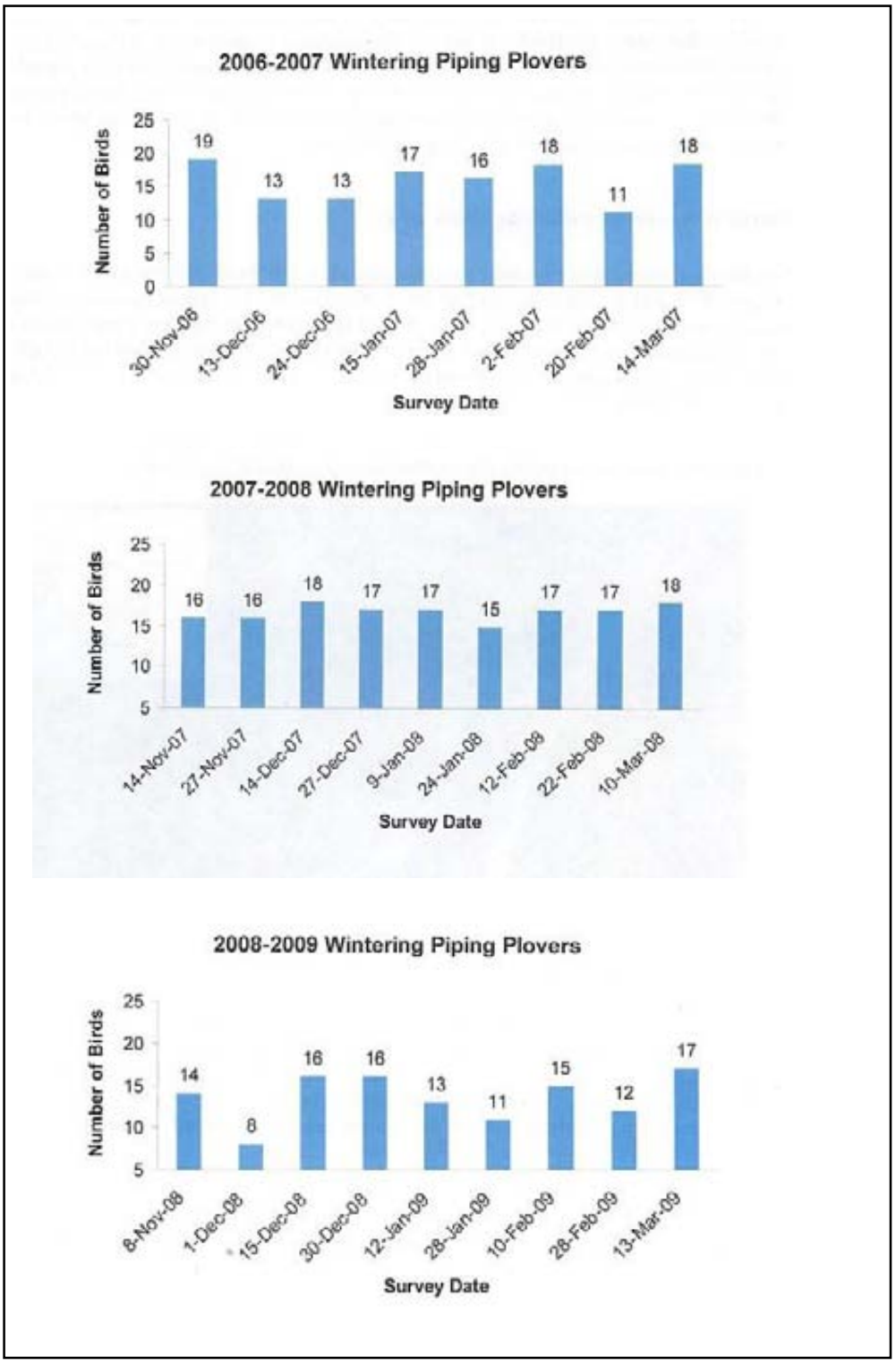


Figure 4. 2006-2009 wintering piping plover population on Hilton Head Island. Data from USFWS, 2010.

Figure 5. Map of piping plover observations along Hilton Head Island from 2006-2009. Source: USFWS, 2010.

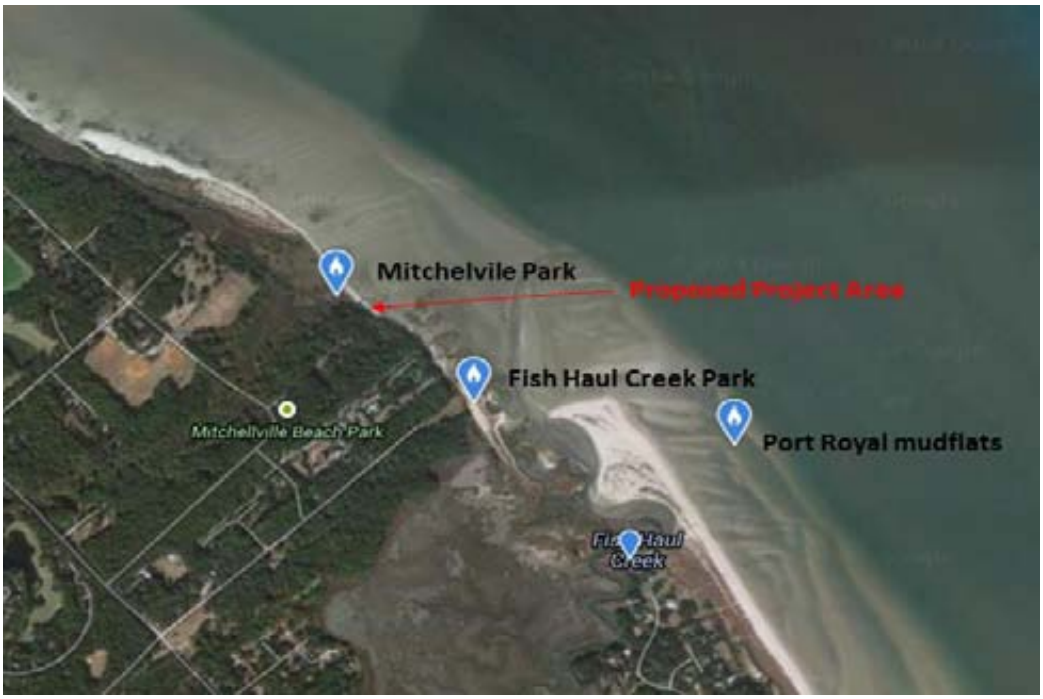


Figure 6. Map of general piping plover observation locations in the vicinity of Fish Haul Creek. Source: ebird.org, 2014.

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FORAGING AND ROOSTING OBSERVATIONS OF WINTERING PIPING PLOVERS DURING THE FIRST PRE-CONSTRUCTION (2010/11) SURVEY FOR THE 2011/12 PORT ROYAL SOUND SHORELINE RESTORATION AND STABILIZATION PROJECT IN RELATION TO THE PROPOSED FISH HAUL/SPA PROJECT AREA
APRIL 2011 AERIALS

DRAWN BY: J. EVERS	CHECKED BY: C. MILLER
SCALE: 1" = 1500'	
SURVEY DATE: PRE-CONSTRUCTION - WINTER 2010/2011	
JOB NUMBER	FIGURE No.
7655.00	7a

Coastal EcoGroup Inc.

FORAGING AND ROOSTING OBSERVATIONS OF WINTERING PIPING PLOVERS DURING THE FIRST PRE-CONSTRUCTION (2010/11) SURVEY FOR THE 2011/12 PORT ROYAL SOUND SHORELINE RESTORATION AND STABILIZATION PROJECT IN RELATION TO THE PROPOSED FISH HAUL/SPA PROJECT AREA MAY 2014 AERIALS

DRAWN BY: J. EVERS	CHECKED BY: C. MILLER
SCALE: 1" = 1500'	
SURVEY DATE: PRE-CONSTRUCTION - WINTER 2010/2011	
JOB NUMBER	FIGURE No.
7655.00	7b

Wintering piping plovers select foraging habitat based on a variety of factors, including but not limited to prey density, distance from disturbance, and proximity to roosting habitat. The continued presence of wintering piping plovers on Hilton Head Island suggests optimal foraging and roosting habitats. Benthic invertebrate monitoring conducted by SCDNR for the 2011/2012 Port Royal Sound Shoreline Restoration and Stabilization Project has shown that the intertidal mudflats along "The Heel" shoreline contain abundant populations of preferred prey items for piping plovers (CEG, 2014b; CEG, 2014c).

The Piping Plover Conservation Plan for the Port Royal Sound Shoreline Restoration and Stabilization Project requires piping plover surveys during the overwintering season (November to March). During the winter of 2010/11 (first pre-construction baseline survey), the majority of roosting piping plover observations occurred in the vicinity of the tidal flat at the mouth of Fish Haul Creek (**Figures 7a** and **7b**). Nine surveys were conducted in December 2010 with a total of 48 observations recorded over the 9 surveys. Of the 48 observations, 15 were roosting birds in the vicinity of Fish Haul Creek to the south of the proposed Fish Haul/Spa project fill area. The remainder of the roosting observations occurred in the vicinity of beach marker HH-29B on the southern side of the impact site for the macroinvertebrate monitoring study in areas with higher beach elevation. Foraging observations were nearly equal between the Fish Haul Creek tidal flat and the macroinvertebrate study impact monitoring site with several observations along the linear beach between the two areas. Eleven (11) piping plovers were observed foraging in the tidal flats offshore and immediately south of the Fish Haul/Spa project area in December 2010; one observation was offshore of the proposed project fill area at a distance of 411 ft. from the project fill limit, and a cluster of 10 piping plovers was 592 ft. from the southeast limit of the beach fill (**Figure 7a**).

During the first post-construction surveys for the 2011/12 Port Royal Sound Project (2012/13), the distribution of piping plover was heavily concentrated in the vicinity of the impact site, both on the southern shore where invertebrate sampling occurred and along the tidal flat to the north of the impact site. Foraging was also observed within Critical Habitat Unit 15 to the south of the impact site. Twelve plovers were observed roosting on the southern side of the impact site in February 2013, and 18 plovers were documented roosting to the southeast of the Port Royal Beach House within the critical habitat boundary in March 2013. This was an increase in roosting activity in this area when compared to pre-construction. Increased usage for roosting is important because birds typically select sites near optimal foraging habitat to conserve energy.

Similar to Year 1 post-construction, foraging plover observations during Year 2 post-construction (2013/14) were concentrated in the vicinity of the impact site, but numerous birds were observed foraging along the beach from the impact site north to the Fish Haul Creek area (**Figure 8**). The Year 3 post-construction November and December 2014 surveys indicate a more scattered distribution of foraging activity in comparison to previous surveys (**Figure 9**). A total of 7 foraging observations was recorded in the vicinity of Fish Haul Creek; no roosting piping plovers were observed. It is possible that

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FORAGING AND ROOSTING OBSERVATIONS OF WINTERING PIPING PLOVERS DURING THE YEAR 2 POST-CONSTRUCTION (2013/14) SURVEY FOR THE 2011/12 PORT ROYAL SOUND SHORELINE RESTORATION AND STABILIZATION PROJECT IN RELATION TO THE PROPOSED FISH HAUL/SPA PROJECT AREA

DRAWN BY: J. EVERS	CHECKED BY: C. MILLER
SCALE: 1" = 1500'	
JOB NUMBER	FIGURE No.
7655.00	8

Coastal EcoGroup Inc.

FORAGING OBSERVATIONS OF WINTERING PIPING PLOVERS DURING THE YEAR 3 POST-CONSTRUCTION SURVEYS (NOVEMBER & DECEMBER 2014) FOR THE 2011/12 PORT ROYAL SOUND SHORELINE RESTORATION AND STABILIZATION PROJECT WITH PROPOSED 2016 FISH HAUL/SPA, PORT ROYAL AND HEEL PROJECT FILL SEGMENTS AND 2014 OCEAN POINT PROJECT AREA

DRAWN BY: J. EVERS	CHECKED BY: C. MILLER
SCALE: 1" = 1500'	
JOB NUMBER	FIGURE No.
7655.00	9

foraging activities have shifted north of Fish Haul Creek due to the presence of extensive intertidal mud flats; however, the current surveys do not extend north of Fish Haul Creek. The Ocean Point Interim Sand Fill project (P/N 2013-00695-1W) was completed in May 2014; 24,000 cubic yard of beach-compatible sand were placed between beach markers HI-29 and HI-31. Five foraging piping plover observations were recorded during the first 3 surveys in November and December 2014 (**Figure 9**).

2.2 RUFA RED KNOT

2.2.1 Status and Threats

The rufa red knot (*Calidris canutus rufa*) was listed as threatened throughout its range by the U.S. Fish and Wildlife Service on December 11, 2014 (79 FR 73705); the final rule became effective on January 12, 2015.

In the last 15 years, the overall population of red knots has declined approximately 85%, from an estimated 150,000 individuals to approximately 25,000 (Schwarzer, 2011; Thibault and Levisen, 2013). The final rule identifies the following factors as the basis for the listing of threatened: loss of breeding and non-breeding habitats as a result of sea level rise, shoreline stabilization, and Arctic warming; reduced prey availability; increased predation in breeding habitat; and the increased frequency and severity of asychronies in the timing of annual migrations. Emerging threats related to hunting, predation in non-breeding habitats, human disturbance, oil spills, red tides and other harmful algal blooms, and increasing installation of wind turbines are moderate in comparison to climate change and habitat loss, but could become significant.

2.2.2 Distribution and Range

There are at least six subspecies of red knots (*Calidris canutus*) world-wide. These subspecies include both long-distance and short-distance migrants. The rufa subspecies is one of three subspecies that exists in the Americas. Three distinct American over-wintering populations for the rufa red knot are: southern South America (Tierra del Fuego), Brazil, and the southeastern United States, all of which breed in the Canadian Arctic.

Migrations occur in the spring (northbound) and fall (southbound) with stopover locations along the way. During the spring migration, primary stopover locations include Patagonia, Argentina; eastern and northern Brazil; southeast United States; the barrier islands of Virginia; and Delaware Bay. During the fall, Hudson Bay, James Bay, St. Lawrence River, Mingan Archipelago, and Bay of Fundy in Canada; the coasts of Massachusetts and New Jersey; the Altamaha River in Georgia; the Caribbean; and the northern coast of South America from Brazil to Guyana have been identified as key stopover locations. In the southeastern United States, South Carolina is known to contribute as a wintering site for red knots (Thibault and Levisen, 2013). Within this range, birds are commonly observed in intertidal, marine habitats, typically near inlets, estuaries and bays.

2.2.3 Critical Habitat

There is no designated or proposed critical habitat for the rufa red knot at this time. The USFWS expects to propose critical habitat for public review and comment in 2015 after completing the required review of economic considerations.

2.2.4 Presence in the Project Area

Hilton Head Island is a known stopover location for migrating rufa red knots. Between 2004 and 2013, a total of 240 observations of red knots (subspecies not specified) were reported on Hilton Head Island during the annual Christmas Bird Counts (National Audobon Society, 2013). The highest number of reported sightings was in 2004 (64 birds), and the lowest was in 2013 when no birds were observed during the winter count.

Sightings of red knots within the vicinity of the Fish Haul/Spa project area, reported to the ebird database (http://ebird.org), are provided in **Table 3**, and the general locations of these sightings are shown in **Figure 10.** The highest number of reported sightings is at Fish Haul Creek and Port Royal Sound mudflats to the south of the proposed project beach fill area. Throughout the survey period, 2004-2013, the greatest number of bird observations was in 2012 at Fish Haul Creek. Only 2 red knots sightings were reported in the project area at Michelville Beach Park; these sightings occurred on October 13, 2013.

During migration, red knots utilize various stopover locations for foraging and roosting to replenish energy stores. In 2009, Niles et al. (2012) used geolocators to track the migration patterns of rufa red knots, tracking birds on Hilton Head Island as part of their migration. The presence of rufa red knots on Hilton Head Island during the refueling segment of their migration indicates that the shoreline supports suitable foraging and roosting habitat essential for completing their migration.

The distribution of migrating rufa red knots and selection of stopover locations are dependent upon availability of high-quality prey and proximity of foraging habitat to roosting habitat. The macroinvertebrate monitoring program on Hilton Head Island (CEG, 2014b; CEG 2014c) and studies on rufa red knot prey preference (Cohen et al., 2009; Niles et al., 2009; Thibault and Levisen, 2013) suggest that the Fish Haul Creek shoreline provides optimal foraging habitat for migrating rufa red knots. Additionally, shorebirds have been observed roosting in the vicinity of Fish Haul Creek. This is important because birds select roosting sites near foraging habitat to conserve energy and avoid predation risks. Furthermore, it has been suggested that red knots may prefer foraging sites that are close to roosting sites, even if there is abundant food in a different area (Cohen et al., 2009).

Table 3. Red knot observations within the vicinity of the proposed project area. Site locations are shown in Figure 10. Only the Mitchelville Beach

Park sightings are within the proposed Fish Haul/Spa project area.
Data from ebird.org, 2014.

Fish Haul Creek Park	
Date	**# of Birds**
11/27/2014	12
11/14/2014	2
11/5/2014	5
5/13/2014	75
3/10/2014	20
1/9/2014	30
1/21/2013	unk #
9/12/2012	200
9/12/2012	80
9/11/2012	400
9/9/2012	450
8/19/2012	25
10/27/2011	3
3/30/2011	unk #
2/21/2011	unk #
2/6/2011	30
1/26/2011	unk #
5/21/2009	8
5/7/2009	85
4/25/2009	12
4/24/2009	60
4/24/2009	20
3/25/2009	12
2/26/2009	10
2/17/2009	20
1/14/2008	24
8/28/2008	2
5/7/2008	22

Port Royal Mudflats	
Date	**# of Birds**
5/16/2014	2
3/16/2013	23
11/14/2012	10
8/22/2012	2
5/25/2012	150
5/24/2012	75
2/10/2009	160
2/9/2009	180
2/8/2009	100
6/4/1991	10

Michelville Beach Park	
Date	**# of Birds**
10/13/2013	2

ISS-19 Survey Site	
Date	**# of Birds**
5/16/2014	4
4/18/2014	70
3/20/2014	3
2/21/2014	4
1/22/2014	6
12/6/2013	11
11/6/2013	11
9/7/2013	3
7/24/2013	1
2/2/2013	19

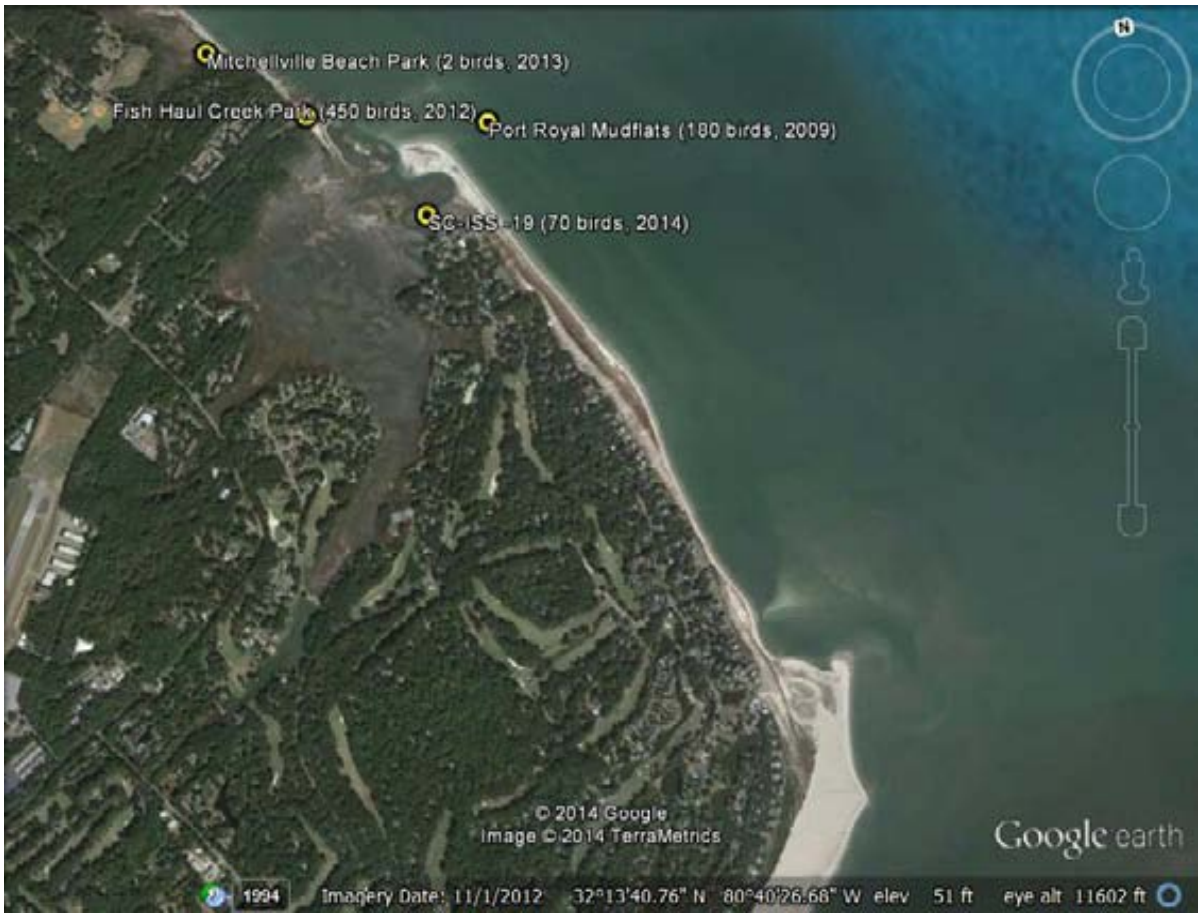

Figure 10. Locations of red knot observations within the vicinity of Fish Haul Creek. Sighting dates for the general areas shown above are provided in Table 3. Maximum number of birds observed in one survey and year indicated in parenthesis. Only the Mitchelville Beach Park sightings are within the limits of the proposed Fish Haul/Spa project. Source: eBird.org.

2.3 WOOD STORK

2.3.1 Status and Threats

The wood stork was listed as endangered by the USFWS on February 28, 1984 (49 FR 7332). On July 30, 2014 the final rule was issued reclassifying the U.S. wood stork DPS as threatened (79 FR 37077). In the State of South Carolina, wood storks are listed as endangered under the South Carolina Nongame and Endangered Species Conservation Act and threatened under the South Carolina Heritage Trust Program.

The wood stork is the largest wading bird and the only species of stork that breeds in the United States. Wood storks are long-legged and stand over 1 meter tall, with a wingspan over 150 cm (60 inches). Historically, wood storks were common along coastal areas from South Carolina to Texas; however populations have drastically declined in recent years. The primary threats to wood storks are habitat alteration and loss of feeding habitat due to draining of wetlands, land development, flood control practices, and lumbering.

The 2007 USFWS 5-Year Review revealed an increase in the number of breeding pairs of wood storks throughout its range. The 2006 nesting totals from Florida, Georgia, North Carolina, and South Carolina during the breeding season were the highest recorded since the species was listed under the Endangered Species Act in 1984, suggesting recovery of the population. Despite continued threats to the population, data suggest that the number of nesting pairs, the number of colonies, and the geographic nesting range are increasing.

2.4.2 Distribution and Range

The wood stork occurs in northern Argentina, eastern Peru and western Ecuador in South America, north to Central America, Mexico, Cuba, Hispaniola, and the southeast United States. The breeding range for the wood stork includes southeastern United States, Cuba, Hispaniola, and southern Mexico through Central America. At the time of listing, wood storks were only known to occur in Florida, Georgia, South Carolina and Alabama with breeding primarily in peninsular Florida, but also observed in Georgia and South Carolina. However, recent data now suggests that the non-breeding wood stork's U.S. range includes Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina (79 FR 37077). The current breeding range for wood storks in the U.S. is Florida, the coastal plain and large river systems of Georgia and South Carolina, and southeastern North Carolina.

