CAMINADA HEADLAND
BEACH AND DUNE RESTORATION
INCREMENT II (BA-143)

APPENDIX D

OWNER OBTAINED CONSTRUCTION PERMITS AND FEDERAL REGULATIONS

LAFOURCHE & JEFFERSON PARISHES, LOUISIANA

STATE OF LOUISIANA
COASTAL PROTECTION AND RESTORATION AUTHORITY

MARCH 2014

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF COASTAL MANAGEMENT
P.O. BOX 44487
BATON ROUGE, LOUISIANA 70804-4487
(225)342-7591
1-800-267-4019

2014 FEB -3

CPI

COASTAL USE PERMIT/CONSISTENCY DETERMINATION

CUP No.: **P20121150 (Amended)**

COE. No.: **MVN 2012-02134 WPP**

NAME: **COASTAL PROTECTION AND RESTORATION AUTHORITY OF LOUISIANA**
Attn: Brad Miller
P. O. Box 44027
Baton Rouge, LA 70804

LOCATION: **Lafourche and Jefferson Parishes, LA;**
Increment II of the Caminada Headland Restoration project extends from Lat. 29°07'36"N, Long. 90°09'05"W (the eastern terminus of Increment I) to Lat. 29°11'15"N, Long. 90°03'10"W (approx. 0.5 miles southwest of Caminada Pass). The sand will be mined from Ship Shoal, an OCS borrow area located in South Pelto Area Blocks 13 and 14, approx. 28 nautical miles southwesterly from the center of the Caminada Headland projects (Increments I and II). The new Ship Shoal borrow area is centered at Lat. 28°54'47"N, Long. 90°37'12"W. The new Offshore No. 3 Pump-Out Area is centered at Lat. 29°08'35"N, Long. 90°03'43"W.

DESCRIPTION: Caminada Headland Beach and Dune Restoration Project – Increment II (CPRA Project BA-35). Increment I was authorized by DNR/OCM P20111274, DNR/Consistency C20110372, USACE MVN-2011-02539-WPP, and DEQ WQC 111006-01. This proposed project increment includes the re-establishment of the eroded headland/beach through the creation of a continuous beach and dune system for approx. 38,500 linear feet of shoreline (+/-448 acres of beach and dune habitat) on the Caminada Headland from Bayou Moreau eastward to Caminada Pass. The dune will be omitted along the easternmost +/-8,500 feet due to the presence of healthy dune habitat. Up to approx. 6,100,000 cu. yds. of sand will be mined from the South Pelto area, and then transported via hopper dredge and/or scow barges to a proposed pump-out (1,500' x 1,500'). This pump-out area, located approx. 11,000 feet offshore in the Gulf and designated as Offshore No. 3 Pump-Out area, will allow the temporary placement of sand mined from offshore. A conveyance corridor will be established to lay an +/-11,000-foot pipeline that will transport sand material from this offshore pump-out area to the headland and beach/dune fill template. Four pump-out areas denoted as Lower Belle Pass, Upper Belle Pass, Offshore West, and Offshore East, along with their respective pipeline corridors were permitted for Increment I and may be utilized for Increment II.

AMENDMENT: Proposed restoration efforts for the Caminada Headland Beach and Dune Restoration Increment 2 Project (BA-135). Restoration and reconstruction is necessary due to impacts from coastal processes and the significant impacts from Hurricane Isaac (August 2012). The goal is to shift the design template northward approximately 210 feet in some areas, in alignment with the Caminada Headland's current position and gulfward of the northern mean high water line. In addition, the dune that was existing prior to the storm (and present during the original application) will be reconstructed on the eastern portion of the template. The proposed volume of placed material would increase by 1.14 mcy. Minor changes in acreage area quantities for supratidal and unvegetated waterbottoms would occur. No changes in the intertidal acreage would occur.

This amended permit supersedes the original permit which was issued on February 14, 2013.

In accordance with the rules and regulations of the Louisiana Coastal Resources Program and Louisiana R.S. 49, Sections 214.21 to 214.41, the State and Local Coastal Resources Management Act of 1978, as amended, the permitted agrees to:

1. Carry out, perform and operate the use in accordance with the permit conditions, plans and specifications approved by the Department of Natural Resources.
2. Comply with any permit conditions imposed by the Department of Natural Resources.
3. Adjust, alter, or remove any structure or other physical evidence of the permitted use if, in the opinion of the Department of Natural Resources, it proves to be beyond the scope of the use as approved or is abandoned.
4. Provide, if required by the Department of Natural Resources, an acceptable surety bond in an appropriate amount to ensure adjustment, alteration, or removal should the Department of Natural Resources determine it necessary.
5. Hold and save the State of Louisiana, the local government, the department, and their officers and employees harmless from any damage to persons or property which might result from the use, including the work, activity, or structure permitted.
6. Certify that the use has been completed in an acceptable and satisfactory manner and in accordance with the plans and specifications approved by the Department of Natural Resources. The Department of Natural Resources may, when appropriate, require such certification to be given by a registered professional engineer.
7. All terms of the permit shall be subject to all applicable federal and state laws and regulations.
8. This permit, or a copy thereof, shall be available for inspection at the site of work at all times during operations.
9. The applicant will notify the Office of Coastal Management of the date on which initiation of the permitted activity described under the "Coastal Use Description" began. The applicant shall notify the Office of Coastal Management by mailing the enclosed green initiation card on the date of initiation of the coastal use.
10. Unless specified elsewhere in this revised permit, this revised permit authorizes the initiation of the coastal use described under "Coastal Use Description" for two (2) years from the date of the signature of the Secretary or his designee on the original permit which was September 29, 2009. If the coastal use is not initiated within this two year period, then this revised permit will expire and the applicant will be required to submit a new application. Initiation of the coastal use, for purposes of this revised permit, means the actual physical beginning of the use of activity for which the permit is required. Initiation does not include preparatory activities, such as movement of equipment onto the coastal use site, expenditure of funds, contracting out of work, or performing activities which by themselves do not require a permit. In addition, the permitted must, in good faith and with due diligence, reasonably progress toward completion of the project once the coastal use has been initiated.
11. The following special conditions must also be met in order for the use to meet the guidelines of the Coastal Resources Program:

a. This amended permit does not convey any property rights, mineral rights or exclusive privileges, nor does it authorize injury to property.

b. The area where the project is located is all part of the aboriginal homelands of the Chitimacha Tribe of Louisiana. As such, large villages, burial sites, and sacred sites were in place in that entire area. If at any time during the course of the work, any traditional cultural properties are discovered, Permittee shall immediately contact Kimberly S. Walden (Cultural Director) or Melanie Aymond (Research Coordinator) at (337) 923-9923 or (337) 923-4395. Office hours are Monday through Thursday from 7:30 A.M. - 5:00 P.M. and on Friday between 7:30 A.M. - 11:30 A.M. If traditional cultural properties are discovered on the weekend or after business hours, the notification shall be made the next business morning.

c. Prior to any activities on Elmer's Island Refuge, CPRA shall notify Julia Lightner in writing their intent to begin the project and give a brief outline of the project schedule. Upon receipt of this notification, LDWF may request a pre-project meeting with the applicant to coordinate project details.

This area has frequent occurrences of stranded marine mammals and sea turtles. Strandings of marine mammals and sea turtles should be reported to LDWF personnel; this includes skeletal remains, recent mortalities or live strandings. Remains should not be touched or removed until an LDWF employee is contacted. Contact Mandy Tumlin at 337-962-7092 or Sandi Mailian at 504-338-6615 to report stranding events. CPRA shall coordinate with the U. S. Coast Guard to verify status of clean-up operations.

Currently, vehicular access is allowed on Elmer's Island. LDWF requests that the construction of the restoration project be designed so that the current vehicular access, or equivalent, can be maintained. The project, as designed, shall not limit vehicular access for public access purposes.

The piping plover (*Charadrius melodus*) may occur within one mile of the project area. This species is federally listed as threatened with its critical habitat designated along the Louisiana coast. Piping plovers winter in Louisiana feeding at intertidal beaches, mudflats, and sand flats with sparse emergent vegetation. Primary threats to this species are destruction and degradation of winter habitat, habitat alteration through shoreline erosion, woody species encroachment of lake shorelines and riverbanks, and human disturbance of foraging birds. For more information on piping plover critical habitat, visit the U.S. Fish and Wildlife website: http://endangered.fws.gov. Contact Brigette Firmin with the United States Fish and Wildlife Service at 337-291-3132 to coordinate activities.

The Louisiana Department of Wildlife and Fisheries (LDWF) Natural Heritage database indicates the presence of bird nesting colonies within one mile of this proposed project. Please be aware that entry into or disturbance of active breeding colonies is prohibited by the LDWF. In addition, LDWF prohibits work within a certain radius of an active nesting colony.

Nesting colonies can move from year to year and no current information is available on the status of these colonies. If work for the proposed project will commence during the nesting season, a field visit to the worksite will be conducted to look for evidence of nesting colonies. This field visit will take place no more than two weeks before the project begins. If no nesting colonies are found within 400 meters (700 meters for brown pelicans) of the proposed project, no further consultation with LDWF will be necessary. If active nesting colonies are found within the previously stated distances of the proposed project, further consultation with LDWF will be required. In addition, colonies should be surveyed by a qualified biologist to document species present and the extent of colonies. Provide LDWF with a survey report which is to include the following information:

1. Qualifications of survey personnel;
2. Survey methodology including dates, site characteristics, and size of survey area;
3. species of birds present, activity, estimates of number of nests present, and general vegetation type including digital photographs representing the site; and
4. Topographic maps and ArcView shapefiles projected in UTM NAD83 Zone 15 to illustrate the location and extent of the colony.

Please mail survey reports on CD to: Louisiana Natural Heritage Program
La. Dept. of Wildlife & Fisheries
P.O. Box 98000
Baton Rouge, LA 70898-9000.

To minimize disturbance to colonial nesting birds, the following restrictions on activity should be observed:

- For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, roseate spoonbills, anhingas, and/or cormorants), all project activity occurring within 300 meters of an active nesting colony should be restricted to the non-nesting period (i.e., September 1 through February 15).

- For colonies containing nesting gulls, terns, and/or black skimmers, all project activity occurring within 400 meters (700 meters for brown pelicans) of an active nesting colony should be restricted to the non-nesting period (i.e., September 16 through April 1, exact dates may vary within this window depending on species present).

d. On-site contract personnel shall be informed of the need to identify colonial nesting birds and their nests, and shall avoid affecting them during breeding season. If these timing restrictions cannot be adhered to due to project timing and/or scheduling, please contact Ms. Patti Holland of the USFWS at 337-291-3121, and the LDWF biologist at 225-765-2643, for further guidance regarding avoiding and/or minimizing impacts to colonial nesting.

e. No other impacts to rare, threatened or endangered species or critical habitats are anticipated from the proposed project. No state or federal parks, wildlife refuges, wildlife management areas or scenic rivers are known at the specified site or within ¼ mile of the proposed project.

The Louisiana Natural Heritage Program (LNHP) has compiled data on rare, endangered, or otherwise significant plant and animal species, plant communities, and other natural features throughout the State of Louisiana. LNHP reports summarize the existing information known at the time of the request regarding the location in question. These reports should not be considered final statements on the biological elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. If at any time LNHP tracked species are encountered within the project area, please contact our biologist at 225-765-2643.

g. Applicant shall not discharge any drilling and/or workover effluent except for flocculated filtered water.

Applicant shall not discharge any human waste which does not meet or exceed the requirements of the Department of Health and Hospitals.

Applicant shall not discharge any produced waters.

Applicant is subject to all applicable state laws related to damages which are demonstrated to have been caused by this proposed action.

Applicant shall use any dredged material beneficially to create/restore emergent wetlands or place the material in open water in such a manner not to decrease the water depth greater than six inches.

h. The hard structure vinyl sheet piles that were placed at Bayou Moreau and eastward, and anywhere else in the project alignment, and the rock barricade placed at the mouth of Bayou Thunder, shall be removed prior to the beach nourishment.

i. All equipment shall remain within the proposed work area as indicated on the plats, and not on the adjacent wetlands, with the exception for the proposed work and fill in 2.9-acre of mangrove wetlands, as depicted on Sheet 7 of 34 of the drawings. All access for heavy equipment shall take place on existing roads, existing beach, or the water, as depicted in the drawings. Applicant shall avoid any tracking outside of the permitted project area.

j. Spoil shall be marked in accordance with USCG regulations for marking temporary spoil mounds.

k. Markers and/or lights shall be placed along the length of the sediment delivery pipelines as required by the U.S. coast guard regulations.

l. Permittee shall restore the access and staging areas to pre-project conditions within 30 days of the proposed activities.

m. That the permittee shall insure that all sanitary sewage and/or related domestic wastes generated during the subject project activity and at the site, thereafter, as may become necessary shall receive the equivalent of secondary treatment (30 mg/l BOD_5; 30 mg/l TSS) with disinfection prior to discharge into any of the streams or adjacent waters of the area or, in the case of total containment, shall be disposed of in approved sewerage and sewage treatment facilities, as is required by the State Sanitary Code. Such opinion as may be served by those comments offered herein shall not be construed to suffice as any more formal approval(s) which may be required of possible sanitary details (i.e. provisions) scheduled to be associated with the subject activity. Such shall generally require that appropriate plans and specifications be submitted to the Department of Health and Hospitals for purpose of review and approval prior to any utilization of such provisions.

n. Permittee is subject to all applicable state laws related to damages which are demonstrated to have been caused by this action.

o. Permittee shall allow representatives of the Office of Coastal Management or authorized agents to make periodic, unannounced inspections to assure the activity being performed is in accordance with the conditions of this revised permit.

p. Permittee shall comply with all applicable state laws regarding the need to contact the Louisiana One Call (LOC) system (1-800-272-3020) to locate any buried cables and pipelines.

q. This amended permit authorizes the initiation of the Coastal Use described under "Coastal Use Description" for two (2) years from the date of the signature of the Secretary or his designee on the original permit which was February 14, 2013. Initiation of the Coastal Use, for purposes of this revised permit, means the actual physical beginning of the use or activity for which the permit is required. Initiation does not include preparatory activities, such as movement of equipment onto the Coastal Use site, expenditure of funds, contracting out of work, or performing activities which by themselves do not require a permit. In addition, the permittee must, in good faith and with due diligence, reasonably progress toward completion of the project once the Coastal Use has been initiated. If the Coastal Use is not initiated within this two (2) year period, an extension may be granted pursuant to the requirements contained in the Rules and Procedures for Coastal Use Permits (Title 43:I.723.D.). Please note that a request for permit extension MUST be made no sooner than one hundred eighty (180) days and no later than sixty (60) days prior to the expiration of the 2-year initiation period of the permit.

The expiration date of this revised permit is five (5) years from the date of the signature of the Secretary or his designee on the original permit which was February 14, 2013.

Upon expiration of this revised permit, a new Coastal Use Permit will be required for completion of any unfinished or uncommenced work items and for any maintenance activities involving dredging or fill that may become necessary. Other types of maintenance activities may also require a new Coastal Use Permit.

END OF CONDITIONS

By accepting this permit the applicant agrees to its terms and conditions.

I affix my signature and issue this permit this 23rd day of January, 2014.

DEPARTMENT OF NATURAL RESOURCES

Karl L Morgan

Karl L. Morgan, Administrator
Office of Coastal Management

This agreement becomes binding when signed by the Administrator of the Office of Coastal Management Permits/Mitigation Division, Department of Natural Resources.

Attachments

Final Plats:
P20121150 Final Plats 10/21/2013

cc: Martin Mayer, COE w/attachments
Dave Butler, LDWF w/attachments
Jessica Diez, OCM w/attachments
Kirk Kilgen, OCM/FI w/attachments
Frank Cole, OCM/FI w/attachments
Lafourche Parish, w/attachments
Jefferson Parish, w/attachments
GEC, Inc.
8282 Goodwood Blvd.
Baton Rouge, LA 70806
Attn: Donna Rogers

FINAL PLATS (Amended)

P20 121160
OJ
01-16-14

STATE OF LOUISIANA
COASTAL PROTECTION AND RESTORATION AUTHORITY

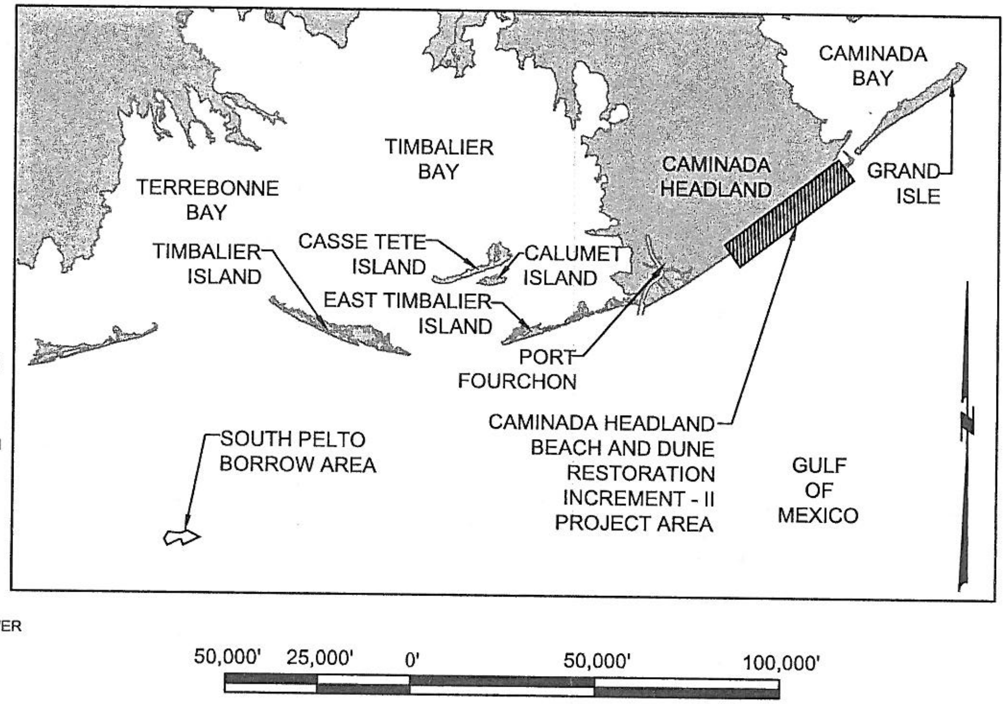
CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

STATE PROJECT NO. BA-143

LAFOURCHE & JEFFERSON PARISHES, LOUISIANA

PERMIT (MVN-2012-02134-WPP)

INDEX TO SHEETS



COASTAL PROTECTION AND RESTORATION AUTHORITY CPRA

THIS DRAWING SET IS FOR PERMITTING PURPOSES ONLY AND IS NOT TO BE USED FOR CONSTRUCTION

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION, PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

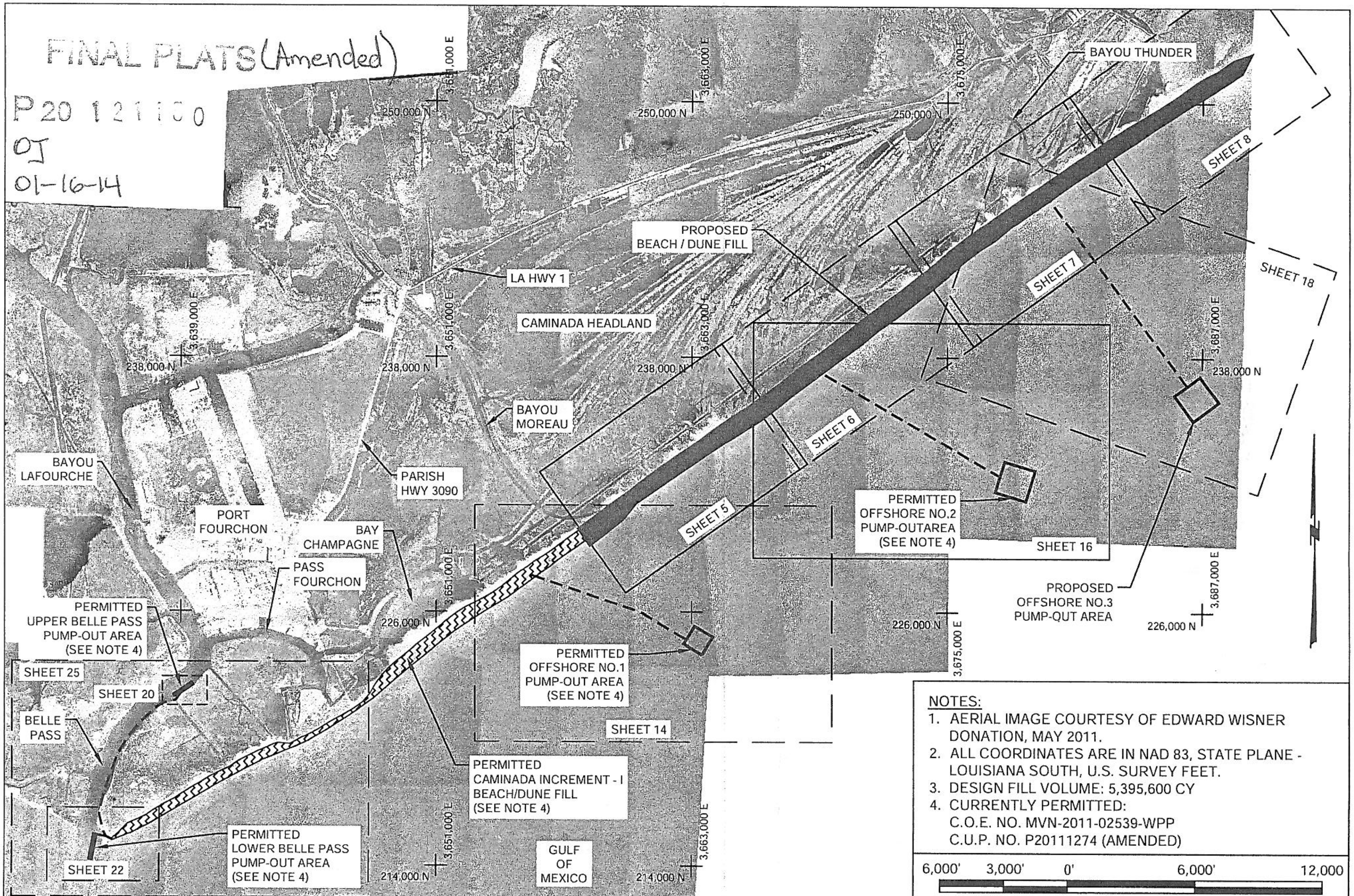
CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II	TITLE SHEET
STATE PROJECT NUMBER: BA-143	DATE: AUGUST, 2012
FEDERAL PROJECT NUMBER:	SHEET 1 OF 34

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FINAL PLATS (Amended)
P20121100
OJ
01-16-14



NOTES:
1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, U.S. SURVEY FEET.
3. DESIGN FILL VOLUME: 5,395,600 CY
4. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP
   C.U.P. NO. P20111274 (AMENDED)

6,000' 3,000' 0' 6,000' 12,000

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION, PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

HEADLAND OVERVIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

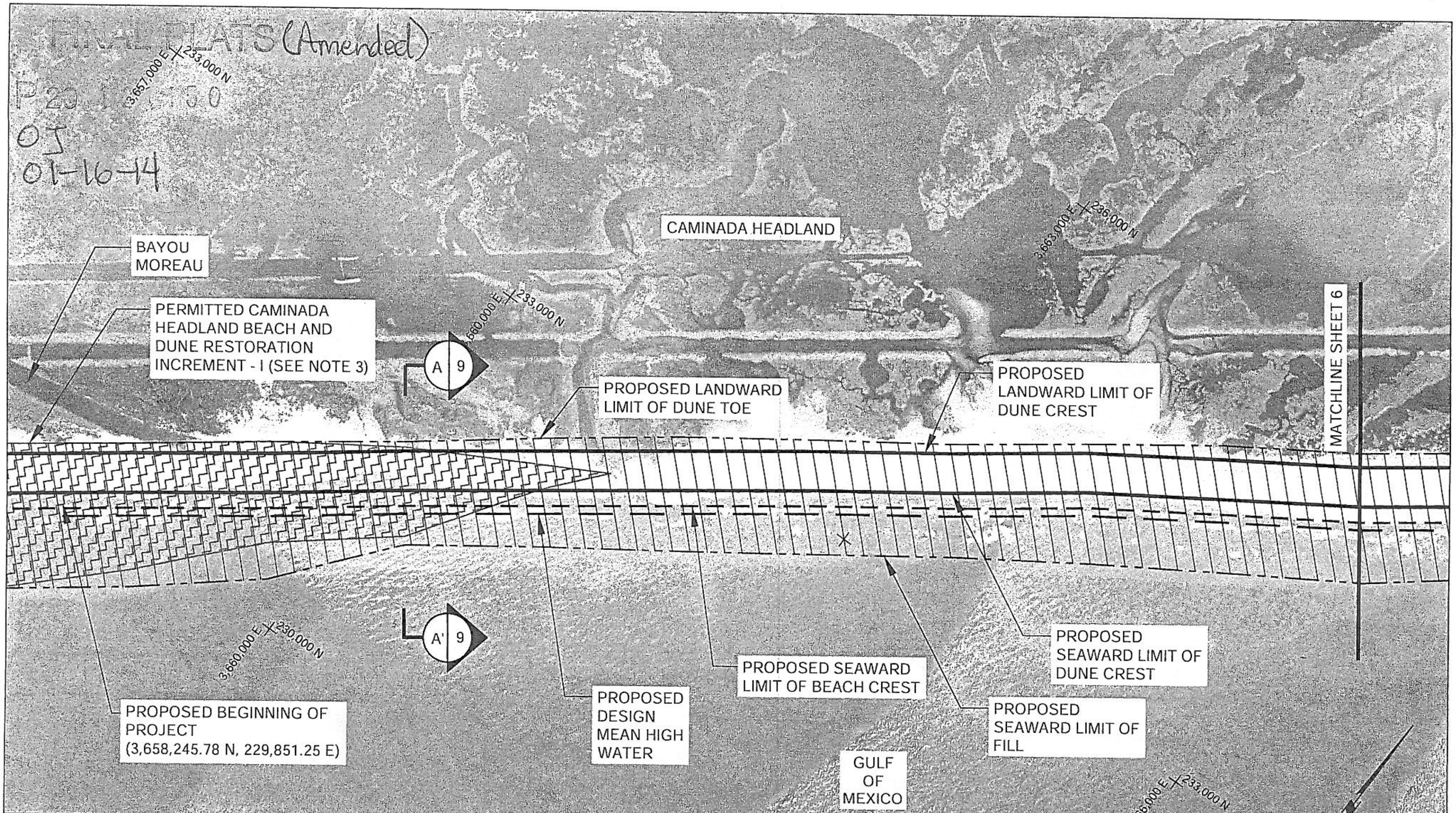
DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 3 OF 34

FINAL PLATS (Amended)
P20111274
OJ
01-16-14



LEGEND

solid line	DUNE CREST	dash-dot line	TOE OF FILL
short-dash line	BEACH CREST	long-dash line	DESIGN MHW
diagonal hatch	PROPOSED FILL AREA	stepped hatch	PERMITTED FILL AREA

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FT.
3. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP
   C.U.P. NO. P20111274 (AMENDED)

1,000' 500' 0' 1,000' 2,000'

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

CAMINADA HEADLAND PLAN VIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

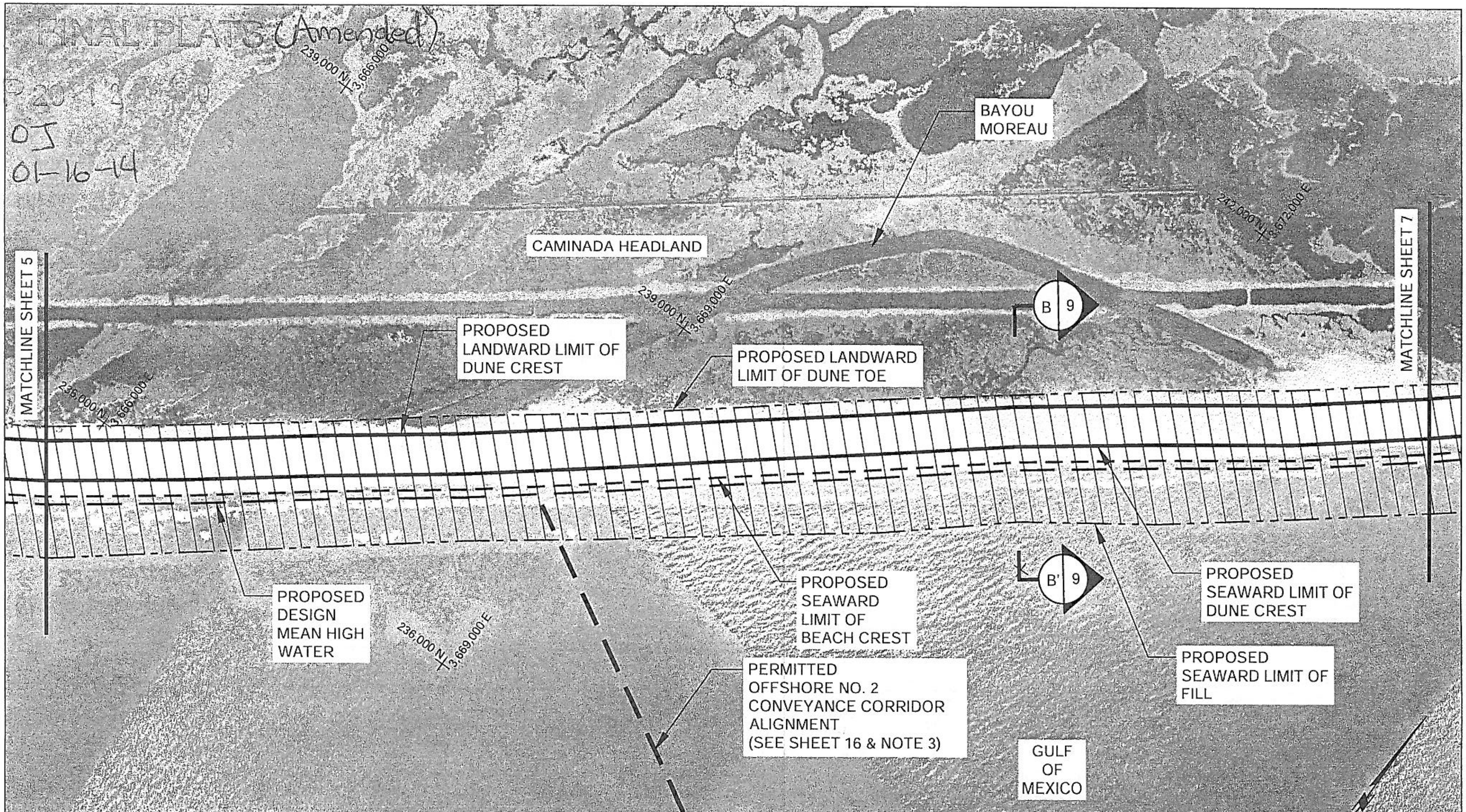
DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 5 OF 34

FINAL PLATS (Amended)
OJ
01-16-14



LEGEND

- DUNE CREST
- BEACH CREST
- PROPOSED FILL AREA
- TOE OF FILL
- DESIGN MHW

NOTES:
1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FT.
3. CURRENTLY PERMITTED AS OFFSHORE WEST:
   C.O.E. NO. MVN-2011-02539-WPP
   C.U.P. NO. P20111274 (AMENDED)

1,000' 500' 0' 1,000' 2,000'

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

CAMINADA HEADLAND PLAN VIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

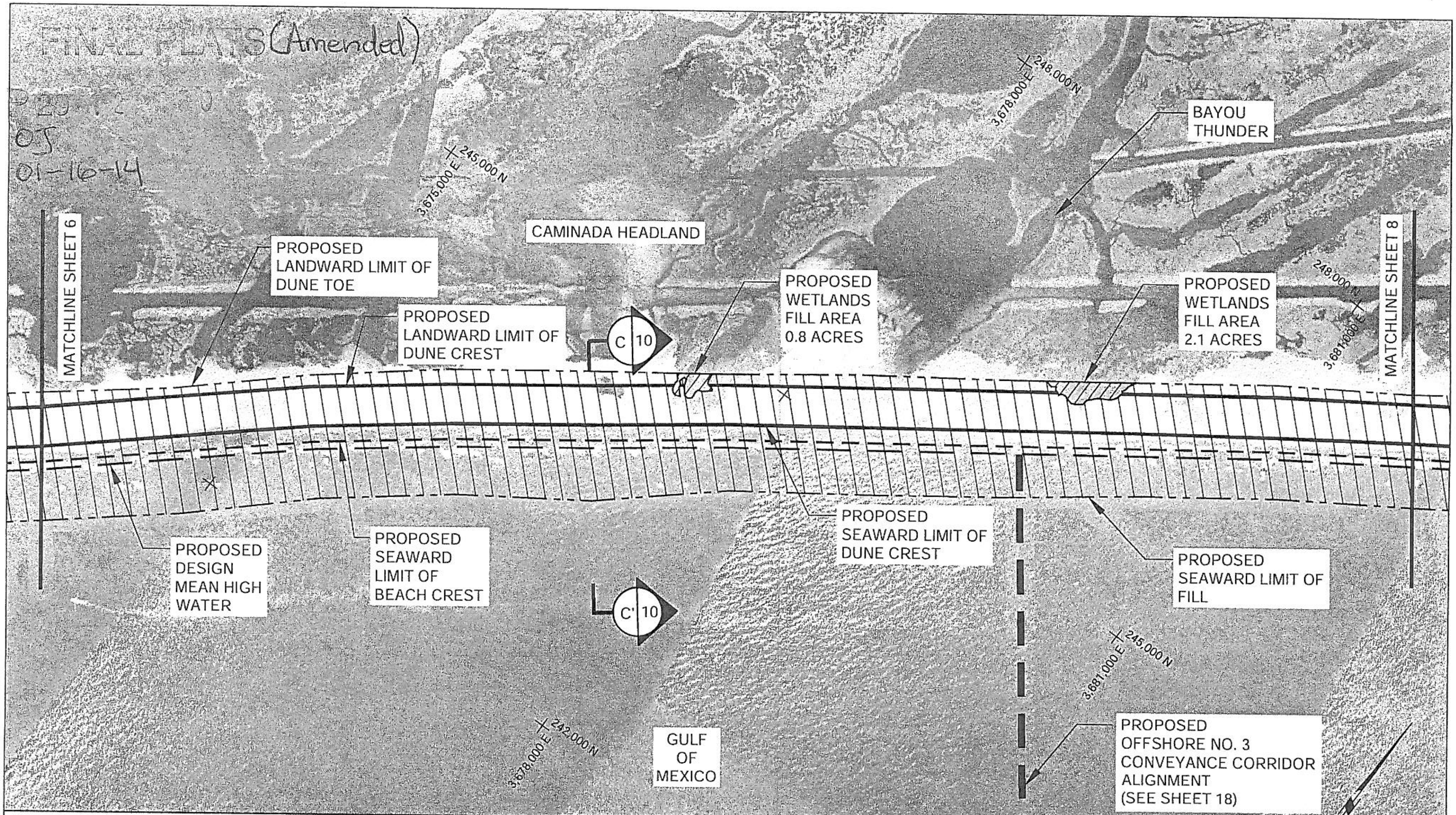
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 6 OF 34



LEGEND

DUNE CREST	TOE OF FILL
BEACH CREST	DESIGN MHW
PROPOSED FILL AREA	PROPOSED WETLANDS FILL AREA

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FT.