Wood storks do not undergo seasonal migrations, however, some individuals do participate in extended regional travel. These trips are typically in response to the availability of resources and occur following breeding (70 FR 37077). Post-breeding wood storks, fledglings, and juveniles in South Florida and the Everglades disperse throughout Florida beginning in May and may continue north to the coast and coastal plains of Georgia, South Carolina, and North Carolina, as well as distributing west along the river basins of Alabama and Mississippi. Following the breeding season from July to August, birds from northern Florida, Georgia, and South Carolina also disperse across the coastal plain and marshes in the southeastern U.S.; most birds from this population winter in south and central Florida and along the Georgia and South Carolina coasts. Seasonally, wood storks have also been observed in Texas, Louisiana, the lower Mississippi valley, and California; however, these birds are from the Central American population and do not typically arrive from the southeastern U.S. population (79 FR 37077).

2.4.3 Habitat

Wood storks utilize a variety of estuarine and freshwater wetlands throughout their range for foraging, roosting, and nesting. Wood storks are tactile feeders; wading in the marshes and feeling around with their open beaks to find food. This species typically feeds in large groups in open wetlands with abundant prey density and shallow water depths. Important feeding habitats include forested riverine floodplains, ponds, ditches, diked marshes, impoundments, and tidal creeks at low tide. Roosting generally occurs in trees adjacent to or overlooking foraging habitat.

Wood storks nest in trees that are surrounded by standing water, such as cypress swamps, shallow creeks, and impoundments. The standing water deters mammalian predators and is essential in colony site selection. Work storks are commonly found in trees next to areas of open water to allow for open access to nesting trees. Throughout their range, there has been an increasing trend towards the use of manmade wetlands as colony sites. In South Carolina, colony sites are typically surrounded by extensive wetlands, particularly palustrine forested wetlands.

2.4.4 Presence in the Project Area

From 1981 to 2006, the South Carolina nesting population of wood storks increased from a single colony with 11 nesting pairs to a total of 13 colonies with 2,010 pairs (USFWS, 2007); a carrying capacity of approximately 2,400 pairs has been estimated for South Carolina (Murphy, 1995). Wood storks are known to nest in four counties in South Carolina including Beaufort County, and are common on Hilton Head Island. Data from ebird.org (2014) showed 102 surveys in which at least 1 wood stork was observed on Hilton Head Island from 1982 to 2014; the highest number of bird observations in a single survey was 25 birds (Disney's Hilton Head Island Resort Fishing Pier, September 2, 2012). **Table 4** shows the number of birds observed at the three sites in the vicinity of the proposed project area; only 1 sighting was reported at Mitchelvile Beach within the proposed project area between 1982 and 2014 (eBird, 2014).

Table 4. Wood stork observations within the vicinity of Fish Haul Creek. Data from eBird.org, 2014. Refer to Figure 6 for bird survey locations in relation to the proposed project area. Only the Mitchelville Beach Park sightings are within the proposed Fish Haul/Spa project area.

Fish Haul Creek Park	
Date	**# of Birds**
9/27/2014	1
10/28/2013	unk #
9/12/2013	2
7/3/2013	1
10/11/2011	unk #
9/23/2009	1
8/14/2009	1

Port Royal Mudflats	
Date	**# of Birds**
5/25/2012	2
7/28/1992	1

Mitchelville Beach Park	
Date	**# of Birds**
11/29/2014	1

2.4 LEAST TERN

2.4.1 Status and Threats

Least terns are the smallest members of the subfamily Sternidae. The least tern (*Sterna antillarum*) is listed as threatened by the State of South Carolina and is protected federally under the Migratory Bird Treaty Act. The interior portion of the population was listed as endangered by USFWS in 1985. However, populations in South Carolina are considered a part of the coastal/estuarine subspecies and are not federally listed.

Least terns utilize their colony sites year after year; however, colony sites are occasionally abandoned due to a variety of factors. Although some vegetation is beneficial as cover for chicks, colonies will abandon sites that become too vegetated. Other factors that are correlated with abandonment are human disturbance; presence of mammalian predators such as raccoon, fox, coyotes and feral cats; and flooding. Of these, human disturbance is probably most responsible for recent declines. Human intrusion along beaches, lakes, and streams reduces the available nesting habitat for these birds. Human-caused disturbances can increase the rate of turnover and decrease the reproductive success of colonies. In addition to mechanical destruction by trampling, eggs and chicks are at risk when parent birds are flushed from nests by humans, which can expose eggs to the sun or predators. Repeated flushing can cause an entire colony to permanently desert their eggs.

With the loss and degradation of natural colony sites, the least tern has adapted to nesting on gravel rooftops. Gore et al. (2007) found that 84% of all least tern nesting pairs in Florida were on gravel roofs. Several studies have shown that roof colonies have higher reproductive success than do nearby beach colonies. This finding may reflect the degradation of existing ground colonies. An emerging threat to least terns is the phase-out of gravel rooftops on new construction and reroofing projects. In a 2010 roof nesting survey, a single pair of least terns was found nesting on a *non-gravel* roof in Pensacola Beach that had been replaced after hurricane damage. This was the first reported incidence of least terns nesting on a *non-gravel* roof (Zambrano and Warraich, 2010). In 2013, approximately 60% of least tern nesting sites in South Carolina were on rooftops. Most of the nests were located on gravel rooftops, however, one colony site was located on a concrete rooftop that was covered in broken clam shells that were left by wintering gulls (SCDNR, 2013a). Although least tern numbers are reported to be relatively stable throughout the state, the majority of these birds nest on roofs and not in natural habitat.

2.4.2 Distribution and Range

The least tern has an extremely large range throughout the western hemisphere and is divided into three subspecies. The eastern least tern (*S. a. antillarum)* breeds along the Atlantic coast from Massachusetts to Florida, along the Gulf coast from Florida to Texas, and in the Bahamas and Caribbean Islands. Least terns arrive in South Carolina from their Central and South American wintering grounds each year in late April and begin nesting in mid-May.

2.4.3 Habitat

The least tern is a colonial nesting species and typically nests on barren beaches of sand, gravel or shells, on dry mudflats and salt-encrusted soils (salt flats), and on sand and gravel pits along rivers. Least terns have also been known to nest on dredge spoil mounds. Nesting success depends on the presence of bare or nearly barren sandbars, favorable water levels during nesting, and abundant food. Nests are inconspicuous scrapes usually containing two to three eggs. Egg laying and incubation occur from late May through early August. Eggs hatch in about 20 days and chicks are fledged in about another 20 days. Least terns feed on small fish and crustaceans taken by diving from

the air into shallow water. During the breeding season, these birds usually feed within a few hundred meters of the nesting colony. Least terns will often nest in large colonies with black skimmers (*Rhynchops niger*). Fish is the primary food item along with crustaceans and insects.

2.4.4 Presence in the Project Area

The least tern arrives in South Carolina in late April and begins nesting in mid-May. Nesting has been documented at 12 locations on South Carolina coastal islands. Least terns have been observed along the Atlantic coast of Hilton Head Island and in the vicinity of the proposed project at Fish Haul/Spa Beach (ebird.org, 2014). **Table 5** shows the number of birds observed at the three survey locations in the vicinity of the proposed project area; only the Mitchelville Beach Park location is within the proposed project area limits. The greatest number of least terns during any one survey day was on the Port Royal Mudflats, south of the proposed project area, in 1991 (100 birds in one survey). Least terns have been most frequently observed at Fish Haul Creek Park with a maximum of 20 birds observed during a single survey since 2009. Least terns were observed at Mitchelville Beach Park in July and August 2014 (**Table 5**). Least tern nesting has not been reported on Hilton Head Island.

Table 5. Least tern observations within the vicinity of Fish Haul Creek. Data from eBird.org, 2014. Refer to Figure 6 for bird survey locations in relation to the project area. Only the Mitchelville Beach Park sightings are within the limits of the proposed Fish Haul/Spa project area.

Fish Haul Creek Park	
Date	**# of Birds**
9/7/2014	4
8/27/2014	20
7/19/2014	18
4/22/2014	7
4/21/2014	1
9/30/2013	1
9/13/2013	1
8/23/2013	unk #
8/16/2013	unk #
5/13/2013	2
7/23/2012	1
8/28/2011	3
8/19/2010	unk #
8/14/2009	15
8/13/2009	8
5/21/2009	1
4/24/2009	3

Port Royal Mudflats	
Date	**# of Birds**
8/22/2012	25
7/31/2009	13
6/4/1991	100

Mitchelville Beach Park	
Date	**# of Birds**
8/14/2014	14
7/18/2014	15
7/14/2014	14
7/12/2014	3

2.5 WILSON'S PLOVER

2.5.1 Status and Threats

Wilson's plovers are listed as threatened in South Carolina and are classified as a "species of high concern" by the U.S. Shorebird Conservation Plan (Brown et al., 2001). This species is also protected under the U.S. Migratory Bird Treaty Act; the act prohibits the take of birds, nests, or eggs. The southeastern U.S. breeding population of Wilson's plovers is estimated at 8,600 individuals (Zradvkovic, 2013) with the majority of breeding pairs occurring along the Gulf Coast (≤ 6,400 individuals). The Wilson's plover population in South Carolina comprises an estimated range of 375-400 breeding pairs.

A re-evaluation of the current population trends has categorized the Wilson's plover as "*Apparent Decline"* in American shorebird population estimates (Zradvkovic, 2013). The Wilson's plover's status as threatened is based on the abundance of threats throughout its breeding and non-breeding range, the small population size, and its limited breeding distribution (Zradvkovic, 2013). The main threats to the Wilson's plover include loss of habitat and human disturbance to nesting areas.

2.5.2 Distribution and Range

Wilson's plovers are short-distance migratory shorebirds. The breeding range for the Wilson's plover is from Virginia to Texas along the southeastern United States, and extends through the eastern and western coasts of Mexico and Central America and the Caribbean Islands. Nesting has been documented as far north as New Jersey and Maryland, however the last record for this northern extent was in 1985 (Sanders et al., 2013). This species winters on the southeast Atlantic and U.S. Gulf coasts south through northern and eastern South America.

2.5.3 Habitat

Wilson's plover are migratory shorebirds associated with coastal habitats. This bird utilizes a variety of habitats for nesting, as compared to other beach-nesting shorebirds. Nesting occurs above the high waterline on barrier islands/peninsulas, coastal lagoons, coastal lagoon shores, midland beaches, rivermouth shorelines, and coastal lakeshores; as well as utilizing artificial habitats such as dredge spoil islands, impoundments, salt evaporation ponds, limestone fill, pavement and roadsides (Zdravkovic, 2013).

Wilson's plovers are visual feeders, typically found foraging on intertidal pools, intertidal mudflats, salt pond inlets, mangrove island salt pannes, and artificial limestone fill areas associated with wetlands. Roosting habitat includes areas of dry substrate above the high-tide line.

2.5.4 Presence in the Project Area

Wilson's plover surveys have revealed a breeding population of birds on South Carolina beaches. Between 2009 and 2012, a mean of 376 breeding pairs was recorded in South

Carolina (Sanders et al., 2013). Of the pairs, 79% were found nesting on beaches; 68% were within 1 km of an inlet.

Wilson's plovers have been observed within the Fish Haul/Spa Beach project area (**Table 6**). Individuals have been observed at Fish Haul Creek Park, Mitchelville Beach Park, and on the Port Royal Mudflats. A maximum observation of 10 individuals during one survey has been recorded south of the project area at Fish Haul Creek Park. The most recent observation was four individuals at Mitchelville Beach Park on October 13, 2014. Nesting has not been reported on Hilton Head Island.

Table 6. Wilson's plover observations within the vicinity of Fish Haul Creek. Data from eBird.org. Refer to Figure 6 for bird survey locations in relation to the project area. Only the Mitchelville Beach Park sightings are within the limits of the proposed Fish Haul/Spa project area.

Fish Haul Creek Park	
Date	**# of Birds**
4/1/2014	10
9/12/2013	2
3/15/2011	1
2/21/2011	1

Port Royal Mudflats	
Date	**# of Birds**
3/11/2014	1
2/9/2009	1
2/8/2009	1
6/4/1991	10

Mitchelville Beach Park	
Date	**# of Birds**
10/9/2014	1
10/13/2013	4

2.6 LOGGERHEAD SEA TURTLE

2.6.1 Status and Threats

The loggerhead turtle (*Caretta caretta*) was listed by the USFWS as threatened throughout its range on July 28, 1978 (43 FR 32808). The loggerhead is the most abundant sea turtle species in U.S. coastal waters (NMFS and USFWS, 1991a).

Based upon nesting data collected on index nesting beaches in the U.S. from 1989-1998, the total number of loggerhead nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,016 nests to 89,034 nests annually (TEWG, 2000). On average, 90.7% of the nests were from the South Florida population, 8.5% were from the northern subpopulation, and 0.8% of the nests were from the Florida Panhandle subpopulation. The addition of nesting data through 2007 revealed a decreasing trend in the annual number of nests of all Western North Atlantic loggerhead subpopulations in the past decade (TEWG, 2009). An increase in nesting activity was documented in the Northern U.S. subpopulation (Florida/Georgia border north to southern Virginia); loggerhead nests in this region increased to a record high of 1,854 nests in 2008.

The most significant threats to the loggerhead sea turtle population are coastal development, commercial fisheries and marine pollution (NMFS, 2014). Juvenile loggerhead turtles are particularly susceptible to impacts associates with shrimp fisheries offshore of the Atlantic coast and along the southeastern Atlantic coast. Loggerhead nesting habitat is threatened with beach erosion, armoring and nourishment; artificial lighting; increased human activity associated with coastal development, including poaching activities; natural predation by fire ants, raccoons, armadillos, and opossums; and storm activity. The sea turtle nesting season on Hilton Head Island overlaps the hurricane season in the Caribbean Sea and northwest Atlantic Ocean (June to November). Hurricanes can have a devastating effect on sea turtle reproductive success.

Negative impacts to sea turtle nesting and hatching success on Hilton Head Island include coastal development and beach armoring, predation, hatchling disorientation due to artificial upland lighting, human activity/disturbance, and lost or damaged nests due to storm activity.

2.6.2 Distribution and Range

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Gulf of Mexico, Pacific and Indian Oceans. Similar to other sea turtle species, water temperature influences the movements of loggerheads, and they do not usually appear at summer foraging grounds until June, although some individuals can be found in Virginia as early as April. Immature stages of loggerheads (i.e. juveniles/sub-adults) which forage in the northeastern U.S. are known to migrate southward in the fall as water temperatures drop, and migrate northward in spring.

2.6.3 Habitat

Adult loggerheads occupy various habitats from turbid bays to clear waters of reefs. After emergence from the nest, hatchlings move out to sea, and spend approximately 3 to 5 years in the pelagic immature stage, generally associated with floating *Sargassum* mats (NMFS and USFWS, 1991a). The pelagic lifestage may span as long as 7 to 12 years. Juveniles/subadults occur mainly in nearshore and estuarine waters and use these habitats for feeding. As loggerheads mature, they travel and forage through nearshore waters until their breeding season, when they return to the nesting beach. The estimated age at maturity is approximately 21 to 35 years (Frazer and Ehrhart, 1985; Frazer et al., 1994). The majority of mature loggerheads appear to nest on a two or three year cycle.

In the continental U.S., loggerhead sea turtles nest along the Atlantic coast from Florida to New Jersey (Musick, 1979). In the western Atlantic, most loggerhead nesting occurs from North Carolina to Florida and the Gulf coast. Steeply sloped beaches with gradually sloped offshore approaches are generally favored by nesting females.

2.6.4 Critical Habitat

Critical habitat for the Northwest Atlantic Ocean DPS of loggerhead sea turtles was designated on July 10, 2014 (79 FR 39855). The final rule assigned 38 occupied marine areas within the range of the Northwest Atlantic Ocean DPS to include one or a combination of nearshore reproductive habitat, winter area, breeding areas, migratory corridors, and/or *Sargassum* habitat. Additionally, the USFWS designated approximately 685 miles of nesting beaches in North Carolina, South Carolina, Georgia, Florida, Alabama and Mississippi as critical habitat for loggerhead sea turtles (79 FR 39755). In Beaufort County, SC, nearshore reproductive habitat was designated from Harbor Inlet to Johnson Inlet on Harbor Island. Terrestrial critical habitat along nesting beaches was designated at Harbor Island, Little Capers Island, St. Phillips Island, and Bay Point Island in Beaufort County, SC. There is no critical habitat for the loggerhead sea turtle on Hilton Head Island.

2.6.5 Presence in the Project Area

Loggerhead nesting season in Beaufort County extends from May 1 through October 31 with the highest nesting activity in June and July. The loggerhead sea turtle is responsible for nearly all nesting on Hilton Head Island with an annual average of 193 nests/year deposited along the entire island between 2000 and 2013 (**Table 7**). The lowest annual number of nests throughout the entire island during the 14–year period between 2000 and 2013 was 66 in 2004, and the highest was 339 in 2013.

Along the Port Royal Sound shoreline between Fish Haul Creek and the north end of the proposed Port Royal Sound segment of the 2015/16 Hilton Head Island Beach Nourishment Project (BM Markers 131 to 134), average nesting density was 4 nests/year between 1999 and 2012 with an annual range of 0 to 8 nests; 6 nests were documented in this area in 2013. The shoreline to the north of Fish Haul Creek typically supports even lower nesting density with an overall average of 3 nests/year between 1999 and 2011. Two nests were laid in the Fish Haul/Spa project fill placement area in 2013, and one was laid just north of the project area (**Figure 11**).

Preliminary data from the 2014 nesting season indicate a 61% decrease in island-wide nesting between 2013 and 2014, decreasing from the 14-year high of 339 nests in 2013 to 131 in 2014; 126 of the 131 nests were deposited on the Atlantic Ocean shoreline. Forty two percent (42%) of nests were relocated to higher elevations in 2014; and nesting success was higher at relocated nests (91%) versus those that were not moved (80%) (Hilton Head Island Sea Turtle Nesting Project, 2014).

Table 7. Island-wide loggerhead nesting activity on Hilton Head Island: 2000-2013.

Year	Nests	Mean Hatch Success (%)	Mean Emergence Success (%)	Nest Success (%)	Beach Success (%)
2000	134	61.2	58	78.3	100
2001	105	40.9	36.7	55.2	100
2002	165	50.8	45.3	64.8	100
2003	173	72.8	63.5	84.3	99.4
2004	66	64.6	56.8	78.7	100
2005	159	63.8	53.5	78.4	100
2006	187	68.1	58.7	82.8	100
2007	112	53	48.3	66	100
2008	201	71	64.2	85.9	100
2009	180	72.5	63.7	85.5	54.2
2010	239	72.8	67.4	93.7	60.3
2011	324	68.7	63.6	87.2	60.7
2012	320	72.2	66.5	86.1	49.6
2013	339	74.5	69.7	93.3	66.7

Source: SCDNR Sea Turtle Conservation Program, 2014

2.6 GREEN SEA TURTLE

2.4.1 Status and Threats

The green sea turtle (*Chelonia mydas*) was listed on July 28, 1978 as threatened, except for Florida and the Pacific Coast of Mexico (including the Gulf of California), where it was listed as endangered (43 FR 32808). The greatest cause of the worldwide decline in green sea turtle populations is the commercial harvest for eggs and meat. In Florida, the nesting population was nearly extirpated within 100 years of the initiation of commercial exploitation.

Other threats to green sea turtles include fibropapillomatosis; loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; excessive nest predation by fire ants, raccoons, and opossums; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and incidental take from commercial fishing operations such as shrimp trawling.

LEGEND

- 2013 SEA TURTLE NEST LOCATIONS
- HILTON HEAD MILE MARKER
- PROPOSED FISH HAUL/SPA PROJECT AREA
- TOWN BEACH MARKER

NOTE

DATE OF AERIAL PHOTOGRAPH: MAY 2014

Coastal EcoGroup Inc.

LOCATIONS AND DATES OF
LOGGERHEAD SEA TURTLE NESTS IN 2013 WITHIN AND
IMMEDIATELY ADJACENT TO THE FISH HAUL/SPA PROJECT AREA
ALONG PORT ROYAL SOUND

DRAWN BY: J. EVERS	CHECKED BY: C. MILLER
SCALE: 1" = 1500'	
JOB NUMBER	FIGURE No.
7655.00	11

2.4.2 Distribution and Range

The green sea turtle is a circumglobal species in tropical and subtropical waters. In U.S. Atlantic waters, it occurs around the U.S. Virgin Islands, Puerto Rico, and continental U.S. from Massachusetts to Texas. Relatively small numbers nest in Florida with even smaller numbers in Georgia, North Carolina, and Texas (NMFS and USFWS, 1991b; Hirth, 1997). Green turtles are distributed more widely in the summer when warmer temperatures allow them to migrate north along the Atlantic coast. As the water temperatures decline during the winter months, green sea turtles that are found north of Florida migrate south into subtropical and tropical water.

Major nesting areas for green sea turtles in the Atlantic include Surinam, Guyana, French Guyana, Costa Rica, the Leeward Islands, and Ascension Island in the mid-Atlantic. Historically in the U. S. green turtles have been known to nest in the Florida Keys and Dry Tortugas. Green sea turtles primarily nest on selected beaches along the coast of eastern Florida, predominantly Brevard through Broward Counties. In the southeastern U.S. the majority of nesting occurs during the months of June, July and August. Nesting has been documented in Beaufort County, South Carolina.

2.4.3 Habitat

The green sea turtle primarily utilizes shallow habitats such as lagoons, bays, inlets, shoals, estuaries and other areas with an abundance of marine algae and seagrasses. Individuals observed in the open ocean are believed to be migrating to feeding grounds or nesting beaches (Meylan, 1982). Hatchlings often float in masses of algae (*Sargassum* spp.) in convergence zones. Coral reefs and rock outcrops are often used as resting areas.

Nesting occurs nocturnally at 2, 3, or 4-year intervals, and females only occasionally produce clutches in successive years. Little is known about the pelagic distribution of hatchlings to juvenile size. When juveniles reach a carapace length of approximately 20 to 25 cm, they leave their pelagic habitats and enter benthic foraging areas, shifting to an herbivorous diet.

2.4.4 Presence in the Project Area

There was one documented green turtle nest on Hilton Head Island in 2003, and one nest in 2014. The nest was laid on August 4, 2014 near the Westin Resort in the “The Heel” segment of the proposed 2015/16 Hilton Head Beach Nourishment Project. Statewide green turtle nesting is infrequent to rare. Juvenile green sea turtles (curved carapace length ranging in size from 28 to 38 cm) are found in South Carolina in shallow creeks, bays, and salt marshes.

2.5 KEMP’S RIDLEY SEA TURTLE

2.5.1 Status and Threats

The Kemp’s ridley sea turtle (*Lepidochelys kempii*) was listed as endangered throughout its range on December 2, 1970 (35 FR 18320). Of the seven extant species of sea turtles, the Kemp’s ridley has declined to the lowest population level. Recent

studies suggest increased nesting activities and an overall increase in population size due to increased hatchling production and survival rates of immature turtles (USFWS and NMFS, 2000). Kemp's ridleys have been subject to high levels of incidental take by shrimp trawlers (USFWS and NMFS, 1992). In 1990, the National Research Council's Committee on Sea Turtle Conservation estimated that 86% of human-caused death of juvenile and adult loggerheads and Kemp's ridleys resulted from shrimp trawling (Campbell, 1995). The recent increased survival of juvenile and subadult individuals is partly attributed to the use of turtle exclusion devices (TEDs) in commercial shrimping fleets.

The decline of the Kemp's ridley turtle is primarily due to human activities including collection of eggs, fishing for juveniles and adults, and direct take for indigenous use. Dredging operations affect Kemp's ridley turtles through incidental take and degradation of habitat. Incidental take of Kemp's ridley has been documented with hopper dredging. Similar to other sea turtle species, future threats to the Kemp's ridley include interaction with fishery gear; marine pollution which results in the ingestion of manmade debris and garbage; destruction of foraging habitat; illegal poaching; and impacts to nesting beaches associated with rising sea level, development, artificial lighting and tourism pressure.

2.5.2 Distribution and Range

Adults are primarily restricted to the Gulf of Mexico, although juveniles may range throughout the Atlantic Ocean and have been observed as far north as Nova Scotia (Musick, 1979). Important foraging areas include Campeche Bay, Mexico, and Louisiana coastal waters. Nearly the entire population of Kemp's ridleys nests on an 11-mile stretch of coastline near Rancho Nuevo, Tamaulipas, Mexico, approximately 190 miles south of the Rio Grande. A second nesting aggregation occurs at Tuxpan, Veracruz.

Juveniles and sub-adults have been found along the eastern seaboard of the U.S. and in the Gulf of Mexico. Studies suggest that the benthic-stage juvenile sea turtles stay in shallow, warm, nearshore waters in the northern Gulf until cooling waters force them offshore or south along the Florida coast (Renaud, 1995). Little is known about the movements of the post-hatchling pelagic stage within the Gulf. Studies have indicated that this stage varies from 1 to 4 or more years and the immature stage lasts about 7 to 9 years. The maturity age of this species is estimated to be 7 to 15 years. Females return to their nesting beach approximately every other year with nesting from April into July and usually limited to the western Gulf of Mexico. The mean clutch size for this species is about 100 eggs per nest and an average of 2.5 nests per female per season.

2.5.3 Habitat

Kemp's ridleys inhabit shallow coastal and estuarine waters, usually over sand or mud bottoms. Adults are primarily shallow-water benthic feeders that specialize on crabs, especially portuniid crabs, while juveniles feed on *Sargassum* spp. and associated infauna, and other epipelagic species of the Gulf (USFWS and NMFS, 1992). Other food items include shrimp, snails, bivalves, sea urchin, jellyfish, sea stars, fish and

occasionally marine plants (Pritchard and Marquez, 1973; Shaver, 1991; Campbell, 1995).

2.5.4 Presence in the Project Area

There is no documentation of nesting by Kemp's ridley sea turtles within Beaufort County. Hatchlings are distributed along the Atlantic Ocean coast from Florida to Massachusetts. Small juveniles of this species [18 to 65 cm (11 to 26 in)] occur offshore of the South Carolina coast during the summer. In 1992 and 2008, two Kemp's ridley nests were laid in Georgetown County, SC, north of Hilton Head Island. This species also represents the second most common sea turtle to strand on the South Carolina coast. It is possible that the recent increases in Kemp's ridley strandings may be a result of an increasing population size (SCDNR, 2013b).

2.6 LEATHERBACK SEA TURTLE

2.6.1 Status and Threats

The leatherback sea turtle (*Dermochelys coriacea*) was listed as endangered throughout its range on June 2, 1970 (35 FR 8495), with critical habitat designated in the U.S. Virgin Islands on September 26, 1978 and March 23, 1979 (43 FR 43688–43689 and 44 FR 17710–17712, respectively).

The general decline of the leatherback sea turtle is attributed to exploitation of eggs (Ross, 1981). The population has been threatened by egg-harvesting in countries such as Malaysia, Surinam, the Guianas, the west coast of Mexico, Costa Rica, and in several Caribbean islands. In the past, leatherbacks were killed for their abundant oil, which was used for oil lamps and for caulking wooden boats. Similar to other sea turtle species, ingestion of man-made debris, such as plastic bags and other plastic waste, is a significant cause of mortality in leatherback sea turtles.

Leatherbacks prefer open access beaches possibly to avoid damage to their soft plastron and flippers. Unfortunately, open beaches with little shoreline protection are vulnerable to beach erosion triggered by seasonal changes in wind and wave direction. Nests are more susceptible to inundation on open beaches during severe erosion events.

2.6.2 Distribution and Range

The leatherback, the largest of all sea turtles, is mainly pelagic, inhabiting the open ocean and diving nearly continuously to great depths. Leatherbacks seldom approach land except for nesting (Eckert, 1992). The leatherback is probably the most wide-ranging of all sea turtle species, occurring in the Atlantic, Pacific and Indian oceans; as far north as British Columbia, Newfoundland, Great Britain and Norway; as far south as Australia, Cape of Good Hope, and Argentina; and in other water bodies such as the Mediterranean Sea (NFWL, 1980). Distribution of this species has been linked to thermal preference and seasonal fluctuations in the Gulf Stream and other warm water features (Fritts et al., 1983).

2.6.3 Habitat

Leatherback sea turtles are omnivorous. Leatherbacks feed mainly on pelagic soft-bodied invertebrates such as jellyfish and tunicates, but their diet also includes squid, fish, crustaceans, algae, and floating seaweed. Highest concentrations of these prey animals are often found in upwelling areas or where ocean currents converge.

Leatherbacks nest primarily in tropical regions. Major nesting beaches include Malaysia, Mexico, French Guiana, Surinam, Costa Rica, and Trinidad (Ross, 1981). Leatherbacks nest only sporadically in some of the Atlantic and Gulf States of the continental U.S., with one nesting reported as far north as North Carolina (Schwartz, 1976). In the Atlantic and Caribbean, the largest nesting assemblages occur in the U.S. Virgin Islands, Puerto Rico, and Florida (NMFS and USFWS, 2007). During the summer, leatherbacks tend to occur along the east coast of the U.S. from the Gulf of Maine south to the middle of Florida. Leatherback nesting is rare in Georgia, South Carolina and North Carolina (USFWS, 2005).

2.6.4 Presence in the Project Area

The leatherback nesting season for South Carolina beaches extends from April 15 through September 30. Since 1996, five leatherback nests have been documented on Hilton Head Island; one in 2006, one in 2010, and three nests in 2011 (SCDNR, 2014). A leatherback false crawl was documented on Hilton Head in 2003 (SCDNR, 2014).

2.7 SHORTNOSE STURGEON

2.7.1 Status and Threats

The shortnose sturgeon (*Acipenser brevirostrum*) was listed as endangered on March 11, 1967 (32 FR 4001). Shortnose sturgeon remained on the endangered species list with enactment of the ESA in 1973. In 1967, the U. S. Fish and Wildlife Service determined that the primary factors for the decline in shortnose sturgeon populations were pollution and overharvesting. Other sources contributing to the declines in shortnose sturgeon populations include incidental catch in shad gillnet fisheries, dredging, dam and bridge construction, reservoir operations, and entrapment in power plant water intake screens. In South Carolina, the primary threats affecting the decline of this species are habitat alteration due to dredging, dam construction, and pollution. Dredging activities can impact the foraging capacity of juvenile sturgeon and dam construction has the potential to reduce suitable spawning sites (SCDNR, 2013c).

Sturgeons are commercially valuable worldwide as a source of high-grade caviar. Their meat is also popular globally both fresh and smoked. Historically, sturgeon landings have reported both Atlantic and shortnose sturgeons. Prior to 1920, the Atlantic sturgeon supported a commercial fishery in the United States; however, in recent years all Atlantic states have closed their fisheries. In South Carolina, declines in landings in the early 1900's lead to the closure of the sturgeon fishery in 1985. Additionally, because of their status as an endangered species, shortnose sturgeons no longer hold any commercial value and are not targeted by fisheries. There is no recreational fishery for this species in the United States (SCDNR, 2013c).

2.7.2 Distribution and Range

Shortnose sturgeon are semi-anadromous. They inhabit the main stems of their natal rivers and migrate between estuarine and freshwater (NMFS, 1998). Feeding and overwintering activities occur in both fresh and saline habitats, however spawning only occurs in upper freshwater areas. Shortnose sturgeons prefer slightly reduced salinity levels than pure seawater, typically from 30 - 31 ppt (Holland and Yelverton, 1973; Dadswell et al., 1984). In areas where both the shortnose sturgeon and the Atlantic sturgeon (*A. oxyrhinchus*) occur, the two species typically gravitate towards their preferred salinity tolerance, with Atlantic sturgeon preferring a more saline environment. While shortnose sturgeon prefer lower salinity environments, they are capable of migrating into open ocean water. However, it has been suggested that the species appears hesitant to enter these environments (Gilbert, 1989), which may limit extensive coastal migrations of this species. One landlocked group may exist in Lake Marion on the Santee River in South Carolina and one functionally landlocked segment may exist in Lake Moultrie, also in South Carolina (NMFS, 2009). The ratio of adults to juveniles was very high in the mid 1980's to the early 1990's in the Savannah population segment indicating that recruitment is low in the Savannah River (NMFS, 1998).
Juvenile and adult sturgeon use the area located 1 to 3 miles from the freshwater/ saltwater interface throughout the year as a feeding ground. During the summer, this species tends to use deep holes at or just above the freshwater/saltwater boundary (Flournoy et al., 1992; Rogers and Weber, 1994; Hall et al., 1991).

2.7.3 Habitat

Although originally listed as endangered throughout its range, the NMFS only recognizes the following 19 distinct population segments: New Brunswick, Canada (1), Maine (2), Massachusetts (1), Connecticut (1), New York (1), New Jersey/Delaware (1), Maryland/Virginia (1), North Carolina (1), South Carolina (4), Georgia (4) and Florida (2) (NMFS, 1998). Within South Carolina there are four distinct population segments of shortnose sturgeon as well as the Savannah segment which includes the South Carolina-Georgia border (**Table 8**).

Shortnose sturgeon are suctorial bottom feeders. They use their barbels to locate a variety of prey, such as worms, insect larvae, snails, shrimp, crayfish and plants, and then vacuum their prey items using their extendable mouths.

2.7.4 Presence in the Project Area

In South Carolina, shortnose sturgeon inhabit Winyah Bay Rivers, those that drain into Lake Marion, the Santee, Cooper and Savannah rivers, and the ACE Basin (Ashepoo, Combahee and Edisto Rivers). In the ACE Basin, shortnose sturgeon are typically found at the freshwater-saltwater interface. Adult and sub-adult shortnose sturgeon are known to inhabit this area during spring through fall. Spawning may take place well upriver; however, the existence of a spawning stock in the ACE Basin is yet to be determined (SCDNR, 2013c).

Table 8. Shortnose sturgeon population segments in South Carolina.

Distinct Population Segments	Rivers Inhabited by Shortnose Sturgeon
Winyah Bay	Waccamaw, Pee Dee and Black Rivers (South Carolina, North Carolina)
Santee	Santee River (South Carolina)
Cooper	Cooper River (South Carolina)
"ACE" Basin	Ashepoo, Combahee and Edisto Rivers (South Carolina)
Savannah	Savannah River (South Carolina, Georgia), and hatchery stocks

Source: NMFS, Final Recovery Plan for the Shortnose Sturgeon, December 1998.

2.8 WEST INDIAN MANATEE

2.8.1 Status and Threats

The manatee was listed as an endangered species throughout its range in 1967 (32 FR 4061) and received federal protection with the passage of the ESA in 1973. Manatees have few natural predators, and the greatest natural threats are exposure to cold temperatures, hurricanes, and poisoning from red tide (USFWS, 2013a).

2.8.2 Distribution and Range

During the cooler months between October and April, manatees concentrate in areas of warmer water. Manatees become thermally stressed at water temperatures below 18ºC (64.4ºF); therefore, during winter months when ambient water temperatures approach 20ºC (68ºF), the manatee population confines itself to the coastal waters of the southern half of peninsular Florida and to springs and warm-water industrial outfalls as far north as southeast Georgia. During the summer months, manatees migrate as far north as coastal Virginia on the east coast and the Louisiana coast on the Gulf of Mexico and appear to choose areas based on an adequate food supply, water depth, and proximity to fresh water.

2.8.3 Habitat

Manatees inhabit both salt and fresh water and can be found in shallow (5 ft. to usually <20 ft.), slow-moving rivers, estuaries, saltwater bays, canals, and coastal areas throughout their range. The West Indian manatee is herbivorous and feeds upon any available aquatic vegetation, although manatees have been known to feed on shoreline vegetation and even fish. Manatees forage for approximately 5 hours a day and can consume up to 9% of their body weight daily.

2.8.4 Presence in the Project Area

Manatees are found in Georgia and South Carolina mainly during warmer months of the year. In South Carolina, 1,087 manatees were sighted between 1993 and 2004. Of these sightings, approximately 50% were noted in Beaufort County, and approximately half of the statewide sightings were of single manatees, suggesting that manatees in South Carolina may be solitary animals (SCDNR, 2013d).

3.0 ANALYSIS OF EFFECTS ON LISTED SPECIES AND HABITATS- CFR 402.12(f)(4)

3.1 PIPING PLOVER AND DESIGNATED CRITICAL HABITAT

3.1.1 Direct Effects

The proposed project will directly affect the piping plover (*Charadrius melodus*). The wintering period for piping plovers on Hilton Head is between July 15 and May 15. Project construction is scheduled to occur between March 1 and October 31 to avoid the main overwintering season. If sand from the Bay Point Shoals borrow area is used as the beach fill material, project construction is expected to occur in conjunction with the Port Royal and "The Heel" segments of the island-wide renourishment project in 2016.

Potential direct effects from project construction include harassment in the form of disturbing or interfering with piping plovers attempting to forage within the construction area or on adjacent beaches and behavior modification of migrating or wintering piping plovers due to disturbances created by construction activities. Construction activities may also directly disturb wintering piping plovers from roosting and loafing areas; such disturbances can result in unnecessary expenditure of energy and force birds to seek alternative areas which may be less suitable and increase their exposure to predation. Construction activities may also change the physical condition of the beach; adverse changes can render habitat areas less suitable for foraging, roosting and/or loafing.

Potential direct disturbance of wintering piping plovers will be substantially reduced if the Fish Haul/Spa nourishment project is constructed using sand from Bay Point Shoals. It is anticipated that work on this segment of the beach can be completed in 20 days or less using sand from Bay Point Shoals. If sand from an upland mine is used as the fill material, project construction is expected to last up to 90 days, extending the period of potential disturbance due to construction activities during the wintering season.

The nourishment project will directly impact approximately 6.9 acres of tidal flats in the project area (**Figure 3**). This short-term burial impact represents approximately 1.5% of the available tidal flat habitat along the Port Royal Sound shoreline north of Fish Haul Creek to Dolphin Head at Hilton Head Plantation as delineated from May 2014 aerial photography (**Figure 12**). Optimal foraging areas offshore of the Fish Haul/Spa beach fill placement area will not be affected by the proposed project. Limited survey data along the project area shoreline suggest that piping plovers are preferentially foraging on the intertidal flats offshore of the breakwaters and *Spartina* beds at a distance of approximately 400 to 600 ft. from the project fill area (**Figures 5, 7a, and 7b**). These tidal flats provide optimal foraging habitat due to the distance from human disturbance on the shoreline, sediment characteristics, and surface macroalgae (**Photos 3** and **4)**. Optimal roosting habitat is located approximately 800 ft. southeast of the project fill area at Fish Haul Creek (**Photo 5**).

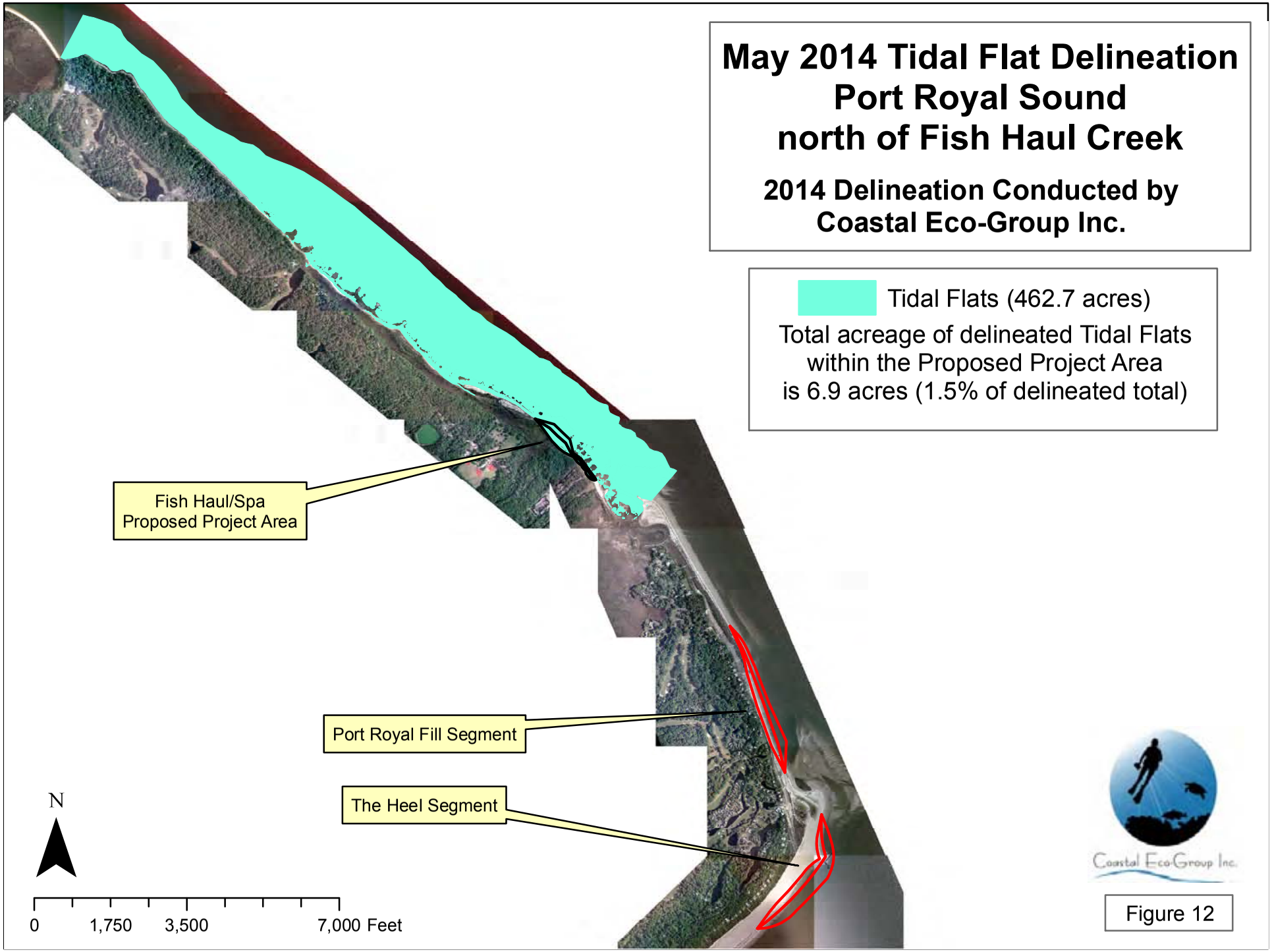
May 2014 Tidal Flat Delineation
Port Royal Sound
north of Fish Haul Creek
2014 Delineation Conducted by
Coastal Eco-Group Inc.
Tidal Flats (462.7 acres)
Total acreage of delineated Tidal Flats
within the Proposed Project Area
is 6.9 acres (1.5% of delineated total)
Fish Haul/Spa
Proposed Project Area
Port Royal Fill Segment
The Heel Segment
N
0
1,750
3,500
7,000 Feet
Coastal Eco-Group Inc.

Figure 12

Photos 3 and 4. Intertidal flats offshore of the breakwaters, showing optimal foraging habitat outside of the project impact area.
Photos taken on December 21, 2014.

Photo 5. Shorebirds utilizing the intertidal flats at Fish Haul Creek on February 14, 2014; location is more than 800 ft. south of the southeast end of the project fill area.

The project area shoreline is not located within the boundaries of Critical Habitat Unit SC-15; therefore, the project will not adversely affect or modify critical habitat for wintering piping plovers.

3.1.2 Indirect Effects

Several factors influence recruitment and recolonization of benthic invertebrate populations following beach nourishment. These factors include the timing of fill placement and frequency of fill events, size and type of the fill used for nourishment, and compatibility of the fill material with the existing beach sediments (Donoghue, 1999; USDOI/FWS, 2000). Sediment characteristics and alterations to the geomorphology of study beaches were suggested to have a greater impact on the recovery of benthic invertebrates than direct burial and mortality (Donoghue, 1999).

Long-term recovery time of softbottom benthic invertebrate populations depends upon the length of the project, timing of the project, and interval between nourishment events. Continued beach nourishment at eight to ten year intervals will create temporary disruptions in the foraging food base which could persist for one to two years following fill placement. The 8-yr interval between nourishment events should allow sufficient time for recovery of benthic invertebrate populations prior to the subsequent nourishment event.

The Bay Point Shoals borrow area has been used during past nourishment projects on Hilton Head Island. Given the compatibility of the borrow area sediments with the existing beach, it is anticipated that impacts to benthic communities will be short-term, limited in duration to the first summer following project completion. Piping plovers have been observed foraging within the beach fill limits of the Ocean Point Project Area during the November and December 2014 surveys, suggesting potential recovery of prey items in the fill template within 6 months after project completion. Recovery of the Ocean Point project fill area will be evaluated following completion of the 2014-15 macroinvertebrate monitoring for the 2011/12 Port Royal Sound Shoreline Stabilization Project. These data will provide valuable information concerning the recovery time of prey abundance, diversity and foraging habitat quality.

3.1.3 Interrelated, Interdependent and Cumulative Effects

If the Fish Haul/Spa Project is constructed hydraulically in conjunction with the Port Royal and "The Heel" segments of the 2015/16 Town of Hilton Head, optimal foraging and roosting habitats will be available immediately adjacent to the Port Royal Sound and Fish Haul/Spa segments in the vicinity of Fish Haul Creek and the Port Royal Sound mudflats located offshore and south of the proposed project area (**Figure 13**). Within the Port Royal Sound segment, sand placement will occur generally between the Beach House (HI-29E) and HHI-31A (BM-130). The fill limits of the Port Royal Sound fill segment have been shortened from the previous fill template; the shoreline at Fish Haul Creek will not be disturbed during project construction (**Figure 14**).

Surveys of wintering piping plovers in the vicinity of the project area indicate that piping plovers are not preferentially feeding along the Fish Haul/Spa beach nourishment project shoreline, but are selecting tidal flat habitat more than 400 ft. offshore of the project fill area (**Figure 7a**). The short-term impact to tidal flat habitat from the proposed beach fill represents approximately 1.5% of the tidal flat habitat available along Port Royal Sound in the study area shown in **Figure 12**. When considering the combined fill placement of the Fish Haul/Spa nourishment project, and the Port Royal and Heel segments of the 2015/16 Hilton Head Beach Nourishment Project along the Port Royal Sound shoreline, the total temporary impact is 3.6% of the approximate 639.5 acres of tidal flats in the study area shown in **Figure 15**.

3.1.4 Conservation Measures

The proposed construction window for the Fish Haul/Spa segment minimizes direct disturbance of piping plovers by commencing construction at the end of the main wintering season, and possibly extending into the period when piping plovers are unlikely to be present on Hilton Head Island in the summer months. Construction will be completed prior to establishment of the main overwintering population on the island in November. The proposed fill amount/placement location has been minimized to the greatest extent practicable to avoid impacts to tidal marsh habitat in the Fish Haul/Spa project fill area, thereby minimizing fill impacts to adjacent intertidal flats which serve as foraging habitat for piping plovers.

Revisions to the Piping Plover Monitoring Plan were proposed in the Biological Assessment for the 2015/16 Hilton Head Island Nourishment Project (CEG, 2014a); this plan will be finalized in the USFWS Biological Opinion for the project. The Town proposes to extend the piping plover distribution surveys to the Fish Haul/Spa segment shoreline starting in November 2015 to document plover utilization of the project area shoreline and tidal flats offshore of Fish Haul Creek.

As described in the Biological Assessment for the 2015/16 island-wide project (CEG, 2014a) and recommended by the USFWS in their 2010 Biological Opinion for the 2011/12 Port Royal Sound Stabilization Project, the Town will install display signs at beach access points to educate local beach users and tourists of piping plover habitat requirements and species protection measures. The Town will also implement an educational program for local residents and visitors in conjunction with USFWS and SCDNR. Increased public outreach and education efforts will enhance understanding and acceptance of shorebird protection measures on Hilton Head Island.