1,000' 500' 0' 1,000' 2,000'

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

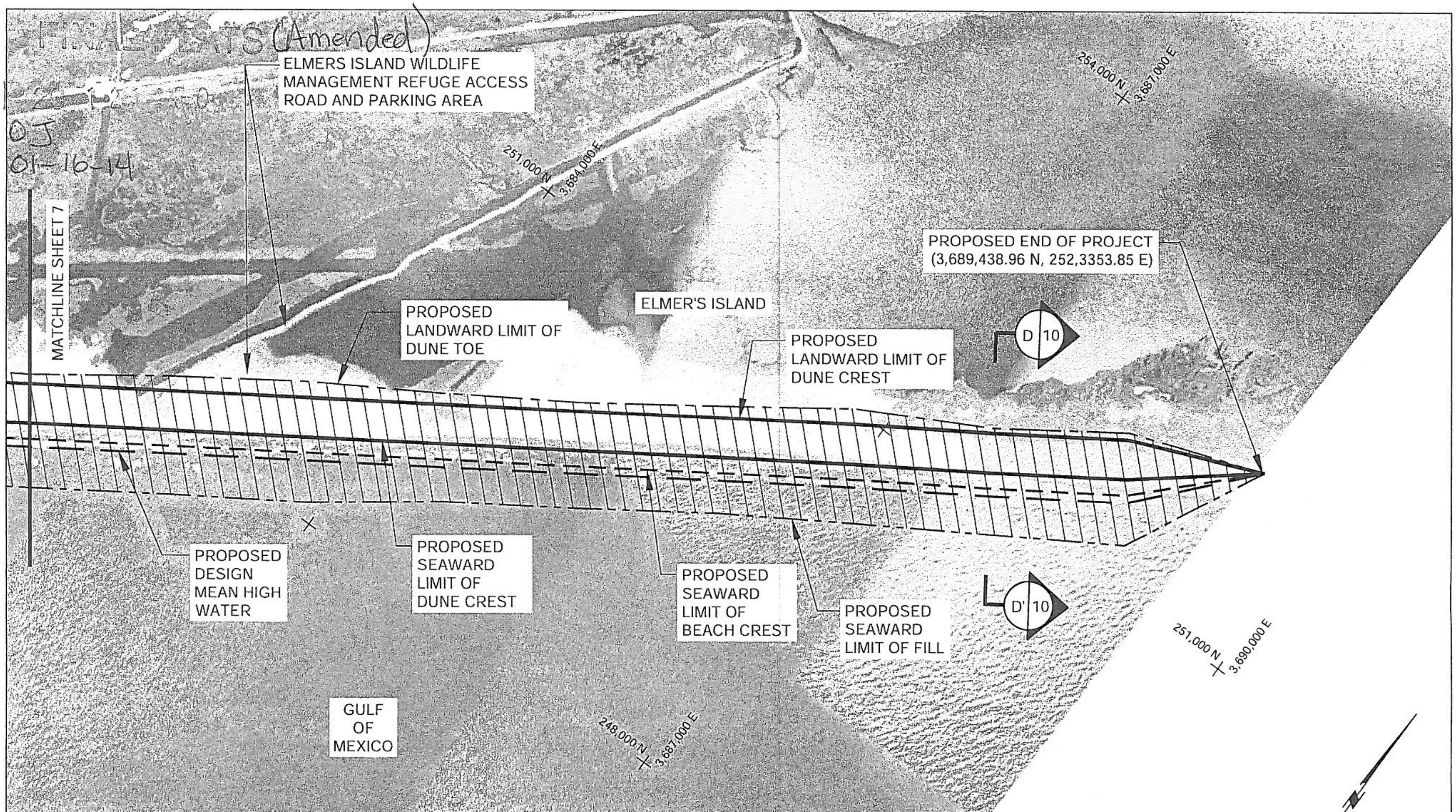
STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

CAMINADA HEADLAND PLAN VIEW

DATE: AUGUST, 2012

FINAL PLATS (Amended)
OJ
01-16-14



LEGEND

- DUNE CREST
- BEACH CREST
- TOE OF FILL
- DESIGN MHW
- PROPOSED FILL AREA

NOTES:
1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FT

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

CAMINADA HEADLAND PLAN VIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

FEDERAL PROJECT NUMBER:

SHEET 8 OF 34

FINAL PLATS (Amended)

LEGEND:

- PROPOSED BEACH / DUNE FILL
- EXISTING GRADE (2010)
- DESIGN
- CONSTRUCTION TOLERANCE (SEE NOTE 4)

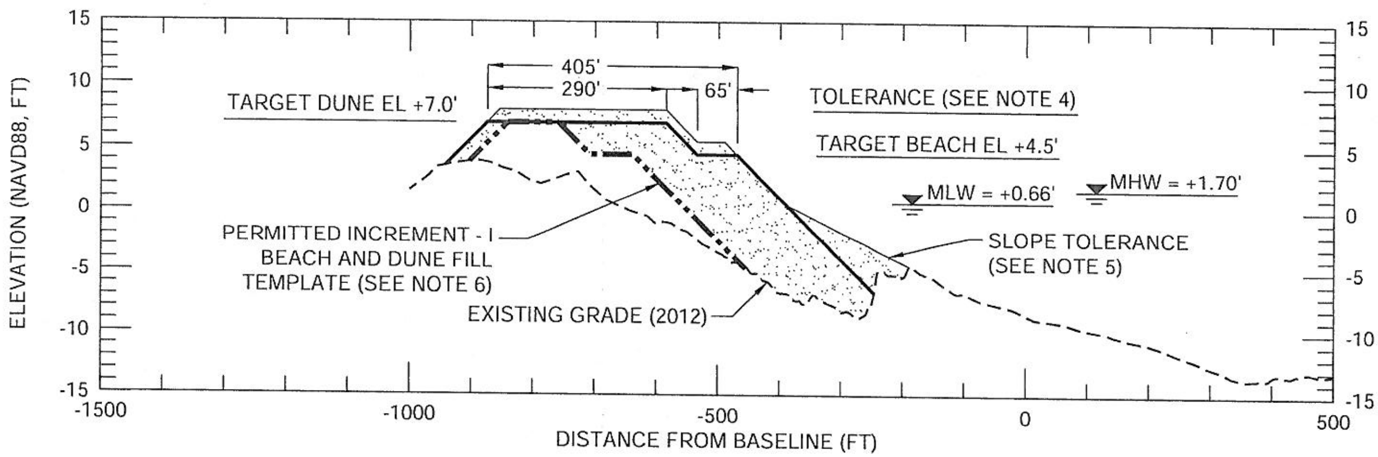
P20121150

05

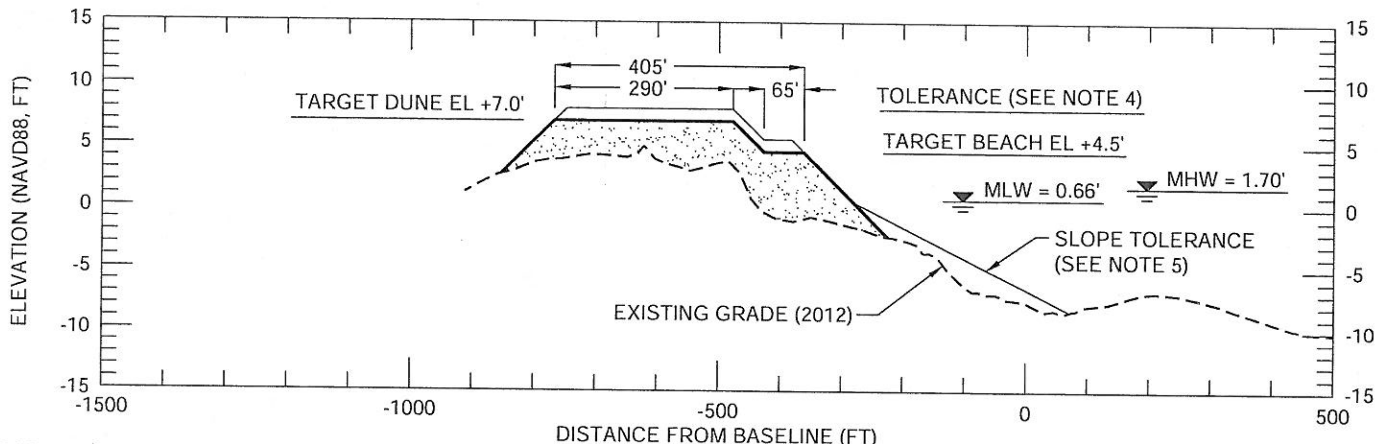
01-16-14

SCALE:
H: 1" = 300'
V: 1" = 15'

A - A'



B - B'



NOTES:
1. SECTIONS ARE VIEWED AS LOOKING EAST.
2. SURVEY BY EMC, INC. 2012.
3. ALL SLOPES 1V:20H UNLESS OTHERWISE DESIGNATED.
4. A ONE FOOT TOLERANCE IS INCLUDED TO ACCOUNT FOR CONSTRUCTION METHODS AND CONSOLIDATION/SETTLEMENT OF THE FILL.
5. CONSTRUCTION SLOPE TOLERANCE OF 1:40 PROVIDED FROM MEAN LOW WATER SEAWARD.
6. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED)

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

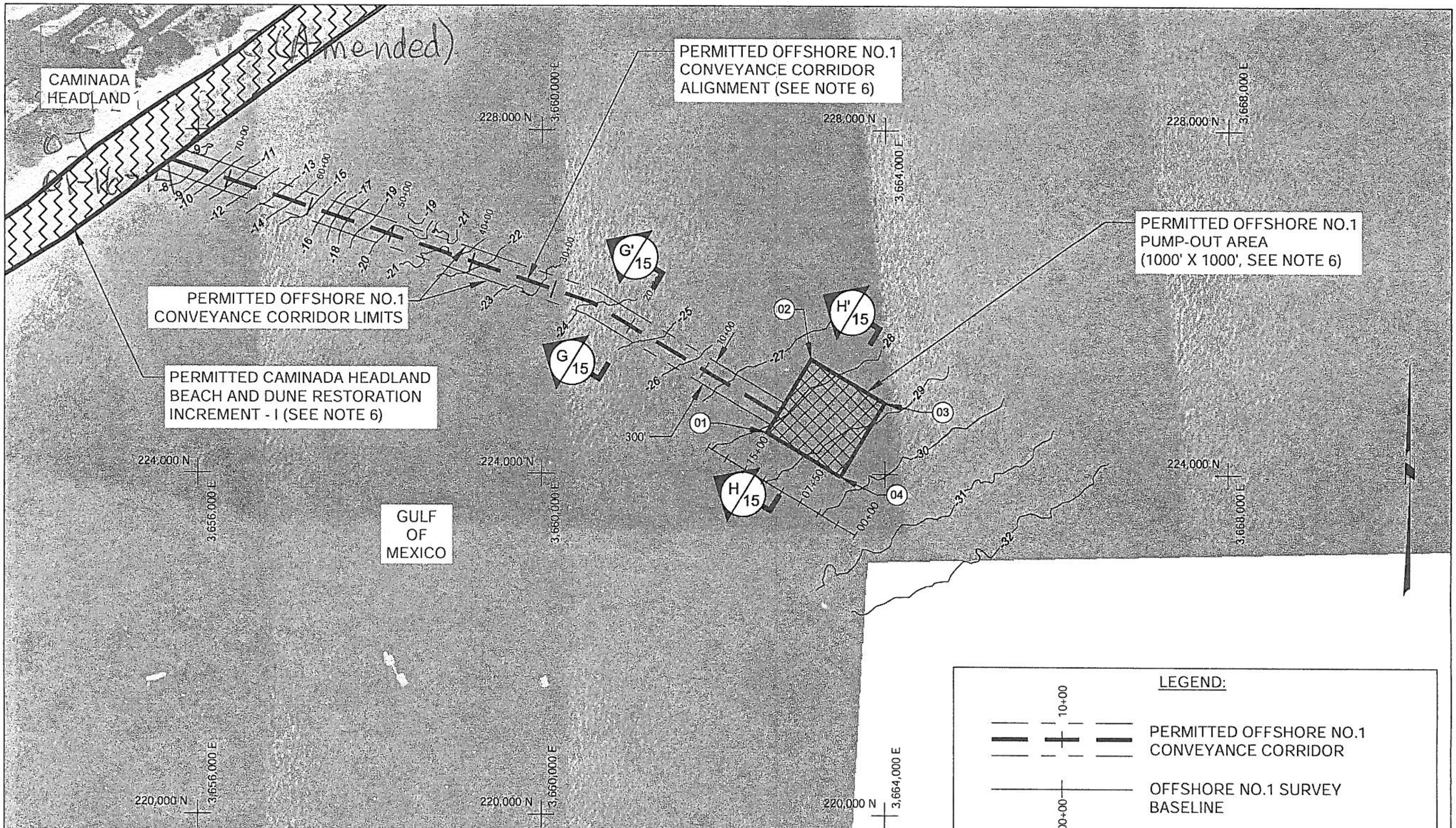
STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

CAMINADA HEADLAND DESIGN SECTIONS

DATE: AUGUST, 2012

SHEET 9 OF 34



LEGEND:

10+00 — PERMITTED OFFSHORE NO.1 CONVEYANCE CORRIDOR

00+00 — OFFSHORE NO.1 SURVEY BASELINE

PERMITTED OFFSHORE NO.1 PUMP-OUT AREA

1600' 800' 0' 1600' 3200'

NOTES:
1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
3. SURVEY CONDUCTED BY OCEAN SURVEY, INC., DECEMBER 2011.
4. THE LIMITS OF MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE OFFSHORE WEST PUMP-OUT AREA.
5. SEE SHEET 33 FOR OFFSHORE NO.1 PUMP-OUT AREA BOUNDARY COORDINATES.
6. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED) AS OFFSHORE WEST.

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

OFFSHORE NO.1 PUMP-OUT AREA PLAN VIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 14 OF 34

SCALE:
VERT: 1" = 20'
HORIZ: 1" = 100'

(Amended)

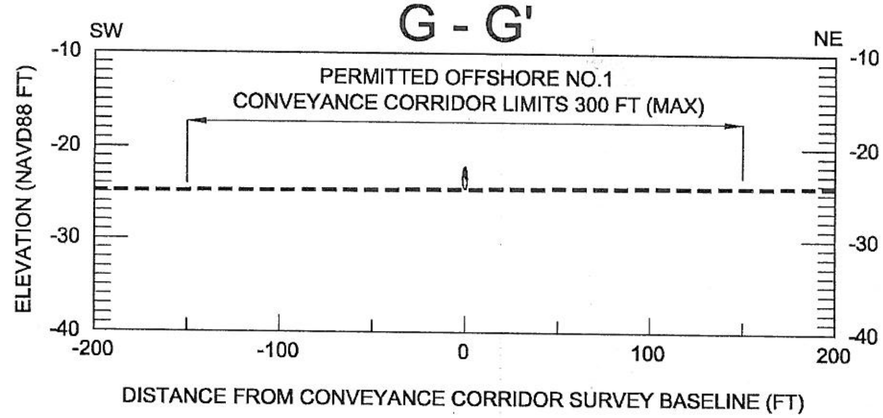
P20121150

LEGEND:

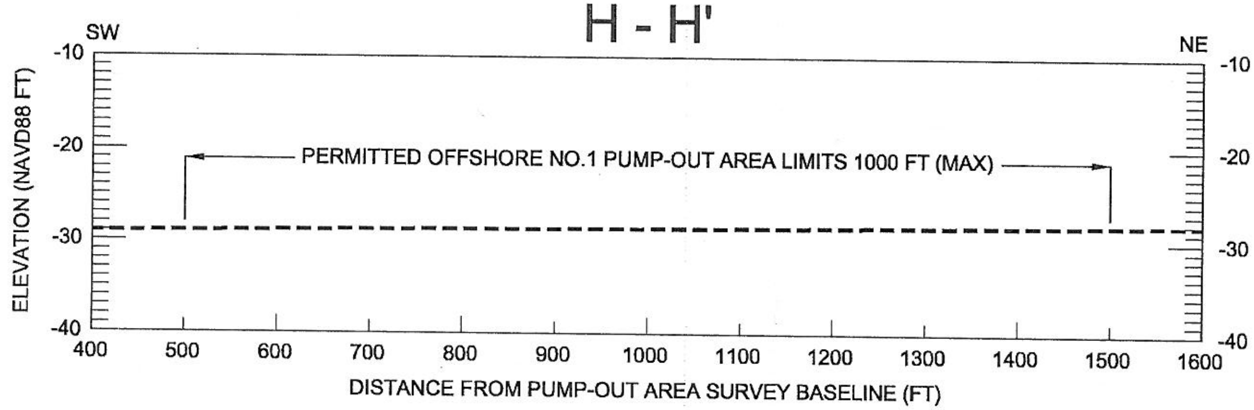
EXISTING GRADE (2011)

SUBMERGED SEDIMENT PIPELINE

G - G'



H - H'



NOTES:
1. SURVEY CONDUCTED BY OCEAN SURVEY, INC., DECEMBER 2011.
2. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 NAVD88.
3. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

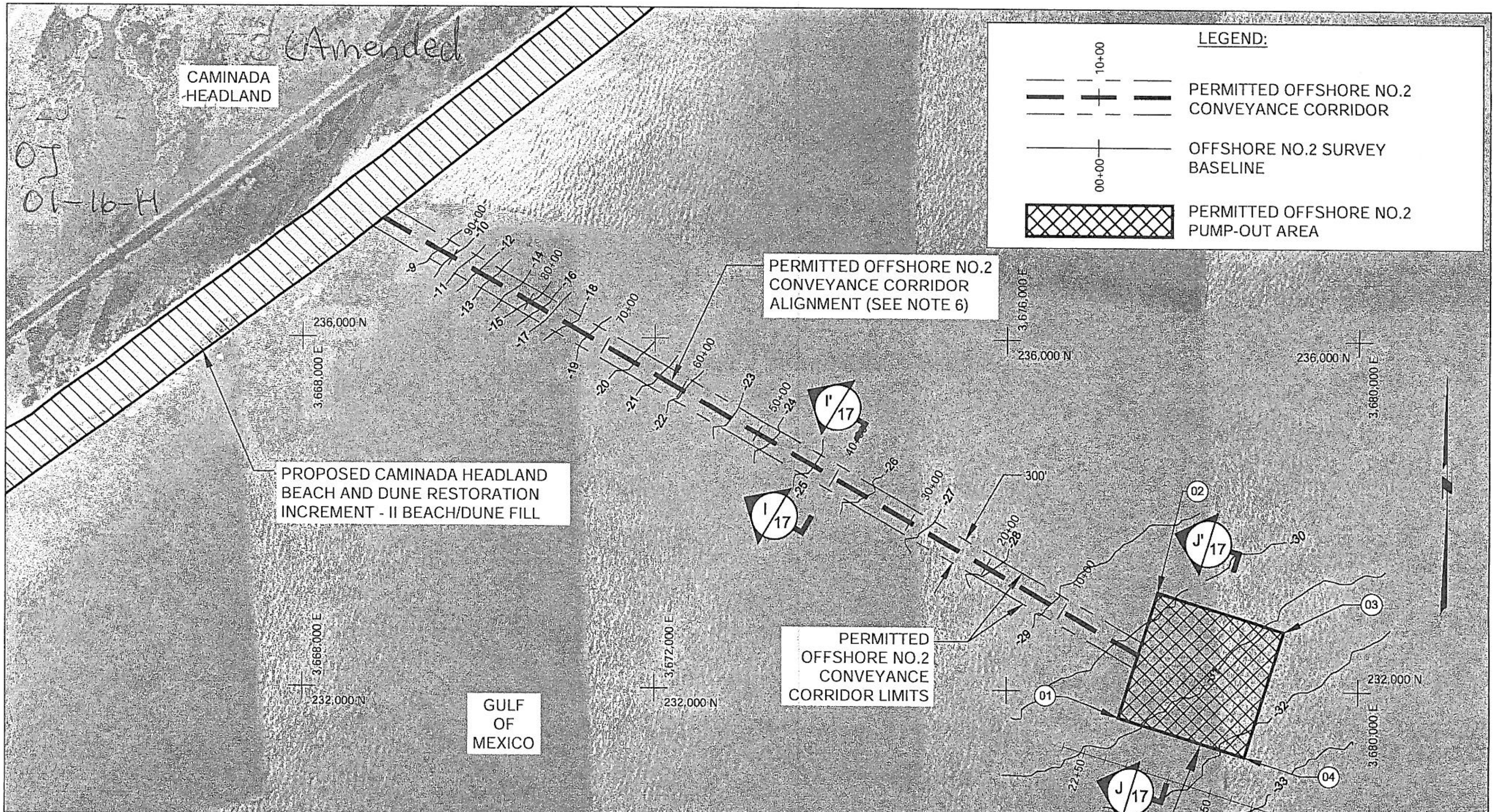
STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

OFFSHORE NO.1 PUMP-OUT AREA AND CORRIDOR TYPICAL SECTIONS

DATE: AUGUST, 2012

SHEET 15 OF 34



NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
3. SURVEY CONDUCTED BY OCEAN SURVEY, INC., DECEMBER 2011.
4. THE LIMITS OF MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE OFFSHORE PUMP-OUT AREA.
5. SEE SHEET 33 FOR OFFSHORE NO.2 PUMP-OUT AREA BOUNDARY COORDINATES.
6. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED) AS OFFSHORE EAST

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

OFFSHORE NO.2 PUMP-OUT AREA PLAN VIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 16 OF 34

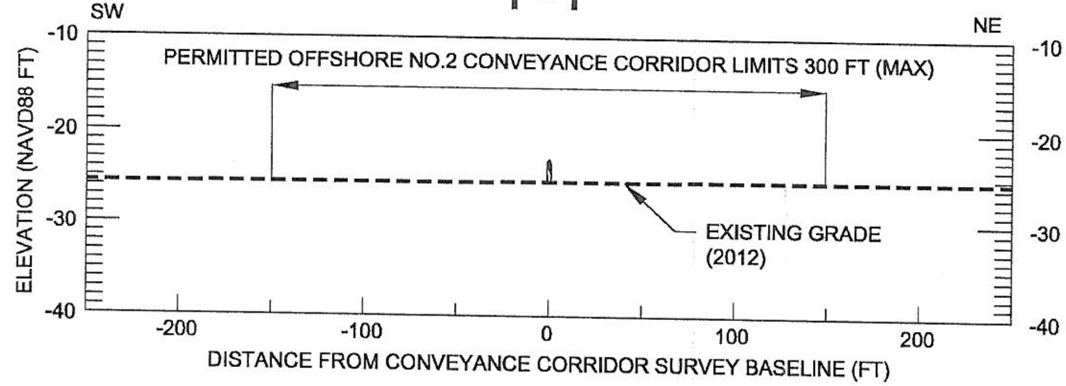
SCALE: ... TS (Amended)
VERT: 1" = 20'
HORIZ: 1" = 100'
P20 12 ... 0

LEGEND:

EXISTING GRADE (2011)

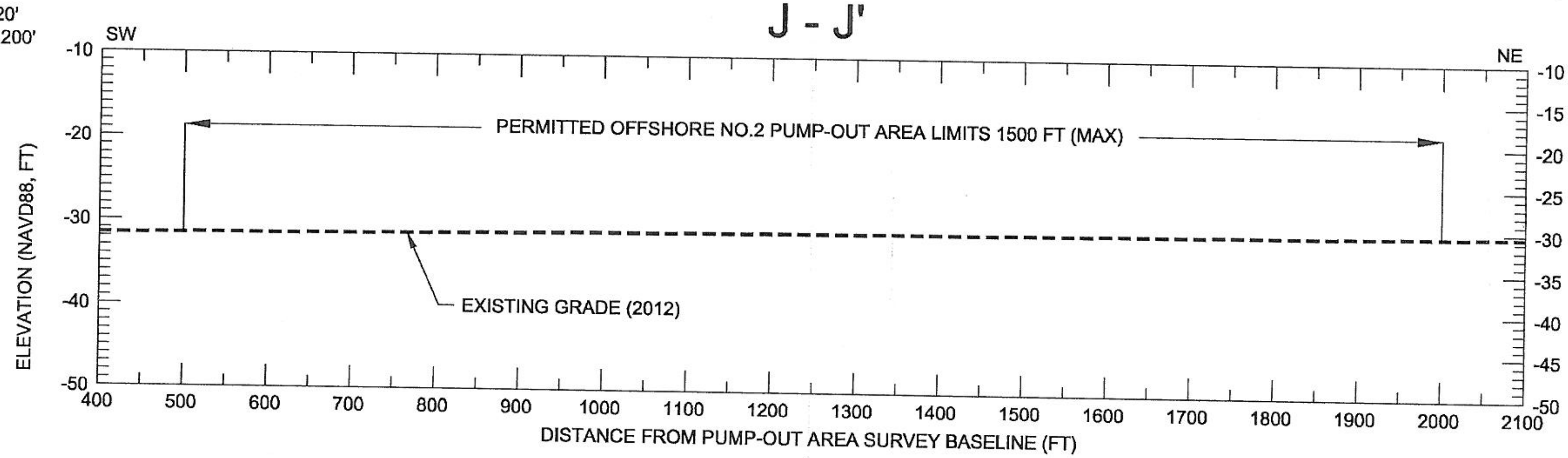
SUBMERGED SEDIMENT PIPELINE

I - I'



SCALE:
VERT: 1" = 20'
HORIZ: 1" = 200'

J - J'



NOTES:
1. SURVEY CONDUCTED BY OCEAN SURVEY, INC., DECEMBER 2011.
2. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 FT NAVD88.
3. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

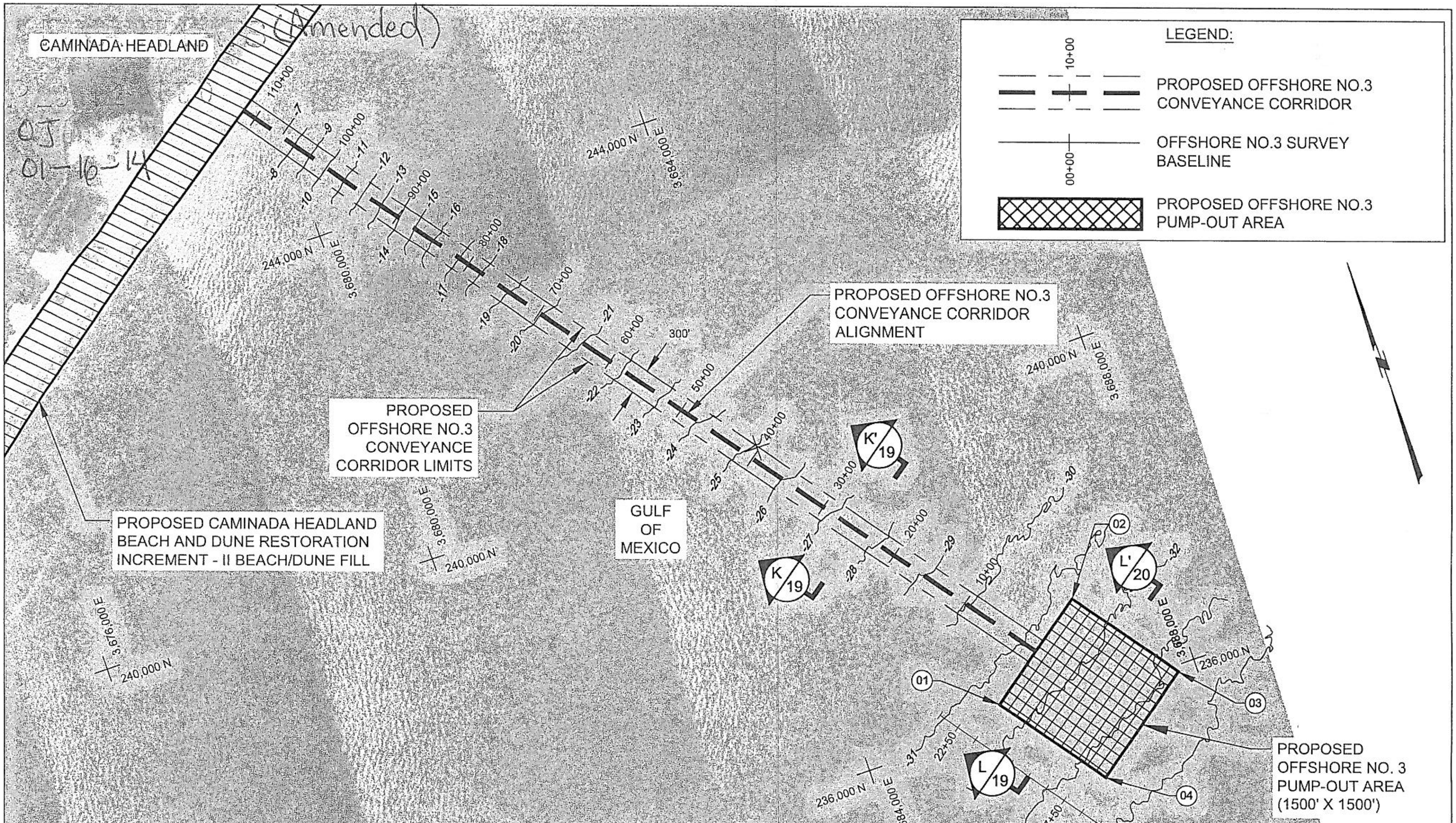
STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

OFFSHORE NO.2 PUMP-OUT AREA AND CORRIDOR TYPICAL SECTIONS

DATE: AUGUST, 2012

SHEET 17 OF 34



NOTES:
1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
3. SURVEY CONDUCTED BY OCEAN SURVEYS, INC., APRIL 2012.
4. THE LIMITS OF MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE OFFSHORE PUMP-OUT AREA.
5. SEE SHEET 33 FOR OFFSHORE NO.3 PUMP-OUT AREA BOUNDARY COORDINATES.

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

OFFSHORE NO.3 PUMP-OUT AREA PLAN VIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 18 OF 34

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

RECEIVED
2013 SEP -4 P 4:25
CPRA

REPLY TO
ATTENTION OF

AUG 2 9 2013

Operations Division
Western Evaluation Section

SUBJECT: MVN 2012-02134-WPP

Coastal Protection and Restoration Authority of Louisiana
450 Laurel Street, Suite 1200
Chase Tower North
Baton Rouge, Louisiana 70801

Dear Gentlemen:

Enclosed is a permit dated this date, subject as above, authorizing work under the Department of the Army permit program.

You are again reminded that any work not in accordance with the approved plans is subject to removal regardless of the expense and the inconvenience that such removal may involve and regardless of the date when the discrepancy is discovered.

Your attention is directed to all the terms and conditions of the approval. In order to have the work approved in accordance with the issued permit, all terms and conditions of the permit and plans shown on the drawings attached thereto must be rigidly adhered to.

It is necessary that you notify the District Engineer, Attention: Western Evaluation Section, in writing, prior to commencement of work and also upon its completion. The notification must include the permittee's name, as shown on the permit, and the permit number. Please note the expiration date on the permit. Should the project not be completed by that date, you may request a permit time extension. Such requests must be received before, but no sooner than six months before, the permit expiration date and must show the work completed and the reason the project was not finished within the time period granted by the permit.

A copy of Page 1 of the permit (ENG Form 1721) must be conspicuously displayed at the project site. Also, you must keep a copy of the signed permit at the project site until the work is completed.

Sincerely,

Darrell S. Barbara

Darrell S. Barbara
Chief Western Evaluation Section

Enclosure

DEPARTMENT OF THE ARMY PERMIT

Permittee: Coastal Protection and Restoration Authority of Louisiana

Permit No. MVN-2012-02134-WPP

Issuing Office: New Orleans District

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

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

Project Description: Reestablish the eroded headland/beach through the creation of a continuous beach and dune system for approximately 38,500 linear feet. Increment II is designed to restore the remaining portion of the dune and beach complex along the Caminada barrier headland system that was not restored under Increment I.

Project Location: Approximately 38,500 linear feet of shoreline on the Caminada Headland, East from the eastern end point of Caminada Headlands Increment I (MVN-2011-2539-WPP) towards Caminada Pass, in Lafourche Parish, Louisiana. The total project area includes the barrier shorelines, passes, and back-barrier marshes from Belle Pass east to Caminada Pass.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on **August 31, 2018.** If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least 1 month before the above date is reached.

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

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

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

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

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

Special Conditions: Pages 4-10.

Further Information:

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

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

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

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

2. Limits of this authorization.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

X Brad Miller X 8/22/13

(PERMITTEE) Brad Miller CPRA Project Manager (DATE)

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

Darrell S. Barbara 8/28/2013

(DATE)

Darrell S. Barbara, Chief Western Evaluation Section

for Richard L. Hansen, District Commander

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

(TRANSFEREE) (DATE)

SPECIAL CONDITIONS: MVN 2012-02134 WPP

7. Any alterations or modifications to the permitted plan must be submitted to the US Army Corps of Engineers, New Orleans District (CEMVN) Regulatory Branch, for re-evaluation prior to beginning work.

8. The permitted activity must not interfere with the public's right to free navigation on all navigable waters of the United States.

9. You must install and maintain, at your expense, any safety lights and signals prescribed by the US Coast Guard, through regulations or otherwise, on your authorized facilities.

10. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

11. If the proposed project, or future maintenance work, involves the use of floating construction equipment (barge mounted cranes, barge mounted pile driving equipment, floating dredge equipment, dredge discharge pipelines, etc.,) in the waterway, you are advised to notify the U.S. Coast Guard so that a Notice to Mariners, if required, may be prepared. Notification, with a copy of your permit approval and drawings, should be mailed to the U.S. Coast Guard, Sector New Orleans Command Center, 201 Hammond Highway, Metairie, Louisiana 70005, about 1 month before you plan to start work. Telephone inquiries can be directed to (504) 846 5923.

12. That structures will not be placed across any state-owned water bottoms without approval of the Louisiana Division of Administration, State Lands Office. The permittee will be responsible for contacting the State Lands Office to ascertain if the structure will be placed over state-owned water bottoms.

13. Barriers will be visible to the boating public both day and night so as to reduce the possibility of boat collision with the barriers.

14. The permittee shall follow Reasonable and Prudent Measures (RPM) as detailed in the USFWS Biological Opinion (04EL1000-2012-F-0594) for the Louisiana Coastal Area - Barataria Basin Barrier Shoreline Restoration (BBBSR) project dated December 21, 2011, pages 54 and 55. Because the proposed Caminada Headland Beach and Dune Restoration (CHBDR) project is smaller in size and scope than the BBBSR project, the extent of the following RPMs may need to be down-sized in time and space to accommodate the specific features of the proposed CHBDR project while still allowing the applicant to monitor the incidental take as provided in the February 28, 2012, amendment to the biological opinion. Therefore, the applicant should coordinate with the USFWS and the Corps regarding any changes that may occur to their proposed monitoring plan for monitoring incidental take in order to accommodate the smaller scale of the CHBDR project and to ensure that the goals of the RPMs would still be achieved if there are any deviations from the specific conditions listed below.

a) The permittee should carefully mark and stake the boundaries of the project footprint on both the Caminada headland and Shell Island and ensure that those markers are maintained for the duration of project construction activities. Should the project extend outside of those boundary markers, then the level (i.e., all piping plovers using the 18.42 miles of Gulf shoreline) of incidental take for this project would be exceeded and the Corps should reinitiate section 7 consultation with the Service as soon as possible.
b) A baseline piping plover survey should be conducted within the migrating and wintering season immediately prior to initial construction in order to determine the piping plover's preferred habitat use within the action area. Such information could then be used as an aid to determine whether specific project actions require slight modifications in order to minimize the effects of the take for future migrating and wintering seasons. For example, initial bird surveys may aid in locating and marking appropriate ingress and egress routes for ORVs and other work-related equipment, as well as equipment staging areas, in order to reduce disturbance to foraging and roosting birds to the maximum extent practicable.
c) A simple diversity and abundance survey of the intertidal benthic prey species community should be conducted within the migrating and wintering season immediately prior to initial construction (preferably at the same time as the plover distribution surveys) in order to establish a baseline of benthic prey species diversity and abundance. Again, such information could then be used as an aid to determine whether specific project actions require slight modifications in order to minimize the effects of the take for future migrating and wintering seasons. For example, initial surveys could locate areas of abundant benthic prey where birds may tend to congregate for foraging, and those areas could be flagged for avoidance by regular personnel traffic to reduce disturbance to foraging plovers.
d) Piping plover monitoring surveys should be conducted during the migrating and wintering seasons throughout initial project construction and three consecutive years following completion of initial construction in order to determine whether ingress and egress routes are working or whether they need to be adjusted.

e) To determine length of time needed for recovery of suitable foraging habitat for migrating and wintering plovers, monitoring surveys of the intertidal benthic prey species community should be conducted each year following completion of initial construction for three consecutive years. Such information could then be used as an aid to determine whether specific project actions require slight modifications in order to minimize the effects of the take for future project renourishment and/or maintenance events.
f) At least six months prior to mobilization, the Service should be notified in writing when renourishment events (i.e., renourishment of the subtidal feeder bar and of Shell Island) will occur within the action area so that the Corps and the Service can coordinate and exchange updated information to ensure that reinitiation of consultation is not necessary.
g) A comprehensive report describing the actions taken to implement the RPMs and terms and conditions associated with this incidental take statement shall be submitted to the Service by June 30 of the year following completion of all required surveys.

15. In order to be exempt from the prohibitions of section 9 of the Endangered Species Act, the permittee shall execute the following terms and conditions, which implement the RPMs described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary. The following Terms and Conditions are detailed in the USFWS Biological Opinion (04EL100-2012-F-0594) for the Caminada Headland Beach and Dune Restoration (CHBDR) project dated December 21, 2011, pages 55 and 56:

Marking Project Boundaries

a) The Permittee should carefully survey and mark the boundaries of the project footprint on the Caminada headland and Shell Island.
b) Boundary markers should be semi-permanent such that they should be maintained throughout construction activities and should persist until all construction-related activities are completed.
c) The Service's Louisiana Ecological Services Office (337/291-3108) should be notified immediately if any work or project-related actions exceed the boundary markers so that reinitiation of section 7 consultation can proceed as quickly and efficiently as possible to avoid delay in the project schedule.

Monitoring Requirements

<u>1. Requirements for piping plover surveys</u>

a) A survey schedule (with dates) is listed in Appendix D and the recommendation is for at least 3 survey dates per month; this schedule should be followed as closely as possible. The Service recognizes that given the remoteness of the project area and the potential for inclement weather conditions during the piping plover wintering season, three survey dates per month may be difficult to achieve in Louisiana. If conditions require a deviation from the recommended survey schedule, such information should be carefully documented, including an explanation why any deviation from the recommended schedule was deemed necessary.

b) Piping plover identification, especially when in non-breeding plumage, can be difficult. Qualified professionals with shorebird/habitat survey experience must conduct the required survey work. Piping plover monitors must be capable of detecting and recording locations of roosting and foraging plovers, and documenting observations in legible, complete field notes. Aptitude for monitoring includes keen powers of observation, familiarity with avian biology and behavior, experience observing birds or other wildlife for sustained periods, tolerance for adverse weather, experience in data collection and management, and patience.

c) Binoculars, a global positioning system (GPS) unit, a 10-60x spotting scope with a tripod, and the Service datasheet (Appendix D) must be used to conduct the surveys.

d) Negative (i.e., no plovers seen) and positive survey data shall be recorded and reported.

e) Piping plover locations shall be recorded with a GPS unit set to record in decimal degrees in universal transverse mercator (UTM) North American Datum 1983 (NAD83).

f) Habitat, landscape, and substrate features used by piping plovers when seen shall be recorded. Such features are outlined on the Service data sheet in Appendix D.

g) Behavior of piping plovers (e.g., foraging, roosting, preening, bathing, flying, aggression, walking) shall be documented on the Service data sheet in Appendix D.

h) Color-bands seen on piping plovers shall also be carefully documented, and should also be reported according to the information found at the following websites. Information regarding color-band observations can be found at:
http://www.fishwild.vt.edu/piping_plover/Protocols_final_draft.pdf ,
http://www.waterbirds.umn.edu/Piping_Plovers/piping2.htm , and
http://www.fws.gov/northeast/pipingplover/pdf/BahamasBandReporting2010.pdf.

2. Requirements for surveying benthic prey species

a) A qualified professional with sediment/macroinvertebrate sampling experience must conduct the benthic prey species surveys.

b) A baseline macroinvertebrate survey will be conducted at the same time of the initial piping plover survey during the migrating/wintering season immediately prior to construction. Additional surveys will be conducted during the migrating/wintering season each year post-construction for three consecutive years to determine benthic prey species recovery. Such surveys should be conducted at the same time as the plover surveys.

c) Sampling will be conducted using a basic before and after control and impact design method. Sampling will be coordinated with piping plover foraging observations based on low tide surveys.

d) In addition to recording benthic species abundance and diversity, a qualitative measure of sediment characteristics (sand, shell, mud) should also be recorded.

e) A detailed sampling methodology should be developed in coordination with the Service prior to initiating surveys.

16. Upon locating a dead or injured piping plover that may have been harmed or destroyed as a direct or indirect result of the proposed project, the permittee and/or contractor shall be responsible for notifying the Service's Lafayette, Louisiana, Field Office (337/291-3100) and the LDWF's Natural Heritage Program (225/765-2821). Care shall be taken in handling an injured piping plover to ensure effective treatment or disposition and in handling dead specimens to preserve biological materials in the best possible state for later analysis.

17. To minimize disturbance to colonial nesting birds, the following restrictions on activity should be observed:

a) For colonies containing nesting wading birds (i.e. herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present).

b) For colonies containing nesting gulls, terns, and/or black skimmers, all activity occurring within 650 feet of a rookery should be restricted to the non-nesting period (i.e., September 16 through April 1, exact dates may vary within this window depending on species present).

18. Guidelines for Activities in Proximity to Manatees and Their Habitat:

a) All personnel associated with the project should be informed of the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. Such personnel instruction should also include a discussion of the civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973.

b) All contract and/or construction personnel are responsible for observing water-related activities for the presence of manatee(s).

c) Temporary signs should be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., work area), and at least one sign should be placed where it is visible to the vessel operator.

d) Siltation barriers, if used, should be made of material in which manatees could not become entangled, and should be properly secured and regularly monitored. Barriers should not impede manatee movement.

e) If a manatee is sighted within 100 yards of the active work zone, special operating conditions should be implemented, including: no operation of moving equipment within 50 feet of a manatee; all vessels should operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, should be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area on its own accord, special operating conditions are no longer necessary, but careful observations would be resumed.

f) Any manatee sighting should be immediately reported to the U.S. Fish and Wildlife Service's (Service) Lafayette, Louisiana, Field Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries (LDWF), Natural Heritage Program (225/765-2821).

19. The Chitimacha Tribe of Louisiana has stated that the project area is part of the aboriginal Chitimacha homelands. If during the course of work at the site, prehistoric and/or historic aboriginal cultural materials are discovered, the permittee will contact the Chitimacha Tribe of Louisiana at P.O. Box 661, Charenton, LA 70523, and the CEMVN. CEMVN will initiate the required Federal, State, and Tribal coordination to determine the significance of the cultural materials and the need, if applicable, for additional cultural resource investigations.

20. The proposed "Lower Belle Conveyance Corridor" is in close proximity to the land tie-in of the Belle Pass East Jetty. This jetty was repaired and a perpendicular back dike was constructed to assure previous flanking of the jetty was eliminated. Care should be taken in the use of this corridor, and any damage to the jetty or tie-back structure must be repaired prior to demobilization from the site.

21. The "Upper Belle Pass Pump-Out Area" and "Lower Belle Pass Pump-Out Area" call for excavation immediately adjacent to the authorized navigation channel. The contractor shall be required to take pre- and post-construction monitoring surveys of the navigation channel immediately adjacent to this work area, and any resulting shoaling of the channel in this vicinity as a result of these construction activities shall be removed prior to demobilization from this site.

22. The beach area east of the Belle Pass jetties is provided as a disposal area for the maintenance of the authorized Port Fourchon navigation channel. In the un-likely event that concurrent contractual efforts are ongoing at this site, the permittee's construction contract must mandate coordination efforts and assure that channel maintenance efforts are not inhibited.

23. As-Built Drawings of the completed work shall be submitted to CEMVN-ED-LW, Attn: Keith O'Cain, US Army Corps of Engineers, New Orleans District, 7400 Leake Avenue, New Orleans,

Louisiana 70118. Work schedules for this construction effort will be coordinated with Port Fourchon navigation Operations Manager, Mr. Donald Schneider, US Army Corps of Engineers, New Orleans District, CEMVN-OD-G, 7400 Leake Avenue, New Orleans, Louisiana 70118.

24. Any modification issued for this project will require consultation with the National Marine Fisheries and other natural resource agencies if any changes are proposed to the location of various project features.

25. A lease for South Pelto Blocks 13 and 14 is required from the Bureau of Ocean Energy Management. The permittee must acquire the BOEM lease for South Pelto Blocks 13 and 14 prior to construction. If you have any questions concerning the lease application, you may contact Kenneth Ashworth at Kenneth.Ashworth@boem.gov (504)736-2656 or Michael Miner at Michael.Miner@boem.gov (504)736-2700 or by fax at 504-736-2502.

STATE OF LOUISIANA

COASTAL PROTECTION AND RESTORATION AUTHORITY

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

STATE PROJECT NO. BA-45

LAFOURCHE & JEFFERSON PARISHES, LOUISIANA

PERMIT (MVN-2012-#####-WPP)

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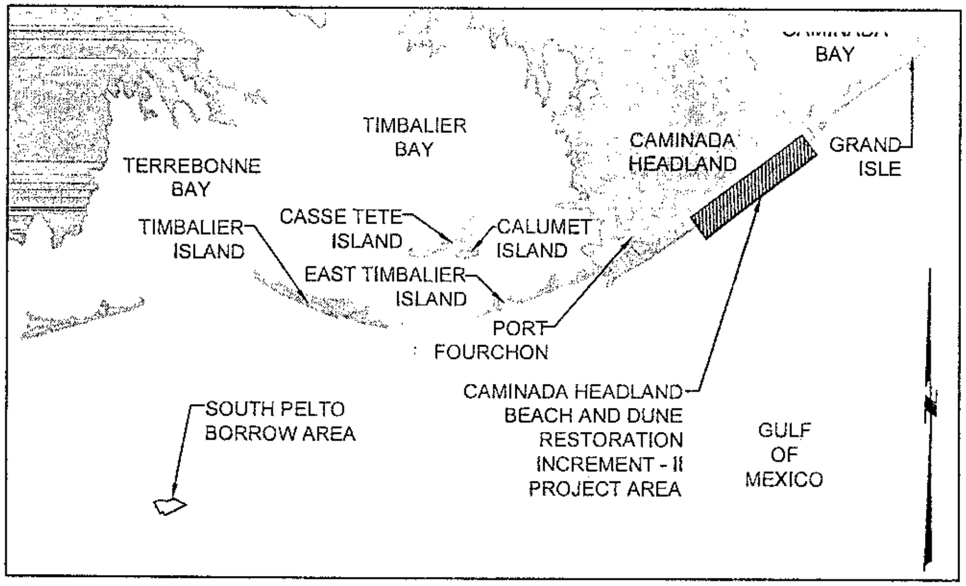
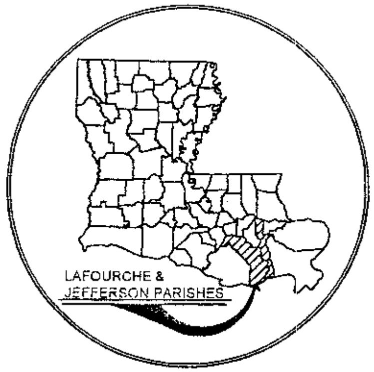


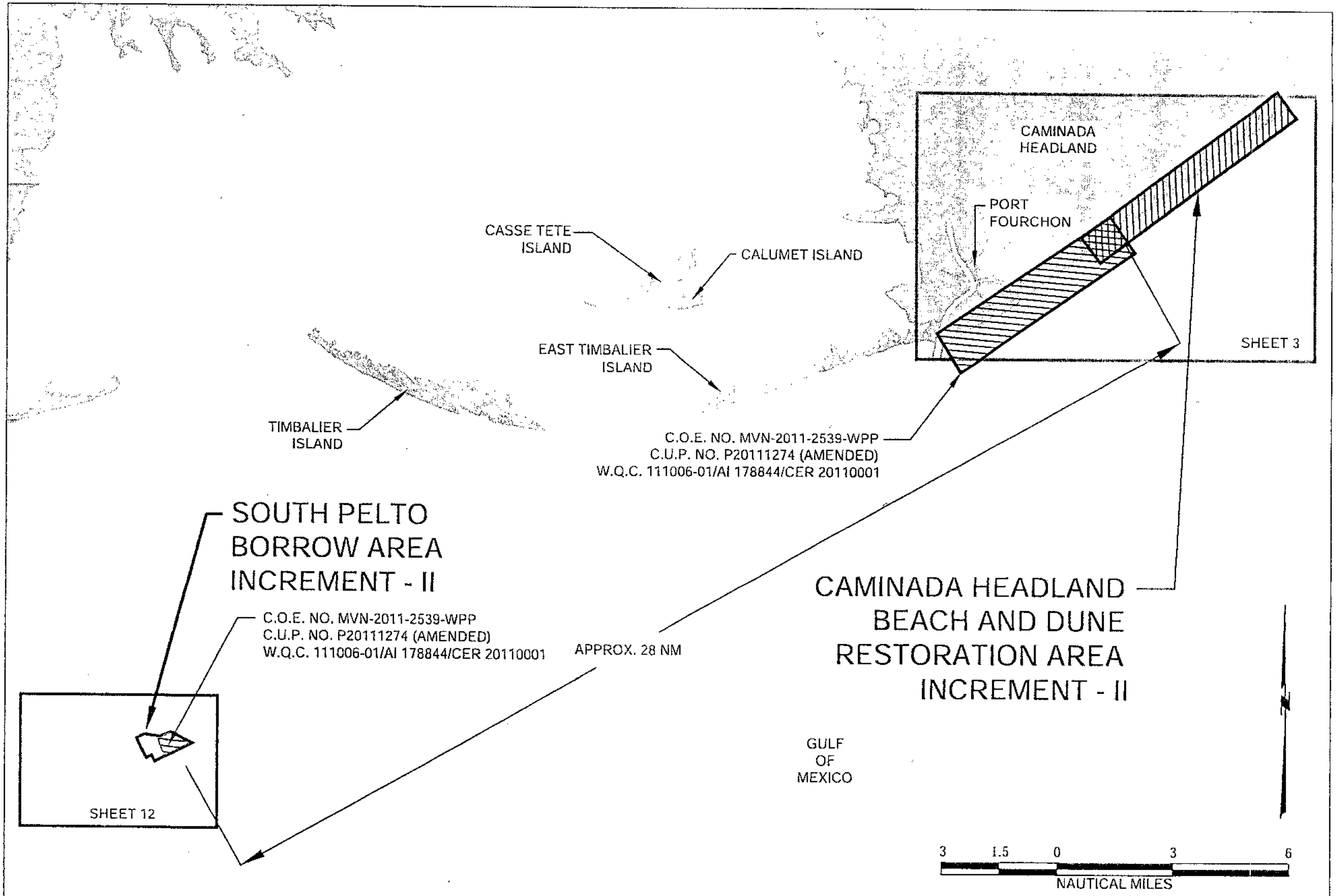


Louisiana Coastal Protection and Restoration Authority

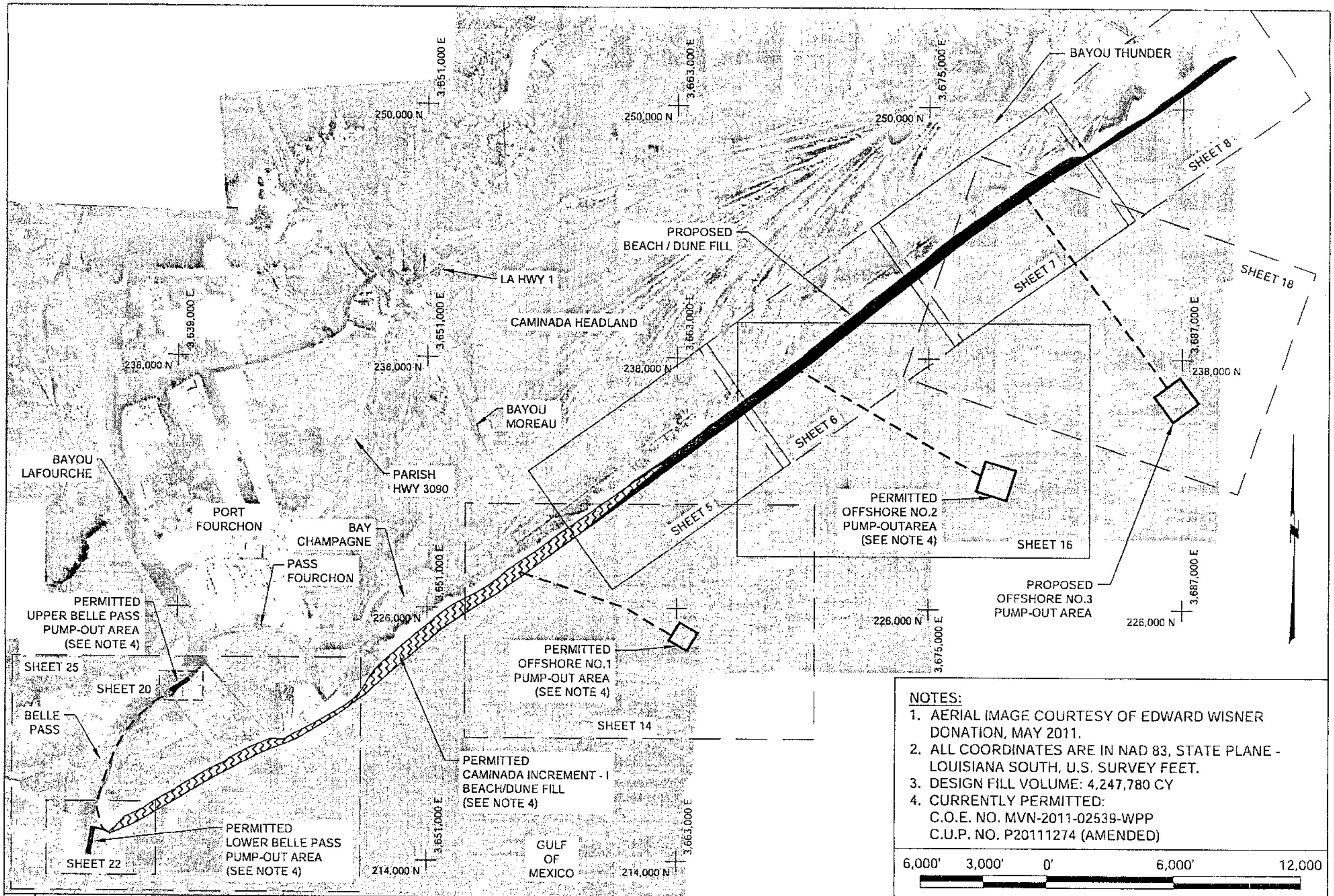
THIS DRAWING SET IS FOR PERMITTING PURPOSES ONLY AND IS NOT TO BE USED FOR CONSTRUCTION

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC	COASTAL PROTECTION AND RESTORATION AUTHORITY 450 LAUREL STREET BATON ROUGE, LOUISIANA 70801	CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II	TITLE SHEET
		STATE PROJECT NUMBER BA-45	DATE: AUGUST, 2012
DRAWN BY: STEVE DARTEZ / DESIGNED BY: MICHAEL T. POFF, P.E	APPROVED BY: SHANNON HAYNES, P.E.	FEDERAL PROJECT NUMBER BA-45	SHEET 1 OF 34



BY	DESCRIPTION	DATE	COASTAL ENGINEERING CONSULTANTS, INC	COASTAL PROTECTION AND RESTORATION AUTHORITY 450 LAUREL STREET BATON ROUGE, LOUISIANA 70801	CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II	PROJECT OVERVIEW
					STATE PROJECT NUMBER: BA-45	DATE: AUGUST, 2012
DRAWN BY: STEVE DARTEZ			DESIGNED BY: MICHAEL T. POFF, P.E.	APPROVED BY: SHANNON HAYNES, P.E.	FEDERAL PROJECT NUMBER: BA-45	SHEET 2 OF 34



NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, U.S. SURVEY FEET.
3. DESIGN FILL VOLUME: 4,247,780 CY
4. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP
   C.U.P. NO. P20111274 (AMENDED)

6,000' 3,000' 0' 6,000' 12,000

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

HEADLAND OVERVIEW

STATE PROJECT NUMBER: BA-45

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER: BA-45

SHEET 3 OF 34

GENERAL NOTES:

1. ANY EXCAVATED MATERIAL WILL BE, TO THE BEST OF KNOWLEDGE, FREE OF CONTAMINANTS AND/OR WILL BE DISPOSED OF IN AN APPROVED LANDFILL.
2. THE CONTRACTOR SHALL BECOME FAMILIAR WITH THE SITE, CONSTRUCTION PLANS, AND CONTRACT DOCUMENTS AND SHALL CONDUCT WORK IN STRICT ACCORDANCE WITH ALL PERMITS AND APPROVALS OBTAINED FOR THIS PROJECT. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY ERRORS OR DISCREPANCIES IN THE PLANS PRIOR TO BIDDING.
3. ALL AERIAL IMAGERY COURTESY OF EDWARD WISNER DONATION, MAY 2011 AND MAY NOT BE INDICATIVE OF CURRENT CONDITIONS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING PIPELINE AND UTILITY OPERATORS AT TIME OF CONSTRUCTION. ALL PIPELINES AND UNDERGROUND UTILITIES SHALL BE FIELD LOCATED AND MARKED.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING LOUISIANA ONE CALL SYSTEM (1-800-272-3020)A MINIMUM OF 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION (DIGGING, DREDGING, JETTING, ETC.) OR DEMOLITION ACTIVITY. THE CONTRACTOR SHALL ALSO NOTIFYING PIPELINE AND UTILITY OPERATORS 72 HOURS PRIOR TO ANY EXCAVATION.
6. THE WATER BOTTOM SHALL NOT BE DISTURBED DURING ACCESS TO THE PROPOSED WORK LOCATION, OR BY THE AUTHORIZED ACTIVITIES WHETHER IT BE BY DREDGING, WHEEL WASHING, PROPWASHING, JETTING, MUCKING, PLOWING, BULL DOZING OR ANY MEANS OF MOVING BOTTOM MATERIAL, EXCEPT AS DEPICTED ON THE PERMIT SHEETS. POWERED VESSELS SHALL BE OPERATED SO AS NOT TO DISTURB THE WATER BOTTOM BY PROPELLER OR JET ACTION.
7. ALL LOGS, STUMPS, AND OTHER DEBRIS UNEARTHED DURING DREDGING SHALL BE REMOVED TO AN APPROVED OFFSITE DISPOSAL AREA.
8. THE CONTRACTOR MUST INSTALL AND MAINTAIN ANY SAFETY LIGHTS, SIGNS, AND SIGNALS PRESCRIBED BY THE U.S. COAST GUARD, THROUGH REGULATIONS OR OTHERWISE ON THE AUTHORIZED FACILITIES.
9. ANY DAMAGE TO EXISTING U.S. COAST GUARD NAVIGATION AIDS OR PRIVATE NAVIGATION AIDS SHALL BE REPAIRED BY THE CONTRACTOR TO U.S. COAST GUARD STANDARDS AT THE EXPENSE OF THE CONTRACTOR.
10. PIPELINES IN OPEN WATER AND/OR NAVIGABLE WATERS SHALL BE MARKED WITH BUOYS BY THE CONTRACTOR IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS. THE CONTRACTOR SHALL MAINTAIN BUOYS DURING CONSTRUCTION OR HAVE ADEQUATE NAVIGATIONAL EQUIPMENT ON THE DREDGE TO AVOID DREDGING IN RESTRICTED AREAS.
11. THE PROPOSED PROJECT AND ANY FUTURE MAINTENANCE WORK INVOLVING THE USE OF FLOATING CONSTRUCTION EQUIPMENT (BARGE MOUNTED CRANES, BARGE MOUNTED PILE DRIVING EQUIPMENT, FLOATING DREDGE EQUIPMENT, DREDGE DISCHARGE PIPELINES, ETC.) IN FEDERAL WATERS, SHALL NOTIFY THE U.S. COAST GUARD SO THAT A NOTICE TO MARINERS, IF REQUIRED, MAY BE PREPARED. NOTIFICATION, WITH A COPY OF THE PERMIT APPROVAL AND DRAWINGS, SHALL BE MAILED TO THE U.S. COAST GUARD, SECTOR NEW ORLEANS COMMAND CENTER, 201 HAMMOND HIGHWAY, METAIRIE, LOUISIANA 70005, 30 DAYS BEFORE COMMENCEMENT OF WORK.
12. THE TEMPORARY UPLAND CONSTRUCTION ACCESS AREAS ARE INDICATED ON THE PERMIT SHEETS 27 THROUGH 29. USE OF THESE AREAS SHALL BE COORDINATED WITH THE PARISH AND PROJECT ENGINEER. THE CONTRACTOR SHALL BE REQUIRED TO CONFINE HIS/HER PLANT, EQUIPMENT, AND OPERATIONS OF PERSONNEL TO AREAS PERMITTED BY LAW, ORDINANCES, PERMITS, AND THE REQUIREMENTS OF THE CONSTRUCTION CONTRACT DOCUMENTS, AND SHALL NOT UNREASONABLY ENCUMBER THE PREMISES WITH PLANT OR EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PREPARATION AND RESTORATION OF THE TEMPORARY CONSTRUCTION ACCESS AREA. THE CONTRACTOR SHALL BE REQUIRED TO SUBMIT A CONSTRUCTION ACCESS PLAN AND CONSTRUCTION ACCESS RESTORATION PLAN PRIOR TO ITS USAGE. THE TEMPORARY CONSTRUCTION ACCESS AREAS SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITIONS AS PART OF DEMOBILIZATION.
13. THE CONTRACTOR SHALL FOLLOW CONVEYANCE CORRIDORS, REMAIN WITHIN THE TEMPORARY CONSTRUCTION ACCESS AND STAGING AREAS, AND / OR FILL TEMPLATES, AND SHALL NOT, AT ANY TIME, TRAVEL ON EXISTING MARSH OR VEGETATED WETLANDS UNLESS SPECIFIED IN THE PERMIT OR THROUGH WRITTEN DIRECTION FROM ENGINEER.
14. THE CONTRACTOR SHALL TAKE PARTICULAR CARE WHEN WORKING IN THE VICINITY OF THE BELLE PASS JETTIES. ANY DAMAGE RESULTING FROM THE CONTRACTORS ACTIVITIES SHALL BE REPAIRED TO THE SATISFACTION OF THE U.S. ARMY CORPS OF ENGINEERS BY THE CONTRACTOR PRIOR TO DEMOBILIZATION. ALL COST ASSOCIATED WITH REPAIRS TO THE BELLE PASS JETTIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
15. IF THE CONTRACTOR ELECTS TO UTILIZE THE UPPER AND/OR LOWER BELLE PASS PUMP-OUT AREAS, THE CONTRACTOR SHALL CONDUCT PRE- AND POST-CONSTRUCTION MONITORING SURVEYS OF THE NAVIGATION CHANNEL IMMEDIATELY ADJACENT TO THIS WORK AREA(S). ANY RESULTANT SHOALING OF THE CHANNEL IN THIS VICINITY AS A RESULT OF CONTRACTOR ACTIVITIES SHALL BE REMOVED AND THE CHANNEL RESTORED TO PRE-CONSTRUCTION CONDITIONS PRIOR TO DEMOBILIZATION. ALL COST ASSOCIATED WITH SHOAL REMOVAL SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
16. THE CONTRACTOR SHALL WORK COOPERATIVELY WITH THE OWNER TO ADDRESS THE NOTIFICATION AND COORDINATION REQUIREMENTS WITH THE LANDOWNERS, UTILITY OPERATORS, AND PIPELINE COMPANIES.
17. AS-BUILT DRAWINGS AND/OR PLATS SHALL HAVE WRITTEN ON THEM THE DATE OF COMPLETION OF SAID ACTIVITIES AND SHALL BE SUBMITTED TO THE LOUISIANA DEPARTMENT OF NATURAL RESOURCES, OFFICE OF COASTAL MANAGEMENT, P.O. BOX 44487, BATON ROUGE, LA 70804-4487 WITHIN 30 DAYS FOLLOWING PROJECT COMPLETION.
18. ALL STRUCTURES, FACILITIES, WELL AND PIPELINE/FLOWLINES OCCURRING IN OPEN WATER AREAS OR IN OILFIELD CANALS OR SLIPS SHALL BE REMOVED WITHIN 120 DAYS OF ABANDONMENT OR THE FACILITIES FOR THE HEREIN PERMITTED USE UNLESS PRIOR WRITTEN APPROVAL TO LEAVE SUCH STRUCTURES IN PLACE IS RECEIVED FROM THE OFFICE OF COASTAL MANAGEMENT. THIS CONDITION DOES NOT PRECLUDE THE NECESSITY FOR REVISING THE CURRENT PERMIT OR OBTAINING A SEPARATE COASTAL USE PERMIT, SHOULD ONE BE REQUIRED.
19. THIS DRAWING SET IS FOR PERMITTING PURPOSES ONLY AND IS NOT TO BE USED FOR CONSTRUCTION.

SURVEY NOTES:

1. ALL COORDINATES ARE NAD 83 (GEOID 09), LOUISIANA STATE PLANE, SOUTHERN ZONE, U.S. SURVEY FEET.
2. ALL ELEVATIONS ARE IN NAVD88, U.S. SURVEY FEET UNLESS OTHERWISE SPECIFIED.
3. ALL BORROW AREA SURVEYS PERFORMED BY OCEAN SURVEYS, INC., 2011.
4. ALL BELLE PASS CONVEYANCE CORRIDORS AND PUMP-OUT AREAS SURVEYS PERFORMED BY PICCIOA & ASSOCIATES, INC.AND COASTAL ENGINEERING CONSULTANTS, INC., 2011. OFFSHORE CONVEYANCE CORRIDORS AND PUMP-OUT AREAS SURVEYS PERFORMED BY OCEAN SURVEYS, INC. 2012.
5. ALL HEADLAND SURVEYS PERFORMED BY PICCIOLA & ASSOCIATES, INC., 2010.
6. INFORMATION SHOWN HERE IN REFLECTS CONDITIONS AS THEY EXISTED ON THE SURVEY DATE SHOWN AND CAN ONLY BE CONSIDERED INDICATIVE OF CONDITIONS AT THAT TIME.

BY	DESCRIPTION	DATE

DRAWN BY STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

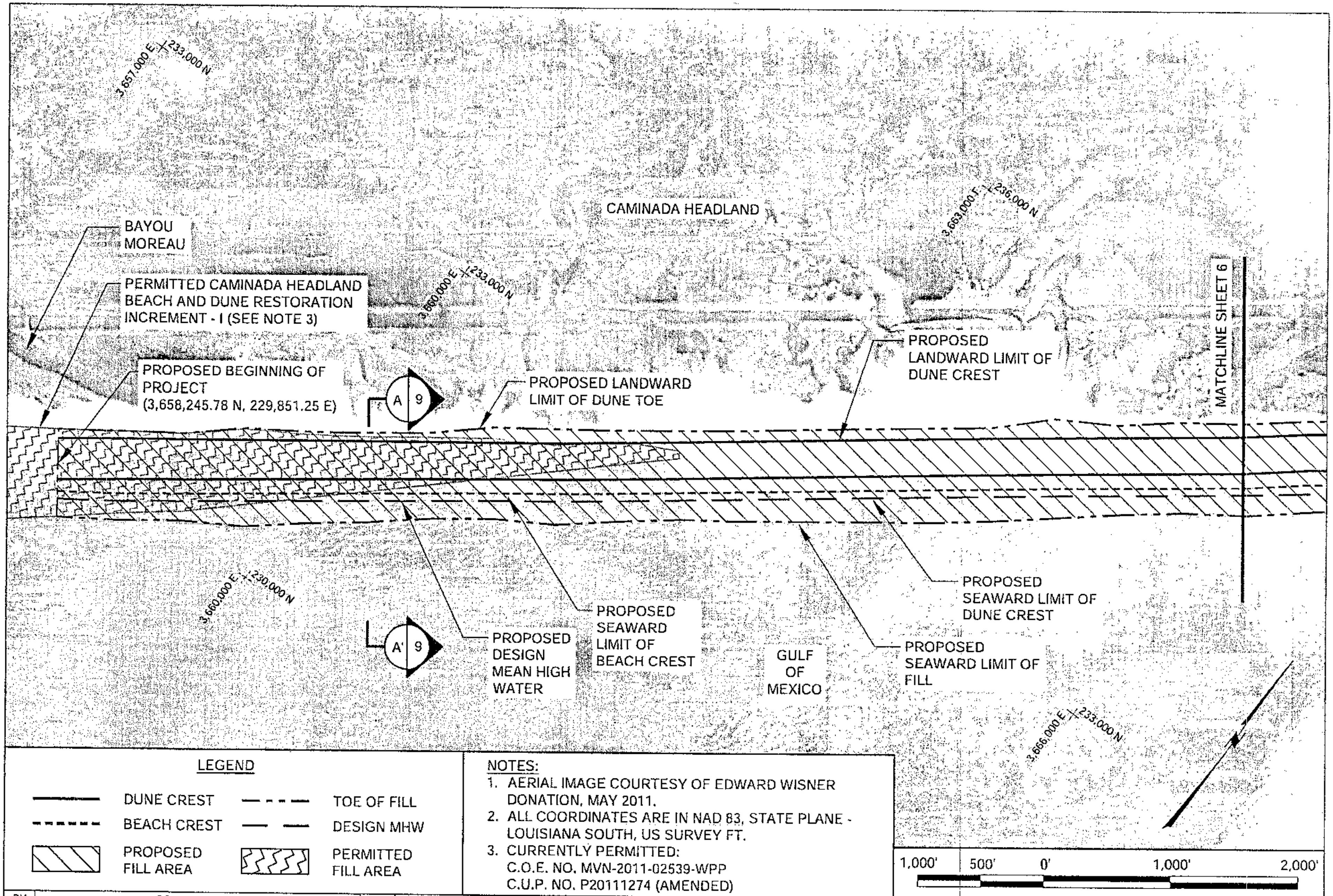
STATE PROJECT NUMBER: BA-45

FEDERAL PROJECT NUMBER: BA-45

GENERAL NOTES

DATE: AUGUST, 2012

SHEET 4 OF 34



LEGEND

(solid line)	DUNE CREST	(dash-dot line)	TOE OF FILL
(dashed line)	BEACH CREST	(long dash line)	DESIGN MHW
(hatch)	PROPOSED FILL AREA	(zigzag hatch)	PERMITTED FILL AREA

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FT.
3. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP
   C.U.P. NO. P20111274 (AMENDED)

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

CAMINADA HEADLAND
PLAN VIEW
STATION 275+00 TO 370+00

STATE PROJECT NUMBER: BA-45

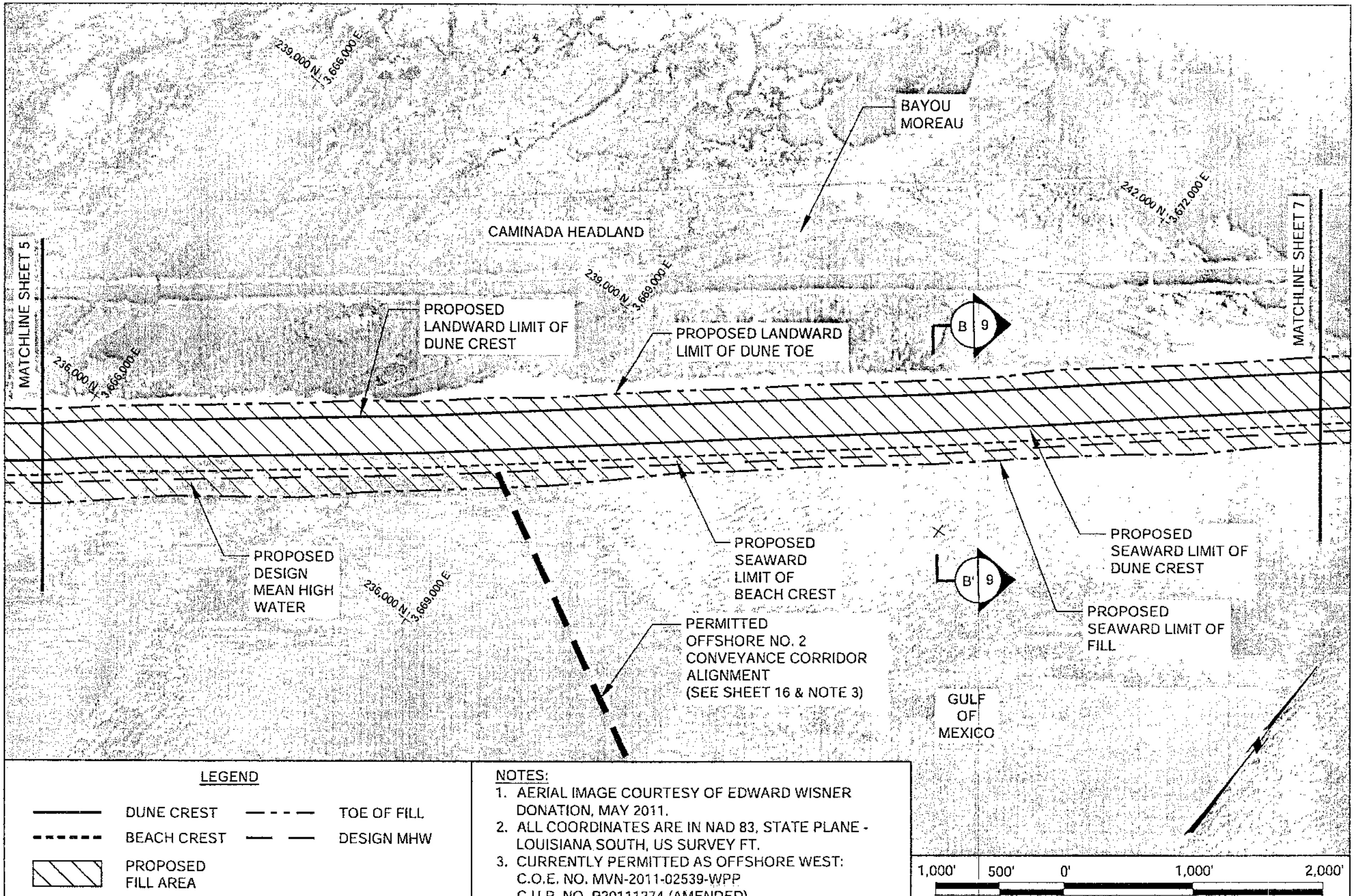
DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES P.E.