Important bird roosting areas will be protected using measures similar to those used for breeding bird colonies. Such measures involve establishment of recommended setback distances and use of signs, posts, high-visibility string, tape, and any other materials as necessary to prevent human approach within the setback distance. The Town will work with USFWS to develop the most appropriate marking techniques and setback distances for the project area and will adjust the marked areas over the course of the annual surveys to protect the areas occupied by piping plovers.

3.1.5 Determination

In consideration of the proposed conservation measures, the proposed project may affect the piping plover, but is not likely to jeopardize the continued existence of the species. The proposed project will not affect Critical Habitat Unit SC-15 or result in adverse modification of critical habitat.

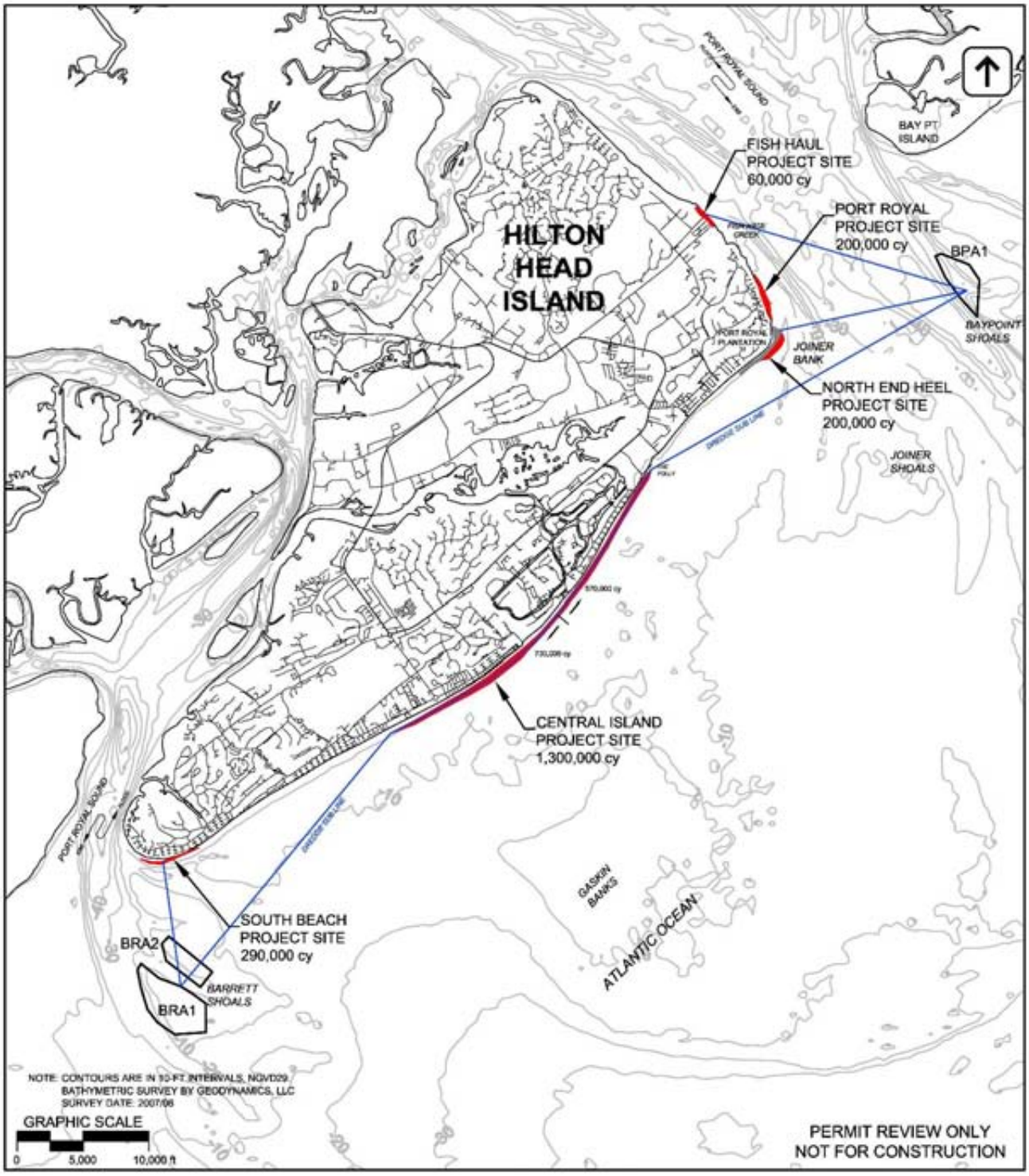

Figure 13. Project history and proposed fill segments between South Beach and the Fish Haul Creek/Spa shoreline (OAI, 2015).

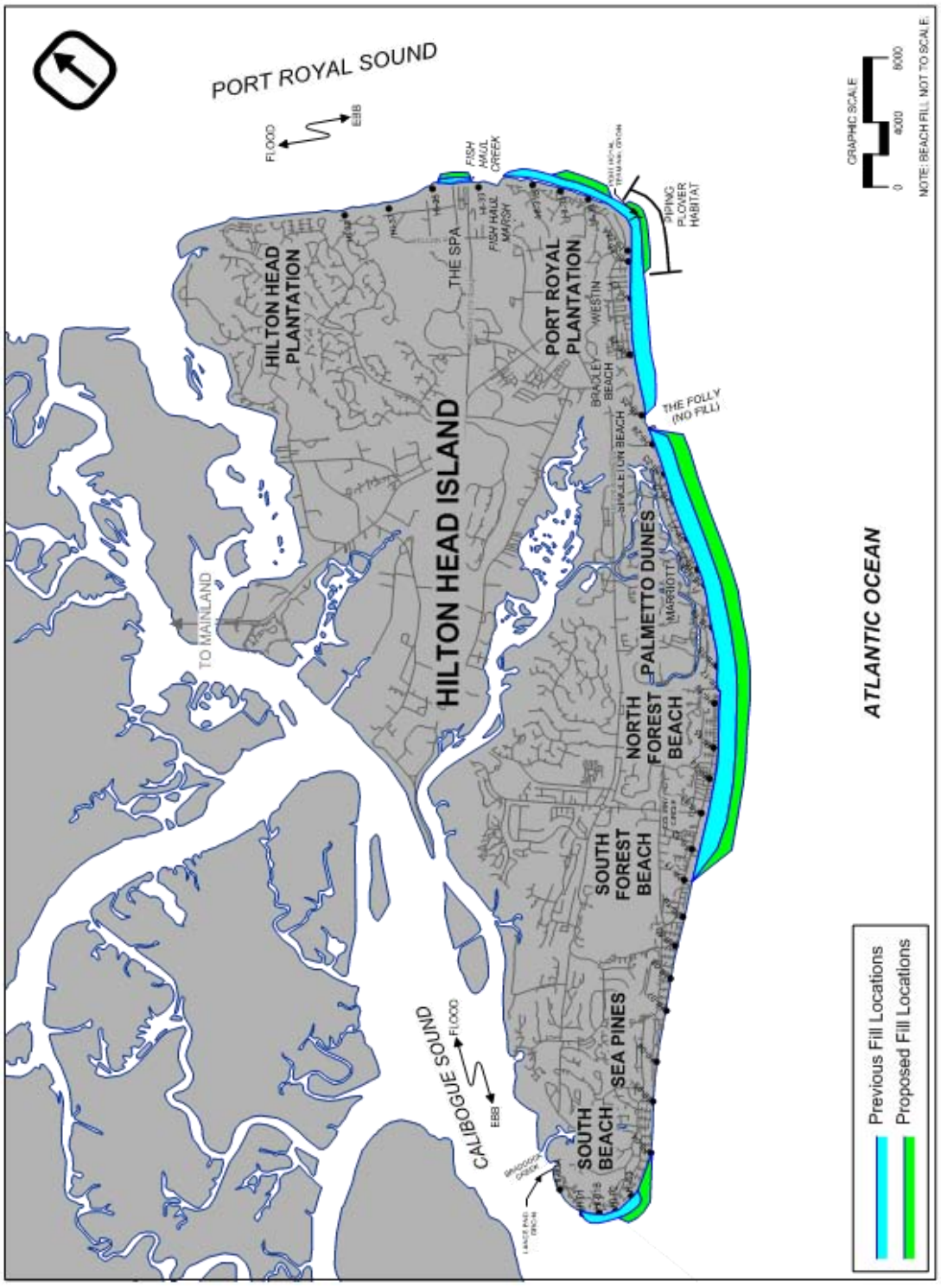

Figure 14. Proposed beach fill segment at Fish Haul Creek/Spa in relation to previous fill locations and proposed beach fill for the 2015/2016 Town of Hilton Head Island Beach Nourishment Project. Piping Plover Critical Habitat Unit SC-15 is shown. Source: OAI, 2014.

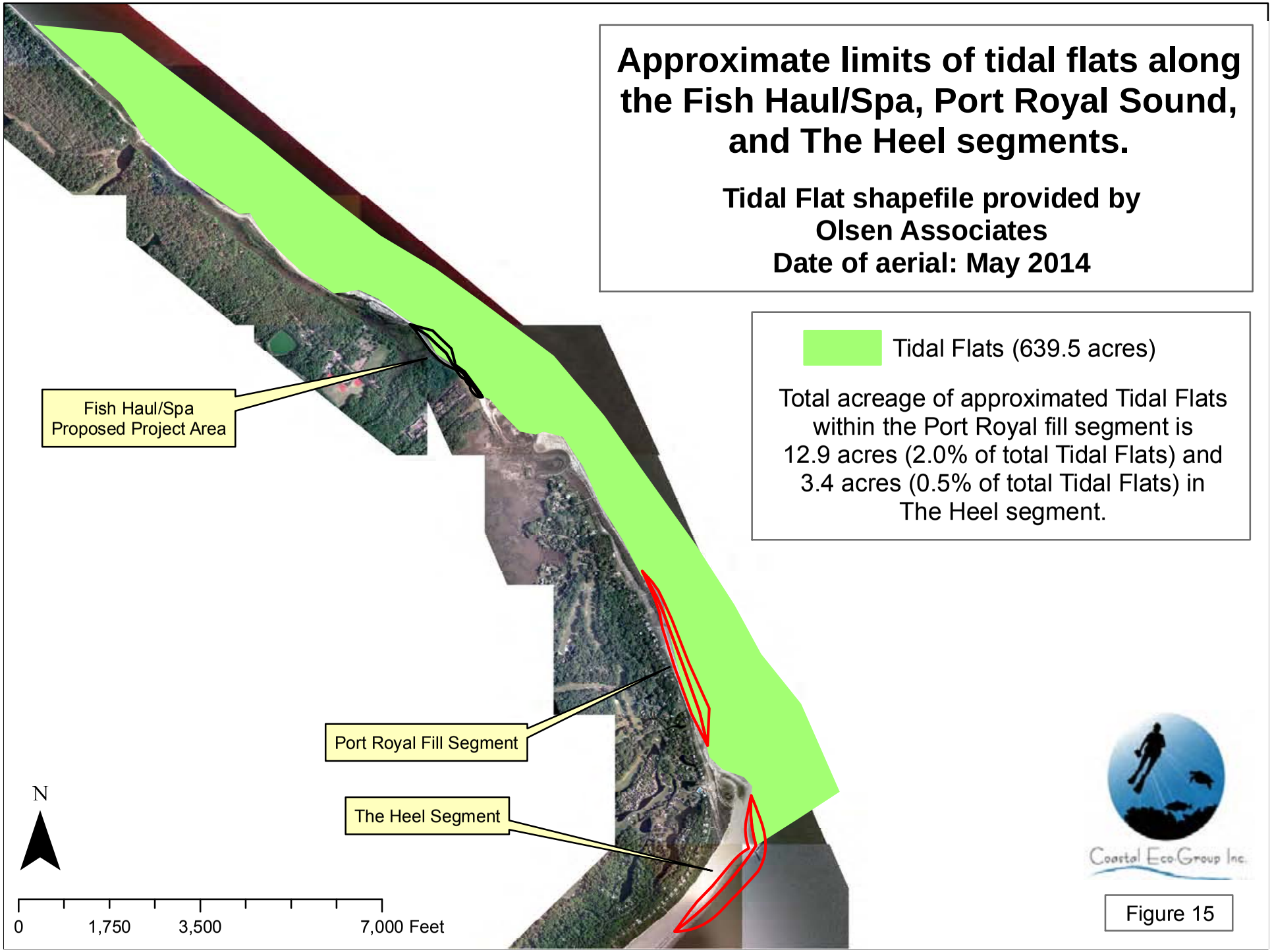
Approximate limits of tidal flats along the Fish Haul/Spa, Port Royal Sound, and The Heel segments.
Tidal Flat shapefile provided by Olsen Associates
Date of aerial: May 2014
Tidal Flats (639.5 acres)
Total acreage of approximated Tidal Flats within the Port Royal fill segment is 12.9 acres (2.0% of total Tidal Flats) and 3.4 acres (0.5% of total Tidal Flats) in The Heel segment.
Fish Haul/Spa Proposed Project Area
Port Royal Fill Segment
The Heel Segment
N
0
1,750
3,500
7,000 Feet
Coastal Eco-Group Inc.

Figure 15

3.2 RUFA RED KNOT

3.2.1 Direct Effects

Hilton Head Island is known to support an overwintering population of rufa red knots, as well as serving as a key stopover location during spring and fall migrations. Potential direct impacts of project construction during the overwintering season include harassment in the form of disturbing or interfering with birds attempting to forage or roost within the construction area or adjacent beaches. Construction activities may also facilitate behavior modification of migrating or wintering birds. Rufa red knots are known to fly more than 18,600 miles roundtrip during annual migrations to and from the breeding grounds (USFWS, 2014). Migrating red knots can travel more than 1,500 miles in a single flight, utilizing critical stopover locations to rest and restore vital energy reserves along the way. Stopovers can last weeks to months and are essential for the birds to complete their migrations. Disturbances from construction activities can result in the unnecessary expenditure of energy and force birds to seek alternative areas which may be less suitable and increase their exposure to predation. Construction activities may also change the physical condition of the beach, rendering it less suitable for foraging, roosting and/or loafing.

As discussed in Section 3.1.1, the construction period is expected to be less than 20 days if the project is constructed using sand from Bay Point Shoals. Potential direct disturbance of red knots will be substantially reduced if the Fish Haul/Spa nourishment project is constructed using sand from Bay Point Shoals. If sand from an upland mine is used as the fill material, project construction is expected to last up to 90 days. Surveys have documented red knots in the Project Action Area throughout most of the year with the lowest number of observations reported in June, July and August (**Table 3**).

3.2.2 Indirect Effects

The proposed project should increase the amount of roosting habitat in the project area. However, as described in Section 3.1.2, the quality of foraging habitat in the project fill area may be less than optimal for one to two years following beach fill placement.

Restoration of beaches through sand placement may increase recreational pressure within the project area. Recreational activities, including increased pedestrian use, have the potential to adversely affect red knots through disturbance and increased presence of predators.

3.2.3 Interrelated, Interdependent and Cumulative Effects

Continued beach nourishment at eight to ten year intervals will create temporary disruptions in the foraging food base for red knots which could persist for one to two years following fill placement. The length of time between proposed renourishment events should allow sufficient time for recovery of benthic invertebrate populations prior to the subsequent nourishment event. Macrofaunal community structure changes could persist for a period of one to two years following project construction, creating chronic short-term impacts to selective birds due to the loss of specific prey species. The macroinvertebrate monitoring program for the 2015/16 island-wide project will provide

valuable data for defining the cumulative effects of beach sand placement on foraging habitat for wintering shorebirds.

3.2.4 Conservation Measures

The conservation and educational measures for piping plovers described in Section 3.1.4 will be expanded to include the rufa red knot. The piping plover distribution and activity surveys in the Port Royal Sound and "The Heel" segments and Fish Haul Creek will also include foraging and roosting surveys for the red knot.

3.2.5 Determination

The proposed Fish Haul/Spa Beach Renourishment Project may affect the rufa red knot, but is not likely to jeopardize the continued existence of the species.

3.3 WOOD STORK

3.3.1. Direct Effects

Wood storks have been observed foraging and wading along the shoreline between Fish Haul Creek and Spa Beach. Observations of individuals have been low with only two observations recorded in 2014. Potential direct impacts include harassment in the form of disturbing or interfering with birds attempting to forage within the construction area or on adjacent beaches. It is unlikely that direct impacts to wood storks will occur as a result of project construction due to the low number of individuals observed within the project area limits.

3.3.2 Indirect Effects and Interrelated, Interdependent and Cumulative Effects

Short term impacts to foraging habitat quality for shorebirds are expected along the project area shoreline. Because wood storks utilize a variety of estuarine and freshwater wetlands for foraging and roosting, burial impacts within the relatively small footprint of the beach fill project should not adversely affect the quantity and quality of foraging habitat available to wood storks in the vicinity of the Project Action Area. There is extensive preferred foraging habitat for wood storks (freshwater marshes, high and low salt marshes, and tidal creeks) at Fish Haul Creek Park immediately south of the Project Action Area.

3.3.3 Determination

The proposed project is not likely to adversely affect the wood stork.

3.5 SEA TURTLES

3.5.1 Direct Effects

In 2013, two loggerhead nests were documented in the project area, and one loggerhead nest was deposited just north of the project fill area (**Figure 11**).

Sand placement impacts will occur along approximately 2,000 feet of project area shoreline during sea turtle nesting season. Potential negative effects during sea turtle nesting season include possible destruction of nests deposited within the boundaries of

the proposed project, harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches, and disorientation of hatchlings and nesting females on beaches adjacent to the construction area as they emerge or return from the nest and crawl to the water as a result of project lighting.

It is anticipated that project construction will be completed in less than 20 days if sand is placed hydraulically from Bay Point Shoals. Project construction involves a greater potential for the direct mechanical destruction and/or burial of nests, as well as a greater likelihood for encounters with construction equipment/pipes on the beach during nesting activities. Nesting sea turtles tend to avoid the immediate construction area during beach restoration projects; however, the increased frequency of non-nesting emergences results in an increased expenditure of energy and, therefore, a potential decrease in overall reproductive fitness.

A high percentage of nests are currently relocated on Hilton Head Island due to eroded shoreline conditions. Forty two percent (42%) of nests were relocated to higher elevations in 2014; and nesting success was higher at relocated nests (91%) versus those that were not moved (80%) (Hilton Head Island Sea Turtle Nesting Project, 2014). Due to the short duration of construction activities during the nesting season, the extremely low nesting density, and the nesting success of the existing nest relocation program on the island, nest relocation for one nesting season during project construction would not significantly increase the potential for incidental take.

3.5.2 Indirect Effects

Several studies have indicated that the principal effect of beach project construction on sea turtle reproduction is a reduction in nesting success (i.e. the percentage of emergences resulting in nests) due to beach compaction and the unnatural beach profile created during project construction (Ernest and Martin, 1999; Ernest, 2001). High compaction levels result in an increased expenditure of energy by nesting females due to the increased length of time required to excavate the nest, as well as repeated attempts to successfully excavate a nest.

A study on Hilton Head Island found no immediate positive impact on sea turtle nesting following beach nourishment (Byrd, 2004). Although nest density increased after nourishment, these increases were not statistically significant and nest to total crawl ratios decreased up to two years following the nourishment project. Three years following the beach nourishment project on Hilton Head Island, nest to total crawl ratios were comparable to those found on the control beach (Byrd, 2004). While beach nourishment appeared to have an immediate adverse effect on sea turtle nesting success on Hilton Head Island, the three year monitoring results indicate that the nourishment project increased the area of suitable nesting habitat with negative effects on nesting success limited to two years following project construction.

Beach-quality sand will be either be dredged from Bay Point Shoals or truck hauled from an upland source; both sites have been used for beach nourishment on Hilton Head Island. The proposed borrow site is highly suitable for use as beach fill material and are compatible with the existing beach on Hilton Head Island in terms of grain size characteristics, percentage of fine material, and shell content. Given the compatibility of the proposed borrow site sediments with the existing beach, minimal adverse impacts to sea turtle hatching success are expected during the first three years after beach sand placement. However, an increase in the frequency of non-nesting emergences (i.e. false crawls) would involve an increased expenditure of energy and, therefore, a potential decrease in overall reproductive fitness.

The presence of heavy equipment and trucks on the beach could lead to increased beach sand compaction within the project area. Tilling of the beach prior to the start of sea turtle nesting season will alleviate beach compaction. Behavior modification of nesting females due to escarpment formation during the first two or three nesting seasons following project construction may occur, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs.

3.5.3 Interrelated, Interdependent and Cumulative Effects

Future cumulative impacts within the project area may result from periodic nourishment events on the island which are scheduled to occur on 8 to 10 year intervals contributing to the disturbance of nesting and hatching activities due to beach nourishment activities.

3.5.4 Conservation Measures

The potential for direct impacts to sea turtles based on the proposed construction schedule would occur during a portion of one sea turtle nesting season. Nest monitoring and relocation during project construction, compaction monitoring, tilling, and escarpment remediation measures will be performed in accordance with the Terms and Conditions of the USFWS Biological Opinion. These measures should minimize the potential for incidental take of sea turtles. Project lighting shall be limited to the immediate area of active construction. Stationary lighting on the beach and all lighting on the dredge shall be minimized through screening/shielding, appropriate placement of lights to minimize illumination of the nesting beach and water, and the use of low pressure sodium lights.

3.5.5 Determination

Although nesting by leatherback and green sea turtles is rare on Hilton Head Island and has not been recorded in the project area, nests have been recorded on Hilton Head Island during the past several years; therefore, the proposed nourishment project may affect these species. The beach nourishment project is not likely to affect the Kemp's ridley sea turtle; potential effects from dredging at the borrow area were reviewed in the BA for the 2015/16 Hilton Head Beach Nourishment Project (CEG, 2014a). The proposed Fish Haul/Spa Beach Renourishment Project may affect nesting loggerhead, leatherback, and green sea turtles and hatchlings along approximately 2,000 feet of project area shoreline.

3.6 SHORTNOSE STURGEON

3.6.1 Direct Effects

The shortnose sturgeon lives in riverine systems migrating between freshwater and mesohaline river reaches and has not been reported in the Port Royal Sound area Although capable of entering open ocean water, it has been suggested that the species appears hesitant to enter open ocean water (Gilbert, 1989). Direct impacts to the shortnose sturgeon during dredging of the Bay Point Shoals offshore borrow site were reviewed in the BA for the 2015/16 Hilton Head Island Beach Nourishment Project (CEG, 2014a).

3.6.2 Indirect and Interrelated, Interdependent and Cumulative Effects

No indirect or cumulative effects to shortnose sturgeon are anticipated as a result of the proposed project.

3.6.3 Determination

The proposed project is not likely to adversely affect the shortnose sturgeon.

3.7 WEST INDIAN MANATEE

3.7.1 Direct Effects

Manatees are found in South Carolina mainly during warmer months of the year. Given that dredging and beach fill placement may occur in the summer months, manatees could be present in the vicinity of the Project Action Area. However, the proposed project area is intertidal estuarine bottom, and water depth is insufficient to support this species. Direct impacts to manatees during dredging of the Bay Point Shoals offshore borrow site were reviewed in the BA for the 2015/16 Hilton Head Island Beach Nourishment Project (CEG, 2014a).

3.7.2 Indirect and Interrelated, Interdependent and Cumulative Effects

No indirect or cumulative effects to manatees and/or their foraging habitat would occur as a result of the proposed project.

3.7.3 Conservation Measures

To avoid contact and potential injury to manatees, the Town of Hilton Head Island will adhere to the Standard Manatee Protection Conditions included in federal permit.

3.7.5 Determination

Based upon adherence to the Standard Manatee Protection Conditions, the project is not likely to adversely affect the West Indian manatee.