FEDERAL PROJECT NUMBER: BA-45



LEGEND

- DUNE CREST
- BEACH CREST
- PROPOSED FILL AREA
- TOE OF FILL
- DESIGN MHW

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FT.
3. CURRENTLY PERMITTED AS OFFSHORE WEST: C.O.E. NO. MVN-2011-02539-WPP C.U.P. NO. P20111274 (AMENDED)

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

CAMINADA HEADLAND PLAN VIEW STATION 370+00 TO 470+00

STATE PROJECT NUMBER: BA-45

DATE: AUGUST, 2012

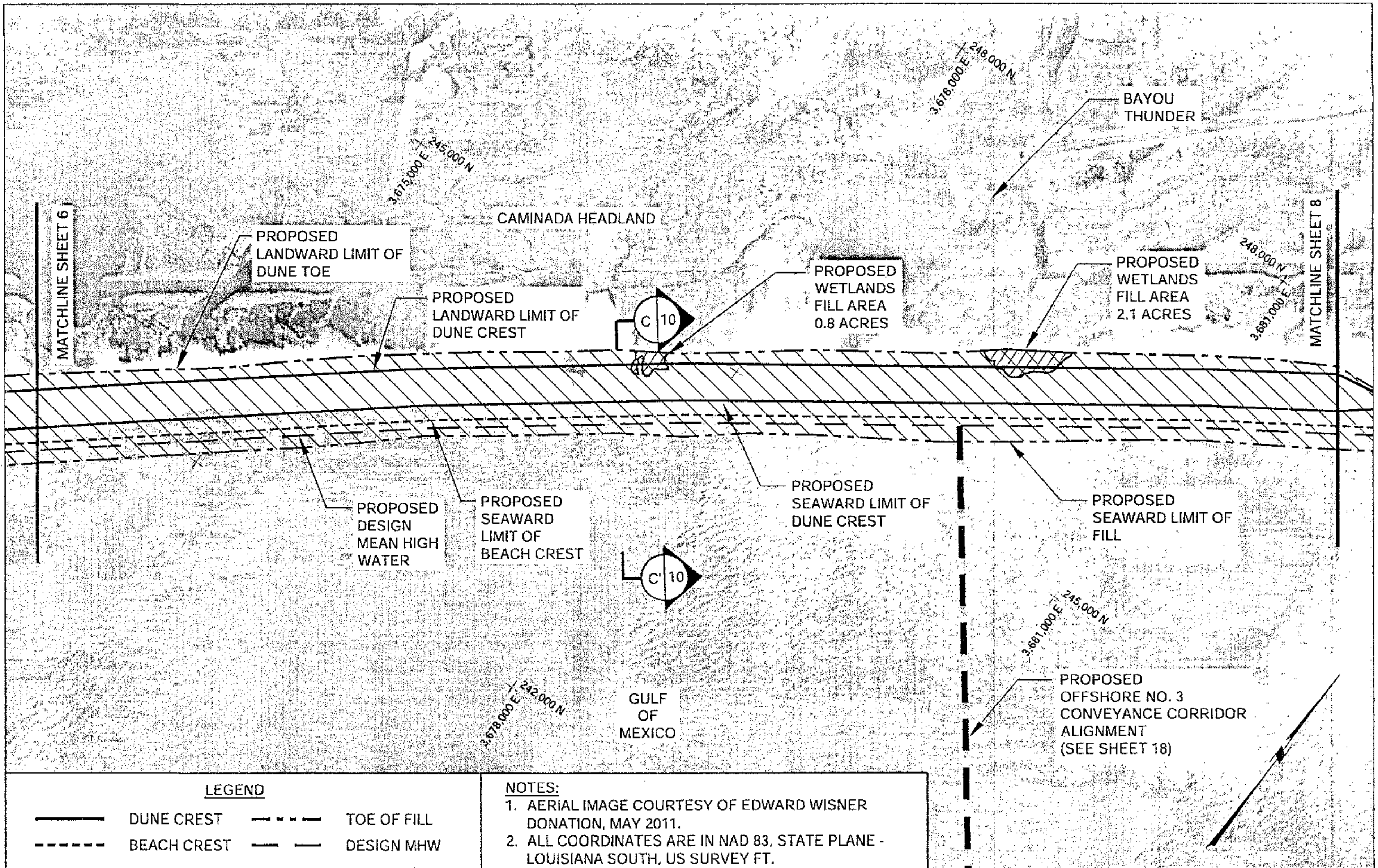
DRAWN BY STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER: BA-45

SHEET 6 OF 34



LEGEND

————	DUNE CREST	— - - —	TOE OF FILL
- - - - -	BEACH CREST	—— ——	DESIGN MHW
⧅	PROPOSED FILL AREA	▨	PROPOSED WETLANDS FILL AREA

NOTES:
1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FT.

BY	DESCRIPTION	DATE
	-	

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

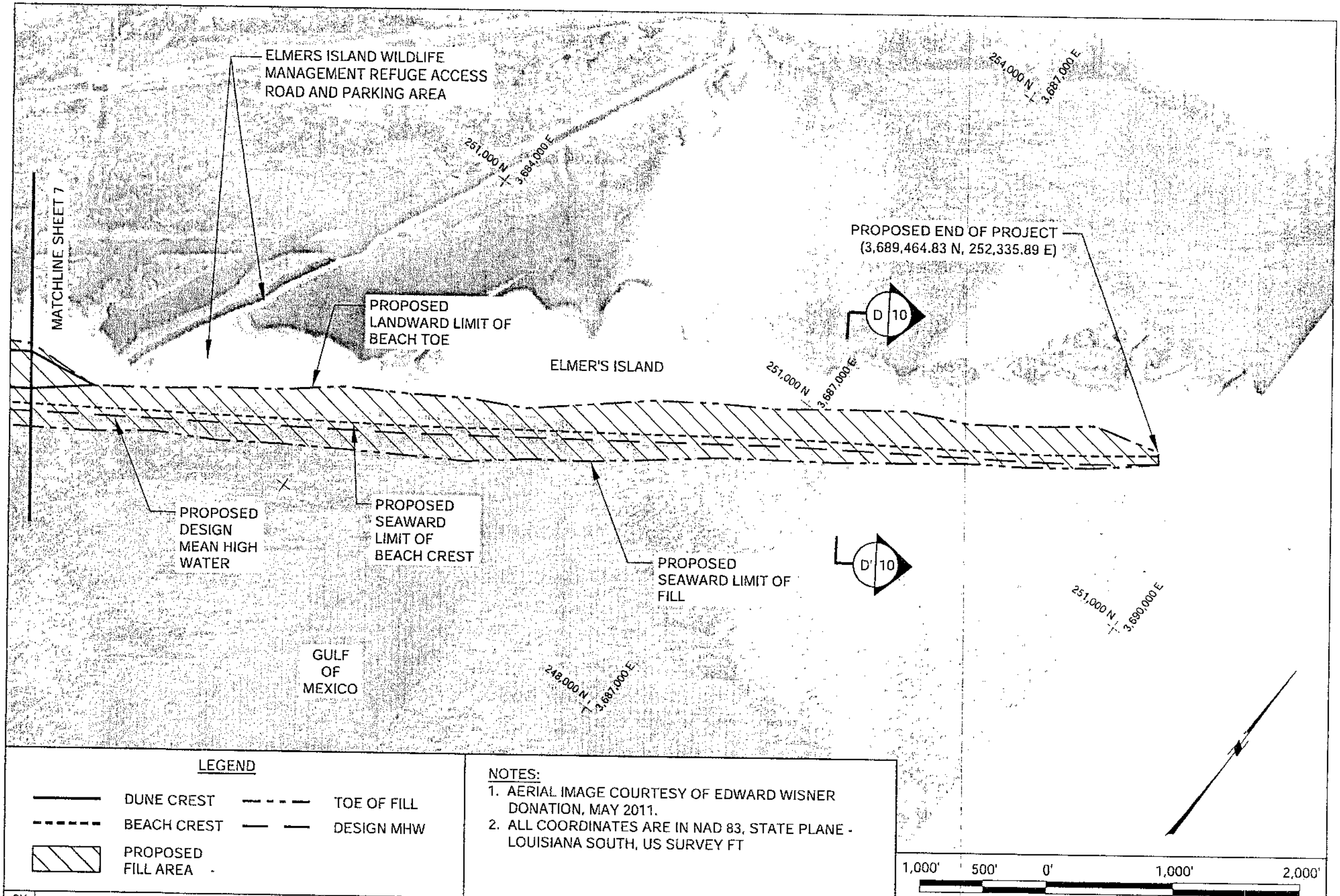
STATE PROJECT NUMBER: BA-45

FEDERAL PROJECT NUMBER: BA-45

CAMINADA HEADLAND PLAN VIEW STATION 470+00 TO 570+00

DATE: AUGUST, 2012

SHEET 7 OF 34



LEGEND

DUNE CREST	TOE OF FILL
BEACH CREST	DESIGN MHW
PROPOSED FILL AREA	

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FT

BY	DESCRIPTION	DATE

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

STATE PROJECT NUMBER: BA-45

FEDERAL PROJECT NUMBER: BA-45

CAMINADA HEADLAND
PLAN VIEW
STATION 570+00 TO 660+00

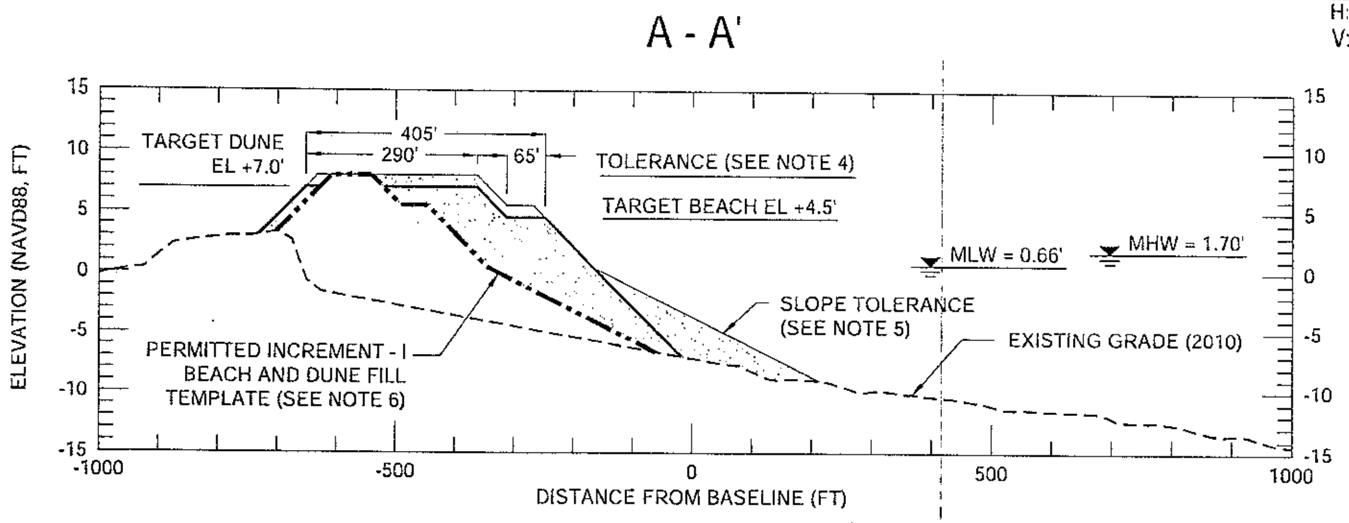
DATE: AUGUST, 2012

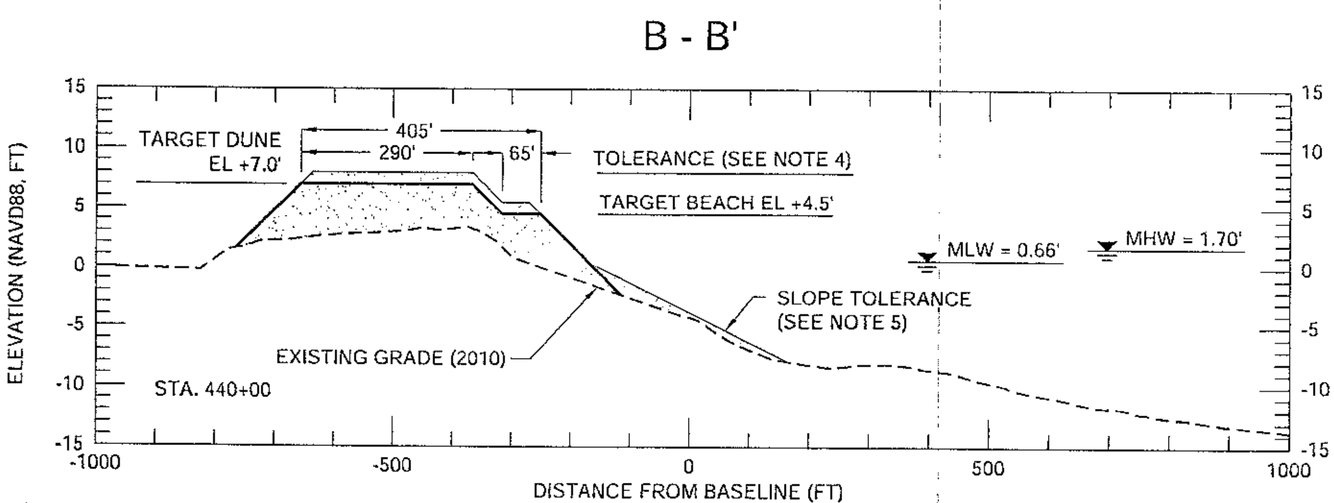
SHEET 8 OF 34

LEGEND:

- PROPOSED BEACH / DUNE FILL
- EXISTING GRADE (2010)
- DESIGN
- CONSTRUCTION TOLERANCE (SEE NOTE 4)

SCALE:
H: 1" = 300'
V: 1" = 15'





NOTES:
1. SECTIONS ARE VIEWED AS LOOKING EAST.
2. SURVEY BY PICCIOLA & ASSOCIATES, INC. 2010.
3. ALL SLOPES 1V:20H UNLESS OTHERWISE DESIGNATED.
4. A ONE FOOT TOLERANCE IS INCLUDED TO ACCOUNT FOR CONSTRUCTION METHODS AND CONSOLIDATION/SETTLEMENT OF THE FILL.
5. CONSTRUCTION SLOPE TOLERANCE OF 1:40 PROVIDED FROM MEAN LOW WATER SEAWARD.
6. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED)

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

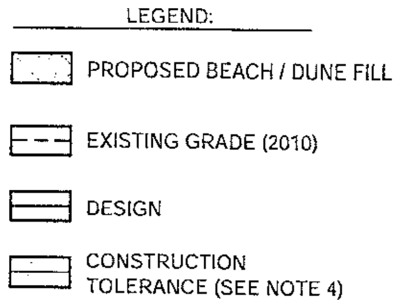
COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

CAMINADA HEADLAND DESIGN SECTIONS

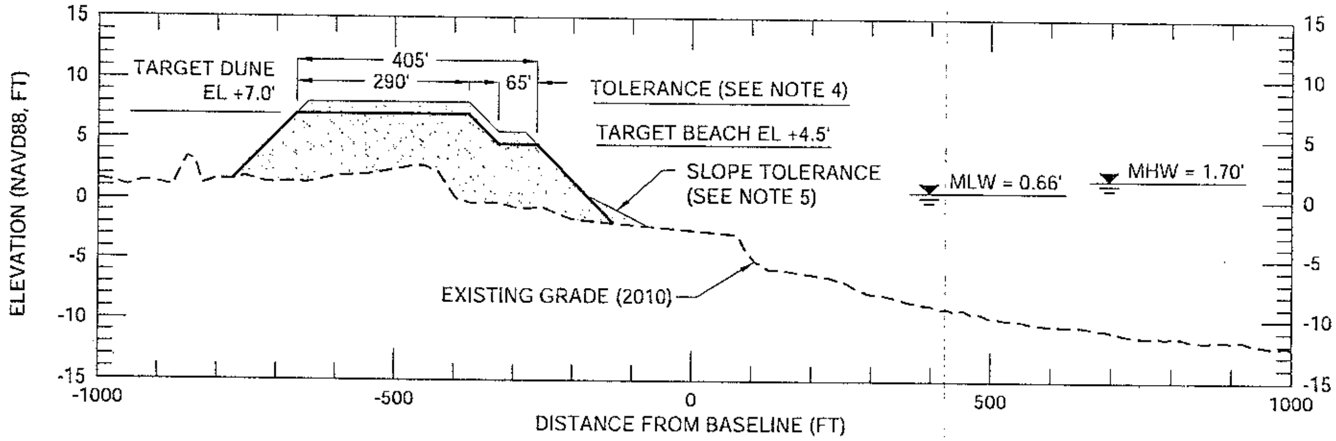
STATE PROJECT NUMBER BA-45
DATE: AUGUST, 2012
FEDERAL PROJECT NUMBER: BA-45
SHEET 9 OF 34

DRAWN BY: STEVE DARTEZ
DESIGNED BY: MICHAEL T. POFF, P.E.
APPROVED BY: SHANNON HAYNES, P.E.

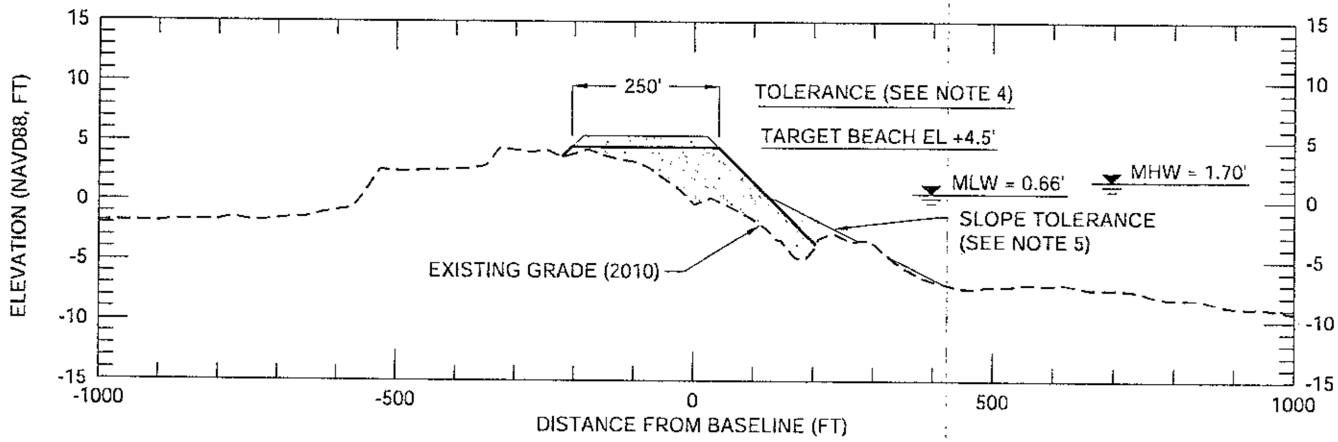


SCALE:
H: 1" = 300'
V: 1" = 15'

C - C'



D - D'



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1. SECTIONS ARE VIEWED AS LOOKING EAST.
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DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

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COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

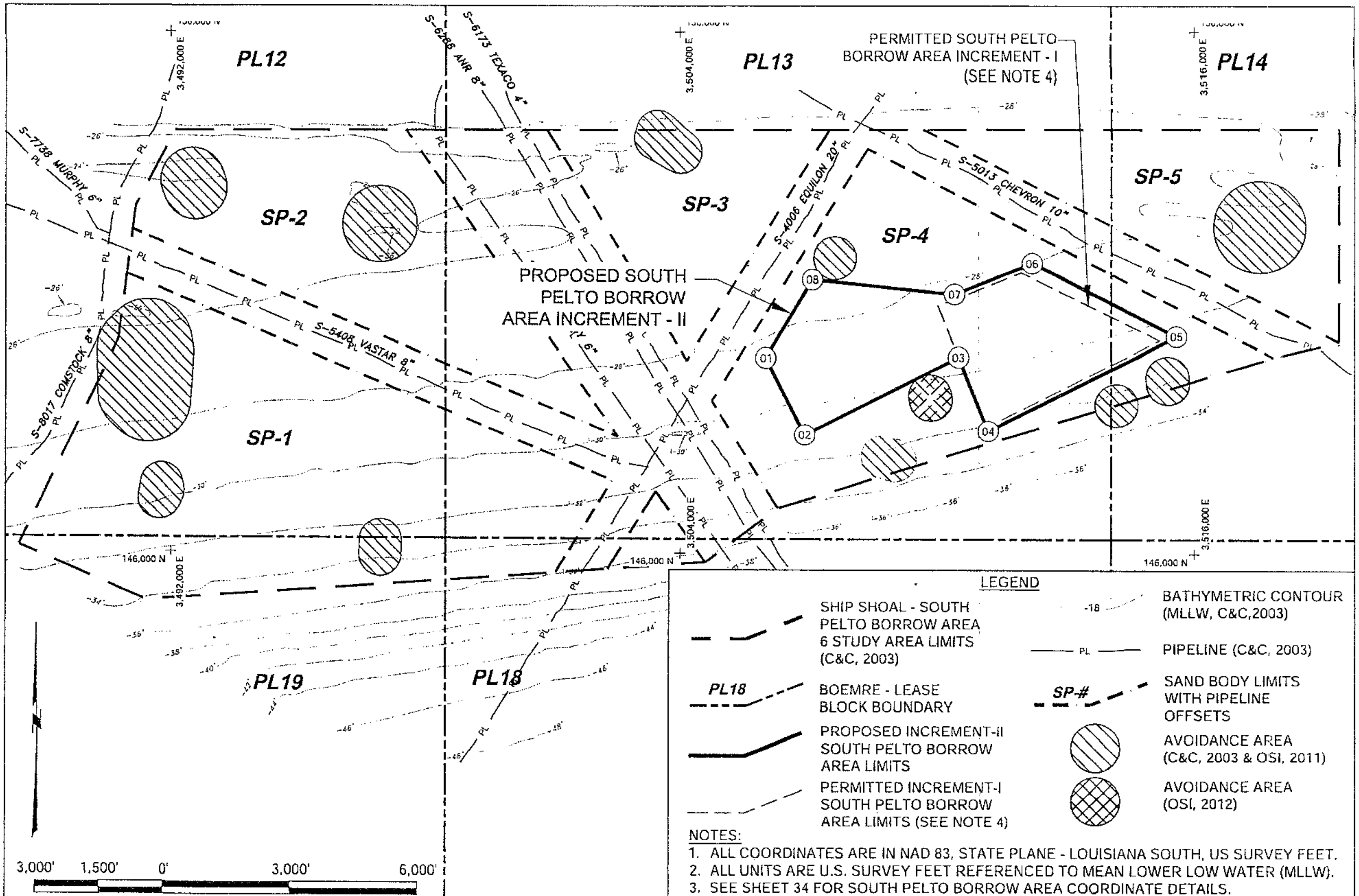
STATE PROJECT NUMBER: BA-45

FEDERAL PROJECT NUMBER: BA-45

CAMINADA HEADLAND DESIGN SECTIONS

DATE: AUGUST, 2012

SHEET 10 OF 34



LEGEND

SHIP SHOAL - SOUTH PELTO BORROW AREA 6 STUDY AREA LIMITS (C&C, 2003)

PL18 BOEMRE - LEASE BLOCK BOUNDARY

PROPOSED INCREMENT-II SOUTH PELTO BORROW AREA LIMITS

PERMITTED INCREMENT-I SOUTH PELTO BORROW AREA LIMITS (SEE NOTE 4)

-18 BATHYMETRIC CONTOUR (MLLW, C&C,2003)

PL PIPELINE (C&C, 2003)

SP-# SAND BODY LIMITS WITH PIPELINE OFFSETS

AVOIDANCE AREA (C&C, 2003 & OSI, 2011)

AVOIDANCE AREA (OSI, 2012)

NOTES:
1. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
2. ALL UNITS ARE U.S. SURVEY FEET REFERENCED TO MEAN LOWER LOW WATER (MLLW).
3. SEE SHEET 34 FOR SOUTH PELTO BORROW AREA COORDINATE DETAILS.
4. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274.

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

SOUTH PELTO OVERVIEW MAP

STATE PROJECT NUMBER: BA-45

DATE: AUGUST, 2012

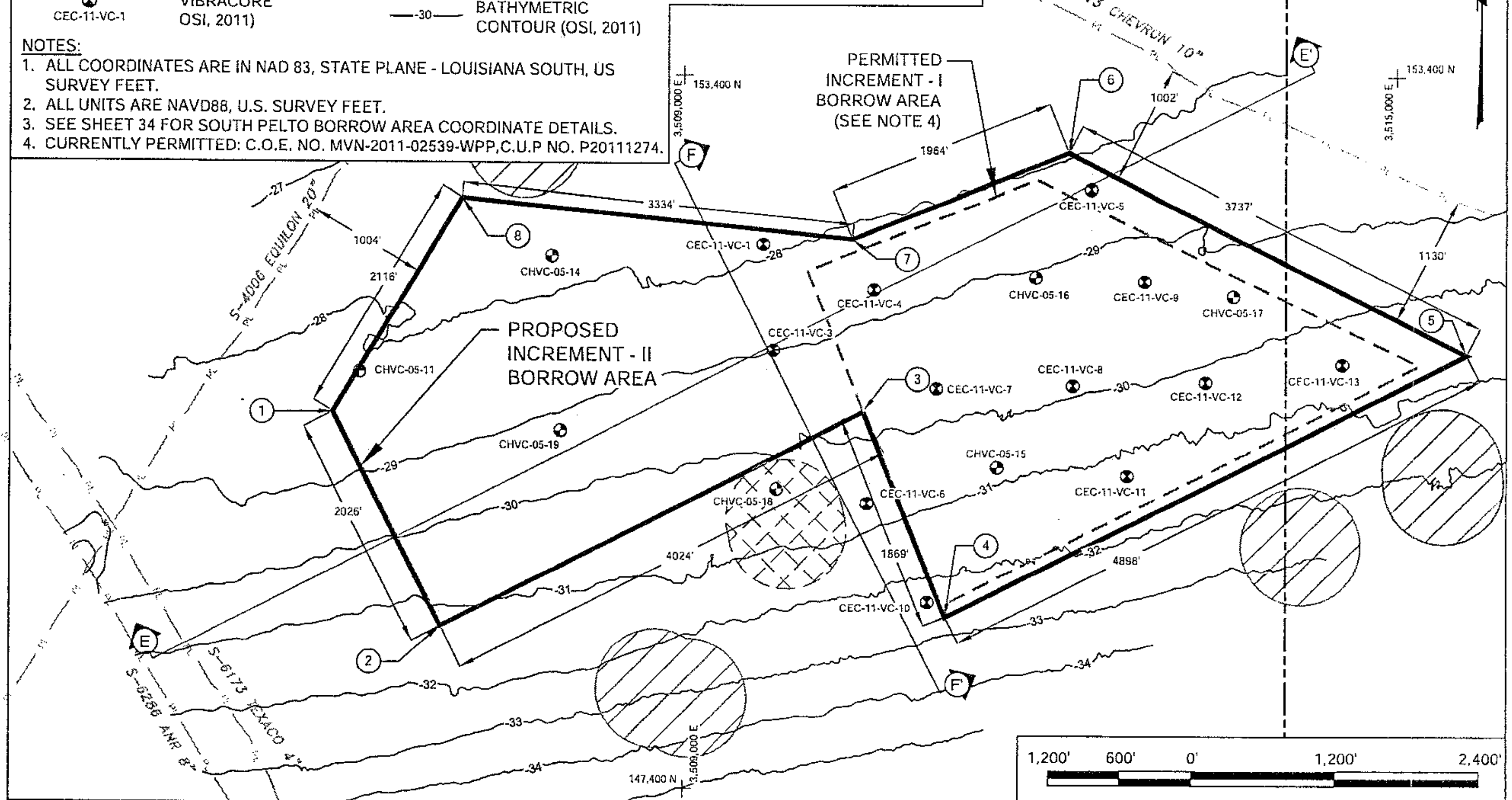
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER: BA-45

SHEET 11 OF 34



LEGEND

PL13	BOEM LEASE BOUNDARY
CHVC-05-14	VIBRACORE (CPE, 2005)
CEC-11-VC-1	VIBRACORE OSI, 2011)
	AVOIDANCE AREA (OSI, 2011)
—PL—	PIPELINE (OSI, 2011)
—30—	BATHYMETRIC CONTOUR (OSI, 2011)
	AVOIDANCE AREA (OSI, 2012)
(1)	BORROW AREA BOUNDARY COORDINATE

NOTES:
1. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
2. ALL UNITS ARE NAVD88, U.S. SURVEY FEET.
3. SEE SHEET 34 FOR SOUTH PELTO BORROW AREA COORDINATE DETAILS.
4. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP,C.U.P NO. P20111274.

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

SOUTH PELTO BORROW AREA PLAN VIEW

STATE PROJECT NUMBER: BA-45

DATE AUGUST, 2012

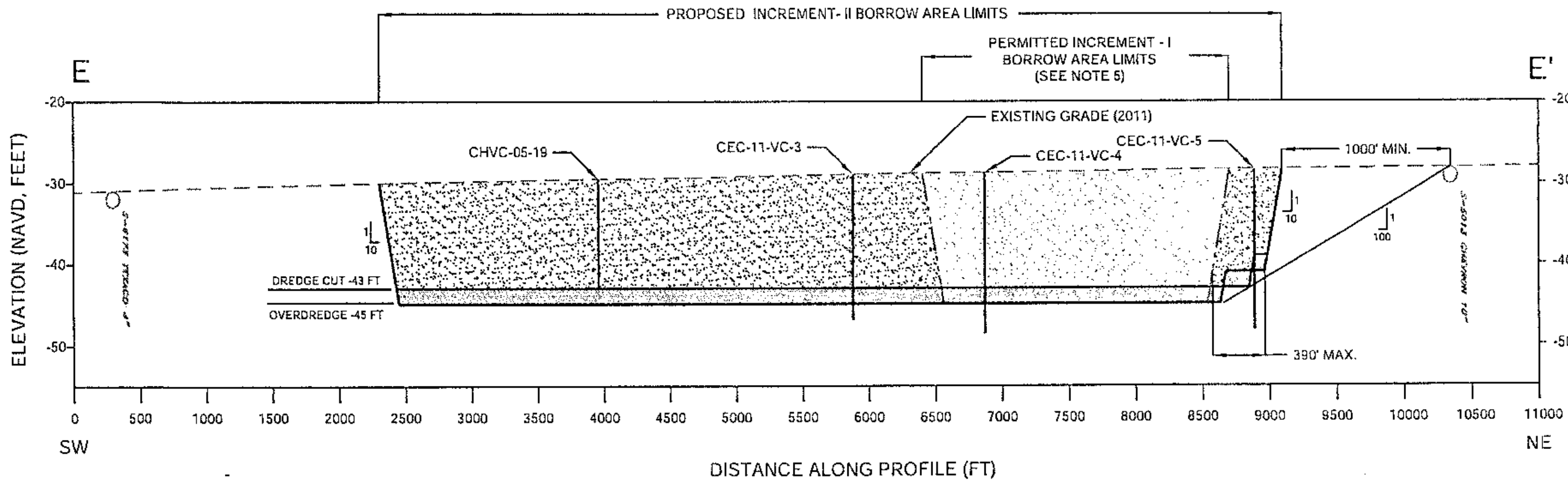
FEDERAL PROJECT NUMBER: BA-45

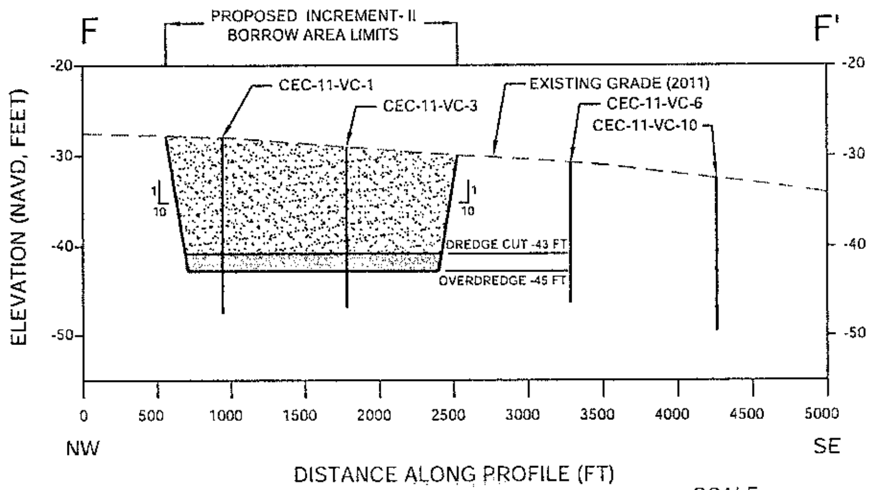
SHEET 12 OF 34

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

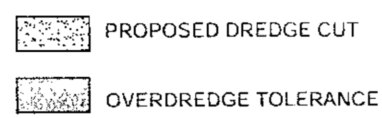
APPROVED BY: SHANNON HAYNES, P.E.





SCALE
H: 1" = 1200'
V: 1" = 20'

LEGEND:



NOTES:
1. PIPELINE DATA FROM OSI, 2011.
2. BATHYMETRIC SURVEY CONDUCTED BY OSI, 2011.
3. ELEVATIONS HEREON ARE REFERENCED TO NORTH AMERICAN VERITCAL DATUM 1988 (NAVD)
4. VIBRACORE DATA OBTAINED FROM CPE, 2005 AND OSI, 2011.
5. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP,C.U.P NO. P20111274.

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

SOUTH PELTO BORROW AREA DESIGN SECTIONS

STATE PROJECT NUMBER: BA-45

DATE: AUGUST, 2012

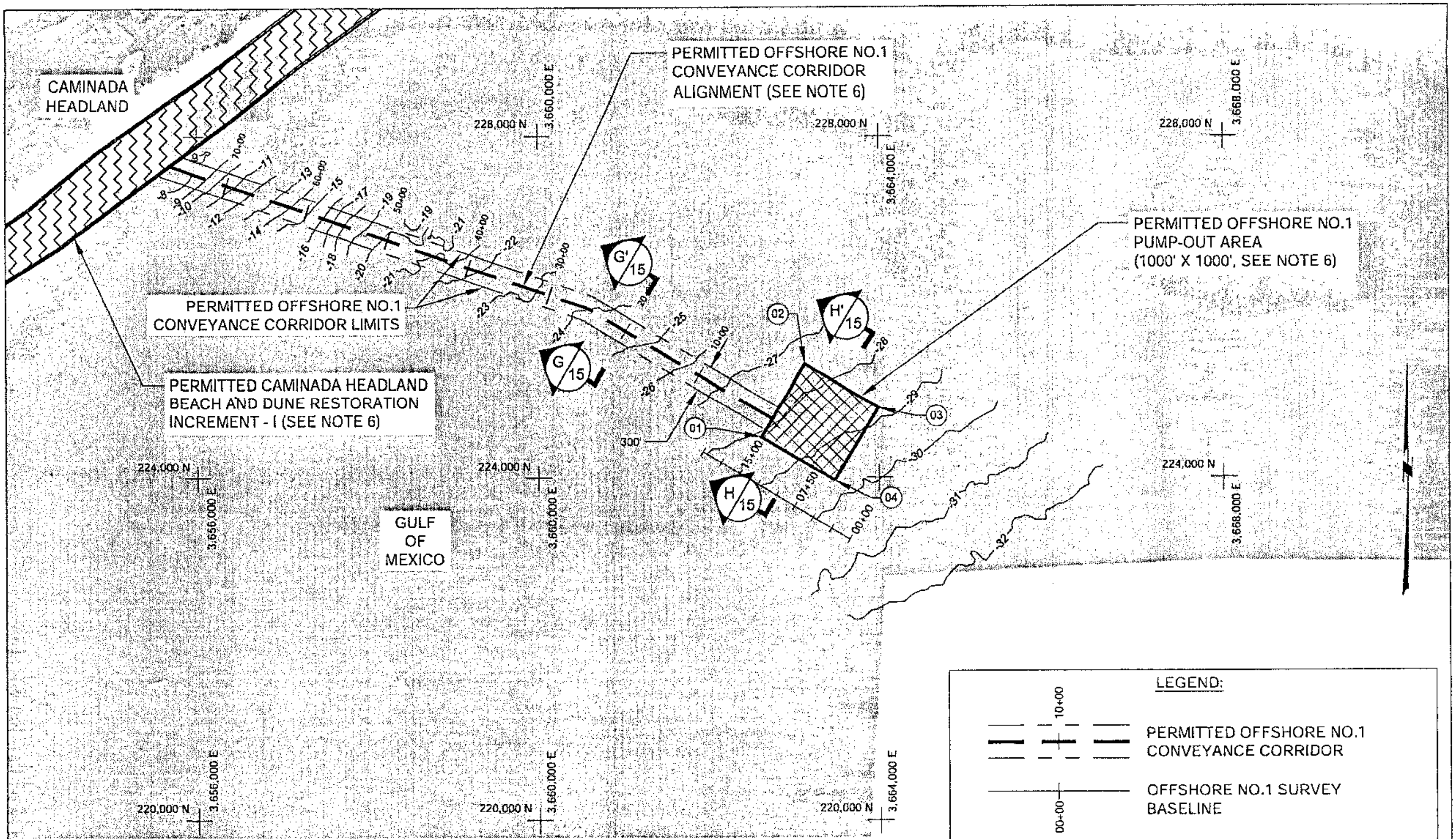
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER: BA-45

SHEET 13 OF 34



NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
3. SURVEY CONDUCTED BY OCEAN SURVEY, INC., DECEMBER 2011.
4. THE LIMITS OF MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE OFFSHORE WEST PUMP-OUT AREA.
5. SEE SHEET 33 FOR OFFSHORE NO.1 PUMP-OUT AREA BOUNDARY COORDINATES.
6. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED) AS OFFSHORE WEST.