4.0 CONCLUSIONS

Based upon the findings of this Biological Assessment and the conservation measures proposed herein, the Applicant, the Town of Hilton Head Island, has found that the proposed project may affect, but is not likely to jeopardize the continued existence of the following species:

Piping plover
Rufa red knot
Loggerhead sea turtle
Leatherback sea turtle
Green sea turtle

The proposed project is not likely to affect the following species:

Kemp's ridley sea turtle
Wood stork
Shortnose sturgeon
West Indian manatee

Although not federally listed as endangered or threatened, the USFWS is encouraged to review potential impacts to the coastal least tern and Wilson's plover due to its threatened status in the state of South Carolina. Least tern and Wilson's plover nests have not been documented in the Project Action Area; however, these birds may occur on Project Area beaches between April and October. Construction activities may disturb and/or disrupt foraging activities, forcing them to seek alternative areas along the Port Royal Sound shoreline.

The May Affect; May Affect, Not Likely to Adversely Affect; and the Not Likely to Adversely Affect/No Effect determinations for the listed species and critical habitat were concluded based upon compiled local and regional data and conservation, monitoring and mitigation measures to avoid and minimize impacts to listed species.

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ATTACHMENT I

ESSENTIAL FISH HABITAT (EFH) ASSESSMENT

2015/16 Fish Haul/Spa Beach Renourishment Project
Hilton Head Island, South Carolina

Applicant: Town of Hilton Head Island
Agent: Olsen Associates, Inc., Jacksonville, Florida

ESSENTIAL FISH HABITAT ASSESSMENT
2016 FISH HAUL/SPA BEACH RENOURISHMENT PROJECT

2015/2016 HILTON HEAD ISLAND
BEACH RENOURISHMENT PROJECT

TOWN OF HILTON HEAD ISLAND, SC

Prepared for:
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665 SE 10th St. Suite 104
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February 2015

TOWN OF HILTON HEAD ISLAND, SC
FISH HAUL/SPA BEACH NOURISHMENT PROJECT
ESSENTIAL FISH HABITAT ASSESSMENT

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1.0 INTRODUCTION

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires identification of habitats needed to create sustainable fisheries and comprehensive fishery management plans with habitat inclusions. The Act also requires preparation of an Essential Fish Habitat (EFH) assessment and coordination with National Marine Fisheries Service (NMFS) when essential fish habitat impacts occur. Essential fish habitat is defined by Congress in the MSFCMA as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The act requires federal agencies to consult on activities that may adversely influence EFH designated in the Fishery Management Plans. Activities having direct (e.g., physical disruption) or indirect (e.g., loss of prey species) effects on EFH must be addressed, and activities may be site-specific or habitat-wide. Any adverse result(s) must be evaluated individually and cumulatively (National Marine Fisheries Service, 2014)

This document evaluates the potential impacts of beach fill placement from the proposed Town of Hilton Head Island Fish Haul Creek/Spa Beach Renourishment Project on federally managed species and EFH. This assessment only includes evaluation of impacts at the beach fill site. EFH consultation for dredging of the Bay Point Shoals offshore borrow area is being addressed in the Town's application for the island-wide nourishment project proposed for construction in 2015-2016 (P/N SAC-2014-00680-1W).

The proposed project will include the placement of up to 60,000 cubic yards (cy) of sand along 2,000 ft. of Port Royal Sound shorefront as part of a continued beach maintenance and management program at Hilton Head Island, SC (**Figure 1**). The project area includes a portion of the Port Royal Sound shoreline north of Fish Haul Creek Park including The Spa on Port Royal Sound (a private development), and Mitchelville Beach Park (public Town park) (**Figure 2**). The purpose of the project is to reestablish beach conditions, consistent with the originally restored beach, sufficient to sustain an 8 to 10 year renourishment life following project completion. Sand placement will be limited to areas of need -- defined as those areas where there is a sand volume deficit in the previously constructed design beach. Initial restoration of the project area was conducted as part of the island-wide nourishment constructed under permit 2006/07 (P/N 2004-1W-319-P).

When considering beach losses and shoreline erosion since completion of the 2006/07 project, re-filling the prior construction template is the preferred alternative. However, significant areas of *Spartina* marsh have flourished in the lee of the breakwaters since project construction, particularly at the eastern limit of the project area. These tidal marsh habitats would be directly buried by fill placement if the entire 2006/07 design template is filled to capacity. To avoid and minimize potential impacts to patches of marsh grass, the project fill length was reduced from 2,200 ft. to 2,000 ft., and the fill volume was reduced and steepened such that the toe of fill falls landward of the tidal marsh habitat in the south half of the project.

The project is proposed in conjunction with the Port Royal Sound and "The Heel" segments of the 2015/16 Hilton Head Island Beach Renourishment Project (P/N SAC-2014-00680-1W). Project construction is proposed to occur between March 1 and October 31, 2016. If the Bay Point shoals borrow area is used, construction would be completed in less than 20 days. If upland sand from a previously authorized mine (Deerfield Mine in Hardeeville, SC and/or the Murray Sand Pit near Summerville, SC) is used, construction would extend as long as 90 days.

Renourishment events are planned to occur every 8 to 10 years depending upon weather conditions and beach performance during the nourishment life. The last comprehensive event on the island was completed in February 2007 and included breakwater construction and the original restoration of the Fish Haul/Spa shoreline. Benthic habitats in the vicinity of the 2006/07 project area were mapped and characterized by Dial Cordy and Associates Inc. (DCA) in September 2003 to assess the impact of a breach and associated overwater of the barrier beach fronting the Fish Haul Creek Marsh. The study area comprised approximately 180 acres (**Figure 3;** DCA, 2004). Using aerial photography dated December 2002 and the September 2003 ground-truthing survey, 5.7 acres of *Spartina* tidal marsh and 0.4 acres of oyster beds were identified in the study area. The 180-acre study area was dominated by intertidal sand/mudflats (DCA, 2004). The study documented a net loss of 2.1 acres of tidal marsh behind the spit due to the breach, and a net gain of 0.7 acres seaward of the new cut.

Approximately 0.07 acres of *Spartina* marsh was present within the 2006/07 project area in May 2008, approximately one year after construction. In May 2009, the Town planted *Spartina alterniflora* on the shoreward side of the breakwaters to expand marsh habitat within the project area (**Figure 4**). By October 2010, the planted marsh grass had expanded, filling in the area behind the breakwaters with consistent tidal marsh habitat (**Figure 5**). The plantings have continued to expand along with expansion of existing marsh grass within the 2006/07 project area, creating an extensive tidal marsh along the shoreline. Approximately 13.5 acres of *Spartina* marsh was present in May 2014 within the boundaries of the 2003 study area, and 2.31 acres of *Spartina* marsh was mapped within the 2006/07 project area. **Figures 3** and **6** show the expansion of tidal marsh from 2003 to 2014. **Figures 7** and **8** show the expansion of tidal marsh habitat in the 2006/07 project area between May 2008 and May 2014.

2.0 ESSENTIAL FISH HABITAT DESIGNATION

The project area on Hilton Head Island falls under the jurisdiction of the South Atlantic Fisheries Management Council (SAFMC) which is responsible for the conservation and management of fish stocks within the federal 200-mile limit of the Atlantic Ocean off the coasts of North Carolina, South Carolina, Georgia and east Florida to Key West. The SAFMC currently manages eight fisheries. These fisheries include: coastal migratory pelagics, coral and live bottom habitat, dolphin and wahoo, golden crab, shrimp, snapper/grouper, spiny lobster, and *Sargassum*. Management of the Atlantic red drum was transferred from the SAFMC to the Atlantic States Marine Fisheries Commission (ASMFC) in 2008, as 100% of the catch is currently taken in state waters.

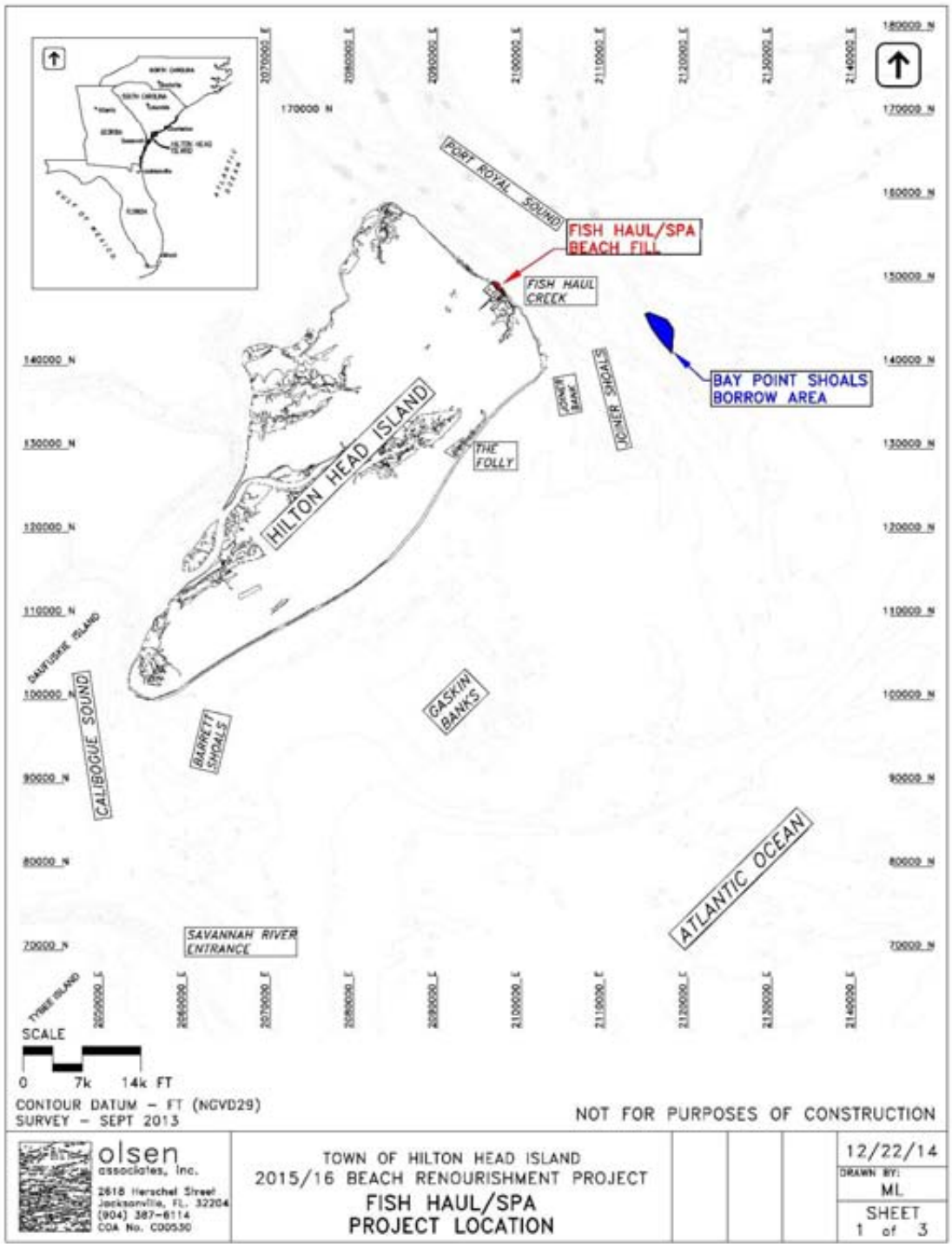


Figure 1. Location map of the proposed Fish Haul/Spa Renourishment project area and offshore borrow area.

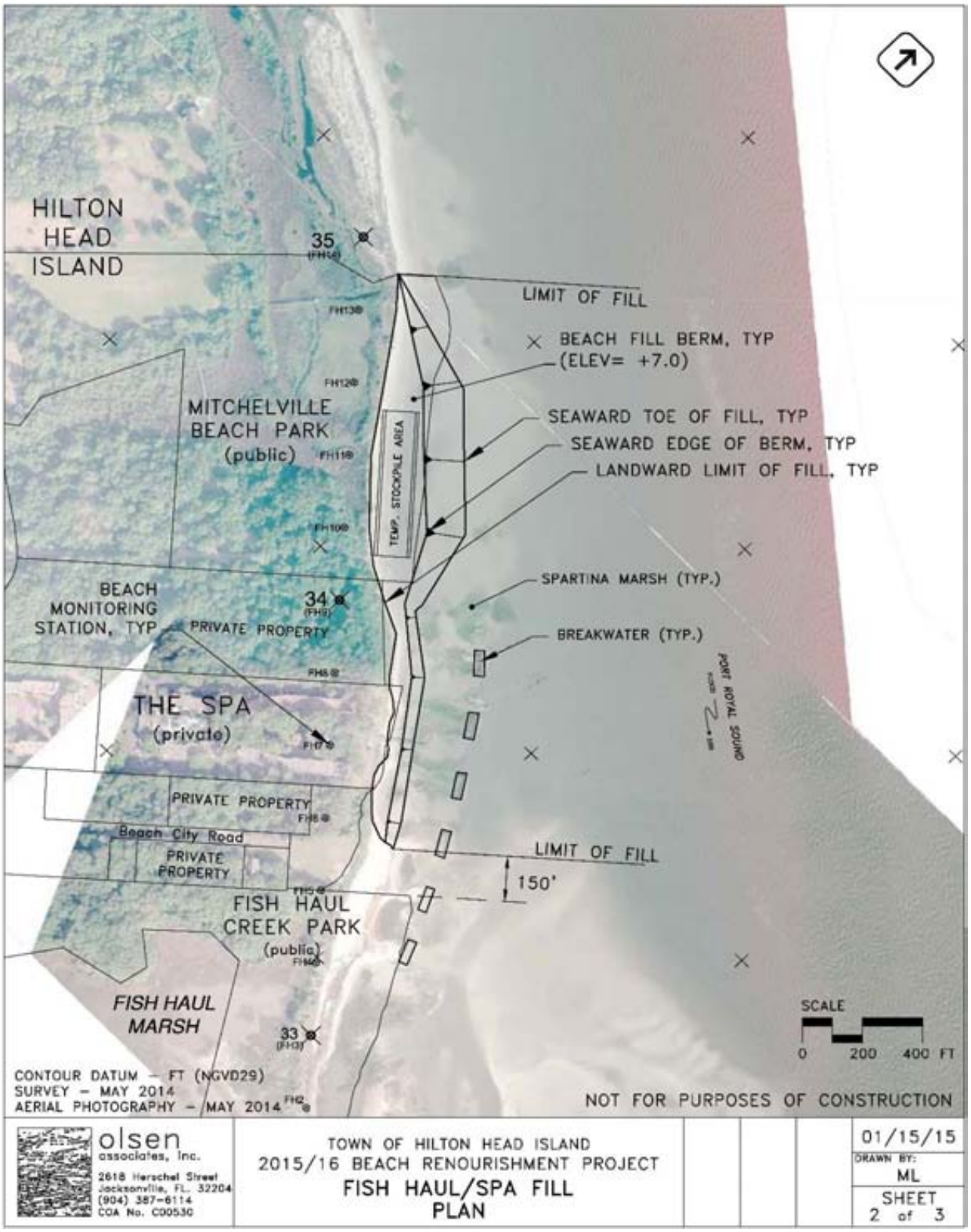


Figure 2. 2016 Fish Haul/Spa Beach Renourishment Project Fill Plan

Figure 3. 2003 EFH delineations within the Fish Haul Creek shoreline study area (Figure from Dial Cordy and Associates, 2004).

Fish Haul/Spa Beach Renourishment Project

2003 DCA Tidal Marsh Delineation
Figure 2, DCA, 2004

Aerial Date: December 2003

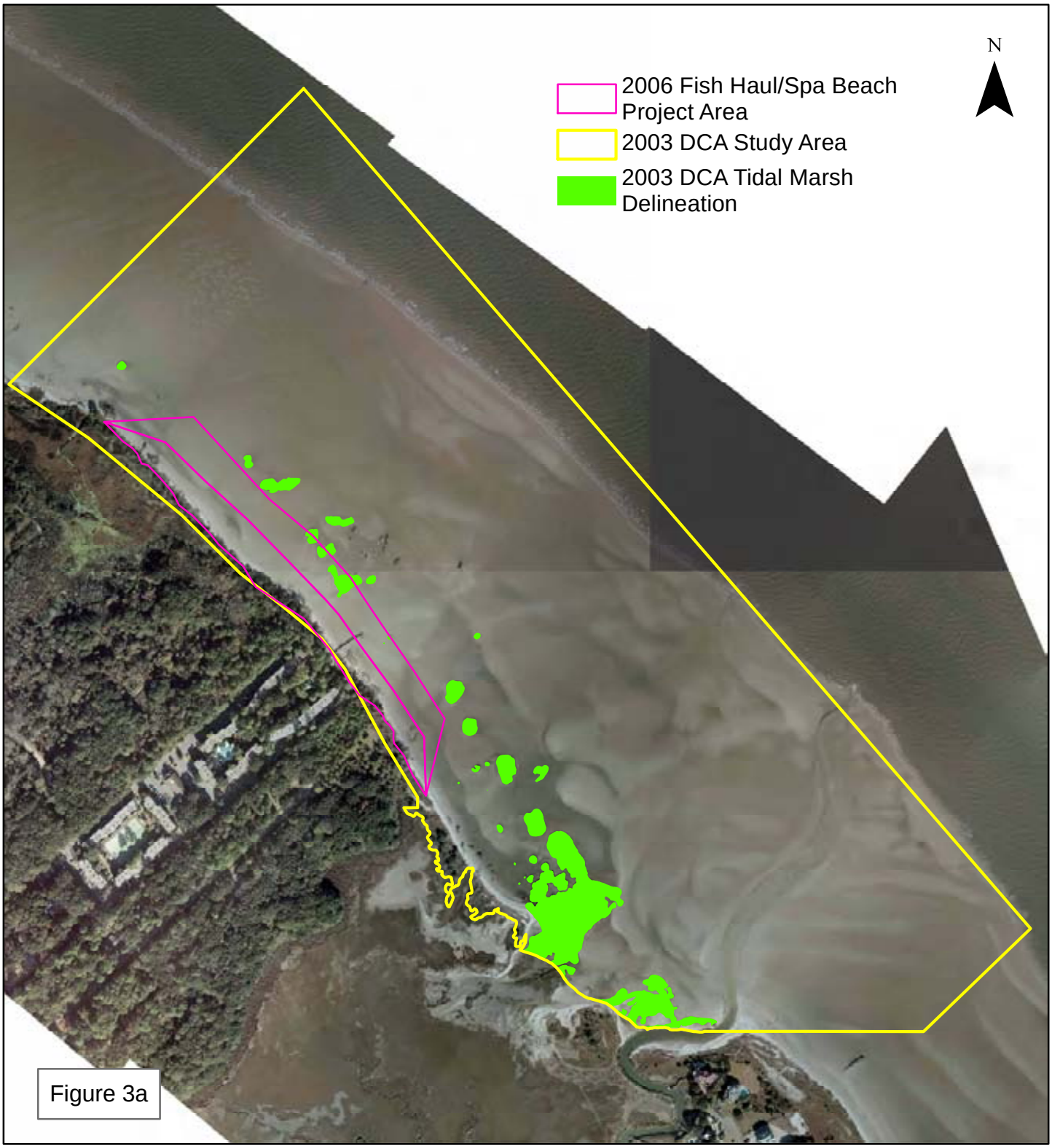


Figure 3a

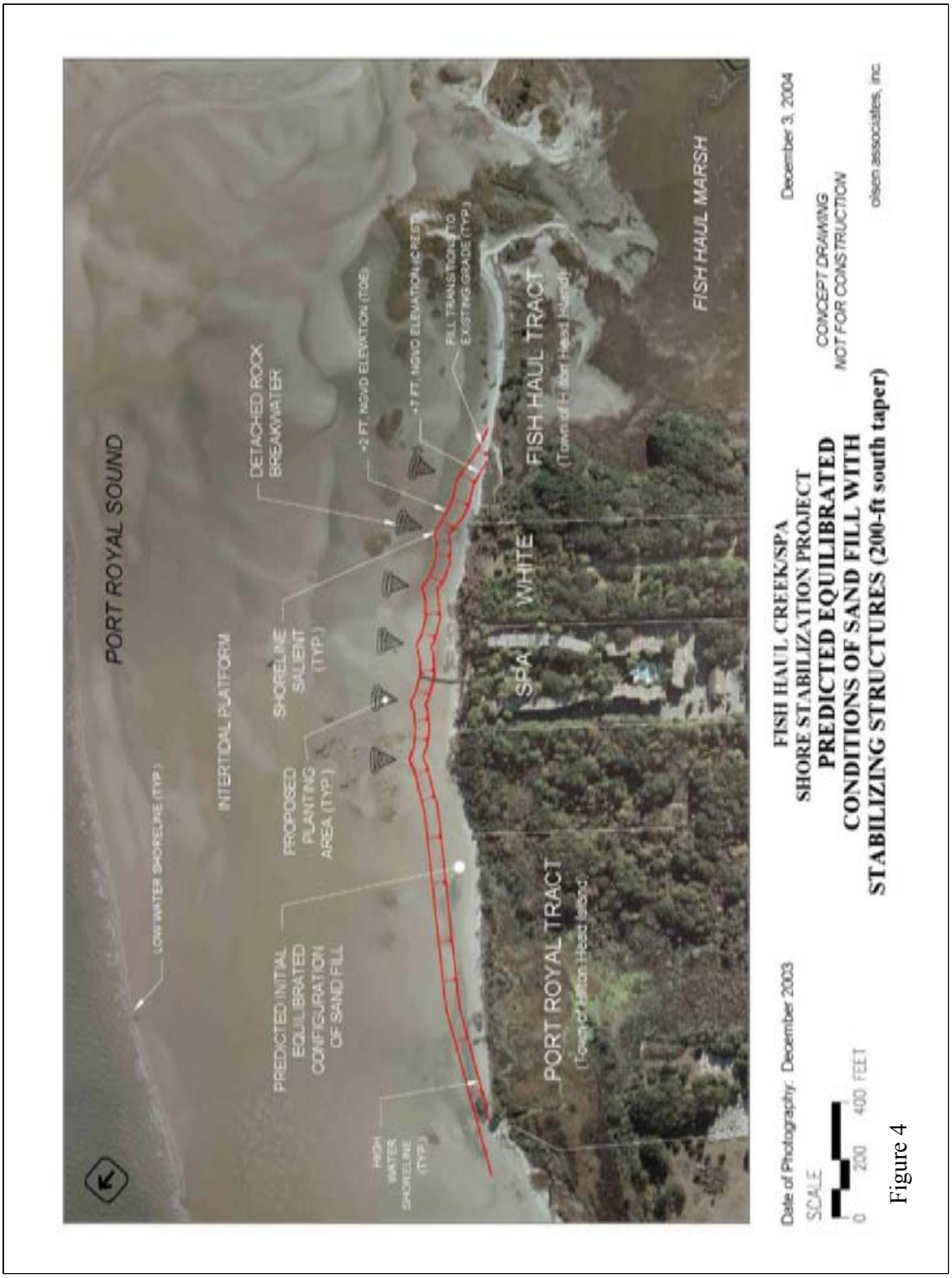


Figure 4

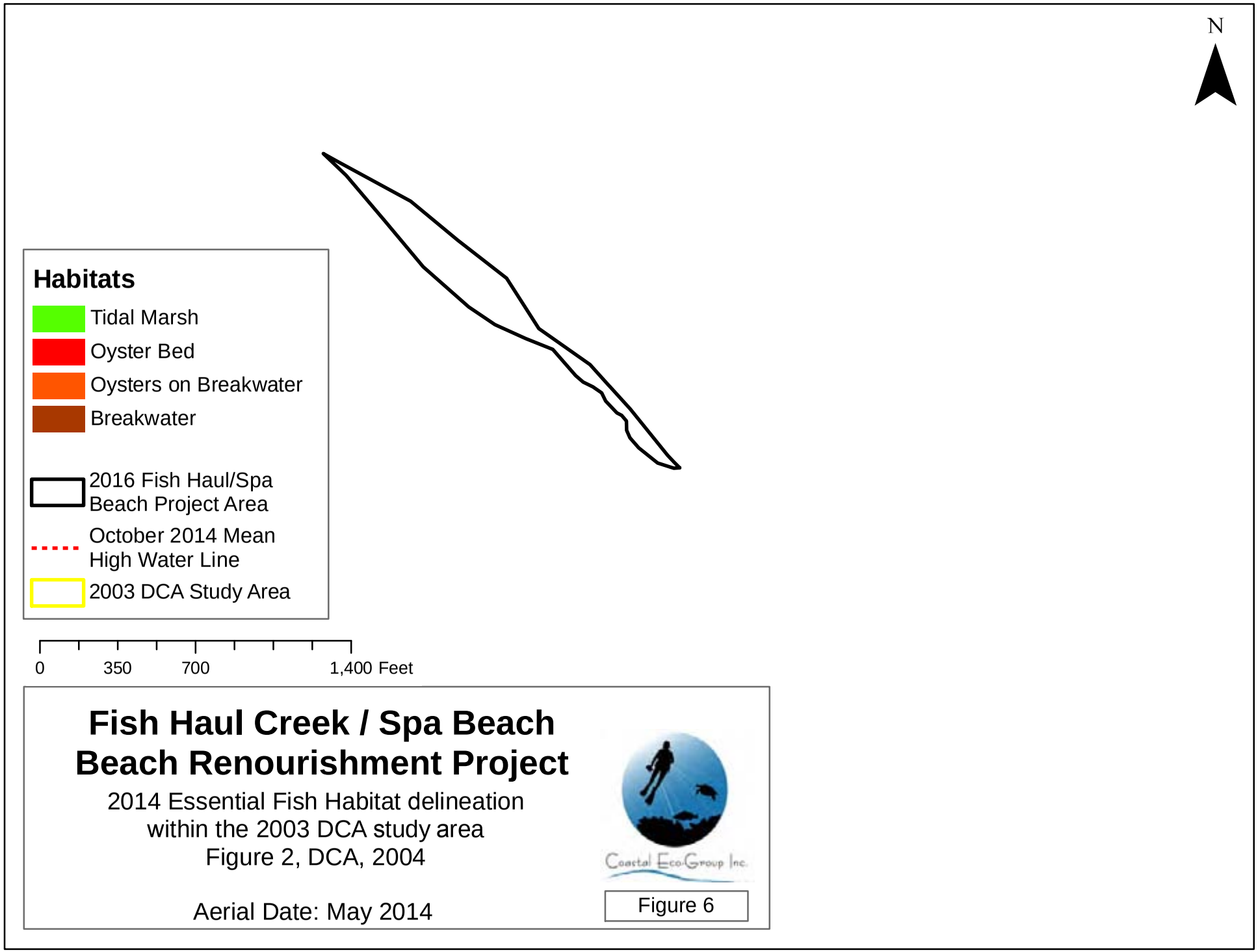
Figure 4. Predicted beach fill equilibration, breakwater structures, and *Spartina* planting areas for 2006/07 Fish Haul/Spa Beach Shoreline Restoration and Stabilization Project

Figure 5. Photos showing planting and expansion of marsh grass from May 2009 to October 2010.

The SAFMC broadly defines EFH habitats for all of its managed fisheries in a generic management plan amendment which contains life stage based EFH information for each of the managed species. Habitats identified in fisheries management plans (FMP) Amendments of the SAFMC as EFH are listed in **Table 1** (SAMFC, 2014).

Table 1. South Atlantic Fisheries Management Council Designated EFH

Estuarine Areas	Marine Areas
Estuarine Emergent Wetlands	Live / Hard Bottom/Worm Reefs
Estuarine Scrub-Shrub Mangroves	Coral and Coral Reef
Submerged Aquatic Vegetation	Artificial/Manmade Reefs
Oyster Reefs and Shell Banks	Sargassum
Intertidal Flats	Water Column
Palustrine Emergent and Forested Wetlands	
Aquatic Beds	
Water Column	


N
Habitats
Tidal Marsh
Oyster Bed
Oysters on Breakwater
Breakwater
2016 Fish Haul/Spa Beach Project Area
October 2014 Mean High Water Line
2003 DCA Study Area
0
350
700
1,400 Feet
Fish Haul Creek / Spa Beach Beach Renourishment Project
2014 Essential Fish Habitat delineation within the 2003 DCA study area
Figure 2, DCA, 2004
Aerial Date: May 2014
Coastal Eco-Group Inc.
Figure 6

2.1 Habitat Areas of Particular Concern

Provisions of the MSFCMA also include Habitat Areas of Particular Concern (HAPC). HAPCs are ecologically important subsets of identified EFH and are particularly susceptible to anthropogenic degradation. HAPC may include highly sensitive intertidal and estuarine habitats, habitats used for migration, spawning and nursery purposes, as well as offshore areas of high habitat value or vertical relief. HAPCs identified in the FMP amendments affecting the South Atlantic region include hermatypic coral habitat and reefs, hardbottoms, Hoyt Hills, Sargassum habitat, submerged aquatic vegetation, and state-designated areas of importance to managed species. There are no designated HAPCs within the proposed beach nourishment project area.

2.2 EFH within the Project Area

The three EFH categories present within the beach fill project area are water column, intertidal flats, and estuarine emergent wetland (*Spartina* tidal marsh). Oysters reefs are located immediately offshore of the project area and will not be impacted by the proposed project. Artificial oyster habitat was created on the geotextile mattresses on the waterward side of the breakwaters constructed during the 2006/07 project (**Photo 1** and **Figure 8**).

Figures 7 and **8** show benthic EFH in May 2008 and May 2014 within the 2006/07 project area, proposed 2016 project area, and adjacent areas from aerial photointerpretation and delineation. A ground-truthing survey of the May 2014 aerial photography was conducted on December 21 & 22, 2014. **Figures 9**, **9a, 9b** and **9c** show representative georeferenced photo locations from the December 2014 ground-truthing survey.

Photo 1. Artificial oyster habitat on the geotextile mattresses on the waterward side of the breakwaters. Photo taken on December 21, 2014.

2.2.1 *Estuarine/Marine Water Column*

Water column environments within the project fill area do not provide sufficient water depths for most fish species. Port Royal Sound is a high salinity estuary with an average salinity of 29 to 32 ppt throughout most of the system. Various life stages of spotted sea trout, flounder, black drum, red drum, blueline tilefish, and gag grouper may be found in the water column in the vicinity of the project area in Port Royal Sound. Penaeid shrimp also utilize the water column when migrating between offshore spawning areas and inshore nursery habitat. Coastal Migratory Pelagics (CMP) such as Spanish mackerel, and Highly Migratory Species (HMS) such as coastal sharks may be found in deeper water offshore of the project area in Port Royal Sound.

2.2.2 *Intertidal Flats*

Intertidal flats are critical components of coastal habitats, serving as nursery areas, refuges, and feeding grounds for a variety of animals (SAFMC, 2014). These habitats also play an important role in the ecological functions of South Atlantic estuarine ecosystems, particularly in respect to water quality and primary production. An important aspect of ecosystem function in intertidal flats is the ebb and flood of the tide over the flats; the flooding tide brings food and predators onto the flat while the ebbing tide provides residents a period of refuge from mobile predators. This dynamic environment provides nursery grounds for early life stages of various estuarine dependent, benthic species; refuges and foraging grounds for several forage species and juvenile fishes; and foraging grounds for specialized predators. Important fishes and invertebrates, including commercially important paralichthid flounders, red drum, spotted sea trout, mullet, gray snapper, blue crab, and penaeid shrimp utilize the intertidal flat as a nursery. The intertidal flats provide refuge for schools of anchovies, silversides, menhaden, spot, croaker, pinfish, mojarra, black seabass, and gag grouper. These species seek out the intertidal flats as refuge during emigration from estuarine nursery habitats to the sea, as well as utilizing this area to maintain their position within the system as current velocities on the flats area generally lower than deeper in the water column.

Intertidal flats also provide a rich and diverse feeding ground for many specialized predators including whelks, blue crabs, oysters and hard clams, predatory fishes, and shorebirds. Clams are common on the intertidal flats along the Port Royal Sound, and clamming has been observed along the project area shoreline. Two individuals were observed clamming on the intertidal flats just offshore of the project area at Mitchelville Beach Park on December 21, 2014, and several more individuals were observed clamming on the intertidal flats to the north of the project area. The majority of the proposed project area, approximately 6.95 acres, is intertidal flats.

2.2.3 Estuarine/Marine Emergent Wetlands

Estuarine emergent wetlands are described as tidal wetlands that occur in low-wave energy environments and have a salinity level greater than 0.5 ppt. Salinity levels can be highly variable owing to evaporation and the mixing of seawater and freshwater (SAFMC, 2014). Marine wetlands, however, are exposed to waves and currents of the open ocean and have a salinity greater than 30 ppt. The proposed project area is characteristic of marine wetlands.

South Carolina has the greatest acreage (365,900 acres; SAFMC, 2014) of salt marsh in the south Atlantic region of the United States. These emergent wetlands provide habitat for a variety of fish, shellfish, and other invertebrates, mammals, waterfowl, wading birds, shorebirds, reptiles, and amphibians. These groups include endangered and threatened species, as well as species of concern in two SAFMC management plans: the red drum fishery and the penaeid shrimp fishery (SAFMC, 2014). Detritus is the first food source for larval shrimp and the fry of most estuarine and many nearshore fish species.

Extensive *Spartina* marsh is present offshore of the seaward toe of fill in the southern half of the project area (**Figures 8** and **9**, **9a**-**9c**). Historically, *Spartina* was sparse along the shoreline within the beach project fill placement area (**Figure 7**). Habitat maps prepared by Dial Cordy and Associates, Inc. (DCA) prior to the 2006/07 beach nourishment project show 5.7 acres of tidal marsh within the 180-acre study area shown in **Figure 5**. The majority of the tidal marsh habitat was located south of the project area near the Fish Haul Creek and marsh entrance (DCA, 2004). Within the limits of the 2006/07 project area, there were 0.26 acres of *Spartina* in 2003, and 0.07 acres in May 2008, approximately one year after project completion.

As described in the Introduction, following construction of the 2006/07 beach nourishment project, the Town planted cordgrass to expand marsh habitat along the shoreline. The tidal marsh habitat within the 2006/07 project area limits had expanded to 13.5 acres in May 2014, a more than 50-X increase in total area in comparison to 2003. Within the limits of the proposed project area, there are a few areas of *Spartina* which totaled 0.09 acres in the May 2014 aerial photography (**Figure 9** and **9a**). Avoidance/minimization of impacts to tidal marsh harsh marsh are presented in Section 2.3.5; however, the beneficial effects of the *Spartina* plantings following the 2006/07 project have more than offset the proposed impacts within the project fill area.

2.2.4 Oyster Reefs

Oyster and shell bank essential fish habitat in the south Atlantic is characterized by natural structures located in the intertidal and subtidal zones along the shoreline (SAFMC, 2014 – Chapter 3). These structures are composed of oyster shell, live oysters, and other discrete organisms and are easily distinguished from scattered oysters in *Spartina* marshes and on mudflats. Approximately 95% of oysters in South Carolina occur in the intertidal (Lunz, 1952; SAFMC, 2014) from approximately one meter above mean low water to just below mean low water. Intertidal oysters are considered keystone species in an estuary, providing important habitat and improving water quality. Oyster reefs provide refuge and foraging area habitat for a variety of fishes and invertebrates including clams, mussels, anemones, polychaetes, amphipods, sponges, crabs, starfish, sea urchins, whelks, red and black drum, striped bass, sheepshead, weakfish, spotted sea trout, summer and southern flounder, and oystertoads.

Oyster reefs are present waterward of the *Spartina* tidal marsh in the southern half of the project area, offshore of the project toe of fill. There are 0.17 acres of oyster reefs/mounds in the May 2014 EFH benthic habitat map in the 2003 study area (**Figures 8** and **10**). An addition 0.04 acres of artificial oyster reef habitat was created during the 2006/07 project

on the marine mattress at the waterward end breakwaters (**Photo 1** and **Figure 8**). When examining the change in oyster reef distribution/area between the 2003 DCA and the October 2014 benthic habitat maps, there are more individual oyster reefs/mounds in May 2014 in comparison to 2003 with additional oyster reef habitat adjacent to the breakwaters and surrounded by new areas of *Spartina* marsh. However, the 2003 benthic map identified an overall total 0.37 acres of oyster reefs in the study area. When examining the 2003 delineations in detail to determine if there has been a decrease in oyster reef habitat offshore of the project fill area, it was discovered that the 2003 delineation of the largest oyster mound had over-delineated the actual extent of oyster reef within the polygon (**Figure 10**). When comparing consistent aerial interpretations between 2003 and 2014, the 0.29 acre oyster reef polygon in 2003 was actually occupied by only 0.08 acres of oyster reef with large sand gaps between individual mounds, and the overall area is nearly identical between years (0.18 in 2003 and 0.17 in 2014) (**Figure 10).**

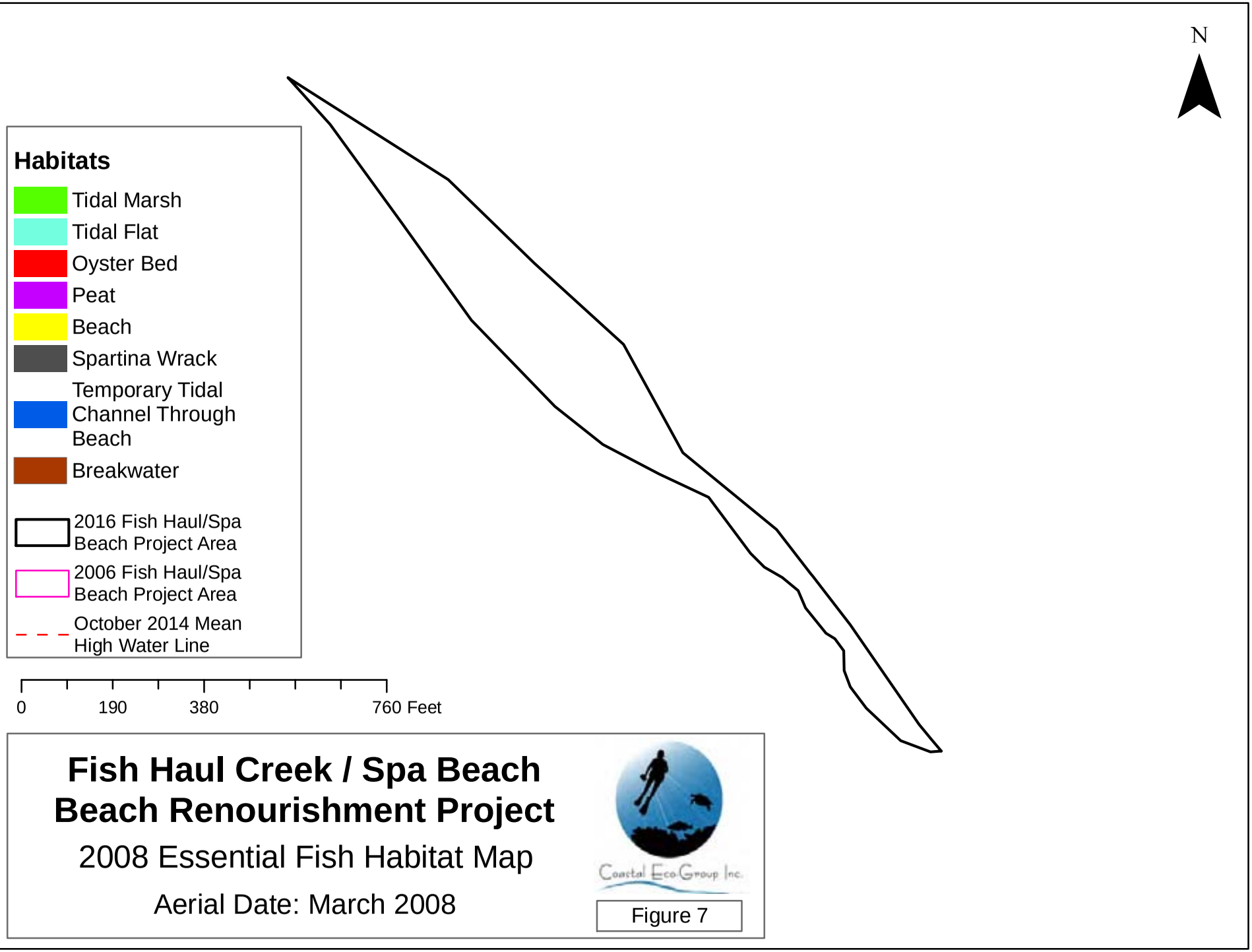
2.3 Impacts to EFH in the Project Area

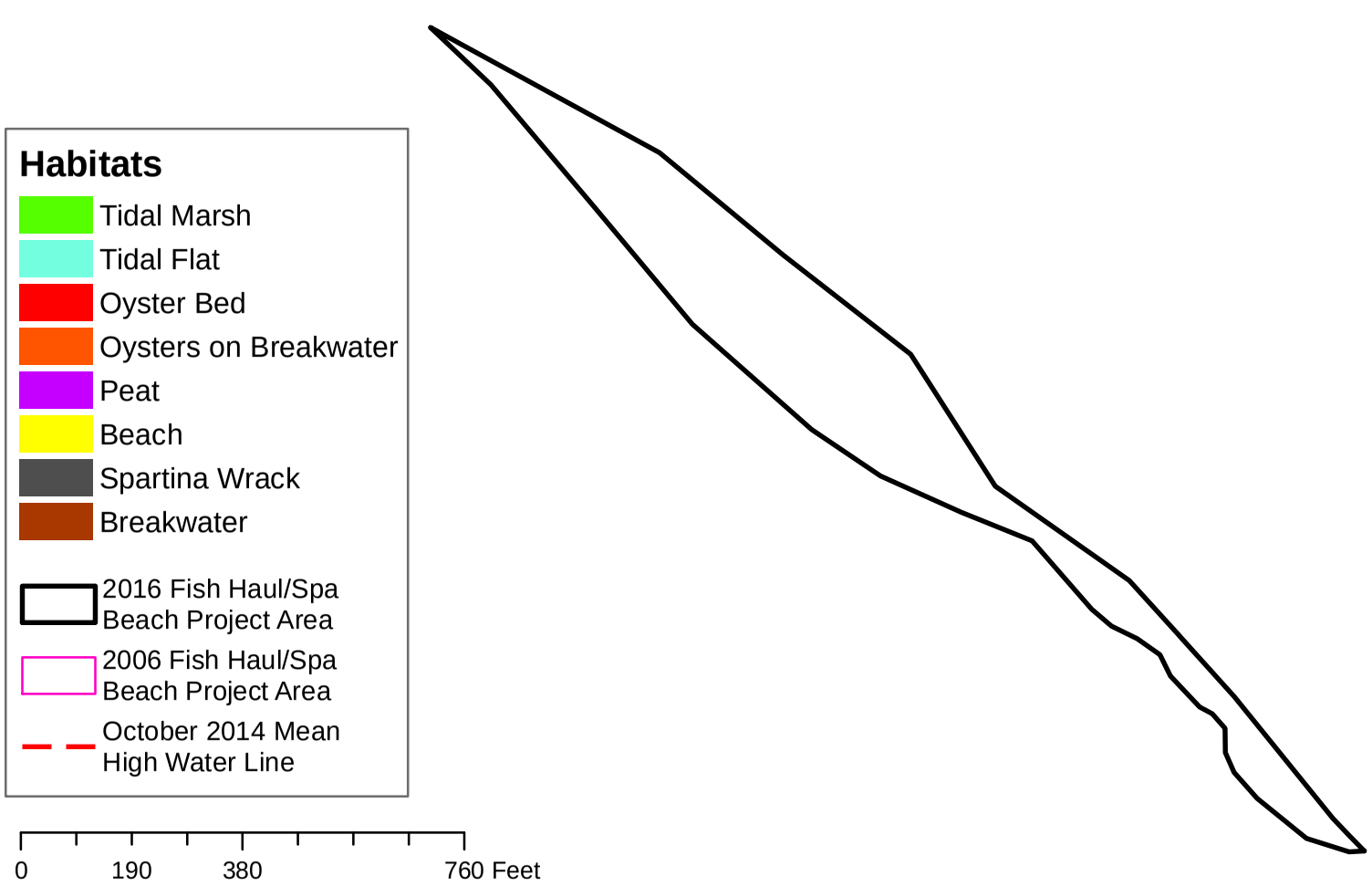
2.3.1 *Water Column*

Beach fill placement at the project site may cause temporary impacts in the water column during brief portions of the tidal cycle. Increased turbidity levels can deter certain fish species (eg. bluefish) from utilizing the area; however, some fish species may be attracted to these higher turbidity waters (Wilber et al., 2003). Higher suspended sediment concentrations can adversely affect the feeding behavior and physiology of visually-orienting estuarine fishes. Site selection exhibited by fish species suggests that fish have the ability to select sites based on preferences to environmental conditions, allowing them to avoid areas with elevated turbidity. The total period of beach fill placement will be less than 20 days.

2.3.2 *Intertidal Flats*

The direct placement of sand will result in the burial of benthic infauna in 6.95 acres of intertidal flat habitat along the proposed 2,000 ft. of project shoreline. Sand placement will result in nearly complete mortality of benthic infauna, temporarily reducing prey availability for six months to one year based upon the compatibility of the sand source with the existing beach and low silt/clay content. The predicted recovery of the macroinvertebrate community following burial of intertidal flat habitat will be assessed through continuation of the piping plover foraging impact study for the Town of Hilton Head island-wide project (P/N SAC-2014-00680-1W). Revisions to the Piping Plover Foraging Habitat Monitoring Plan were proposed in the Biological Assessment for the 2015/16 Hilton Head Island Nourishment Project (CEG, 2014); this plan will be finalized in the USFWS Biological Opinion for the project. The monitoring program will document impacts to and recovery of the macroinvertebrate community on the tidal flats in the Port Royal Sound and "The Heel" segments of the project area. Additional data on the recovery of macroinvertebrate populations following beach sand placement will be available from the one-year post-construction monitoring of the 2014 Ocean Point project fill area that was conducted during the Year 3 post-construction surveys for the 2011/12 Port Royal Sound Shoreline Stabilization Project. These data will provide valuable information concerning the recovery time of prey abundance, diversity and foraging habitat quality for shorebirds and fishes.


N
Habitats
Tidal Marsh
Tidal Flat
Oyster Bed
Peat
Beach
Spartina Wrack
Temporary Tidal Channel Through Beach
Breakwater
2016 Fish Haul/Spa Beach Project Area
2006 Fish Haul/Spa Beach Project Area
October 2014 Mean High Water Line
0
190
380
760 Feet
Fish Haul Creek / Spa Beach
Beach Renourishment Project
2008 Essential Fish Habitat Map
Aerial Date: March 2008
Coastal Eco-Group Inc.
Figure 7



Fish Haul Creek / Spa Beach Beach Renourishment Project

2014 Essential Fish Habitat Map

Aerial Date: May 2014

Coastal Eco-Group Inc.