LEGEND:

- 10+00 — PERMITTED OFFSHORE NO.1 CONVEYANCE CORRIDOR
- 00+00 — OFFSHORE NO.1 SURVEY BASELINE
- PERMITTED OFFSHORE NO.1 PUMP-OUT AREA

1600' 800' 0' 1600' 3200'

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

OFFSHORE NO.1 PUMP-OUT AREA PLAN VIEW

STATE PROJECT NUMBER: BA-45EB
DATE: AUGUST, 2012
FEDERAL PROJECT NUMBER: BA-45EB
SHEET 14 OF 34

DRAWN BY: STEVE DARTEZ
DESIGNED BY: MICHAEL T. POFF, P.E.
APPROVED BY: SHANNON HAYNES, P.E.

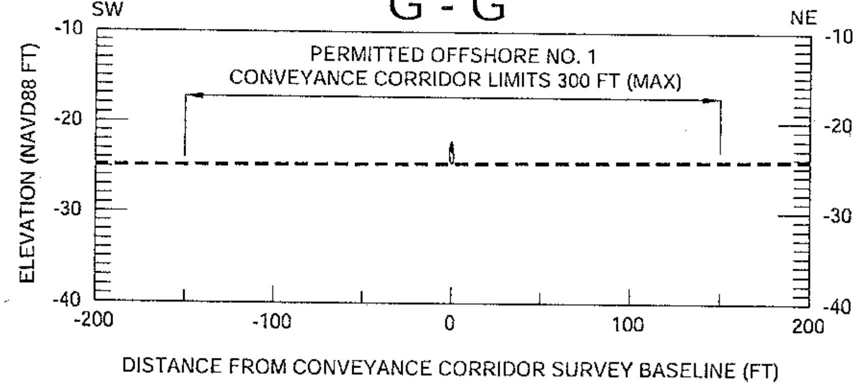
SCALE:
VERT: 1" = 20'
HORIZ: 1" = 100'

LEGEND:

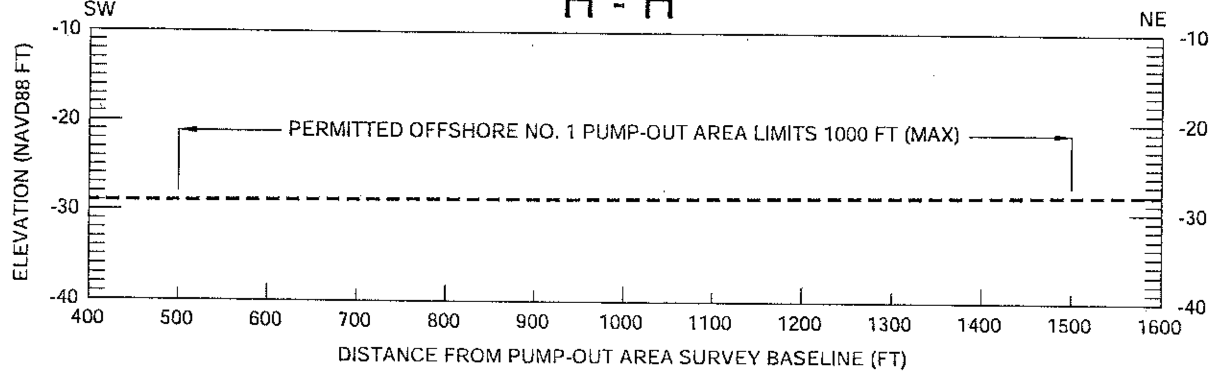
EXISTING GRADE (2011)

SUBMERGED SEDIMENT PIPELINE

G - G'



H - H'



NOTES:
1. SURVEY CONDUCTED BY OCEAN SURVEY, INC., DECEMBER 2011.
2. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 NAVD88.
3. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

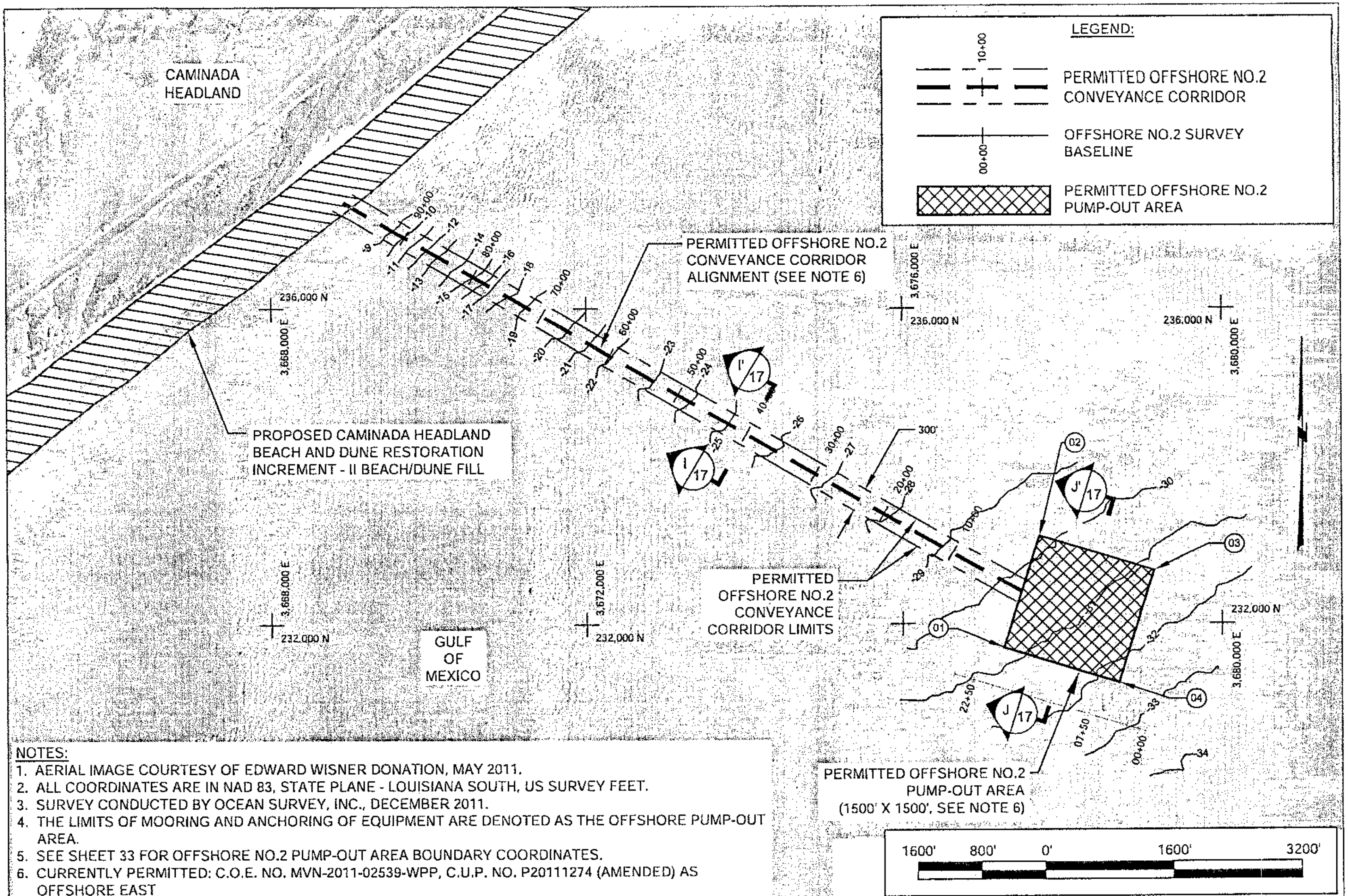
STATE PROJECT NUMBER: BA-45

FEDERAL PROJECT NUMBER: BA-45

OFFSHORE NO. 1 PUMP-OUT AREA AND CORRIDOR TYPICAL SECTIONS

DATE: AUGUST, 2012

SHEET 15 OF 34



NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
3. SURVEY CONDUCTED BY OCEAN SURVEY, INC., DECEMBER 2011.
4. THE LIMITS OF MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE OFFSHORE PUMP-OUT AREA.
5. SEE SHEET 33 FOR OFFSHORE NO.2 PUMP-OUT AREA BOUNDARY COORDINATES.
6. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED) AS OFFSHORE EAST

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

OFFSHORE NO.2 PUMP-OUT AREA PLAN VIEW

STATE PROJECT NUMBER BA-45

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER: BA-45

SHEET 16 OF 34

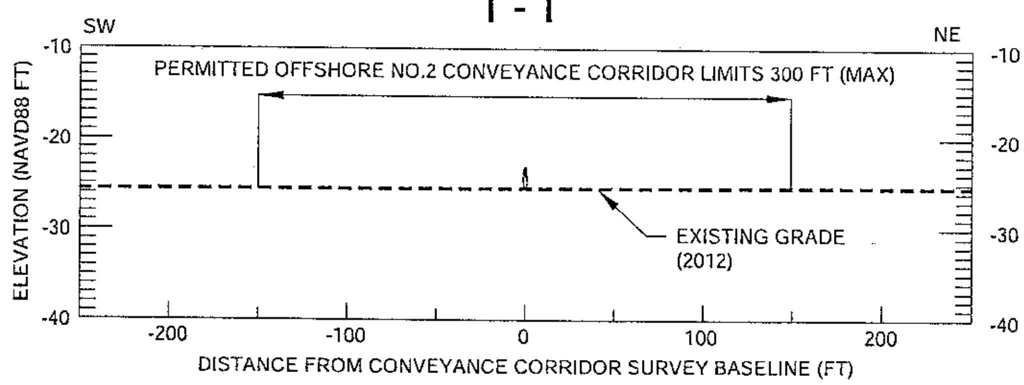
SCALE:
VERT: 1" = 20'
HORIZ: 1" = 100'

LEGEND:

EXISTING GRADE (2011)

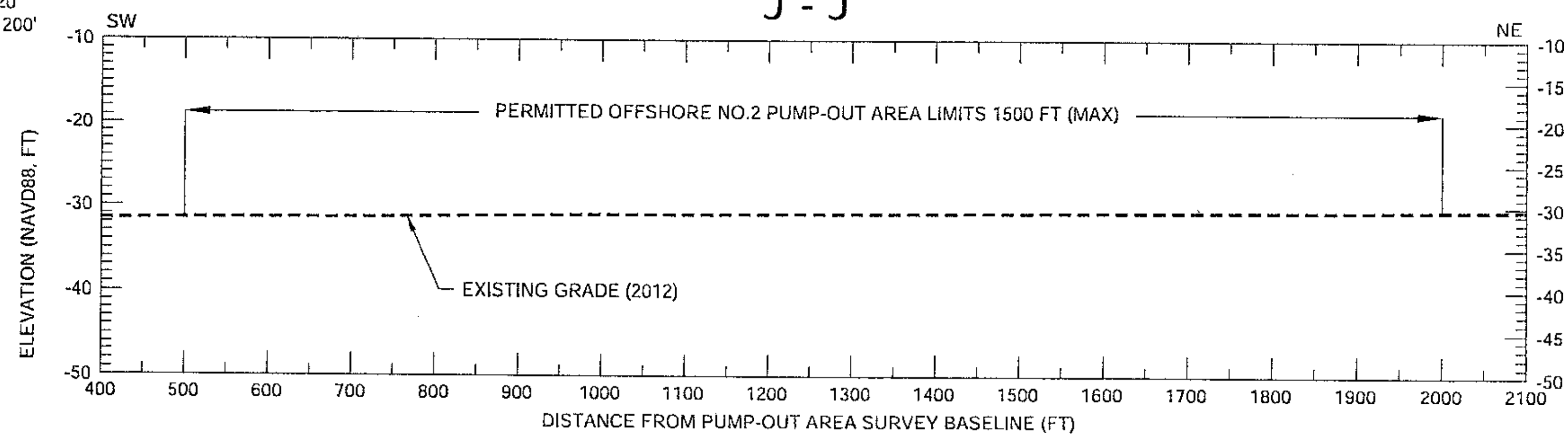
SUBMERGED SEDIMENT PIPELINE

I - I'



SCALE:
VERT: 1" = 20'
HORIZ: 1" = 200'

J - J'



NOTES:
1. SURVEY CONDUCTED BY OCEAN SURVEY, INC., DECEMBER 2011.
2. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 FT NAVD88.
3. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

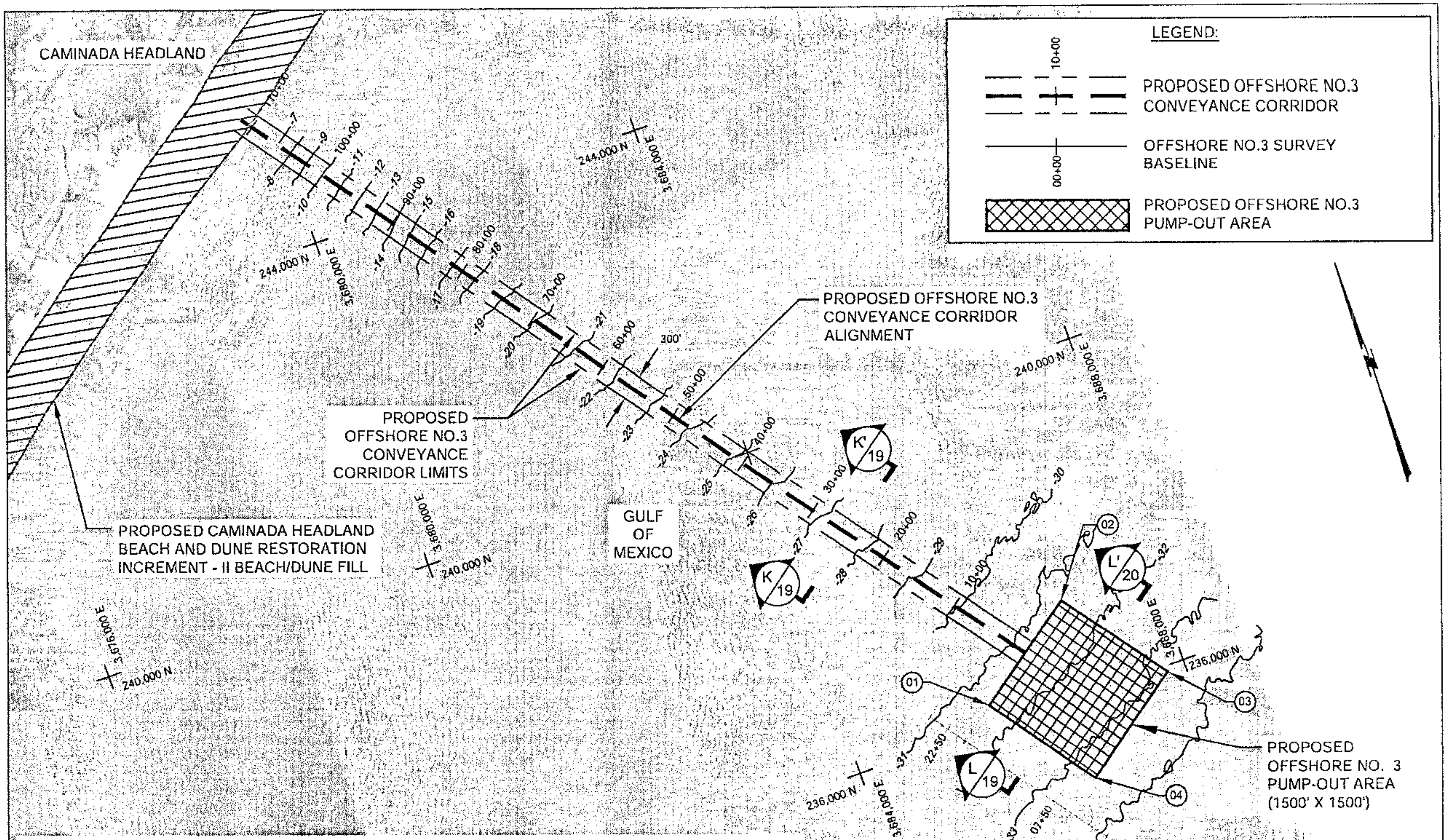
STATE PROJECT NUMBER: BA-45

FEDERAL PROJECT NUMBER: BA-45

OFFSHORE NO. 2 PUMP-OUT AREA AND CORRIDOR TYPICAL SECTIONS

DATE: AUGUST, 2012

SHEET 17 OF 34



NOTES:
1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
3. SURVEY CONDUCTED BY OCEAN SURVEYS, INC., APRIL 2012.
4. THE LIMITS OF MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE OFFSHORE PUMP-OUT AREA.
5. SEE SHEET 33 FOR OFFSHORE NO.3 PUMP-OUT AREA BOUNDARY COORDINATES.

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

OFFSHORE NO.3 PUMP-OUT AREA PLAN VIEW

STATE PROJECT NUMBER: BA-45

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

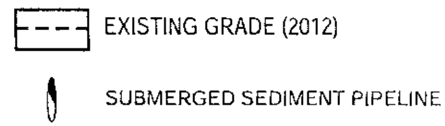
APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER: BA-45

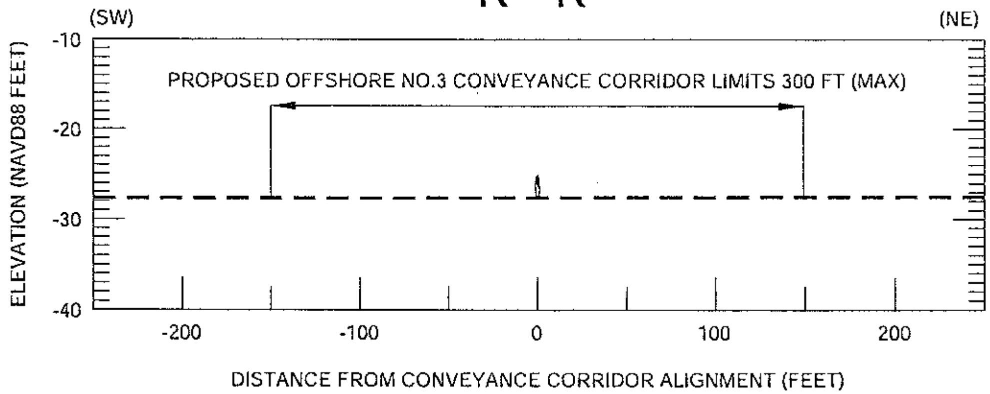
SHEET 18 OF 34

SCALE:
VERT: 1" = 20'
HORIZ: 1" = 100'

LEGEND:

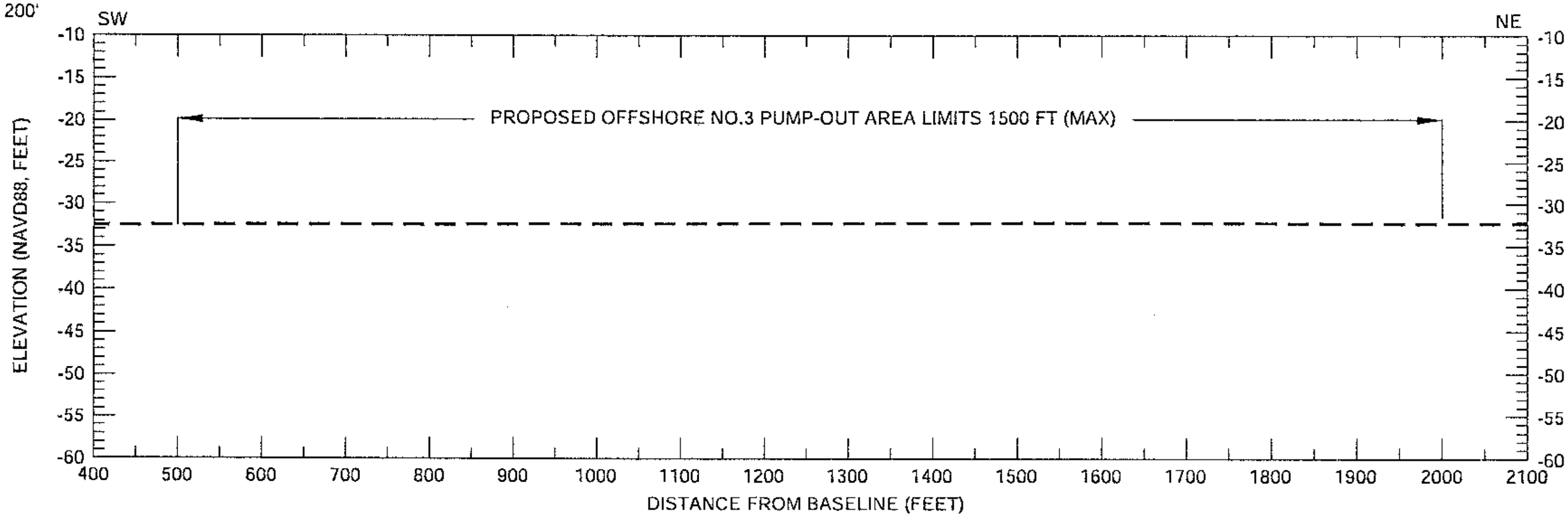


K - K'



SCALE:
VERT: 1" = 20'
HORIZ: 1" = 200'

L - L'



NOTES:
1. SURVEY CONDUCTED BY OCEAN SURVEY, INC., APRIL 2012.
2. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 NAVD88.

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION

OFFSHORE NO. 3 PUMP-OUT AREA AND CORRIDOR TYPICAL SECTIONS

STATE PROJECT NUMBER: BA-45

DATE: AUGUST, 2012

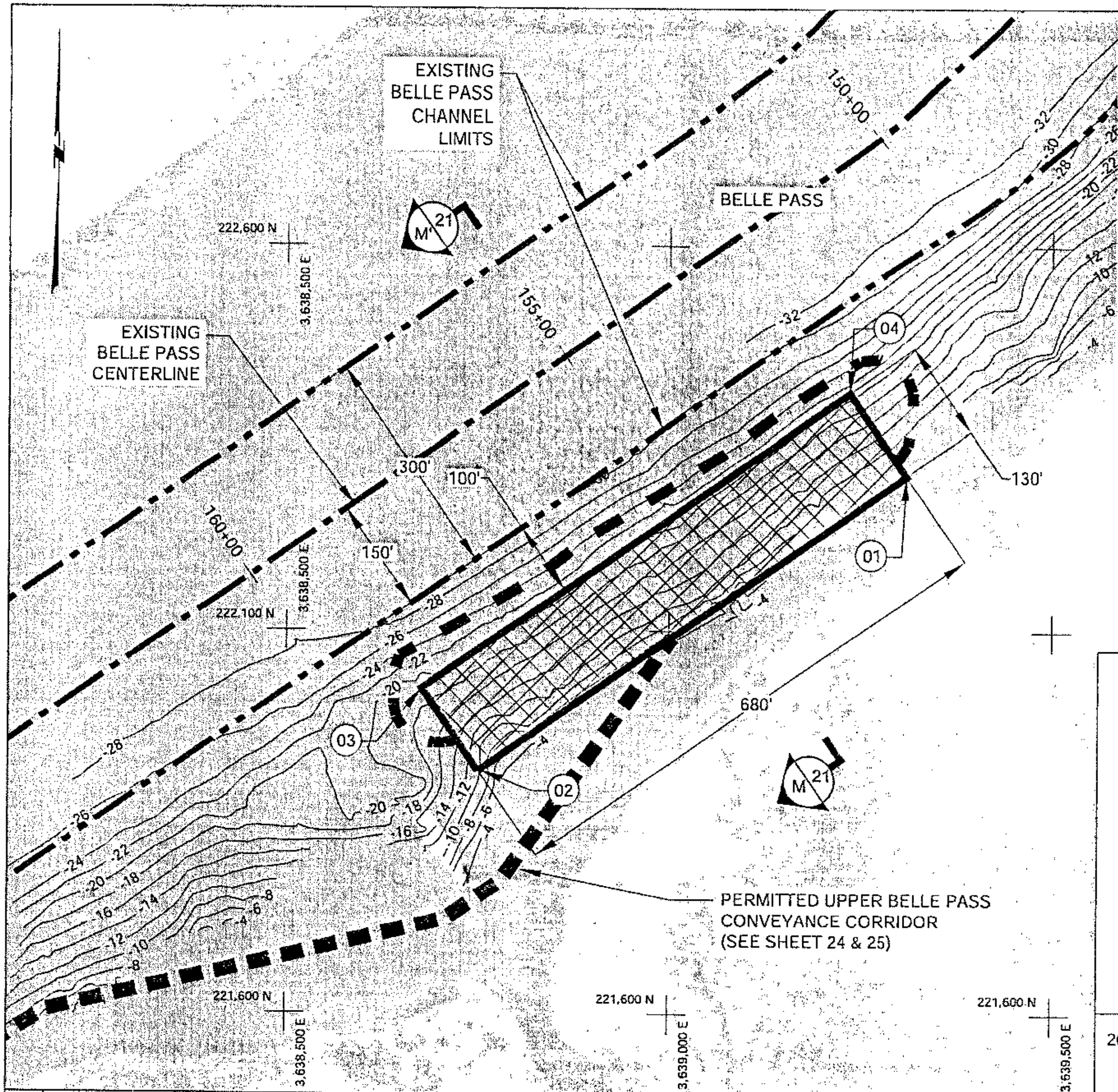
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER: BA-45

SHEET 19 OF 34



NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. BELLE PASS CHANNEL LIMITS AND CENTERLINE OBTAINED FROM USACE FILE NO. H-16-45196, NOVEMBER 2000.
3. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
4. SURVEYS CONDUCTED BY PICCIOLA & ASSOCIATES, INC IN MAY-JUNE 2011. ADDITIONAL SURVEY DATA COLLECTED IN THE VICINITY OF THE PUMP-OUT AREAS BY COASTAL ENGINEERING CONSULTANTS, INC. IN JUNE 2011.
5. THE LIMITS OF EXCAVATION OF IN-SITU SEDIMENT FOR TRANSPORT TO THE BEACH / DUNE FILL TEMPLATE AND MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE UPPER BELLE PASS PUMP-OUT AREA.
6. SEE SHEET 33 FOR UPPER BELLE PASS PUMP-OUT AREA BOUNDARY COORDINATES.
7. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP,
   C.U.P. NO. P20111274 (AMENDED).

LEGEND:

- EXISTING BELLE PASS CHANNEL
- -20 — 2011 BATHYMETRIC CONTOURS
- PERMITTED CONVEYANCE CORRIDOR ALIGNMENT
- PERMITTED LIMITS OF EXCAVATION
- PERMITTED UPPER BELLE PASS PUMP-OUT AREA (SEE NOTE 7)

200' 100' 0' 200' 400'

BY	DESCRIPTION	DATE

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

STATE PROJECT NUMBER: BA-45

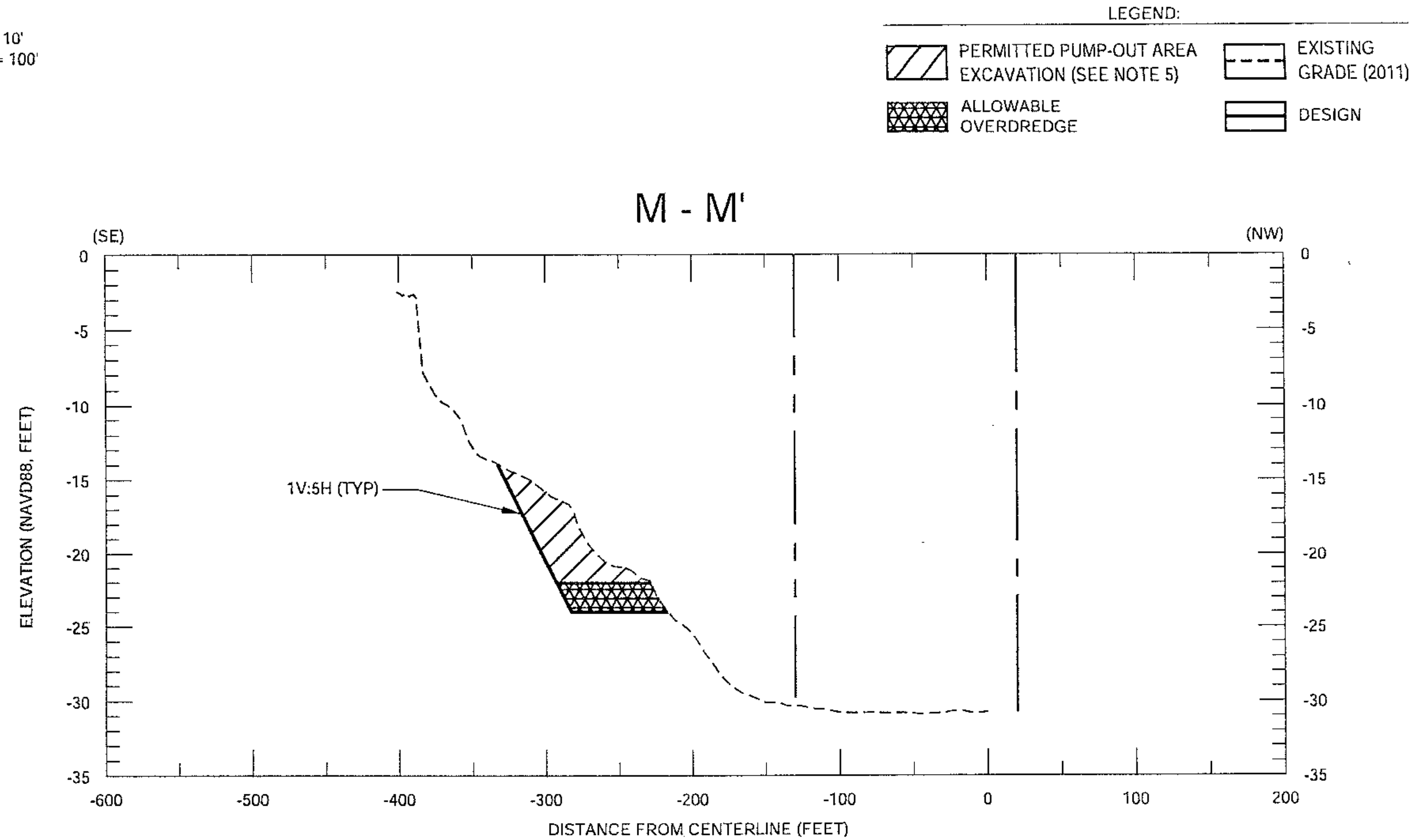
FEDERAL PROJECT NUMBER: BA-45

UPPER BELLE PASS PUMP-OUT AREA PLAN VIEW

DATE: AUGUST, 2012

SHEET 20 OF 34

SCALE:
VERT: 1" = 10'
HORIZ: 1" = 100'



NOTES:
1. BELLE PASS CHANNEL LIMITS AND CENTERLINE OBTAINED FROM USACE FILE NO. H-16-45196, NOVEMBER 2000.
2. SURVEYS CONDUCTED BY PICCIOLA & ASSOCIATES, INC. AND COASTAL ENGINEERING CONSULTANTS, INC. MAY-JUNE, 2011.
3. THE LIMITS OF EXCAVATION OF IN-SITU SEDIMENT FOR TRANSPORT TO THE BEACH / DUNE FILL TEMPLATE AND MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE UPPER BELLE PASS PUMP-OUT AREA.
4. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 FT NAVD88.
5. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

UPPER BELLE PASS PUMP-OUT AREA TYPICAL SECTION

STATE PROJECT NUMBER: BA-45

DATE: AUGUST, 2012

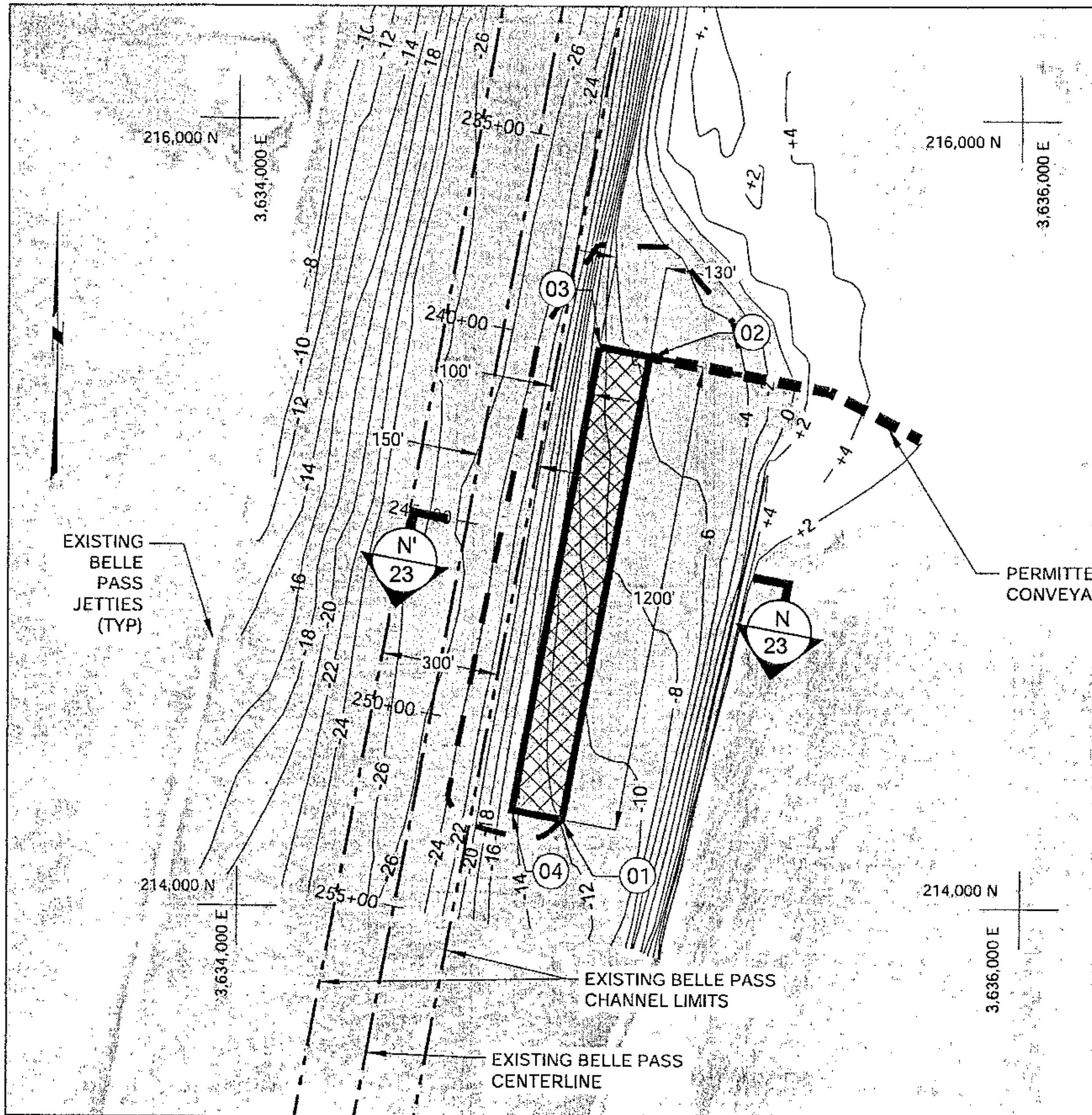
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER: BA-45

SHEET 21 OF 34



NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. BELLE PASS CHANNEL LIMITS AND CENTERLINE OBTAINED FROM USACE FILE NO. H-16-45196, NOVEMBER 2000.
3. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
4. SURVEYS CONDUCTED BY PICCIOLA & ASSOCIATES, INC IN MAY-JUNE 2011. ADDITIONAL SURVEY DATA COLLECTED IN THE VICINITY OF THE PUMP-OUT AREAS BY COASTAL ENGINEERING CONSULTANTS, INC. IN JUNE 2011.
5. THE LIMITS OF EXCAVATION OF IN-SITU SEDIMENT FOR TRANSPORT TO THE BEACH / DUNE FILL TEMPLATE AND MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE LOWER BELLE PASS PUMP-OUT AREA.
6. SEE SHEET 33 FOR LOWER BELLE PASS PUMP-OUT AREA BOUNDARY COORDINATES.
7. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP,
   C.U.P. NO. P20111274 (AMENDED).