Figure 8

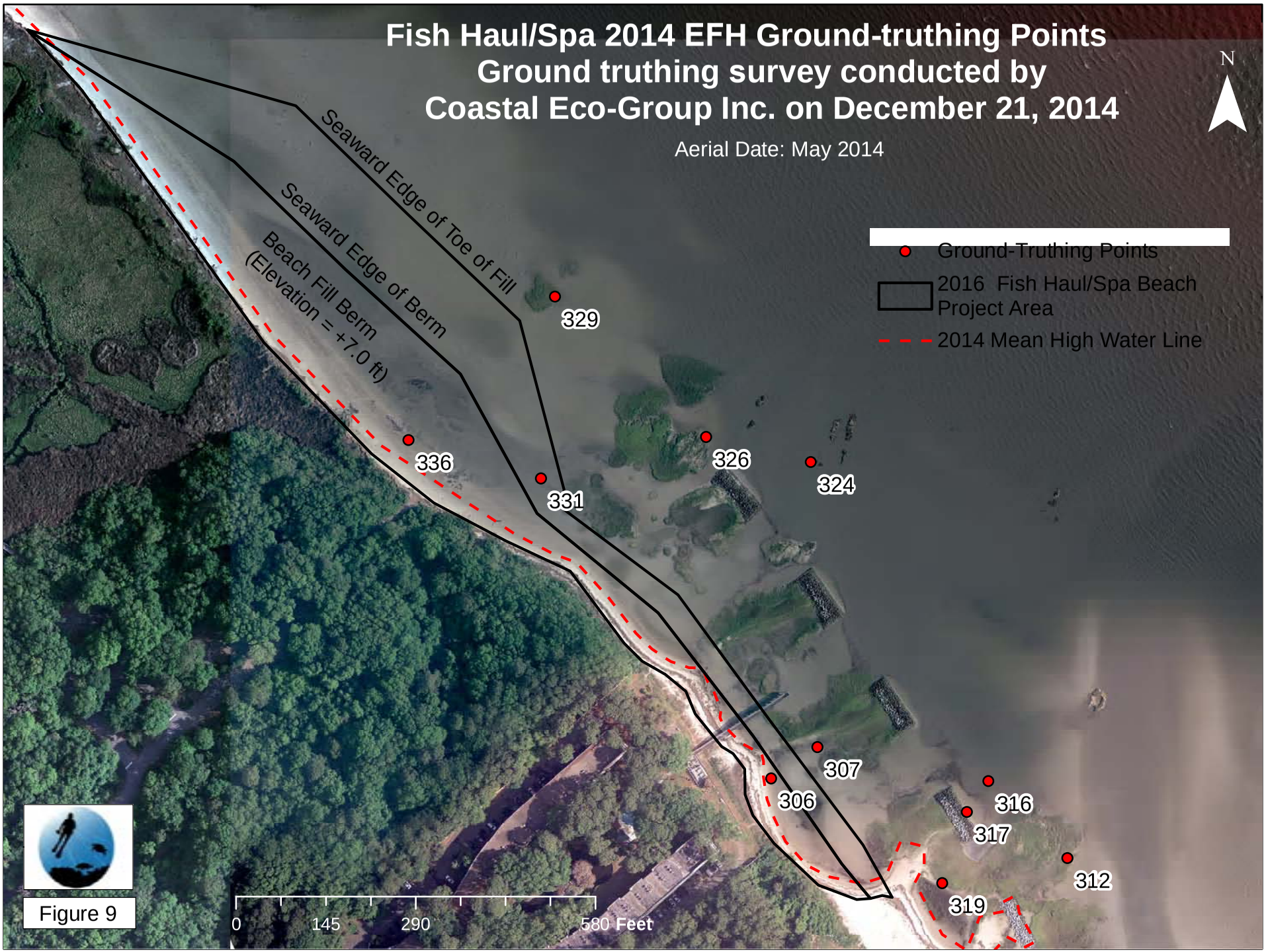

Fish Haul/Spa 2014 EFH Ground-truthing Points
Ground truthing survey conducted by
Coastal Eco-Group Inc. on December 21, 2014
Aerial Date: May 2014
N
Seaward Edge of Toe of Fill
Seaward Edge of Berm
Beach Fill Berm
(Elevation = +7.0 ft)
Ground-Truthing Points
2016 Fish Haul/Spa Beach Project Area
2014 Mean High Water Line
329
336
331
326
324
307
306
316
317
312
319
0
145
290
580 Feet

Figure 9

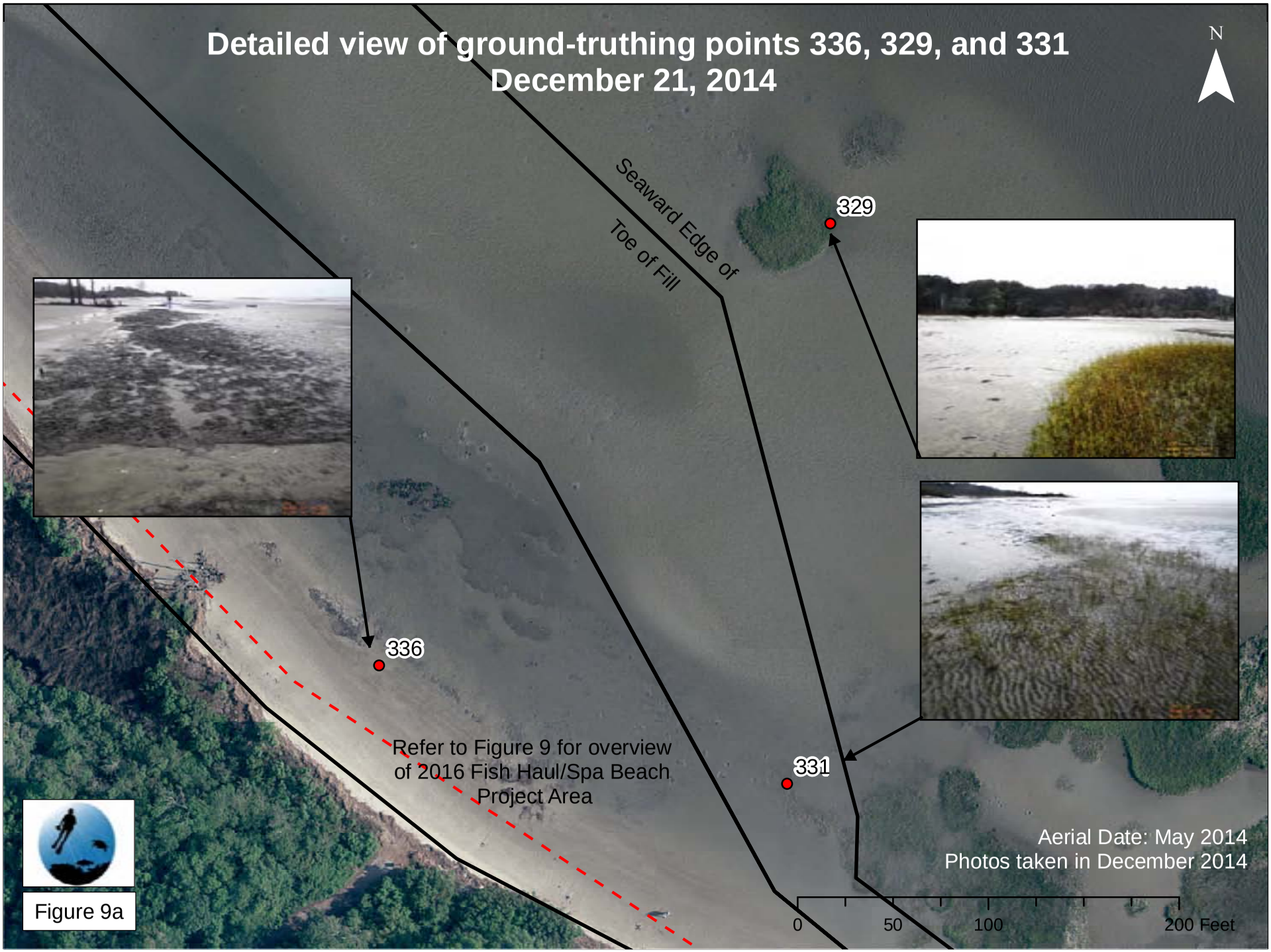
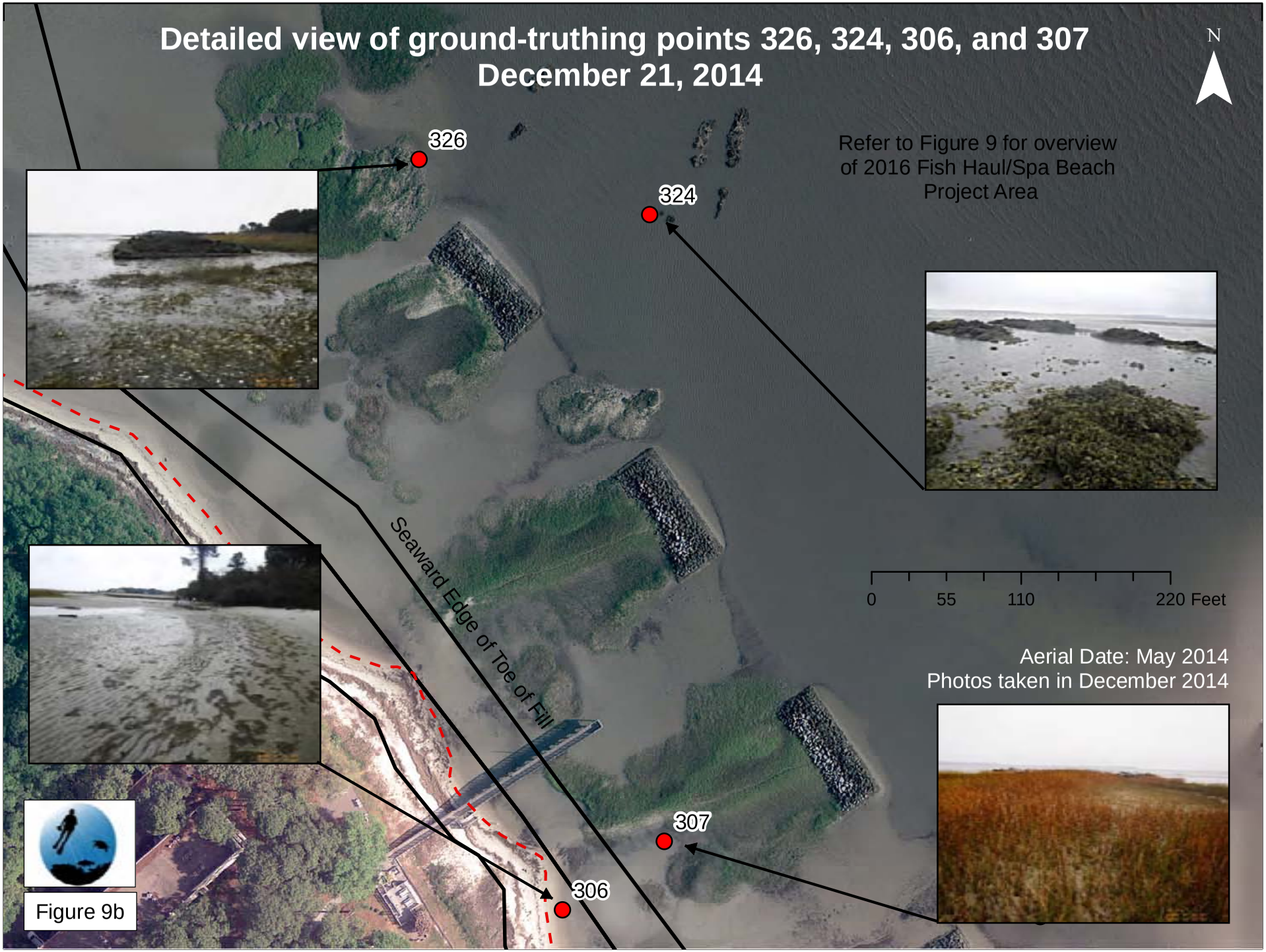

Detailed view of ground-truthing points 336, 329, and 331
December 21, 2014
N
Seaward Edge of
Toe of Fill
329
336
331
Refer to Figure 9 for overview
of 2016 Fish Haul/Spa Beach
Project Area
Aerial Date: May 2014
Photos taken in December 2014
0
50
100
200 Feet

Figure 9a


Detailed view of ground-truthing points 326, 324, 306, and 307
December 21, 2014
N
326
324
307
306
Refer to Figure 9 for overview of 2016 Fish Haul/Spa Beach Project Area
Seaward Edge of Toe of Fill
0
55
110
220 Feet
Aerial Date: May 2014
Photos taken in December 2014
Figure 9b

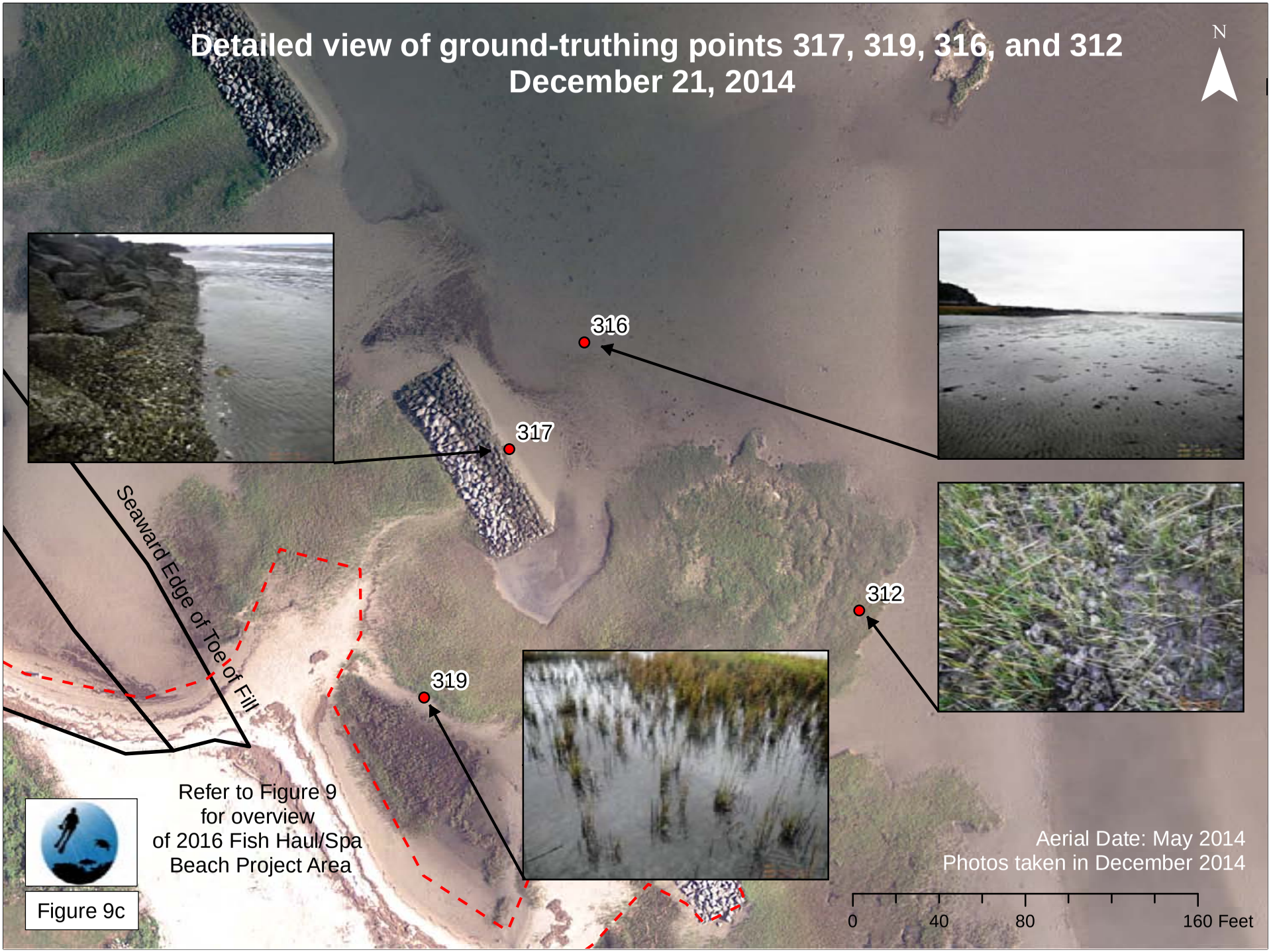

Detailed view of ground-truthing points 317, 319, 316, and 312
December 21, 2014
N
316
317
312
319
Seaward Edge of Toe of Fill
Refer to Figure 9
for overview
of 2016 Fish Haul/Spa
Beach Project Area
Aerial Date: May 2014
Photos taken in December 2014
0
40
80
160 Feet

Figure 9c


DCA Delineation:
0.29 acres
CEG Delineation:
0.08 acres
Oyster Bed Delineations
DCA Delineation of 2003 Oyster Bed
CEG Delineation of 2003 Oyster Bed

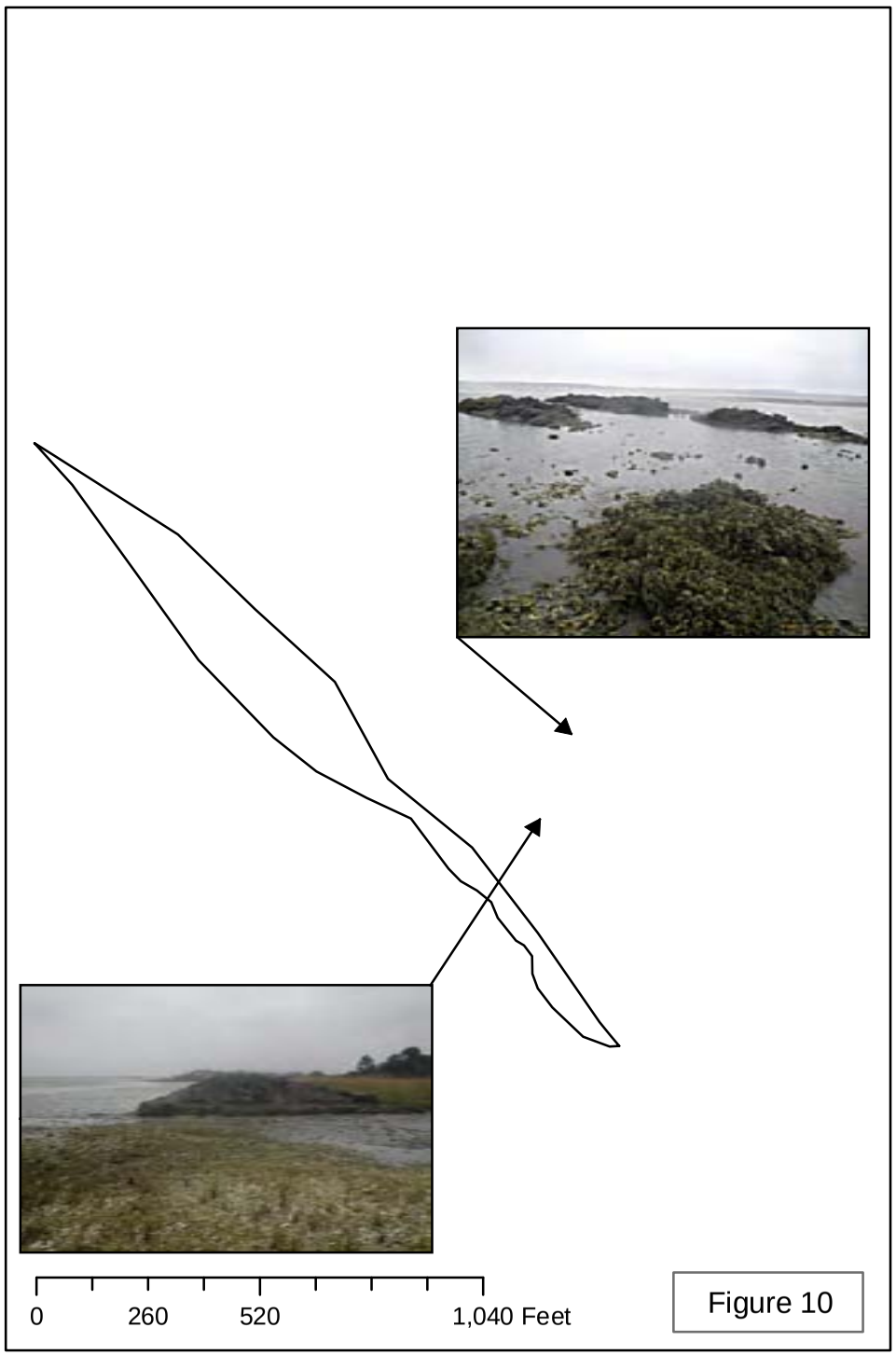

0
260
520
1,040 Feet

Figure 10

2.3.3 *Estuarine/ Marine Emergent Wetlands*

The project will directly impact 0.09 acres of *Spartina* in the project fill area based on the May 2014 aerial interpretation (**Figure 6**). In the north half of the project area, several small patches of emergent marsh totaling 0.02 acres were identified in the May aerial photography just offshore of Mitchelville Park. Emergent vegetation was not observed at this location during the December 2014 ground-truthing survey. A site inspection was conducted on February 2, 2015 to verify the December observations. The site visit verified that no emergent vegetation is currently present in this area (**Photos 2a** and **2b**). The area is characterized by extensive peat deposits.

Sand for the southeastern half of the project, where the construction template has been altered to avoid impacts to emergent vegetation, will be stockpiled on the western half of the segment for mechanical transport across the site, further reducing the risk of direct and secondary impacts to tidal marsh habitat.

Photo 2. **a)** View of the shoreline from the May 2014 *Spartina* patch location within the beach fill area at Mitchelville Park; and **b)** Offshore view from the patch location showing no emergent vegetation landward or within the patch location. Photos taken on February 2, 2015.

2.3.4 *Oyster Reefs*

There are no oyster reefs inside the limits of the proposed project area; the beach fill design was reduced to avoid impacts to these habitats in the southern half of the project area. The proposed sand source is beach compatible with low silt content and should produce very little turbidity at the beach disposal site. Additionally, the sand in the southern portion of the project area will be stockpiled on the beach moved landward with equipment to avoid turbidity impacts and minimize impacts to the *Spartina* marsh.

2.3.5 Avoidance and Minimization

When considering beach losses and shoreline erosion since completion of the 2006/07 project, re-filling the prior construction template, amounting to approximately 60,000 cy of fill, was the preferred alternative. However, significant areas of *Spartina* marsh have flourished in the lee of the breakwaters since project construction, particularly at the south eastern limit of the project segment. These tidal marsh habitats would be directly buried by fill placement if the entire 2006/07 design template is filled to capacity. To avoid and minimize potential impacts to marsh grass, the project fill length was reduced from 2,200

ft. to 2,000 ft., and the fill volume was reduced and steepened such that the toe of fill falls landward of the tidal marsh habitat in the south half of the project. The ultimate volume of sand will be based upon need and avoidance of impacts to marsh grass beds at the time of construction.

Table 2 shows the changes in *Spartina* marsh habitat from 2003 to 2014 in the 2006/07 project area, demonstrating the beneficial effects of the 2009 planting. **Table 3** shows the expansion of intertidal flats and *Spartina* salt marsh habitats within the 2006/07 and 2016 project areas between 2008 and 2014. The avoidance/minimization measures of the 2016 project design have reduced impacts to *Spartina* marsh by 2.2 acres; impacts to intertidal flats have been reduced by 1.61 acres (**Table 4**).

Table 2. *Spartina* tidal marsh habitat (acres) within the 2003 study area, the 2006/07 project fill template, and the 2016 project area in 2003, 2008, and 2014.

Dial Cordy Study Area		**2006/07 Project Area**		**2016 Project Area**	
2003	**2014**	**2008**	**2014**	**2008**	**2014**
5.70	13.44	0.07	2.31	0.00	0.09

Note: Dial Cordy Study Area 2003 acreage from DC, 2004; all remaining acreages were calculated by CEG.

Table 3. EFH areas (acres) within the 2006/07 project area and the 2016 project area in 2008 (1-year post-construction) and 2014

Impacted EFH	**2008 EFH Acreages 2006/07 Project Area**	**2008 EFH Acreages 2016 Project Area**	**2014 Acreages 2006/07 Project Area**	**Expansion of EFH from 2008 to 2014 in the 2006/07 Project Area(acres)**
Intertidal Flats	5.67	1.98	8.56	2.89
Estuarine Emergent Vegetation	0.07	0.00	2.31	2.24

Note: 2008 acres are one year post-construction from the 2006/07 beach nourishment project and one year prior to the May 2009 *Spartina* planting.

Table 4. EFH impacts from the proposed 2016 nourishment project based on May 2014 habitat delineations, showing reduction in impacts to intertidal flats and *Spartina* tidal marsh from minimized project design.

Impacted EFH	**2014 EFH Acreages 2006/07 Project Area**	**2014 EFH Acreages 2016 Project Area**	**Total Reduction in EFH Impacts (acres)**
Intertidal Flats	8.56	6.95	1.61
Estuarine Emergent Vegetation	2.31	0.09	2.22

3.0 MANAGED SPECIES

A complete list of the SAFMC federally managed fish species and their respective FMP's within the vicinity of the project area is included in **Table 5** (SAMFC, 2014a). Descriptions of managed species expected to occur within the Fish Haul/Spa Beach project area are provided in this section.

3.1 Coastal Migratory Pelagic and Highly Migratory Species

Coastal migratory pelagic species include King mackerel, Spanish mackerel, and cobia are managed jointly by the Gulf of Mexico and South Atlantic Fisheries Management Councils. These species are common offshore of Hilton Head Island and considered important species for recreational fisheries. While juveniles can be found in the beach surf along Hilton Head Island, water depth over the high portion of the intertidal flat in the project area is insufficient to support these species.

Highly migratory species include tuna, sharks, swordfish, and billfish. The Atlantic Highly Migratory Species Management Division manages those species that live throughout the Atlantic Ocean and Gulf of Mexico (NMFS, 2014a). Because these species migrate long distances and cross domestic and international boundaries, NOAA Fisheries HMS division is responsible for managing them under the Magnuson-Stevens Fishery Conservation and Management Act. The proposed project area is intertidal estuarine bottom, and water depth is insufficient to support these species.

3.2 Snapper-Grouper Complex

Of the 8 fisheries managed by the SAFMC, the snapper-grouper complex is the only one containing species that are overfished despite both the recreational and the commercial snapper-grouper fisheries being highly regulated. This fishery has the greatest species richness of the eight managed fisheries with 59 listed species. Additionally, many of the species in the snapper-grouper complex are long-lived, slow growing, and late to mature, making this fishery difficult to manage. Several of the species in this complex are estuarine and nearshore dependent for specific life stages.

Essential fish habitat for these species of the snapper-grouper complex includes area inshore of the 200-m contour, such as submerged aquatic vegetation, estuarine emergent wetlands, tidal creeks, estuarine scrub/shrub, oyster reefs and shell banks, unconsolidated bottom, artificial reefs, and coral reefs and live hardbottom. All three categories of EFH within the project area may support various life stages of species in the snapper-grouper complex; although species within this complex are most likely to use the tidal marsh and oyster reefs located waterward of the project area. After spawning in the Atlantic Ocean, black sea bass enter estuarine waters as fry; this species is likely to utilize EFH within the vicinity of the project area. However, based on the small size of the project area and short period of construction, the proposed project should not adversely affect the species of the snapper-grouper complex.

Table 5. Fishery Management Plans and Managed Species for the SAFMC (revised 9/2014)

Fishery Management Plan Name	Managed Species
Shrimp FMP	Brown shrimp *Farfantepenaeus aztecus* Pink shrimp *Farfantepenaeus duorarum* Rock shrimp *Sicyonia brevirostris* Royal red shrimp *Pleoticus robustus* White shrimp *Litopenaeus setiferus*
Coastal Migratory Pelagic FMP	Cobia *Rachycentron canadum* King mackerel *Scomberomorus cavalla* Spanish mackerel *Scomberomorus maculatus*
Red Drum FMP (A)	Red drum *Sciaenops ocellatus*
Golden Crab FMP	Golden crab *Chaceon fenneri*
Spiny Lobster FMP	Spiny lobster *Panulirus argus*
Coral and Coral Reef FMP	Class Anthozoa (sea fans, whips, precious corals, sea pens and scleractinian corals) and Class Hydrozoa (fire corals and hydrocorals)
Dolphin-Wahoo FMP	Dolphin fish *Coryphaena hippurus* Wahoo *Acanthocybium solanderi*
Sargassum FMP	*Sargassum fluitans* *Sargassum natans*
Snapper-Grouper FMP Sea basses and Groupers (Serranidae) – 20 species	Bank sea bass *Centropristis ocyurus* Black grouper *Mycteroperca bonaci* Black sea bass *Centropristis striata* Coney *Cephalopholis fulva* Gag *Mycteroperca microlepis* Goliath grouper *Epinephelus itajara* Graysby *Cephalopholis cruentata* Misty grouper *Epinephelus mystacinus* Nassau grouper *Epinephelus striatus* Red grouper *Epinephelus morio* Red hind *Epinephelus guttatus* Rock hind *Epinephelus adcensionis* Rock sea bass *Centropristis philadelphica* Scamp *Mycteroperca phenax* Snowy grouper *Epinephelus niveatus* Speckled hind *Epinephelus drummondhayi* Warsaw grouper *Epinephelus nigritus* Yellowedge grouper *Epinephelus flavolimbatus* Yellowfin grouper *Mycteroperca venenosa* Yellowmouth grouper *Mycteroperca interstitialis*
Triggerfishes (Balistidae) - 2 species	Gray triggerfish *Balistes capriscus* Ocean triggerfish *Canthidermis sufflamen*
Wrasses (Labridae) - 1 species	Hogfish *Lachnolaimus maximus*
Spadefishes (Eppiphidae) - 1 species	Atlantic spadefish *Chaetodipterus faber*
Wreckfish (Polyprionidae) - 1 species	Wreckfish *Polyprion americanus*

Table 5 (cont.) Fishery Management Plans and Managed Species for the SAFMC

Fishery Management Plan Name	Managed Species
Snapper-Grouper FMP (cont.) Snappers (Lutjanidae) – 14 species	Black snapper *Apsilus dentatus* Blackfin snapper *Lutjanus buccanella* Cubera snapper *Lutjanus cyanopterus* Dog snapper *Lutjanus jocu* Gray snapper *Lutjanus griseus* Lane snapper *Lutjanus synagris* Mahogany snapper *Lutjanus mahogoni* Mutton snapper *Lutjanus analis* Queen snapper *Etelis oculatus* Red snapper *Lutjanus campechanus* Schoolmaster *Lutjanus apodus* Silk snapper *Lutjanus vivanus* Vermilion snapper *Rhomboplites aurorubens* Yellowtail snapper *Ocyurus chrysurus*
Porgies (Sparidae) - 7 species	Jolthead porgy *Calamus bajonado* Knobbed porgy *Calamus nodosus* Longspine porgy *Stenotomus caprinus* Red porgy *Pagrus pagrus* Saucereye porgy *Calamus calamus* Scup *Stenotomus chrysops* Whitebone porgy *Calamus leucosteus*
Grunts (Haemulidae) - 5 species	Cottonwick *Haemulon melanurum* Margate *Haemulon album* Sailor's choice *Haemulon parra* Tomtate *Haemulon aurolineatum* White grunt *Haemulon plumieri*
Jacks (Carangidae) - 5 species	Almaco jack *Seriola rivoliana* Banded rudderfish *Seriola zonanta* Bar jack *Caranx ruber* Greater amberjack *Seriola dumerili* Lesser amberjack *Seriola fasciata*
Tilefishes (Malacanthidae) - 3 species	Blueline tilefish *Caulolatilus microps* Sand tilefish *Malacanthus plumier* Golden Tilefish *Lopholatilus chamaeleonticeps*
Bluefish FMP (A)	Bluefish (*Pomatomus saltatrix*)
Summer Flounder FMP (A)	Summer flounder (*Paralichthys dentatus*)

A = Species managed by the Atlantic States Marine Fisheries Commission

3.3 Penaeid Shrimp

3.3.1 White Shrimp (Litopenaeus setiferus)

White shrimp are distributed through the western Atlantic Ocean from New York to Campeche, Mexico, including the Gulf of Mexico. This species thrives in estuaries on muddy bottoms and is most abundant in areas with extensive estuarine marshes, such as those along the South Carolina coast (SCDNR, 2014a). Approximately 3 weeks after mating, post-larval shrimp enter the estuaries via tide and wind generated currents and migrate upstream to their preferred nursery grounds. In South Carolina, recruitment of white shrimp into estuaries occurs between May and September, with peak recruitment in late May and early June (SCDNR, 2014a). Within the estuary, young white shrimp move into tidal creeks to forage and seek protection from predators; these shrimp remain in the nursery habitat until late spring/early summer when they migrate into larger creeks and eventually offshore to spawn. White shrimp are the first of the penaeid shrimp species to be commercially harvested and marketed for consumption. The penaeid shrimp fishery is the most important fishery in South Carolina with landing of white and brown shrimp totaling $12.2 million in 1996 (SCDNR, 2014a).

3.3.2 Brown Shrimp (Farfantepenaeus aztecus)

Brown shrimp are distributed from Massachusetts to the Yucatan in Mexico, including the Gulf of Mexico and the Florida Keys. Similar to white shrimp, brown shrimp are typically found over muddy bottoms in estuaries. The life history of the brown shrimp is similar to that of the white shrimp. The species is estuary dependent, utilizing tidal creeks and rivers as nursery habitat. Brown shrimp are also commercially harvested and contribute to the penaeid fishery in South Carolina.

3.3.3 Pink Shrimp (Farfanepenaeus duorarum)

Pink shrimp are distributed from the Chesapeake Bay to the Yucatan in Mexico, including the Gulf of Mexico and the Florida Keys. The life history of the pink shrimp is similar to that of the white shrimp. The spawning period of pink shrimp occurs during the spring and summer, overlapping the spawning period of the white shrimp. The species is estuary dependent, utilizing tidal creeks and rivers as nursery habitat. However, unlike white and brown shrimp, pink shrimp prefer sandy/shelly bottoms; which may explain the lower abundance of pink shrimp relative to the other two penaeid species. Pink shrimp are also commercially harvested and contribute to the penaeid fishery in South Carolina.

3.4 Atlantic States Marine Fisheries Commission Managed Species

3.4.1 Red Drum (Sciaenops ocellatus)

Red drum are distributed from Cape Cod, MA to Tuxpan, Mexico in the western Atlantic Ocean (FLMNH, 2014a). Adult red drums are typically found along nearshore and inshore bottom habitats, including tidal creeks, oyster reefs, and beaches over sandy and sandy-mud bottoms. Juveniles, however, inhabit estuaries near shallow tidal creeks and salt marshes, typically over grass edges or near oyster reefs; subadults reside in larger tidal creeks, rivers, and the front beaches of barrier islands (SCDNR, 2014b). Throughout all life stages, red drum are predatory foragers feeding primarily on menhaden, spot, anchovies, and crab as adults and small shrimp, juvenile spot, mud minnows, mud crabs and fiddler crabs as juveniles. Red drum are year round residents in South Carolina. While

no commercial fishery exists for red drum in South Carolina, this species is a heavily targeted in recreational fisheries throughout the state.

3.4.2 Bluefish (Pomatomus saltatrix)

Bluefish occur in temperate and tropical water around the globe with the exception of the eastern Pacific Ocean. Along the East Coast of the U.S., bluefish range from Maine to eastern Florida. Bluefish spawn offshore in the open ocean; the larvae develop in continental shelf water and migrate into nearshore habitats and estuaries (Fishwatch, 2014a). Juveniles typically inhabit sandy bottoms, but have been observed over muddy bottoms and in vegetated areas. Adult bluefish reside both inshore and offshore. In South Carolina, both juveniles and adults are present in estuarine and coastal waters. Bluefish are caught in both commercial and recreational fisheries. On Hilton Head Island, fishing charters target bluefish during the spring months. This species is currently managed under the joint management authority of the Mid-Atlantic Fisheries Mangement Council and the Atlantic States Marine Fisheries Commission.

3.4.3 Summer flounder (Paralichthys dentatus)

The summer flounder's range spans from Nova Scotia, Canada in the north along the east coast south to Florida; however this species is the most abundant in the Mid-Atlantic from Massachusetts to North Carolina. Summer flounder inhabit both inshore and offshore waters throughout their life cycle. Spawning occurs offshore and the larvae migrate to nursery areas in coastal and estuarine areas (ASMFC, 2014). Juvenile summer flounder are typically found buried in the sediments of marsh creeks, muflats, seagrass beds, and open bays; adults mostly inhabit sandy areas along the sea floor but are also known to occur in marsh creeks, seagrass beds, and sand flats (Fishwatch, 2014b).

3.5 Impacts to Managed Species

3.5.1 Atlantic States Marine Fisheries Commission Managed Species

All three species managed by the ASFCM have the potential for temporary impacts from project construction. Adult and juvenile life stages of red drum and bluefish and the adult, juvenile and larval stages of the summer flounder are common in the coastal and estuarine waters of South Carolina. The intertidal flats, tidal marsh, and water column within project area provide essential fish habitat for the three ASMFC fish species that occur in the area. All three of these species are predatory feeders; common prey items for each of these species are typical in the habitats found within the project area. Loss of habitat and reduction in the availability of prey items will impact all life stage of the red drum, bluefish, and summer flounder.

4.0 CONCLUSIONS

The proposed project will temporarily impact 6.95 acres of intertidal flats and directly impact 0.09 acres of *Spartina* tidal marsh. **Table 6** lists the potential temporary and short-term impacts to EFH as a result of sand placement activities within the fill site of the Fish Haul/Spa Beach Renourishment Project area.

Table 6. Potential impacts to EFH as a result of sand placement activities within the fill site of the Fish Haul/Spa Beach Renourishment Project area

Essential Fish Habitat	Potential Beach Fill Related Impacts
Estuarine/Marine Water Column	Temporary reduction in water clarity from increased suspended sediment concentrations as a result of sand placement activities.
Intertidal Flat	Sand placement on the intertidal flats will result in burial of benthic infauna reducing the quality of foraging habitat for shorebirds and surf zone fishes. Approximately 6.95 acres of intertidal flat will be temporarily impacted by sand placement.
Oyster Reefs	There are no oyster reefs within the boundaries of the beach fill area, therefore no impacts are expected as a result of project construction.
Estuarine Emergent Vegetation	Approximately 0.09 acres of tidal marsh are present within the proposed beach fill site; sand placement in the fill site will result in the burial of this habitat.

Note: All acreages for impacted EFH were calculated by CEG from aerial photointerpretation and delineation of habitats (May 2014); ground-truthing surveys were conducted in December 2014.

The short-term impact to 6.95 acres of tidal flat habitat from the proposed beach fill represents approximately 1.5% of the tidal flat habitat available along Port Royal Sound in the study area shown in **Figure 11**. When considering the combined fill placement of the Fish Haul/Spa nourishment project, and the Port Royal and Heel segments of the 2015/16 Hilton Head Beach Nourishment Project along the Port Royal Sound shoreline, the total temporary impact is 3.6% of the approximate 639.5 acres of tidal flats in the study area shown in **Figure 12**. These impacts will be temporary and rapid recovery of benthic invertebrates is anticipated following project construction. These species are characterized by rapid development, fast growth, frequent reproduction, and high recruitment rates (McCall, 1977).

One of the beneficial effects of the 2006/07 project was the creation of EFH through planting of *S. alterniflora* landward of the breakwaters. Renourishment of the beach within the 2006/07 project footprint would result in the burial of 2.31 acres of *Spartina* marsh. To avoid and minimize potential impacts to marsh grass, the proposed project fill length was reduced, and the fill volume was reduced and steepened such that the toe of fill falls landward of the tidal marsh habitat in the south half of the project. Only 0.09 acres of *Spartina* marsh will be affected by beach fill activities. The tidal marsh habitat within the 2006/07 project area limits had expanded to 13.5 acres in May 2014, a nearly 50-X increase in total area in comparison to 2003. The beneficial effects of the *Spartina* plantings following the 2006/07 project have more than offset the proposed impacts to 0.09 acres of patchy *Spartina* within the project fill area.

The proposed project will not have a substantial individual or cumulative adverse impact on EFH or fisheries managed by the South Atlantic Fishery Management Council and the National Marine Fisheries Services.

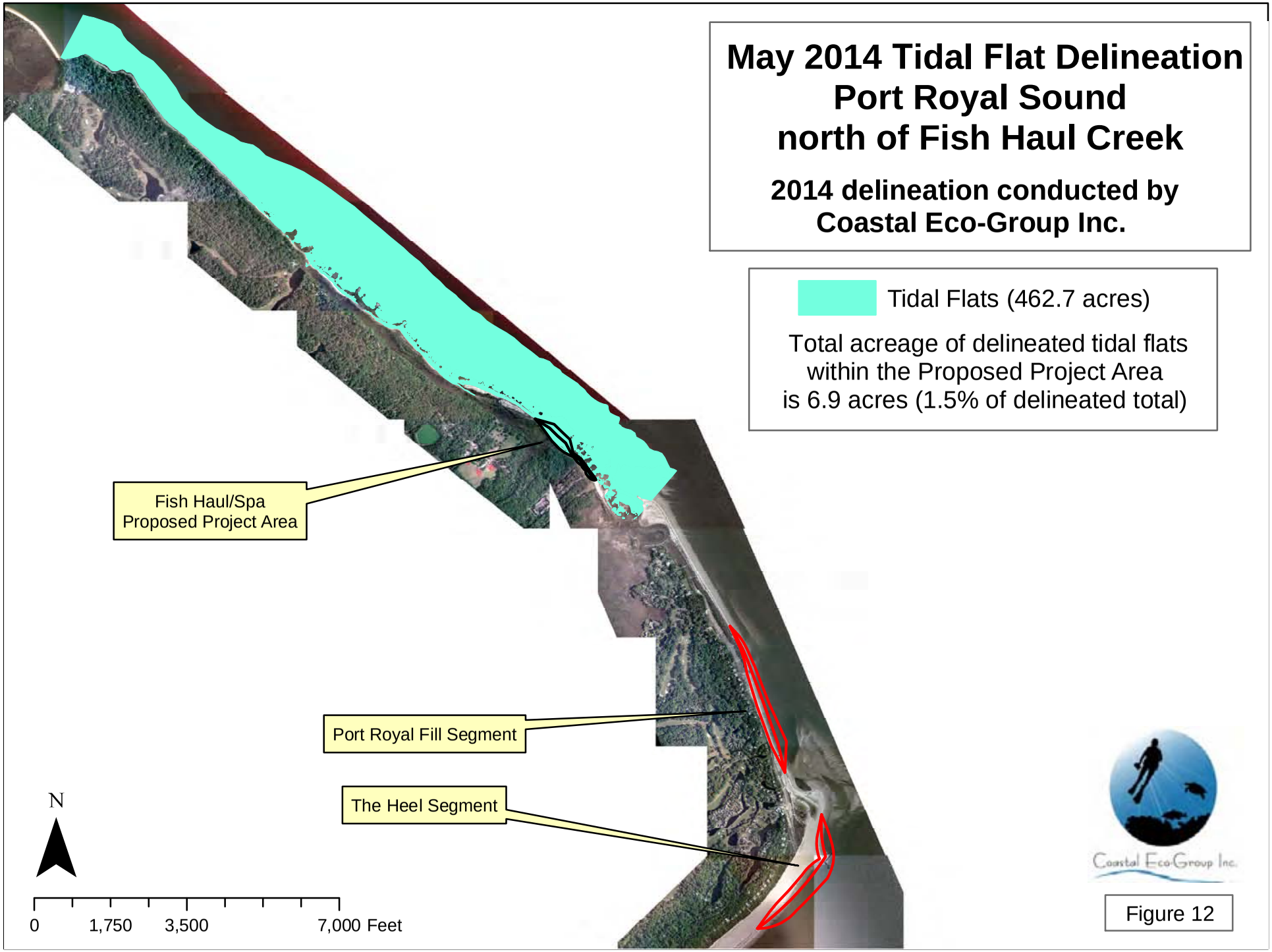

May 2014 Tidal Flat Delineation
Port Royal Sound
north of Fish Haul Creek
2014 delineation conducted by
Coastal Eco-Group Inc.
Tidal Flats (462.7 acres)
Total acreage of delineated tidal flats
within the Proposed Project Area
is 6.9 acres (1.5% of delineated total)
Fish Haul/Spa
Proposed Project Area
Port Royal Fill Segment
The Heel Segment
N
0
1,750
3,500
7,000 Feet
Coastal Eco-Group Inc.

Figure 12

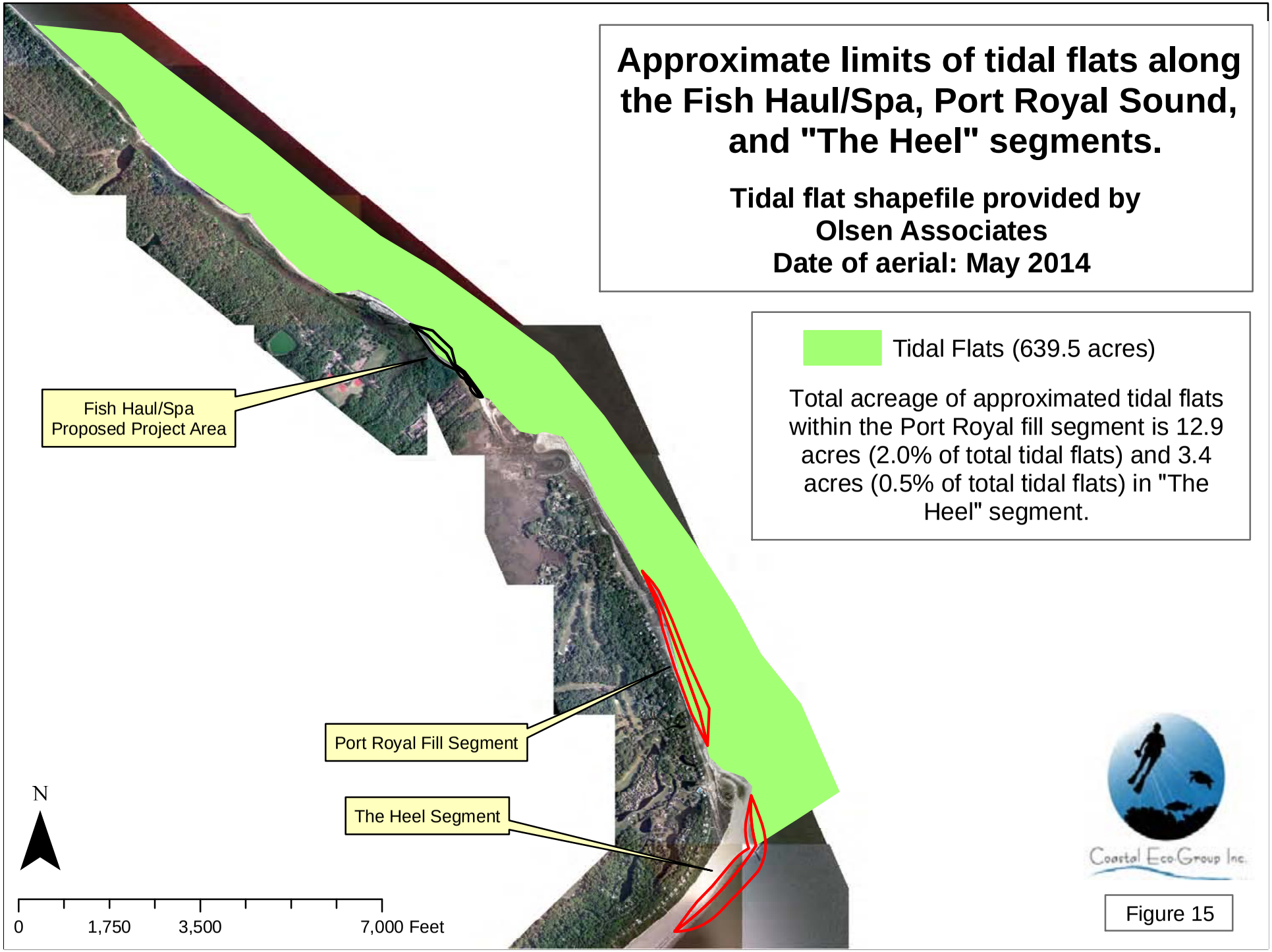

Approximate limits of tidal flats along the Fish Haul/Spa, Port Royal Sound, and "The Heel" segments.
Tidal flat shapefile provided by Olsen Associates
Date of aerial: May 2014
Tidal Flats (639.5 acres)
Total acreage of approximated tidal flats within the Port Royal fill segment is 12.9 acres (2.0% of total tidal flats) and 3.4 acres (0.5% of total tidal flats) in "The Heel" segment.
Fish Haul/Spa Proposed Project Area
Port Royal Fill Segment
The Heel Segment
N
0
1,750
3,500
7,000 Feet
Coastal Eco-Group Inc.

Figure 15

5.0 REFERENCES

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