LEGEND:

- EXISTING BELLE PASS CHANNEL
- -20 — 2011 BATHYMETRIC CONTOURS
- PERMITTED CONVEYANCE CORRIDOR ALIGNMENT
- PERMITTED LIMITS OF EXCAVATION
- PERMITTED LOWER BELLE PASS PUMP-OUT AREA (SEE NOTE 7)

400' 200' 0' 400' 800'

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

LOWER BELLE PASS PUMP-OUT AREA PLAN VIEW

STATE PROJECT NUMBER BA-45

DATE: AUGUST, 2012

FEDERAL PROJECT NUMBER: BA-45

SHEET 22 OF 34

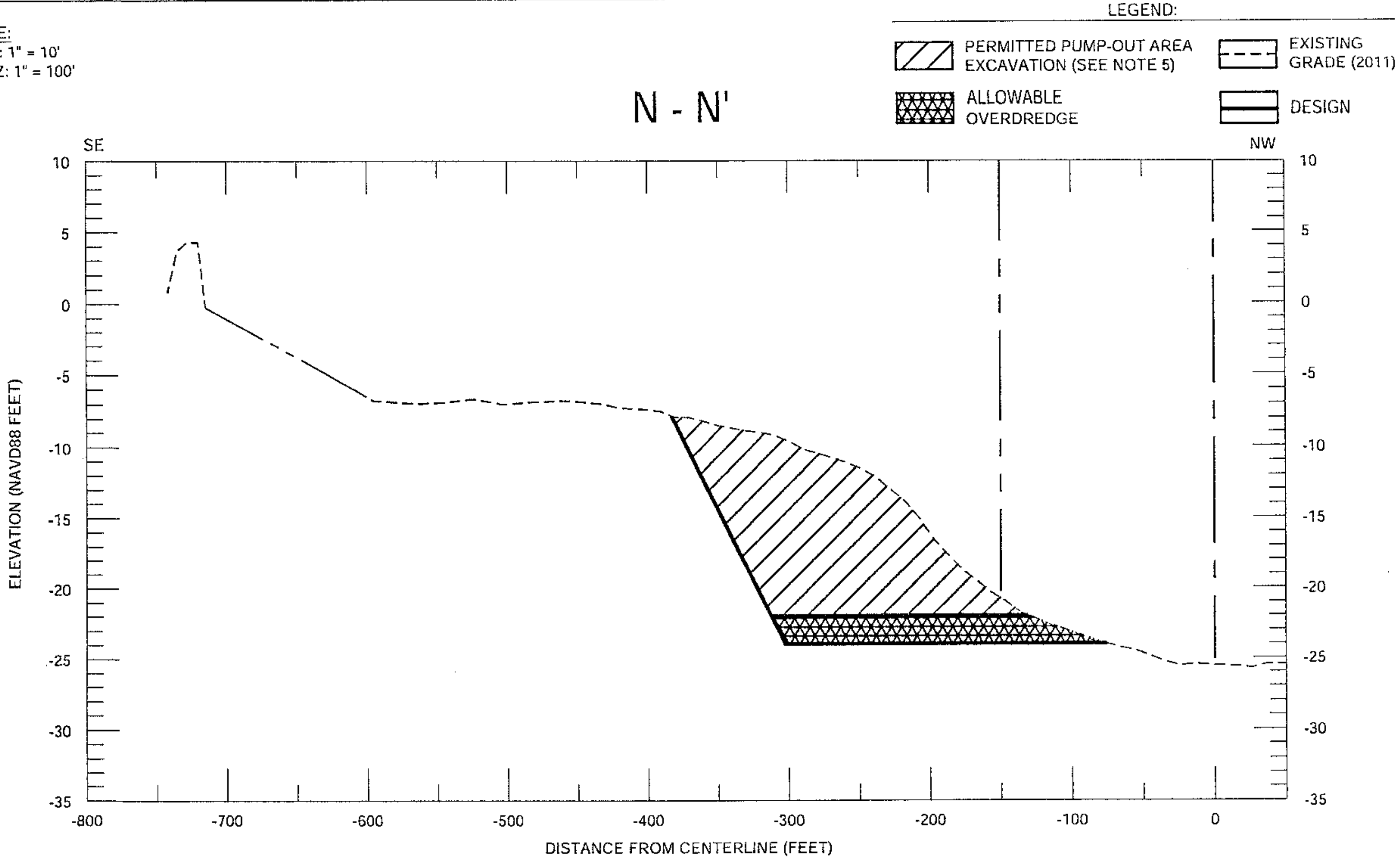
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

SCALE:
VERT: 1" = 10'
HORIZ: 1" = 100'

N - N'



NOTES:
1. BELLE PASS CHANNEL LIMITS AND CENTERLINE OBTAINED FROM USACE FILE NO. H-16-45196, NOVEMBER 2000.
2. SURVEYS CONDUCTED BY PICCIOLA & ASSOCIATES, INC. AND COASTAL ENGINEERING CONSULTANTS, INC. MAY-JUNE, 2011.
3. THE LIMITS OF EXCAVATION OF IN-SITU SEDIMENT FOR TRANSPORT TO THE BEACH / DUNE FILL TEMPLATE AND MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE LOWER BELLE PASS PUMP-OUT AREA.
4. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 FT NAVD88.
5. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

LOWER BELLE PASS PUMP-OUT AREA TYPICAL SECTION

STATE PROJECT NUMBER: BA-45

DATE: AUGUST, 2012

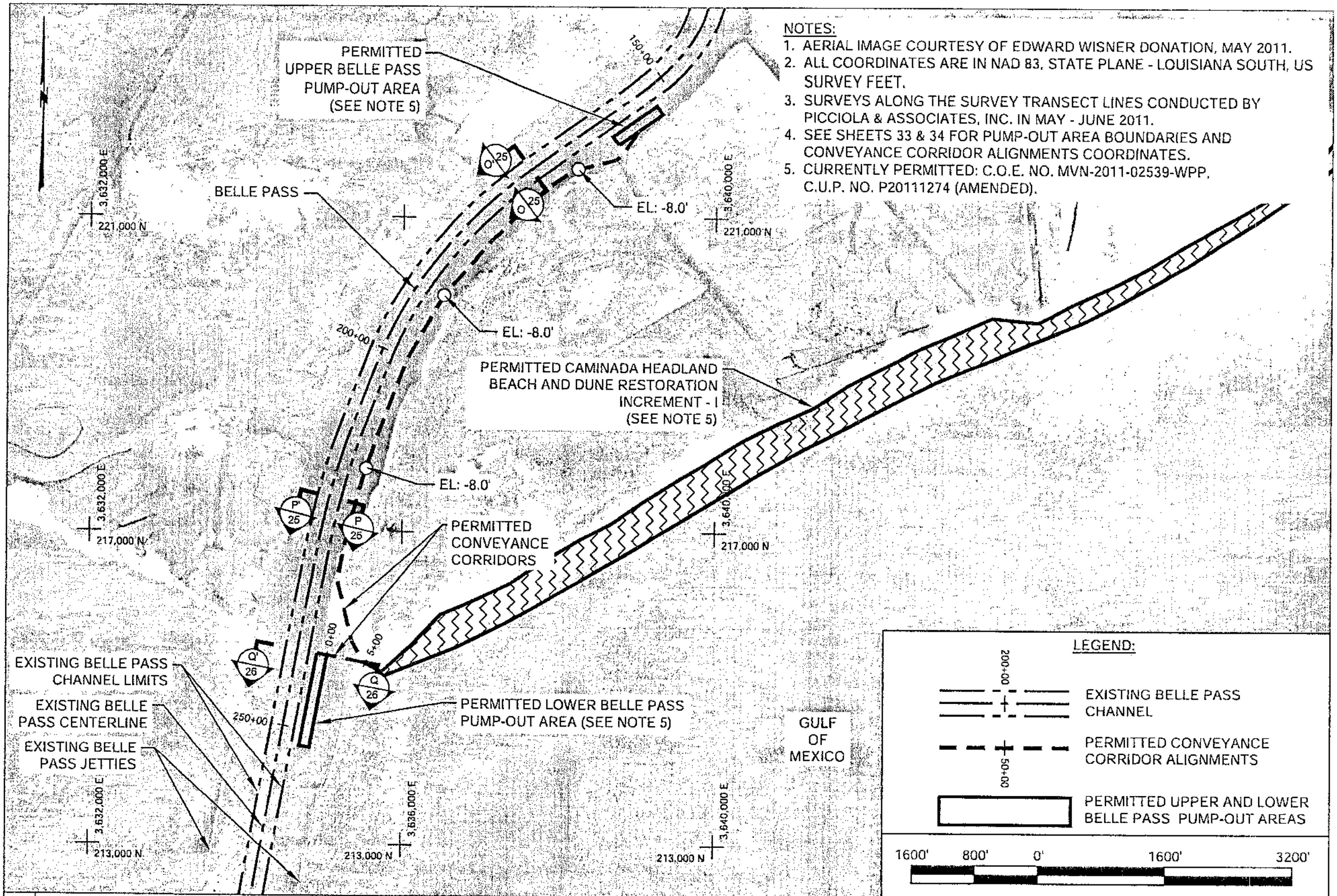
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER: BA-45

SHEET 23 OF 34



NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
3. SURVEYS ALONG THE SURVEY TRANSECT LINES CONDUCTED BY PICCIOLA & ASSOCIATES, INC. IN MAY - JUNE 2011.
4. SEE SHEETS 33 & 34 FOR PUMP-OUT AREA BOUNDARIES AND CONVEYANCE CORRIDOR ALIGNMENTS COORDINATES.
5. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

LEGEND:

200+00 — EXISTING BELLE PASS CHANNEL

50+00 — PERMITTED CONVEYANCE CORRIDOR ALIGNMENTS

PERMITTED UPPER AND LOWER BELLE PASS PUMP-OUT AREAS

1600' 800' 0' 1600' 3200'

BY	DESCRIPTION	DATE

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

STATE PROJECT NUMBER: BA-45

FEDERAL PROJECT NUMBER: BA-45

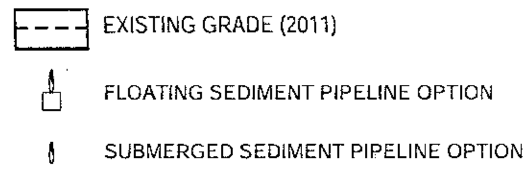
BELLE PASS CORRIDOR PLAN VIEW

DATE: AUGUST, 2012

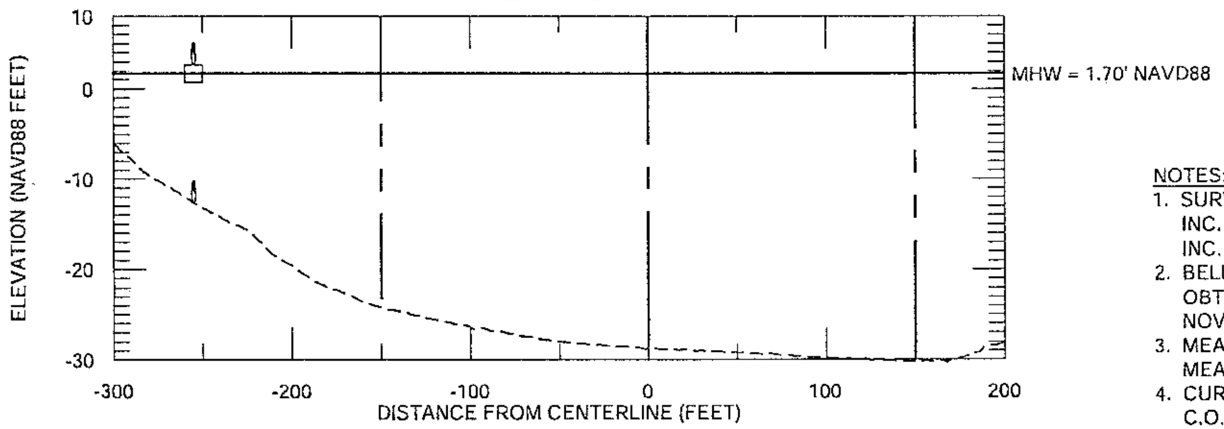
SHEET 24 OF 34

SCALE:
VERT: 1" = 20'
HORIZ: 1" = 100'

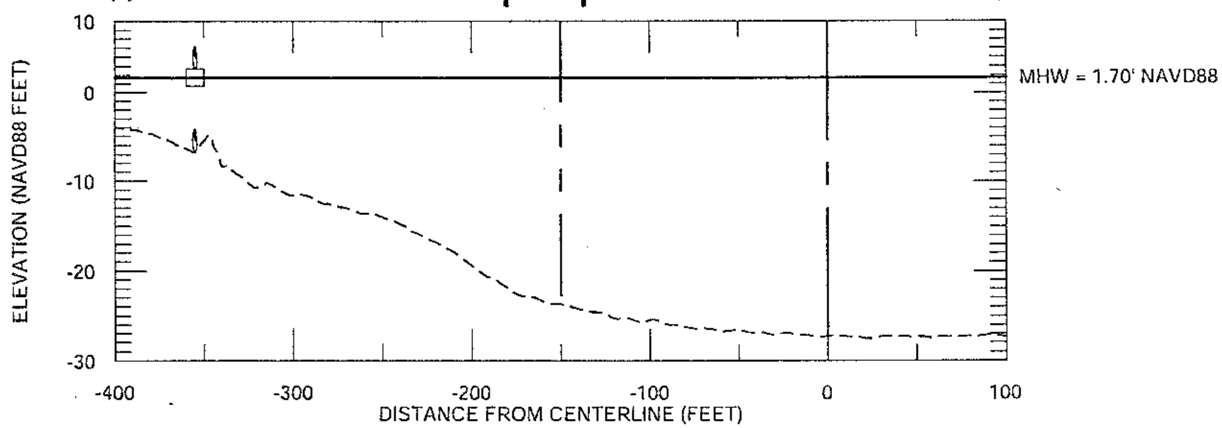
LEGEND:



O - O'



P - P'



NOTES:
1. SURVEYS CONDUCTED BY PICCIOLA & ASSOCIATES, INC. AND COASTAL ENGINEERING CONSULTANTS, INC. MAY-JUNE, 2011.
2. BELLE PASS CHANNEL LIMITS AND CENTERLINE OBTAINED FROM USACE FILE NO. H-16-45196, NOVEMBER 2000.
3. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 FT NAVD88.
4. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP,
   C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

STATE PROJECT NUMBER: BA-45

FEDERAL PROJECT NUMBER: BA-45

UPPER BELLE PASS CORRIDOR TYPICAL SECTION

DATE: AUGUST, 2012

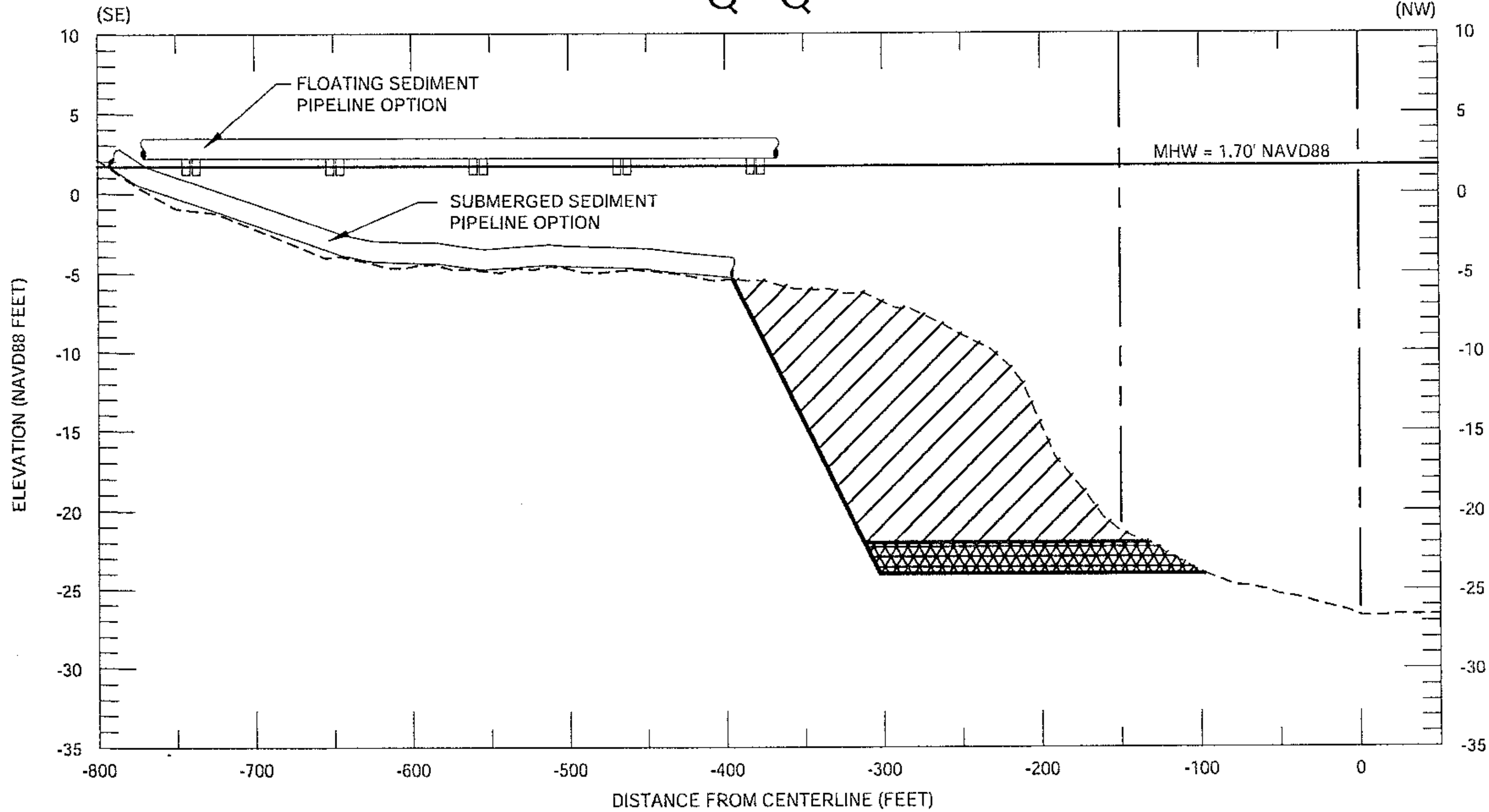
SHEET 25 OF 34

SCALE:
VERT: 1" = 10'
HORIZ: 1" = 100'

LEGEND:

- PERMITTED PUMP-OUT AREA EXCAVATION (SEE NOTE 5)
- ALLOWABLE OVERDREDGE
- EXISTING GRADE (2011)
- DESIGN

Q - Q'



NOTES:
1. BELLE PASS CHANNEL LIMITS AND CENTERLINE OBTAINED FROM USACE FILE NO. H-16-45196, NOVEMBER 2000.
2. SURVEYS CONDUCTED BY PICCIOLA & ASSOCIATES, INC. AND COASTAL ENGINEERING CONSULTANTS, INC. MAY-JUNE, 2011.
3. THE LIMITS OF EXCAVATION OF IN-SITU SEDIMENT FOR TRANSPORT TO THE BEACH / DUNE FILL TEMPLATE AND MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE LOWER BELLE PASS PUMP-OUT AREA.
4. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 FT NAVD88.
5. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

LOWER BELLE PASS CORRIDOR TYPICAL SECTION

STATE PROJECT NUMBER: BA-45

DATE: AUGUST, 2012

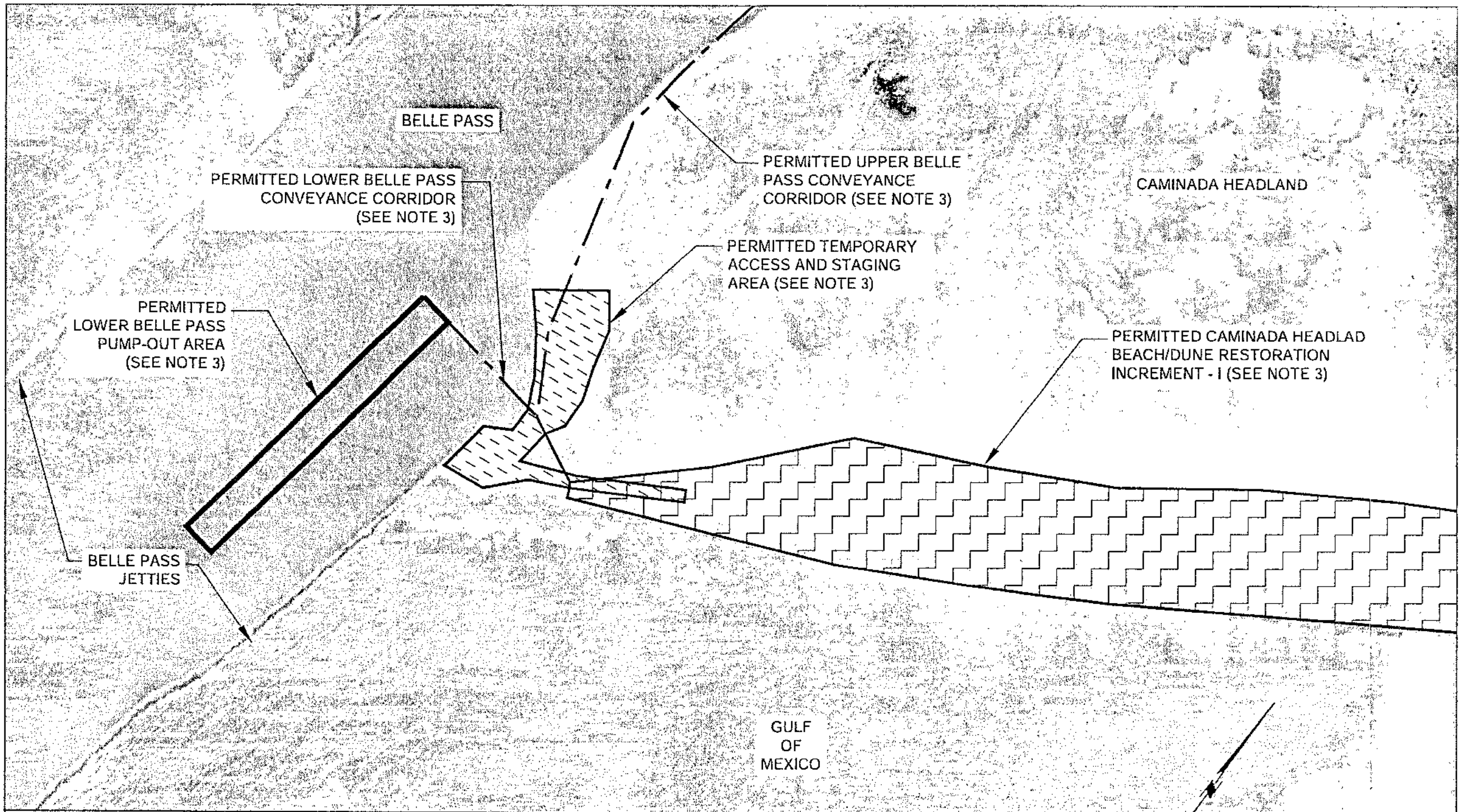
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER: BA-45

SHEET 26 OF 34



LEGEND

- PERMITTED PUMP OUT AREA
- PERMITTED CONVEYANCE CORRIDOR ALIGNMENT
- PERMITTED CONSTRUCTION CONTRACTOR ACCESS AND STAGING AREA (SEE NOTE 3)
- PERMITTED INCREMENT - I BEACH / DUNE FILL (SEE NOTE 3)

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH US SURVEY FT.
3. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP
   C.U.P. NO. P20111274 (AMENDED)

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

TEMPORARY ACCESS/STAGING AREA LOWER BELLE PASS

STATE PROJECT NUMBER: BA-45

DATE: AUGUST, 2012

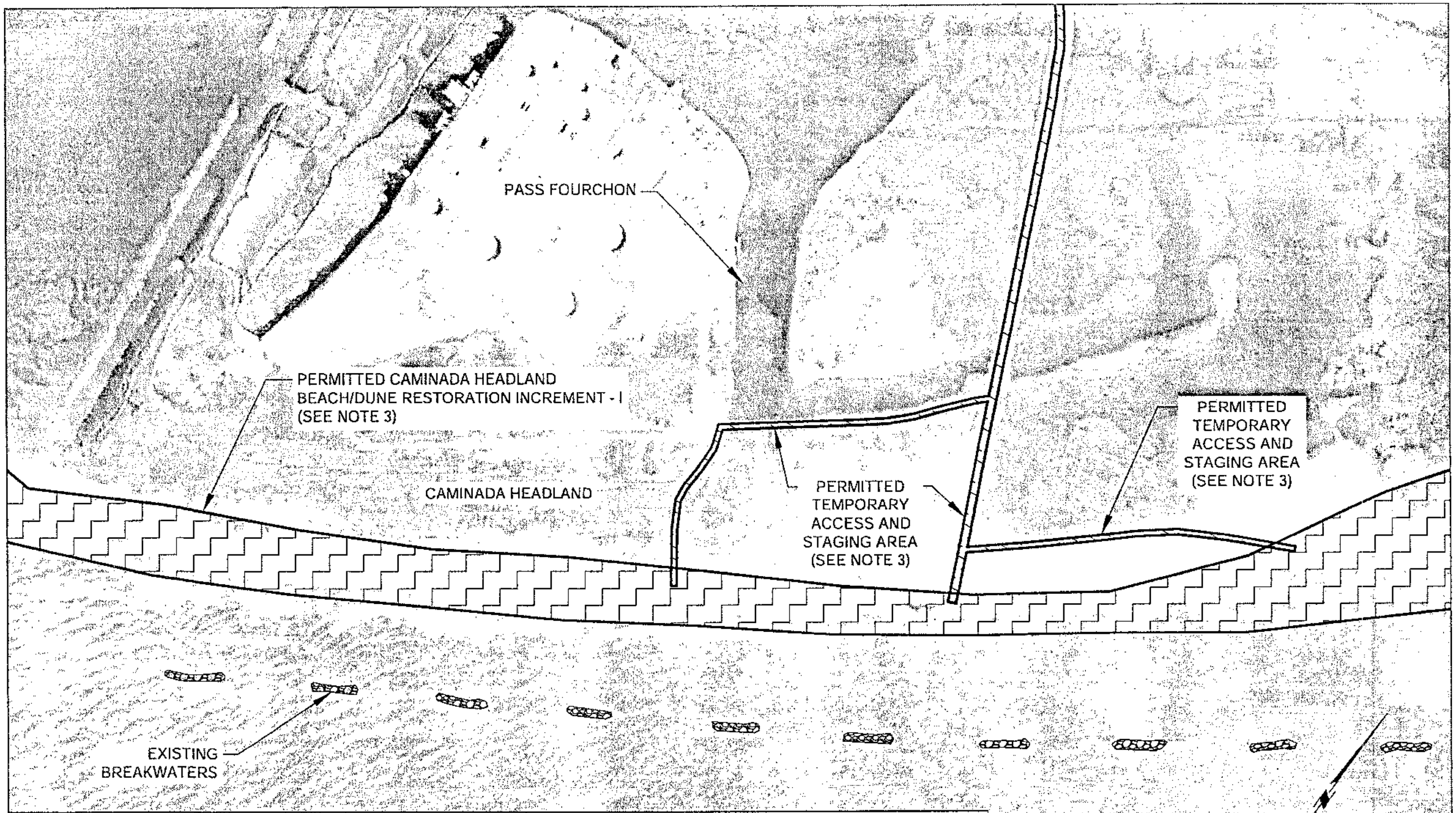
FEDERAL PROJECT NUMBER: BA-45

SHEET 27 OF 34

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.



LEGEND

PERMITTED CONSTRUCTION CONTRACTOR ACCESS AND STAGING AREA (SEE NOTE 3)

PERMITTED INCREMENT - 1 BEACH / DUNE FILL (SEE NOTE 3)

NOTES:
1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH US SURVEY FT.
3. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP
   C.U.P. NO. P20111274 (AMENDED)

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

TEMPORARY ACCESS/STAGING AREA PARISH HWY 3090

STATE PROJECT NUMBER: BA-45

DATE: AUGUST, 2012

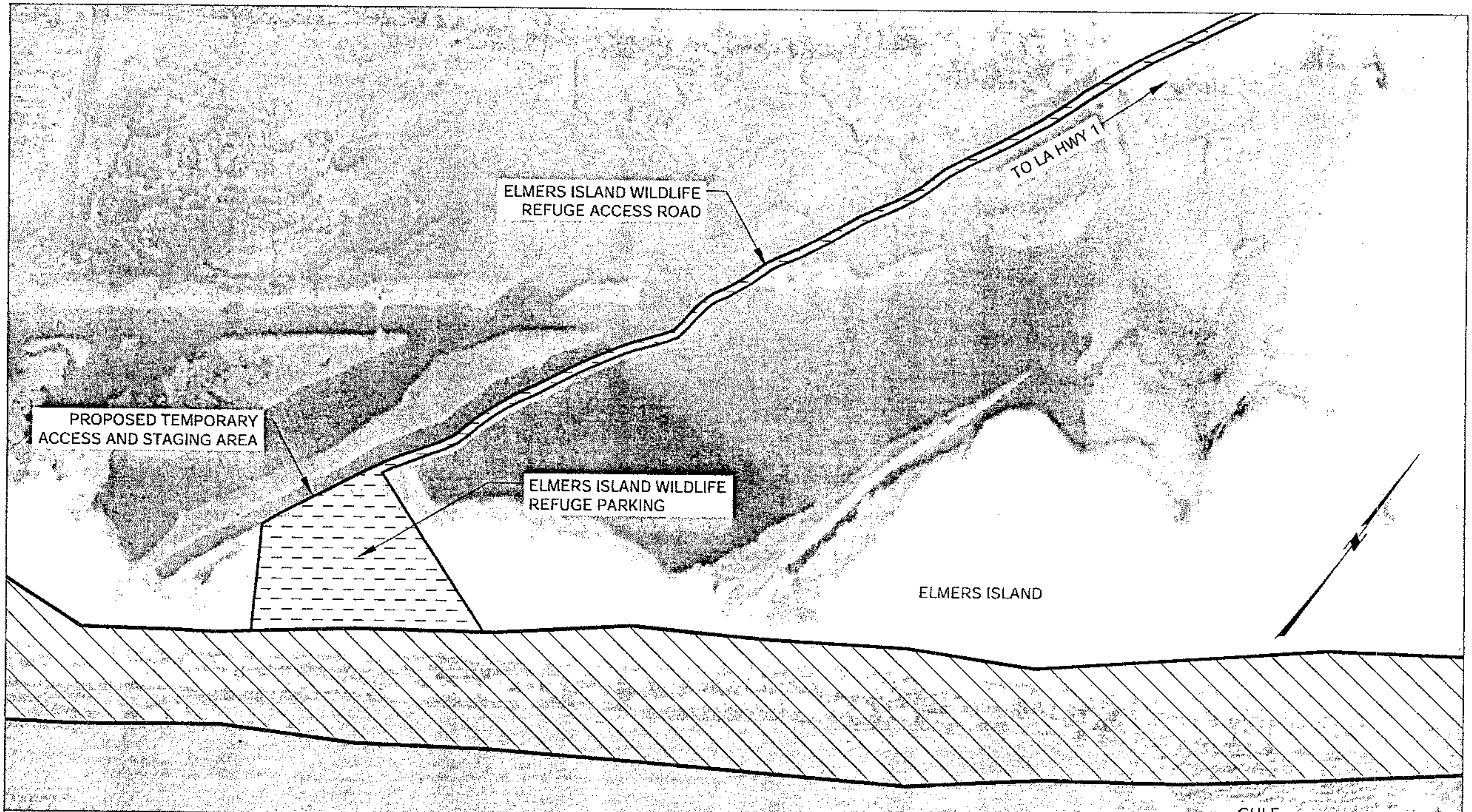
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER: BA-45

SHEET 28 OF 34



LEGEND

- PROPOSED CONSTRUCTION CONTRACTOR ACCESS AND STAGING AREA
- PROPOSED INCREMENT - II BEACH / DUNE FILL

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH US SURVEY FT.

500' 250' 0' 500' 1,000'

BY	DESCRIPTION	DATE

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

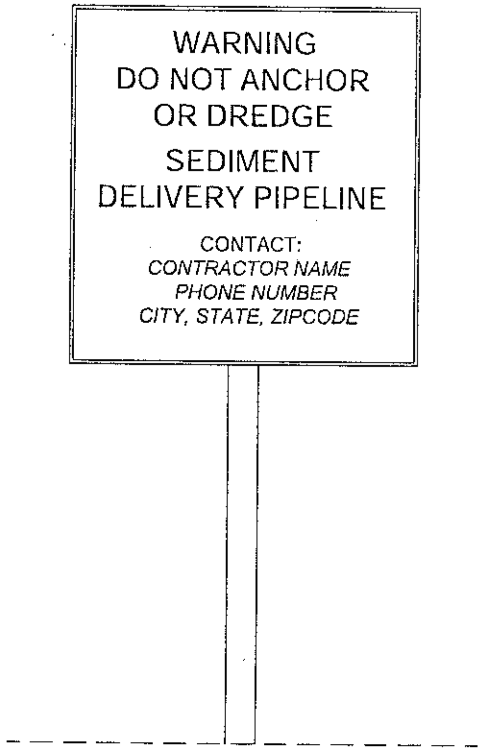
STATE PROJECT NUMBER: BA-45

FEDERAL PROJECT NUMBER: BA-45

TEMPORARY ACCESS/STAGING AREA ELMER'S ISLAND

DATE: AUGUST, 2012

SHEET 29 OF 34



SEDIMENT DELIVERY
PIPELINE MARKER DETAIL
NOT TO SCALE

NOTES:
1. MARKERS SHALL BE PLACED ALONG THE LENGTH OF THE SEDIMENT DELIVERY PIPELINE AS REQUIRED BY U.S. COAST GUARD REGULATIONS.
2. MARKERS SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH LADOTD 2000 STANDARD SPECIFICATION 729.
3. A PROPOSED DRAWING SHALL BE SUBMITTED TO THE OWNER FOR APPROVAL IN THE WORK PLAN PRIOR TO CONSTRUCTION.
4. MARKERS SHALL BE PLACED IMMEDIATELY FOLLOWING TO SEDIMENT PIPELINE INSTALLATION AND REMOVED FOLLOWING TO SEDIMENT PIPELINE REMOVAL.

BY	DESCRIPTION	DATE

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

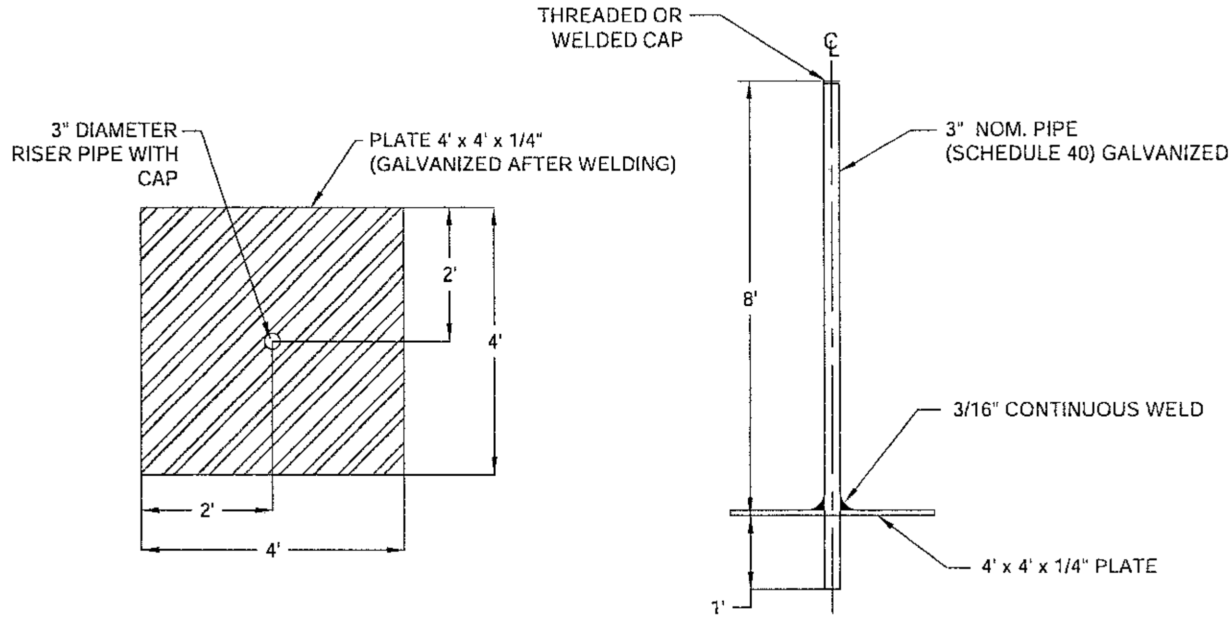
STATE PROJECT NUMBER: BA-45

FEDERAL PROJECT NUMBER: BA-45

SEDIMENT PIPELINE MARKER DETAILS

DATE: AUGUST, 2012

SHEET 30 OF 34

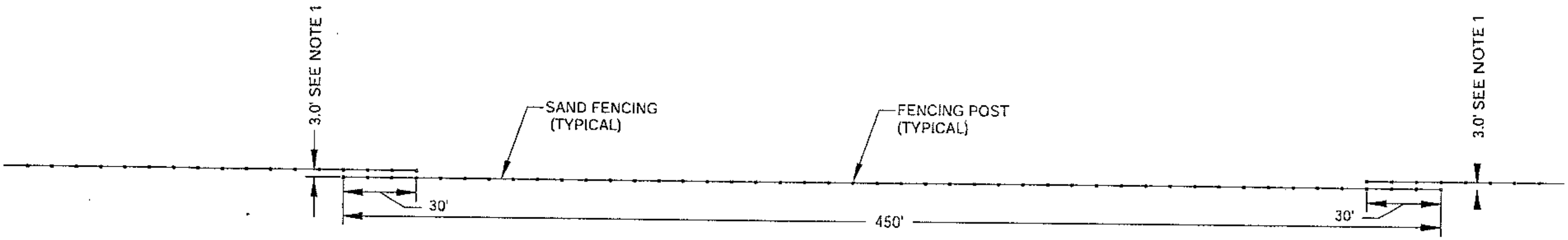


SETTLEMENT PLATE

NOT TO SCALE

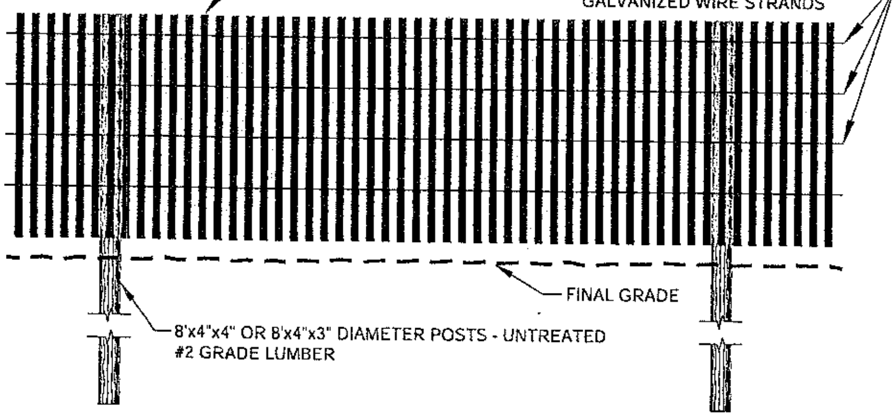
NOTES:
1. SETTLEMENT PLATES SHALL BE CONSTRUCTED USING ASTM A36 STEEL AND HOT- DIPPED GALVANIZED AFTER FABRICATION.
2. ALL SETTLEMENT PLATES SHALL BE SURVEYED UNDER THE SUPERVISION OF THE RESIDENT PROJECT REPRESENTATIVE WITHIN A DAY OF INSTALLATION AND WEEKLY THROUGHOUT THE DURATION OF THE PROJECT.
3. ALL SETTLEMENT PLATES MUST BE INSTALLED AND MAINTAINED WITHIN 10.5 DEGREES OF VERTICAL.
4. ALL SETTLEMENT PLATES SHALL BE MARKED WITH SURVEY FLAGGING.
5. LENGTH OF THE SETTLEMENT PLATE RISER PIPE SHALL BE SUCH THAT THE ELEVATION OF THE TOP CAP BE NO LESS THAN 4 FEET ABOVE MAXIMUM FINAL DESIGN GRADE FOR ITS LOCATION.

BY	DESCRIPTION	DATE				
			COASTAL ENGINEERING CONSULTANTS, INC	COASTAL PROTECTION AND RESTORATION AUTHORITY 450 LAUREL STREET BATON ROUGE, LOUISIANA 70801	CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II	SETTLEMENT PLATE DETAIL
					STATE PROJECT NUMBER: BA-45	DATE: AUGUST, 2012
DRAWN BY: STEVE DARTEZ			DESIGNED BY: MICHAEL T. POFF, P.E.	APPROVED BY: SHANNON HAYNES, P.E.	FEDERAL PROJECT NUMBER: BA-45	SHEET 31 OF 34

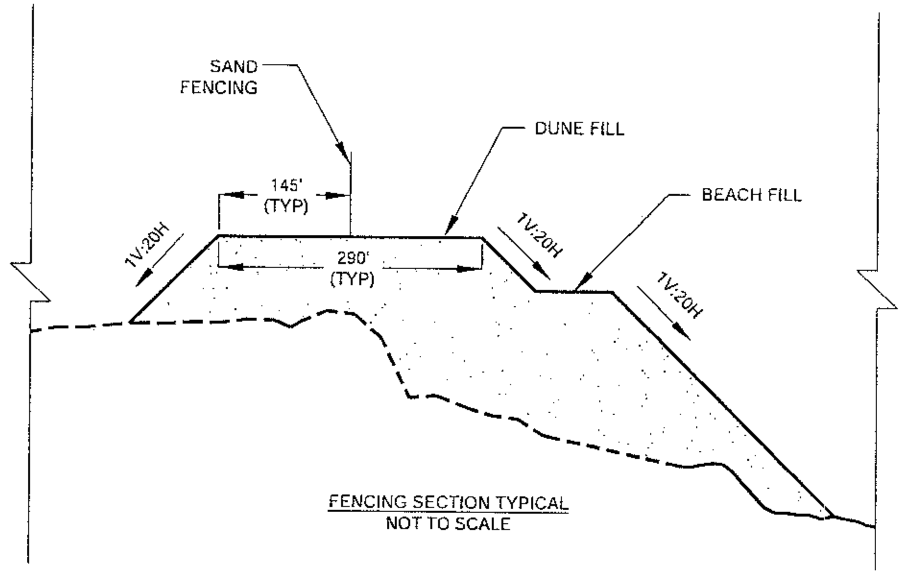


NOTES:
1. THE DISTANCE BETWEEN FENCES SHALL BE INCREASED FROM 3.0' TO 8.0' AT EVERY FIFTH GAP TO ALLOW ALL-TERRAIN VEHICLE ACCESS.

FENCING GAPPING DIMENSIONS
NOT TO SCALE



FENCING DETAIL
NOT TO SCALE



FENCING SECTION TYPICAL
NOT TO SCALE

BY	DESCRIPTION	DATE	COASTAL ENGINEERING CONSULTANTS, INC	COASTAL PROTECTION AND RESTORATION AUTHORITY 450 LAUREL STREET BATON ROUGE, LOUISIANA 70801	CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II	SAND FENCING DETAIL
					STATE PROJECT NUMBER: BA-45	DATE: AUGUST, 2012
DRAWN BY: STEVE DARTEZ			DESIGNED BY: MICHAEL T. POFF, P.E.	APPROVED BY: SHANNON HAYNES, P.E.	FEDERAL PROJECT NUMBER: BA-45	SHEET 32 OF 34

PERMITTED OFFSHORE NO. 1 PUMPOUT AREA BOUNDARY				
POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
01	224,003.55	3,663,238.45	29° 06' 37.61" N	90° 08' 09.17" W
02	225,340.71	3,663,135.55	29° 06' 50.86" N	90° 08' 10.18" W
03	224,827.34	3,663,993.74	29° 06' 45.69" N	90° 08' 00.56" W
04	223,969.17	3,663,480.36	29° 06' 37.25" N	90° 08' 06.45" W

PERMITTED OFFSHORE NO. 2 PUMPOUT AREA BOUNDARY				
POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
01	231,693.92	3,677,273.52	29° 07' 52.26" N	90° 05' 30.11" W
02	233,126.78	3,677,717.26	29° 08' 06.39" N	90° 05' 24.94" W
03	232,682.58	3,679,142.76	29° 08' 01.85" N	90° 05' 08.83" W
04	231,249.72	3,678,699.02	29° 07' 47.71" N	90° 05' 14.01" W

PROPOSED OFFSHORE NO. 3 PUMPOUT AREA BOUNDARY				
POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
01	231,693.92	3,677,273.52	29° 07' 52.26" N	90° 05' 30.11" W
02	233,126.78	3,677,717.26	29° 08' 06.39" N	90° 05' 24.94" W
03	232,682.58	3,679,142.76	29° 08' 01.85" N	90° 05' 08.83" W
04	231,249.72	3,678,699.02	29° 07' 47.71" N	90° 05' 14.01" W

PERMITTED UPPER BELLE PASS PUMPOUT AREA BOUNDARY				
POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
01	222,303.78	3,639,310.10	29° 06' 23.19" N	90° 12' 39.17" W
02	221,917.25	3,638,751.02	29° 06' 19.41" N	90° 12' 45.51" W
03	222,024.18	3,638,677.08	29° 06' 20.47" N	90° 12' 46.33" W
04	222,411.15	3,639,236.16	29° 06' 24.25" N	90° 12' 39.99" W

PERMITTED LOWER BELLE PASS PUMPOUT AREA BOUNDARY				
POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
01	214,224.44	3,634,831.36	29° 05' 03.64" N	90° 13' 30.53" W
02	215,404.23	3,635,050.70	29° 05' 15.29" N	90° 13' 27.93" W
03	215,427.93	3,634,922.88	29° 05' 15.54" N	90° 13' 29.37" W
04	214,252.18	3,634,704.23	29° 05' 03.92" N	90° 13' 31.96" W

PERMITTED OFFSHORE NO. 1 CONVEYANCE CORRIDOR					
POINT NO.	STATION	NORTHING	EASTING	LATITUDE	LONGITUDE
01	0+00.00	224691.63	3662743.20	29° 06' 44.52" N	90° 08' 14.68" W
02	25+25.56	225993.62	3660583.17	29° 06' 57.59" N	90° 08' 38.87" W
03	78+65.08	227705.67	3655525.56	29° 07' 15.05" N	90° 09' 35.69" W

PERMITTED OFFSHORE NO. 2 CONVEYANCE CORRIDOR					
POINT NO.	STATION	NORTHING	EASTING	LATITUDE	LONGITUDE
01	0+00.00	232,410.35	3,677,495.39	29° 07' 59.33" N	90° 05' 27.44" W
02	103+10.00	237,563.75	3,668,565.74	29° 08' 51.29" N	90° 07' 07.50" W

PROPOSED OFFSHORE NO. 3 CONVEYANCE CORRIDOR					
POINT NO.	STATION	NORTHING	EASTING	LATITUDE	LONGITUDE
01	0+00.00	236,685.46	3,686,288.45	29° 08' 40.69" N	90° 03' 47.77" W
02	114+53.00	245,888.74	3,679,471.84	29° 10' 12.54" N	90° 05' 03.50" W

BY	DESCRIPTION	DATE

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

ALIGNMENT TABLES

STATE PROJECT NUMBER: BA-45

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER: BA-45

SHEET 33 OF 34

PERMITTED LOWER BELLE PASS CONVEYANCE CORRIDOR					
POINT NO.	STATION	NORTHING	EASTING	LATITUDE	LONGITUDE
LBP1	0+00.00	215404.21	3635050.70	29° 05' 15.30" N	90° 13' 27.85" W
LBP2	4+68.30	215317.04	3635510.82	29° 05' 14.39" N	90° 13' 22.67" W
LBP3	7+30.14	215197.83	3635743.95	29° 05' 13.19" N	90° 13' 20.06" W

PERMITTED UPPER BELLE PASS CONVEYANCE CORRIDOR					
POINT NO.	STATION	NORTHING	EASTING	LATITUDE	LONGITUDE
01	0+00.00	222091.75	3639003.97	29° 06' 21.12" N	90° 12' 42.56" W
02	3+88.79	221773.45	3538780.71	29° 06' 17.99" N	90° 12' 45.11" W
03	4+74.39	221724.82	3638710.26	29° 06' 17.51" N	90° 12' 45.91" W
04	10+11.91	221601.22	3638187.15	29° 06' 16.34" N	90° 12' 51.82" W
05	14+55.81	221362.53	3637812.89	29° 06' 14.01" N	90° 12' 56.07" W
06	23+96.61	220714.86	3637130.51	29° 06' 07.67" N	90° 13' 03.83" W
07	33+31.19	220002.85	3636525.13	29° 06' 00.68" N	90° 13' 10.73" W
08	42+80.25	219182.04	3636048.70	29° 05' 52.60" N	90° 13' 16.19" W
09	52+57.05	218269.41	3635700.51	29° 05' 43.60" N	90° 13' 20.21" W
10	59+87.28	217578.75	3635463.41	29° 05' 36.78" N	90° 13' 22.96" W
11	66+76.94	216912.61	3635284.84	29° 05' 30.21" N	90° 13' 25.05" W
12	72+11.68	216389.41	3635174.33	29° 05' 25.04" N	90° 13' 26.35" W
13	80+29.91	215593.47	3635364.00	29° 05' 17.14" N	90° 13' 24.30" W
14	83+42.91	215317.04	3635510.82	29° 05' 14.39" N	90° 13' 22.67" W
15	86+04.75	215197.83	3635743.95	29° 05' 13.19" N	90° 13' 20.06" W

PROPOSED SOUTH PELTO BORROW AREA BOUNDARY				
POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
01	150,564.99	3,506,021.70	28° 54' 43.55" N	90° 37' 46.49" W
02	148,759.10	3,506,940.29	28° 54' 25.62" N	90° 37' 36.28" W
03	150,583.53	3,510,526.96	28° 54' 43.46" N	90° 36' 55.80" W
04	148,848.02	3,511,219.93	28° 54' 26.24" N	90° 36' 48.13" W
05	151,068.59	3,515,585.39	28° 54' 47.95" N	90° 35' 58.86" W
06	152,767.04	3,512,256.30	28° 55' 04.97" N	90° 36' 36.19" W
07	152,038.50	3,510,432.63	28° 54' 57.87" N	90° 36' 56.76" W
08	152,376.14	3,507,116.75	28° 55' 01.42" N	90° 37' 34.05" W

BY	DESCRIPTION	DATE

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

STATE PROJECT NUMBER: BA-45

FEDERAL PROJECT NUMBER: BA-45

ALIGNMENT TABLES

DATE: AUGUST, 2012

SHEET 34 OF 34

DEPARTMENT OF THE ARMY

NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

MAR 13 2014

Operations Division
Western Evaluation Section

RECEIVED
2014 MAR 19 P 12:08
CPRA

SUBJECT: MVN-2012-02134-WPP

Coastal Protection and Restoration Authority of Louisiana
Attn: Brad Miller
Post Office Box 44027
Baton Rouge, Louisiana 70804

Gentlemen:

Additional drawings attached in thirty four sheets, furnished with your letter dated October 21, 2013, requesting modification of the previously permitted Caminada Headlands Project Increment II, to shift the fill template northward in alignment with the Headland's current position and reconstruct the dune of the eastern end of the Headland, in Port Fourchon, Louisiana, in Jefferson and Lafourche Parishes are approved and will be included in your plans for the work authorized by the Secretary of the Army in the permit dated August 29, 2013, from the District Engineer at New Orleans, Louisiana.

All other conditions to which the work is made subject remain in full force and effect.

A copy of this permit approval letter must be conspicuously displayed at the project site. Also, you must keep a copy of this signed letter, with attached drawings, at the project site until the work is completed.

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

Martin S. Mayer

Martin S. Mayer
Chief, Regulatory Branch
for
Richard L. Hansen
Colonel, US Army
District Commander

Enclosure

STATE OF LOUISIANA
COASTAL PROTECTION AND RESTORATION AUTHORITY

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

STATE PROJECT NO. BA-143

LAFOURCHE & JEFFERSON PARISHES, LOUISIANA

PERMIT (MVN-2012-02134-WPP)

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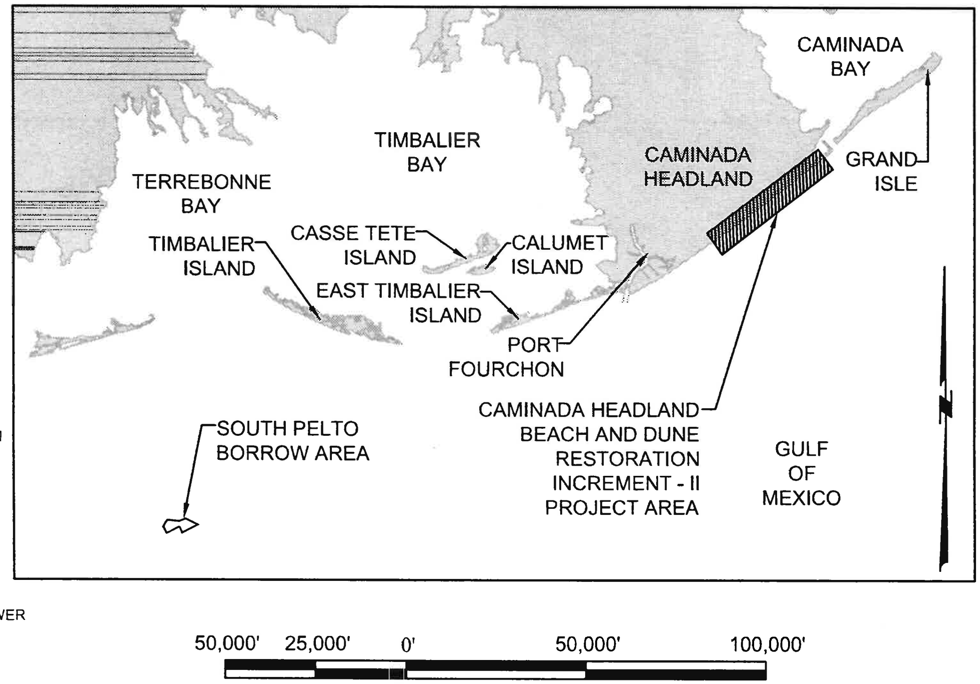


COASTAL PROTECTION AND RESTORATION AUTHORITY CPRA

THIS DRAWING SET IS FOR PERMITTING PURPOSES ONLY AND IS NOT TO BE USED FOR CONSTRUCTION

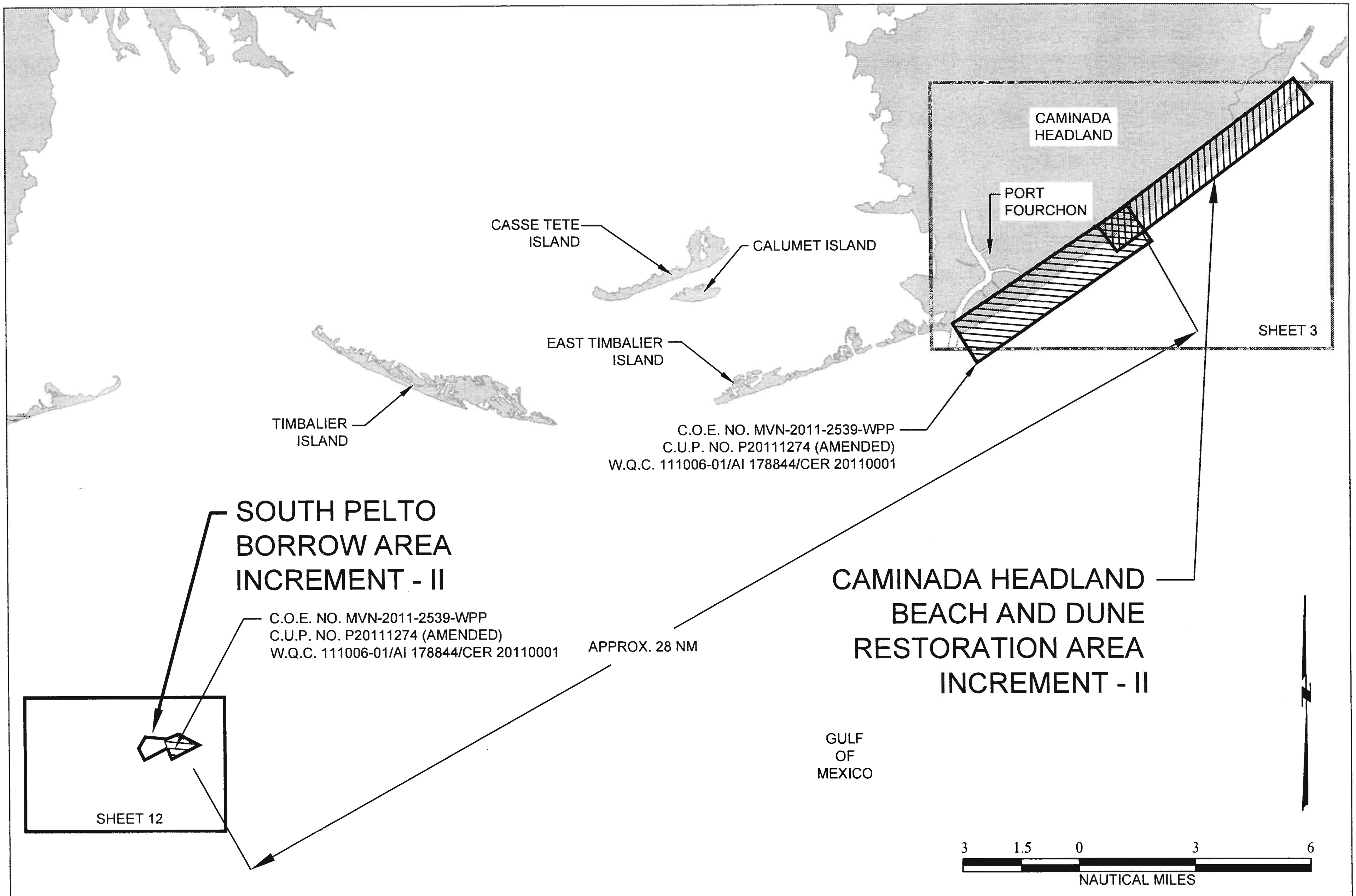
BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION, PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II	TITLE SHEET
STATE PROJECT NUMBER: BA-143	DATE: AUGUST, 2012
FEDERAL PROJECT NUMBER:	SHEET 1 OF 34

DRAWN BY: STEVE DARTEZ | DESIGNED BY: MICHAEL T. POFF, P.E. | APPROVED BY: SHANNON HAYNES, P.E.



BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION, PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

PROJECT OVERVIEW

STATE PROJECT NUMBER: BA-143

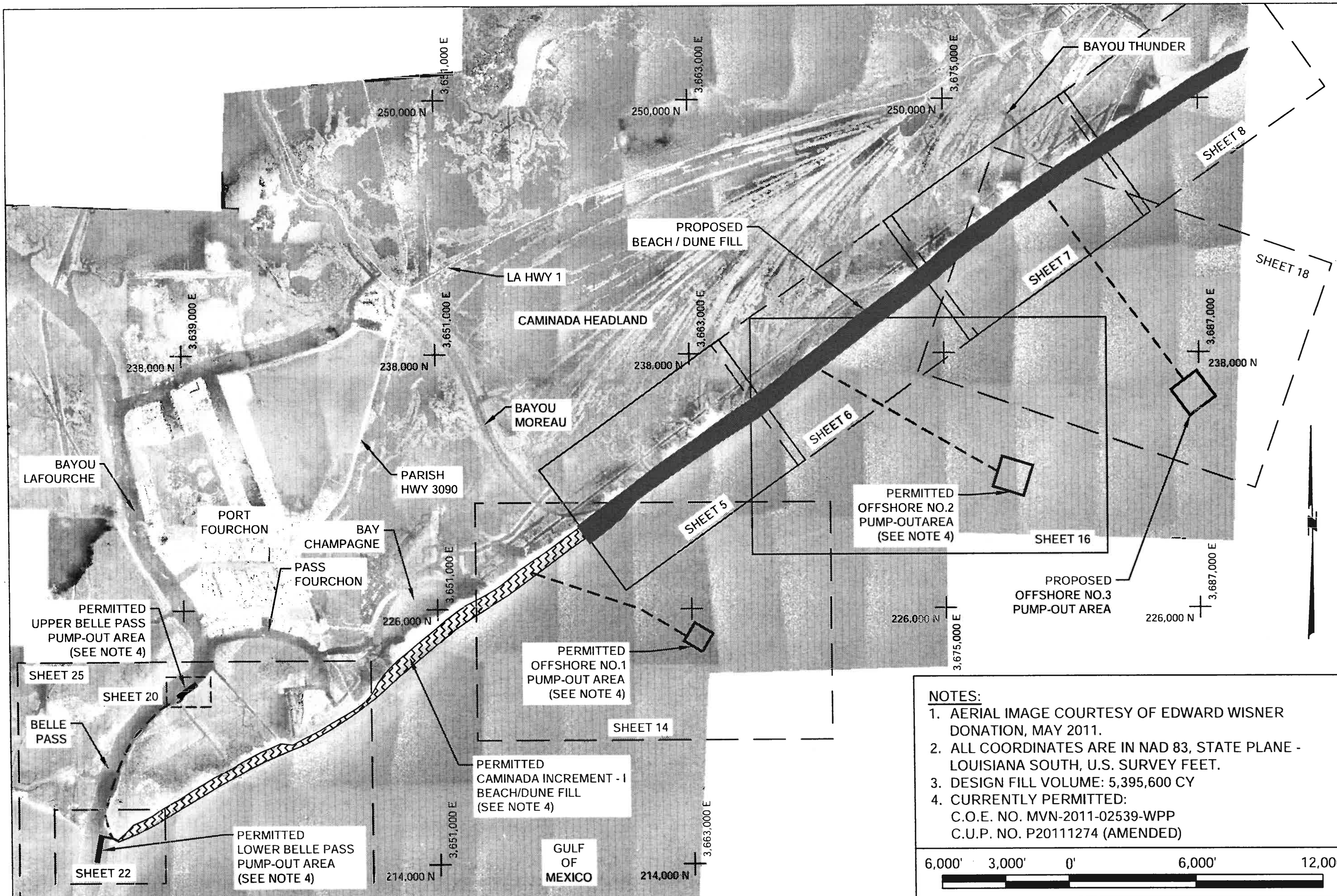
DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:



NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, U.S. SURVEY FEET.
3. DESIGN FILL VOLUME: 5,395,600 CY
4. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP
   C.U.P. NO. P20111274 (AMENDED)

6,000' 3,000' 0' 6,000' 12,000'

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION, PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

HEADLAND OVERVIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 3 OF 34

GENERAL NOTES:

1. ANY EXCAVATED MATERIAL WILL BE, TO THE BEST OF KNOWLEDGE, FREE OF CONTAMINANTS AND/OR WILL BE DISPOSED OF IN AN APPROVED LANDFILL.
2. THE CONTRACTOR SHALL BECOME FAMILIAR WITH THE SITE, CONSTRUCTION PLANS, AND CONTRACT DOCUMENTS AND SHALL CONDUCT WORK IN STRICT ACCORDANCE WITH ALL PERMITS AND APPROVALS OBTAINED FOR THIS PROJECT. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY ERRORS OR DISCREPANCIES IN THE PLANS PRIOR TO BIDDING.
3. ALL AERIAL IMAGERY COURTESY OF EDWARD WISNER DONATION, MAY 2011 AND MAY NOT BE INDICATIVE OF CURRENT CONDITIONS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING PIPELINE AND UTILITY OPERATORS AT TIME OF CONSTRUCTION. ALL PIPELINES AND UNDERGROUND UTILITIES SHALL BE FIELD LOCATED AND MARKED.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING LOUISIANA ONE CALL SYSTEM (1-800-272-3020)A MINIMUM OF 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION (DIGGING, DREDGING, JETTING, ETC.) OR DEMOLITION ACTIVITY. THE CONTRACTOR SHALL ALSO NOTIFYING PIPELINE AND UTILITY OPERATORS 72 HOURS PRIOR TO ANY EXCAVATION.
6. THE WATER BOTTOM SHALL NOT BE DISTURBED DURING ACCESS TO THE PROPOSED WORK LOCATION, OR BY THE AUTHORIZED ACTIVITIES WHETHER IT BE BY DREDGING, WHEEL WASHING , PROPWASHING, JETTING, MUCKING, PLOWING, BULL DOZING OR ANY MEANS OF MOVING BOTTOM MATERIAL, EXCEPT AS DEPICTED ON THE PERMIT SHEETS. POWERED VESSELS SHALL BE OPERATED SO AS NOT TO DISTURB THE WATER BOTTOM BY PROPELLER OR JET ACTION.
7. ALL LOGS, STUMPS, AND OTHER DEBRIS UNEARTHED DURING DREDGING SHALL BE REMOVED TO AN APPROVED OFFSITE DISPOSAL AREA.
8. THE CONTRACTOR MUST INSTALL AND MAINTAIN ANY SAFETY LIGHTS, SIGNS, AND SIGNALS PRESCRIBED BY THE U.S. COAST GUARD, THROUGH REGULATIONS OR OTHERWISE ON THE AUTHORIZED FACILITIES.
9. ANY DAMAGE TO EXISTING U.S. COAST GUARD NAVIGATION AIDS OR PRIVATE NAVIGATION AIDS SHALL BE REPAIRED BY THE CONTRACTOR TO U.S. COAST GUARD STANDARDS AT THE EXPENSE OF THE CONTRACTOR.
10. PIPELINES IN OPEN WATER AND/OR NAVIGABLE WATERS SHALL BE MARKED WITH BUOYS BY THE CONTRACTOR IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS. THE CONTRACTOR SHALL MAINTAIN BUOYS DURING CONSTRUCTION OR HAVE ADEQUATE NAVIGATIONAL EQUIPMENT ON THE DREDGE TO AVOID DREDGING IN RESTRICTED AREAS.
11. THE PROPOSED PROJECT AND ANY FUTURE MAINTENANCE WORK INVOLVING THE USE OF FLOATING CONSTRUCTION EQUIPMENT (BARGE MOUNTED CRANES, BARGE MOUNTED PILE DRIVING EQUIPMENT, FLOATING DREDGE EQUIPMENT, DREDGE DISCHARGE PIPELINES, ETC.) IN FEDERAL WATERS, SHALL NOTIFY THE U.S. COAST GUARD SO THAT A NOTICE TO MARINERS, IF REQUIRED, MAY BE PREPARED. NOTIFICATION, WITH A COPY OF THE PERMIT APPROVAL AND DRAWINGS, SHALL BE MAILED TO THE U.S. COAST GUARD, SECTOR NEW ORLEANS COMMAND CENTER, 201 HAMMOND HIGHWAY, METAIRIE, LOUISIANA 70005, 30 DAYS BEFORE COMMENCEMENT OF WORK.
12. THE TEMPORARY UPLAND CONSTRUCTION ACCESS AREAS ARE INDICATED ON THE PERMIT SHEETS 27 THROUGH 29. USE OF THESE AREAS SHALL BE COORDINATED WITH THE PARISH AND PROJECT ENGINEER. THE CONTRACTOR SHALL BE REQUIRED TO CONFINE HIS/HER PLANT, EQUIPMENT, AND OPERATIONS OF PERSONNEL TO AREAS PERMITTED BY LAW, ORDINANCES, PERMITS, AND THE REQUIREMENTS OF THE CONSTRUCTION CONTRACT DOCUMENTS, AND SHALL NOT UNREASONABLY ENCUMBER THE PREMISES WITH PLANT OR EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PREPARATION AND RESTORATION OF THE TEMPORARY CONSTRUCTION ACCESS AREA. THE CONTRACTOR SHALL BE REQUIRED TO SUBMIT A CONSTRUCTION ACCESS PLAN AND CONSTRUCTION ACCESS RESTORATION PLAN PRIOR TO ITS USAGE. THE TEMPORARY CONSTRUCTION ACCESS AREAS SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITIONS AS PART OF DEMOBILIZATION.
13. THE CONTRACTOR SHALL FOLLOW CONVEYANCE CORRIDORS, REMAIN WITHIN THE TEMPORARY CONSTRUCTION ACCESS AND STAGING AREAS, AND / OR FILL TEMPLATES, AND SHALL NOT, AT ANY TIME, TRAVEL ON EXISTING MARSH OR VEGETATED WETLANDS UNLESS SPECIFIED IN THE PERMIT OR THROUGH WRITTEN DIRECTION FROM ENGINEER.
14. THE CONTRACTOR SHALL CAREFULLY SURVEY AND MARK THE BOUNDARIES OF THE PROJECT FOOTPRINT. BOUNDARY MARKERS SHALL BE SEMI-PERMANENT SUCH THAT THEY SHOULD BE MAINTAINED THROUGHOUT CONSTRUCTION ACTIVITIES AND SHOULD PERSIST UNTIL CONSTRUCTION-RELATED ACTIVITIES ARE COMPLETED.
15. THE CONTRACTOR SHALL TAKE PARTICULAR CARE WHEN WORKING IN THE VICINITY OF THE BELLE PASS JETTIES. ANY DAMAGE RESULTING FROM THE CONTRACTORS ACTIVITIES SHALL BE REPAIRED TO THE SATISFACTION OF THE U.S. ARMY CORPS OF ENGINEERS BY THE CONTRACTOR PRIOR TO DEMOBILIZATION. ALL COST ASSOCIATED WITH REPAIRS TO THE BELLE PASS JETTIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
16. IF THE CONTRACTOR ELECTS TO UTILIZE THE UPPER AND/OR LOWER BELLE PASS PUMP-OUT AREAS, THE CONTRACTOR SHALL CONDUCT PRE- AND POST-CONSTRUCTION MONITORING SURVEYS OF THE NAVIGATION CHANNEL IMMEDIATELY ADJACENT TO THIS WORK AREA(S). ANY RESULTANT SHOALING OF THE CHANNEL IN THIS VICINITY AS A RESULT OF CONTRACTOR ACTIVITIES SHALL BE REMOVED AND THE CHANNEL RESTORED TO PRE-CONSTRUCTION CONDITIONS PRIOR TO DEMOBILIZATION. ALL COST ASSOCIATED WITH SHOAL REMOVAL SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
17. THE CONTRACTOR SHALL WORK COOPERATIVELY WITH THE OWNER TO ADDRESS THE NOTIFICATION AND COORDINATION REQUIREMENTS WITH THE LANDOWNERS, UTILITY OPERATORS, AND PIPELINE COMPANIES.
18. AS-BUILT DRAWINGS AND/OR PLATS SHALL HAVE WRITTEN ON THEM THE DATE OF COMPLETION OF SAID ACTIVITIES AND SHALL BE SUBMITTED TO THE LOUISIANA DEPARTMENT OF NATURAL RESOURCES, OFFICE OF COASTAL MANAGEMENT, P.O. BOX 44487, BATON ROUGE, LA 70804-4487 WITHIN 30 DAYS FOLLOWING PROJECT COMPLETION.
19. ALL STRUCTURES, FACILITIES, WELL AND PIPELINE/FLOWLINES OCCURRING IN OPEN WATER AREAS OR IN OILFIELD CANALS OR SLIPS SHALL BE REMOVED WITHIN 120 DAYS OF ABANDONMENT OR THE FACILITIES FOR THE HEREIN PERMITTED USE UNLESS PRIOR WRITTEN APPROVAL TO LEAVE SUCH STRUCTURES IN PLACE IS RECEIVED FROM THE OFFICE OF COASTAL MANAGEMENT. THIS CONDITION DOES NOT PRECLUDE THE NECESSITY FOR REVISING THE CURRENT PERMIT OR OBTAINING A SEPARATE COASTAL USE PERMIT, SHOULD ONE BE REQUIRED.
20. THIS DRAWING SET IS FOR PERMITTING PURPOSES ONLY AND IS NOT TO BE USED FOR CONSTRUCTION.

SURVEY NOTES:

1. ALL COORDINATES ARE NAD 83 (GEOID 09), LOUISIANA STATE PLANE, SOUTHERN ZONE, U.S. SURVEY FEET.
2. ALL ELEVATIONS ARE IN NAVD88, U.S. SURVEY FEET UNLESS OTHERWISE SPECIFIED.
3. ALL BORROW AREA SURVEYS PERFORMED BY OCEAN SURVEYS, INC., 2011.
4. ALL BELLE PASS CONVEYANCE CORRIDORS AND PUMP-OUT AREAS SURVEYS PERFORMED BY PICCIOA & ASSOCIATES, INC.AND COASTAL ENGINEERING CONSULTANTS, INC., 2011. OFFSHORE CONVEYANCE CORRIDORS AND PUMP-OUT AREAS SURVEYS PERFORMED BY OCEAN SURVEYS, INC. 2012.
5. ALL HEADLAND SURVEYS PERFORMED BY PICCIOLA & ASSOCIATES, INC., 2010.
6. INFORMATION SHOWN HERE IN REFLECTS CONDITIONS AS THEY EXISTED ON THE SURVEY DATE SHOWN AND CAN ONLY BE CONSIDERED INDICATIVE OF CONDITIONS AT THAT TIME.

BY	DESCRIPTION	DATE
MTP	GENERAL NOTE ADDITION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

GENERAL NOTES

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

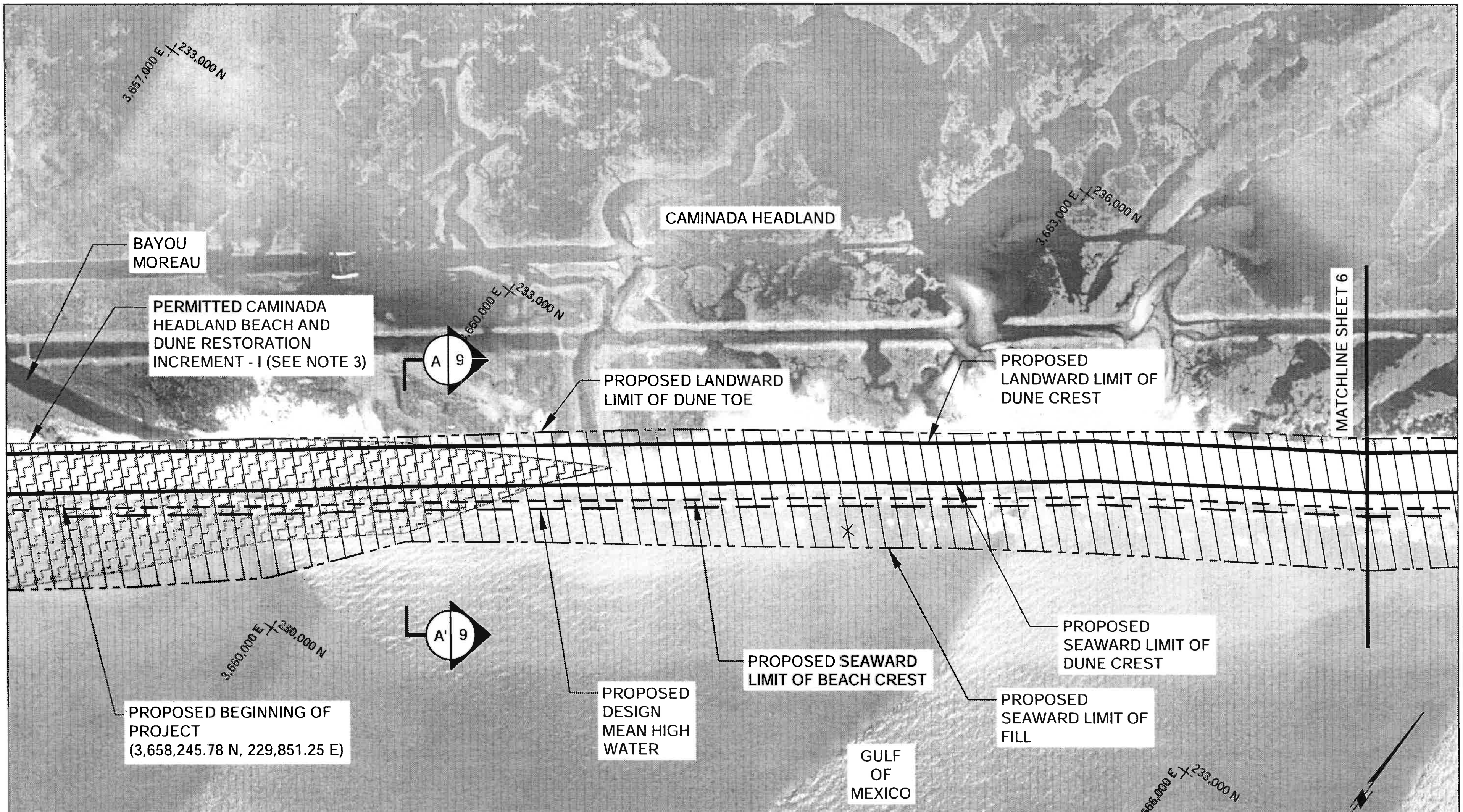
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 4 OF 34



LEGEND

DUNE CREST	TOE OF FILL
BEACH CREST	DESIGN MHW
PROPOSED FILL AREA	PERMITTED FILL AREA

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FT.
3. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP
   C.U.P. NO. P20111274 (AMENDED)

1,000' 500' 0' 1,000' 2,000'

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

CAMINADA HEADLAND PLAN VIEW

STATE PROJECT NUMBER: BA-143

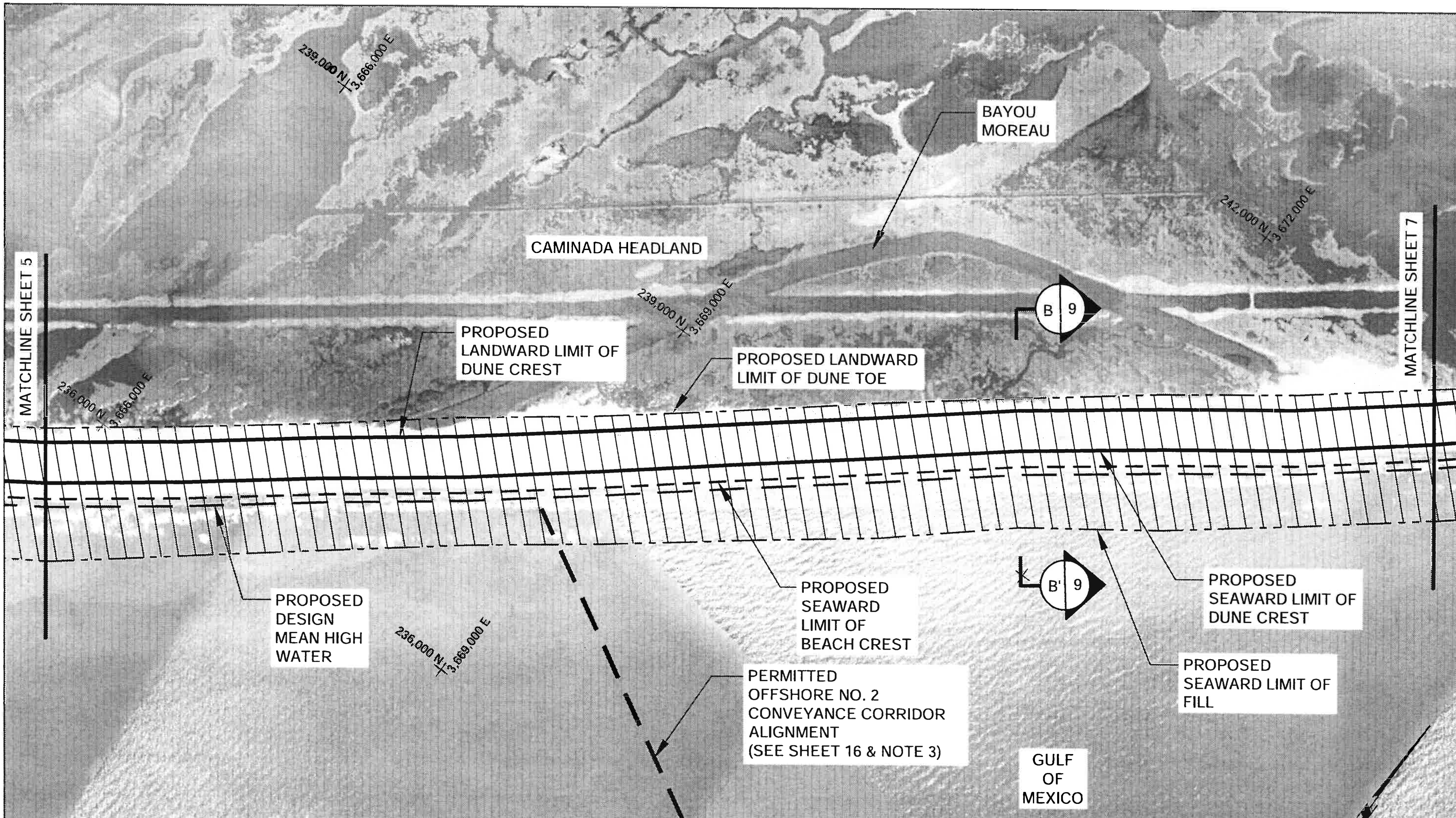
DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:



LEGEND

- DUNE CREST (solid line)
- BEACH CREST (dashed line)
- PROPOSED FILL AREA (hatched)
- TOE OF FILL (dash-dot line)
- DESIGN MHW (long-dash line)

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FT.
3. CURRENTLY PERMITTED AS OFFSHORE WEST:
   C.O.E. NO. MVN-2011-02539-WPP
   C.U.P. NO. P20111274 (AMENDED)

1,000' 500' 0' 1,000' 2,000'

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

CAMINADA HEADLAND PLAN VIEW

STATE PROJECT NUMBER: BA-143

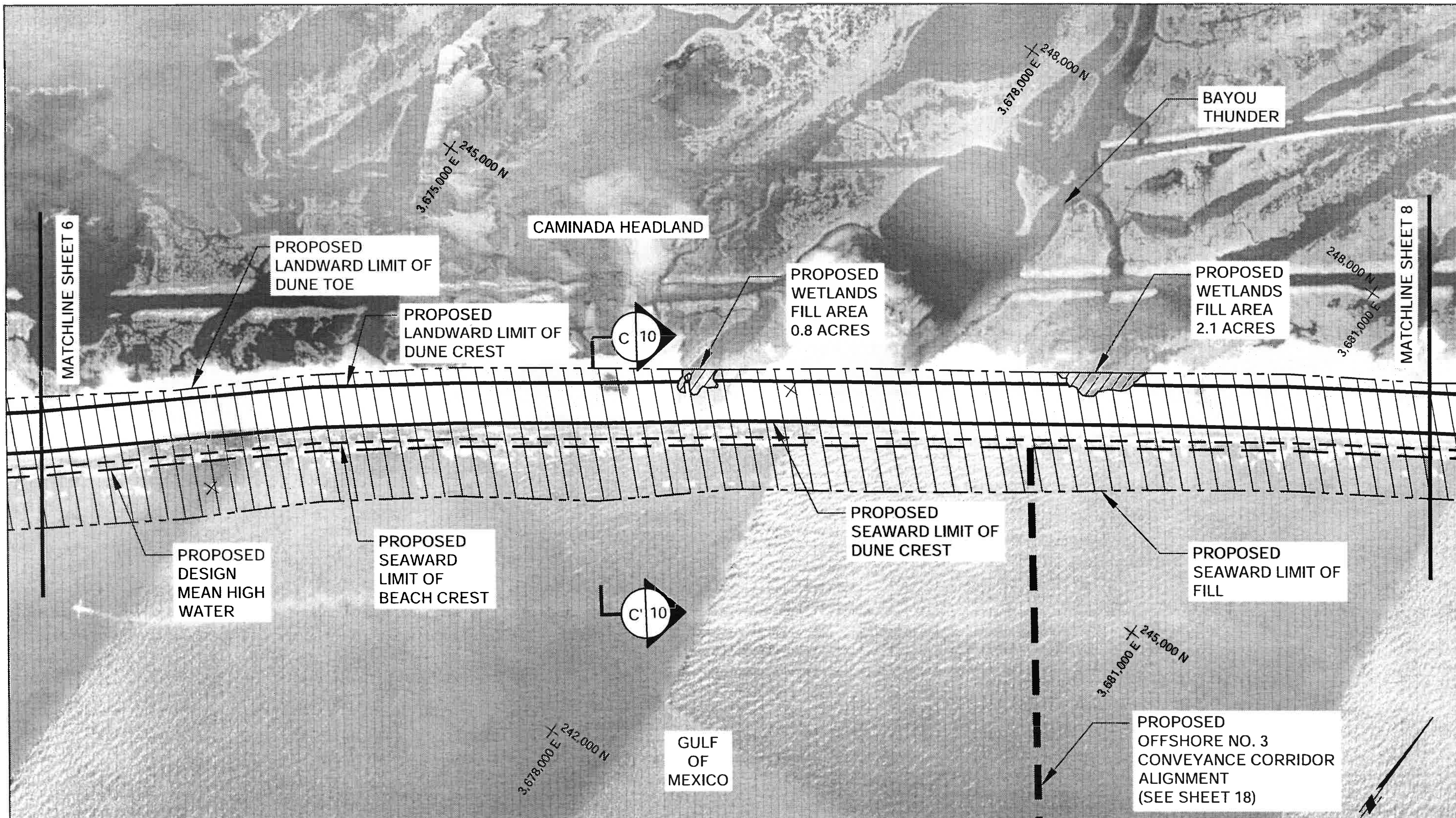
DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:



LEGEND

DUNE CREST	TOE OF FILL
BEACH CREST	DESIGN MHW
PROPOSED FILL AREA	PROPOSED WETLANDS FILL AREA

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FT.

1,000' 500' 0' 1,000' 2,000'

BY	DESCRIPTION	DATE
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COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

CAMINADA HEADLAND PLAN VIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

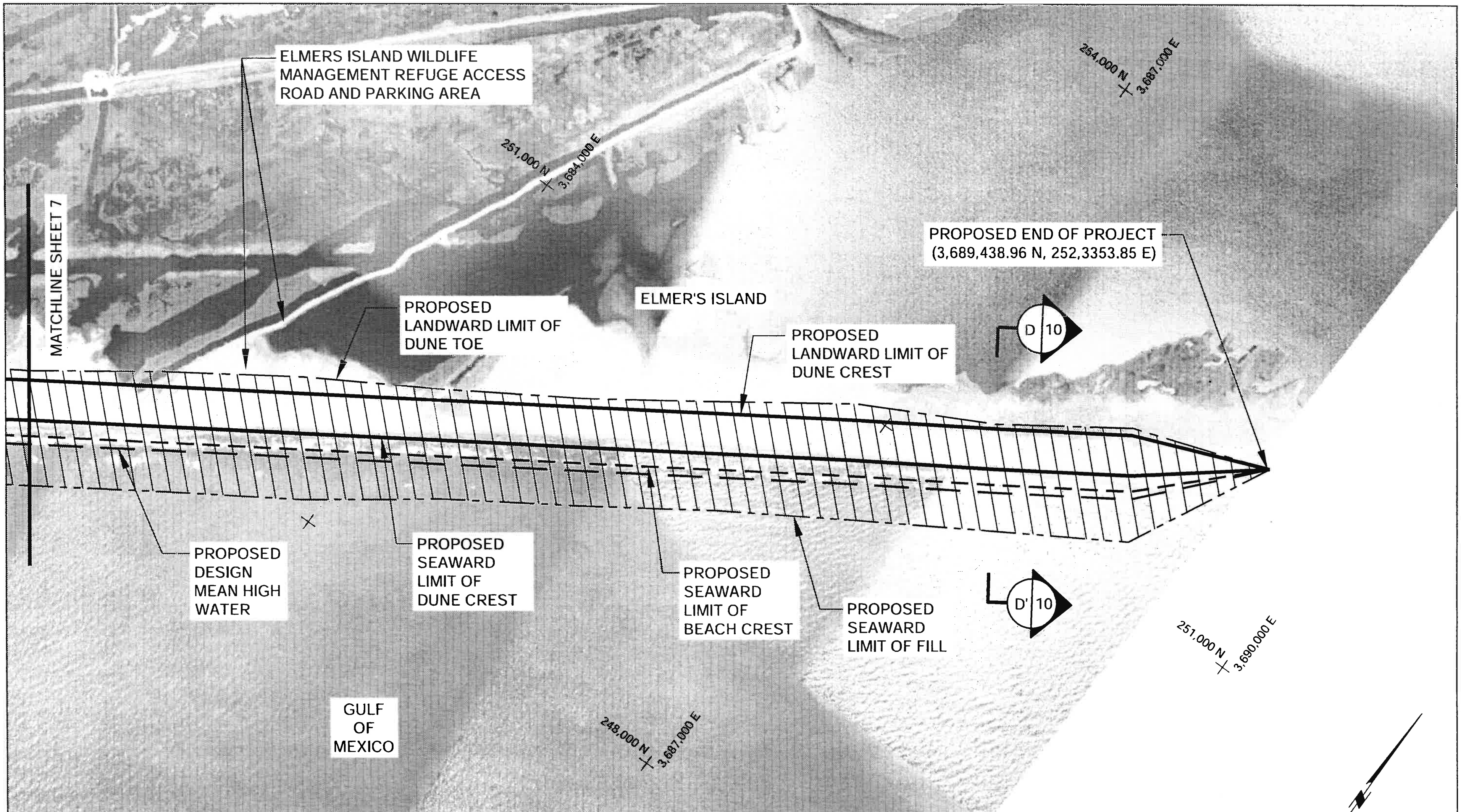
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 7 OF 34



LEGEND

DUNE CREST	TOE OF FILL
BEACH CREST	DESIGN MHW
PROPOSED FILL AREA	

NOTES:
1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FT

1,000' 500' 0' 1,000' 2,000'

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

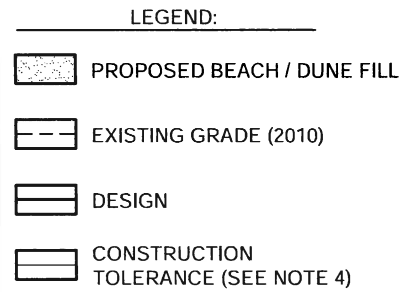
STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

CAMINADA HEADLAND PLAN VIEW

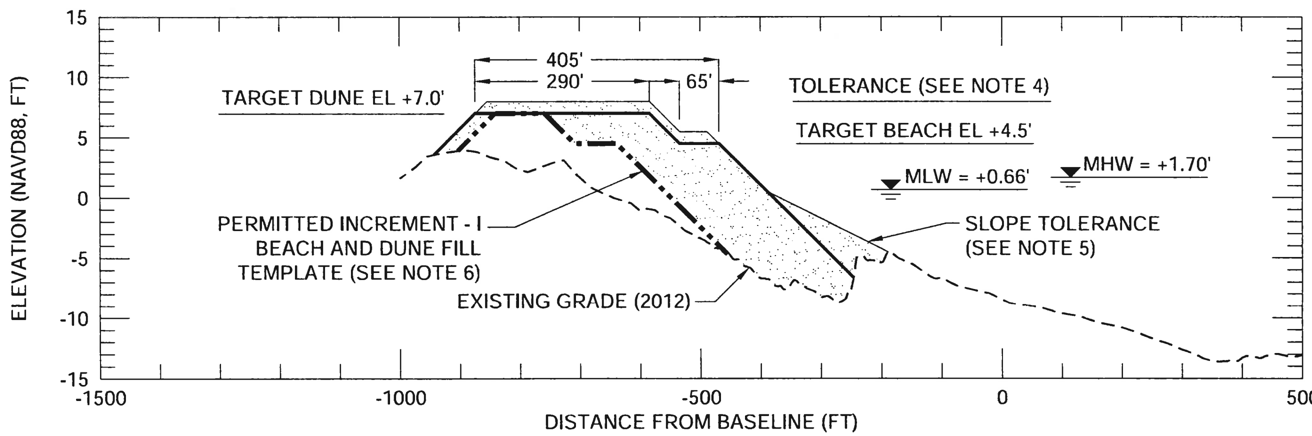
DATE: AUGUST, 2012

SHEET 8 OF 34

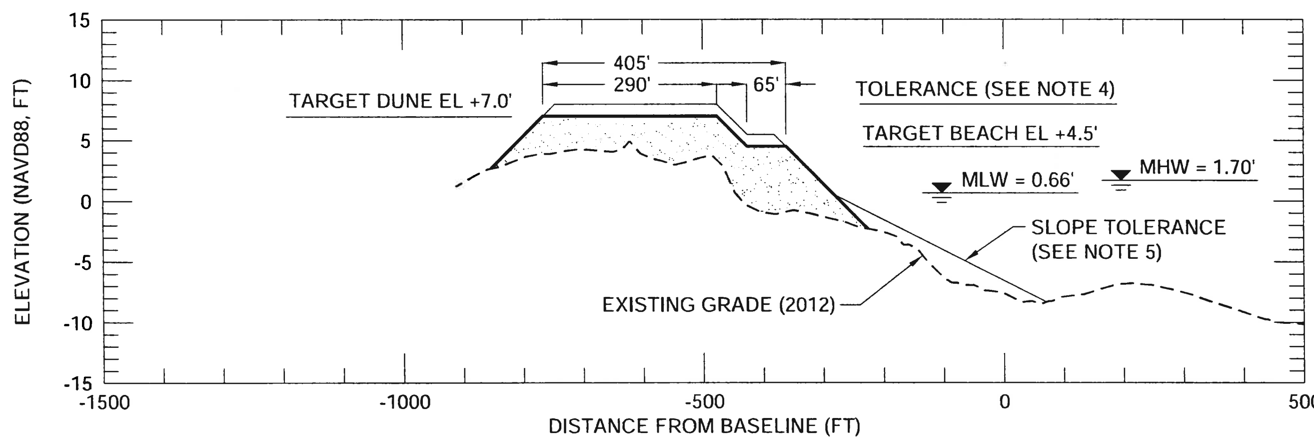


SCALE:
H: 1" = 300'
V: 1" = 15'

A - A'



B - B'



NOTES:
1. SECTIONS ARE VIEWED AS LOOKING EAST.
2. SURVEY BY EMC, INC. 2012.
3. ALL SLOPES 1V:20H UNLESS OTHERWISE DESIGNATED.
4. A ONE FOOT TOLERANCE IS INCLUDED TO ACCOUNT FOR CONSTRUCTION METHODS AND CONSOLIDATION/SETTLEMENT OF THE FILL.
5. CONSTRUCTION SLOPE TOLERANCE OF 1:40 PROVIDED FROM MEAN LOW WATER SEAWARD.
6. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED)

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

CAMINADA HEADLAND DESIGN SECTIONS

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 9 OF 34

LEGEND:

PROPOSED BEACH / DUNE FILL

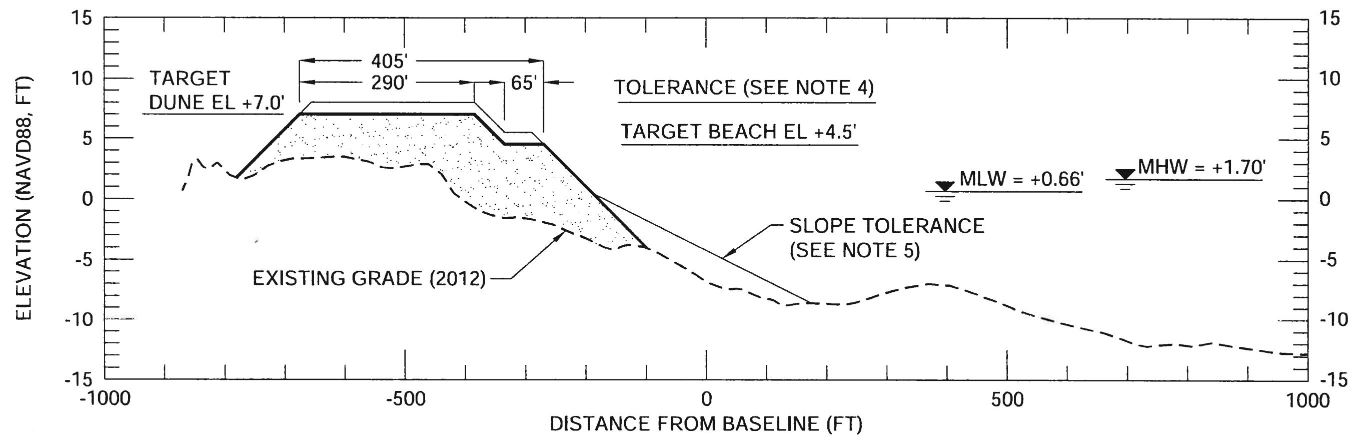
EXISTING GRADE (2010)

DESIGN

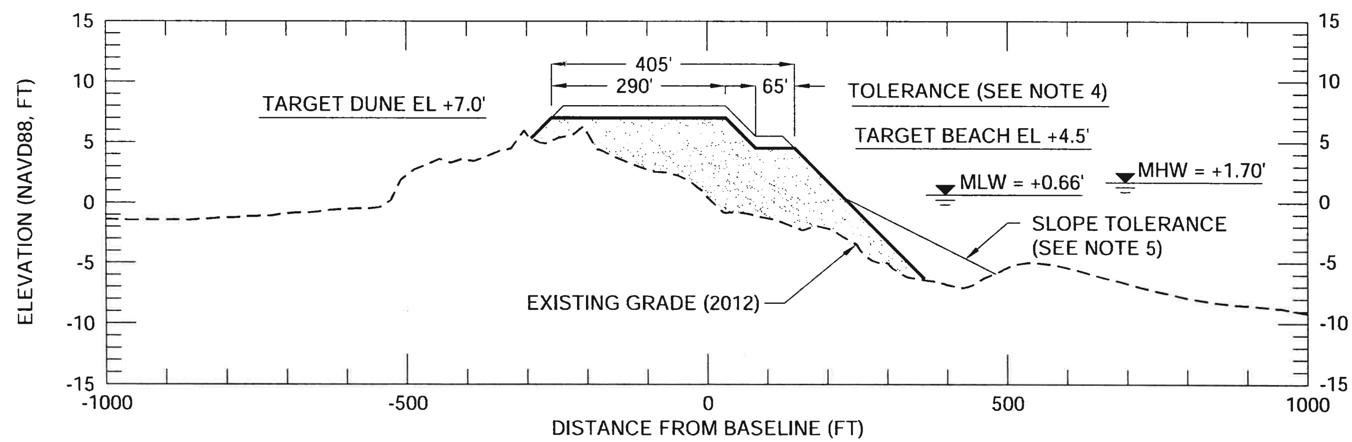
CONSTRUCTION TOLERANCE (SEE NOTE 4)

SCALE:
H: 1" = 300'
V: 1" = 15'

C - C'



D - D'



NOTES:
1. SECTIONS ARE VIEWED AS LOOKING EAST.
2. SURVEY BY EMC, INC. 2012.
3. ALL SLOPES 1V:20H UNLESS OTHERWISE DESIGNATED.
4. A ONE FOOT TOLERANCE IS INCLUDED TO ACCOUNT FOR CONSTRUCTION METHODS AND CONSOLIDATION/SETTLEMENT OF THE FILL.
5. CONSTRUCTION SLOPE TOLERANCE OF 1:40 PROVIDED FROM MEAN LOW WATER SEAWARD.

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

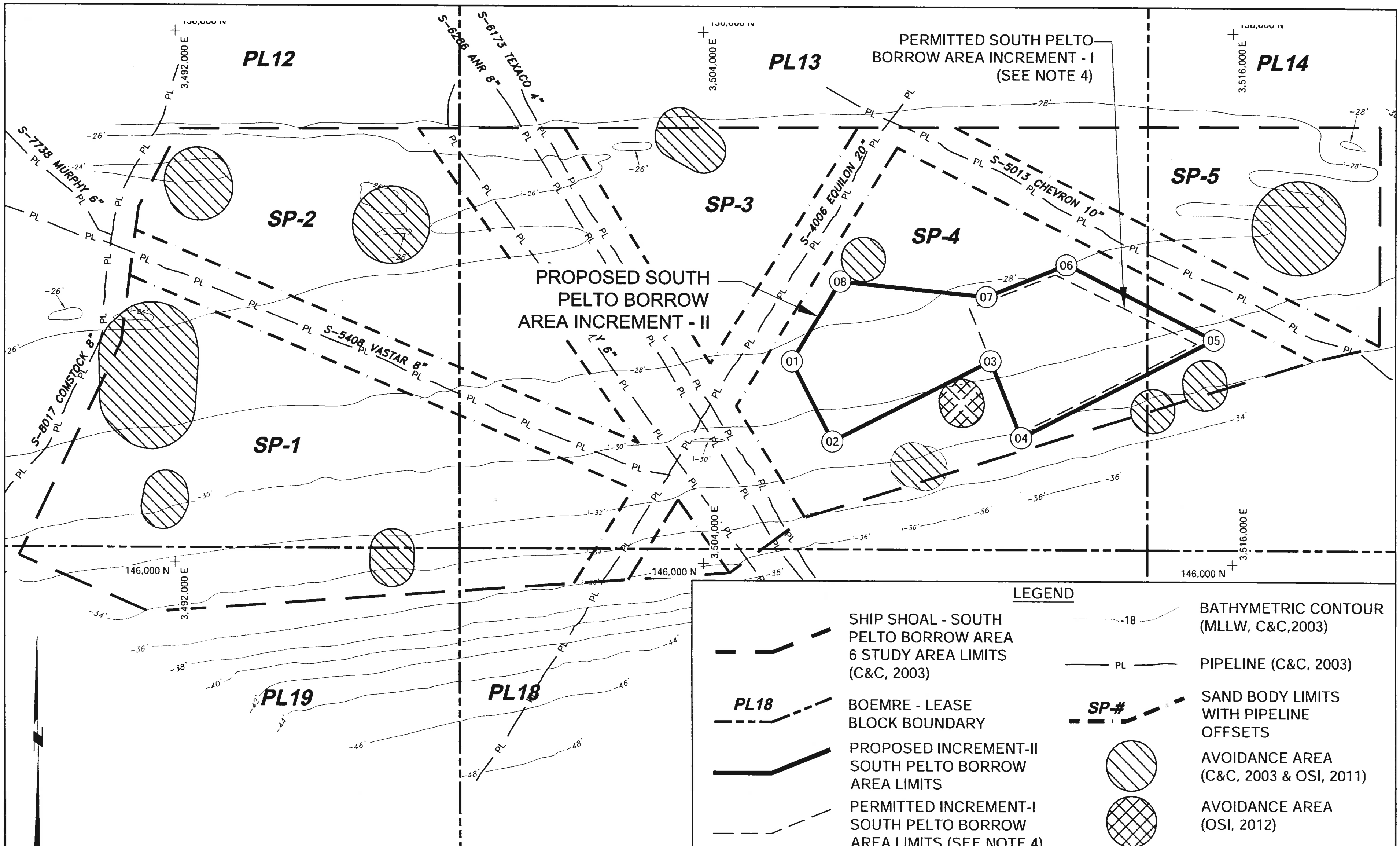
STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

CAMINADA HEADLAND DESIGN SECTIONS

DATE: AUGUST, 2012

SHEET 10 OF 34



NOTES:

1. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
2. ALL UNITS ARE U.S. SURVEY FEET REFERENCED TO MEAN LOWER LOW WATER (MLLW).
3. SEE SHEET 34 FOR SOUTH PELTO BORROW AREA COORDINATE DETAILS.
4. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274.

BY	DESCRIPTION	DATE
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COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

SOUTH PELTO OVERVIEW MAP

STATE PROJECT NUMBER: BA-143

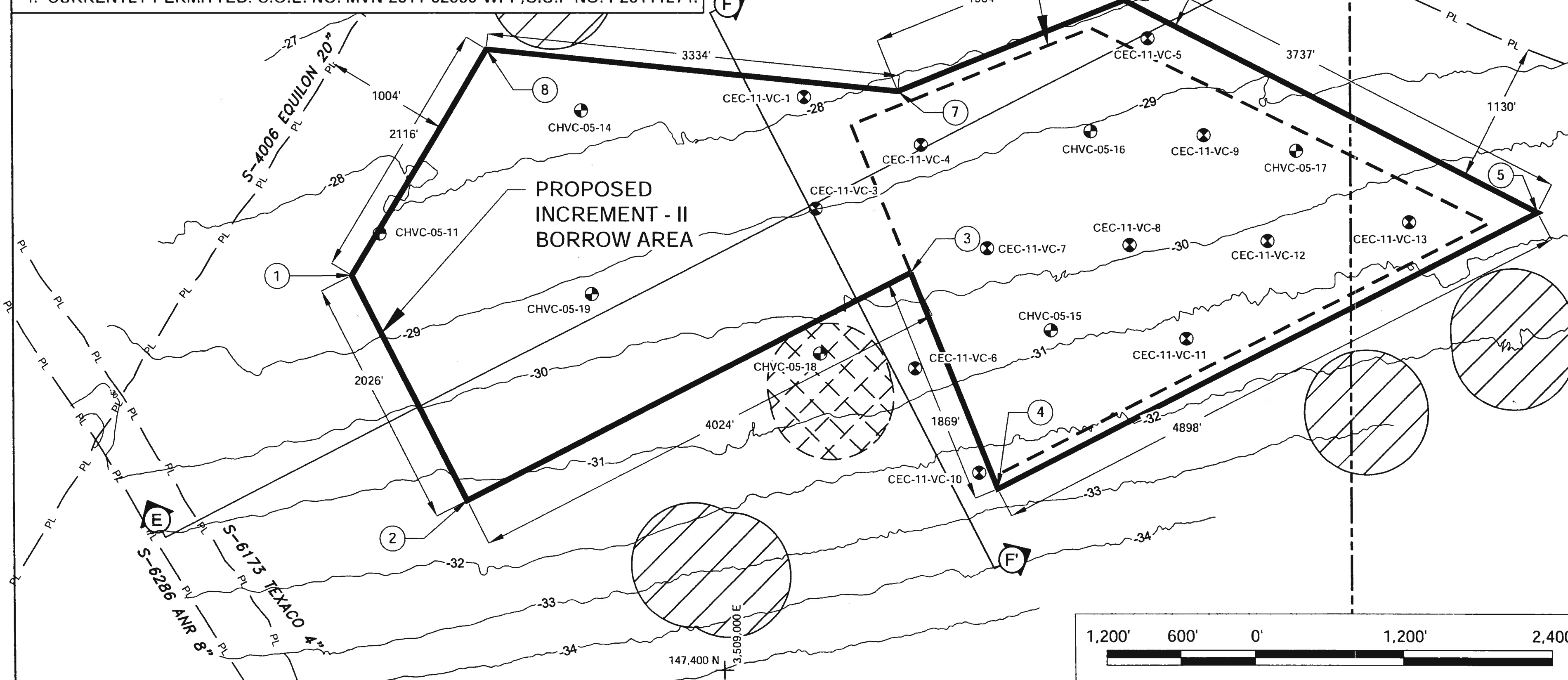
DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:



LEGEND

PL13	BOEM LEASE BOUNDARY	
CHVC-05-14	VIBRACORE (CPE, 2005)	
CEC-11-VC-1	VIBRACORE OSI, 2011)	
	AVOIDANCE AREA (OSI, 2011)	
— PL —	PIPELINE (OSI, 2011)	
—30—	BATHYMETRIC CONTOUR (OSI, 2011)	
	AVOIDANCE AREA (OSI, 2012)	
1	BORROW AREA BOUNDARY COORDINATE	

NOTES:
1. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
2. ALL UNITS ARE NAVD88, U.S. SURVEY FEET.
3. SEE SHEET 34 FOR SOUTH PELTO BORROW AREA COORDINATE DETAILS.
4. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP,C.U.P NO. P20111274.

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

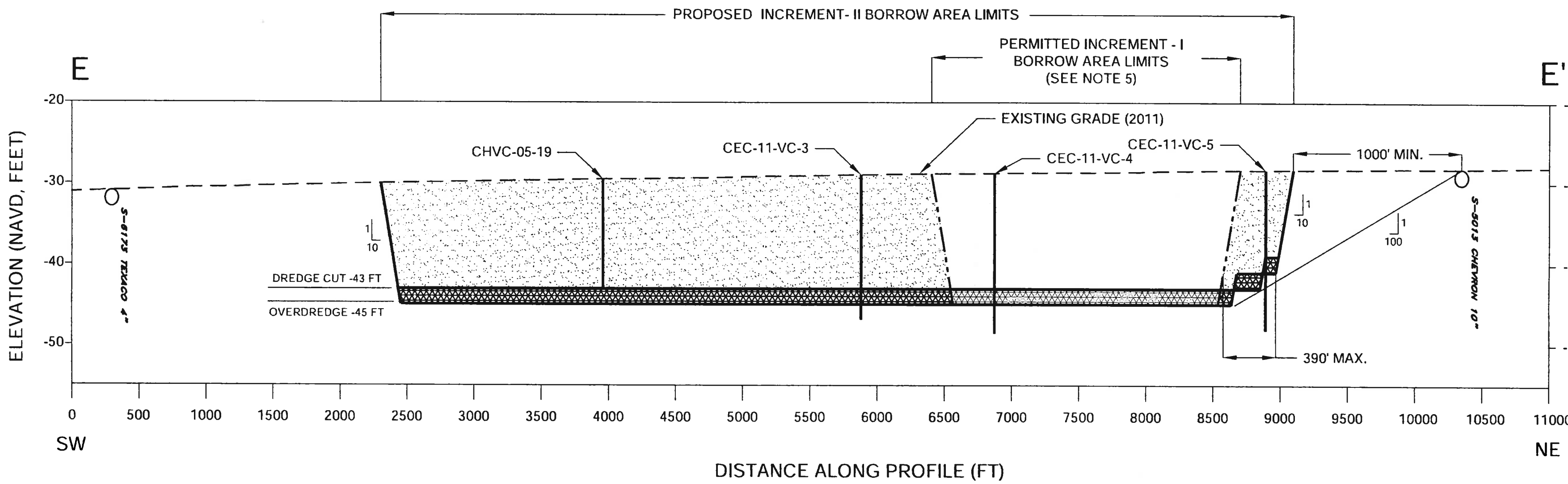
COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

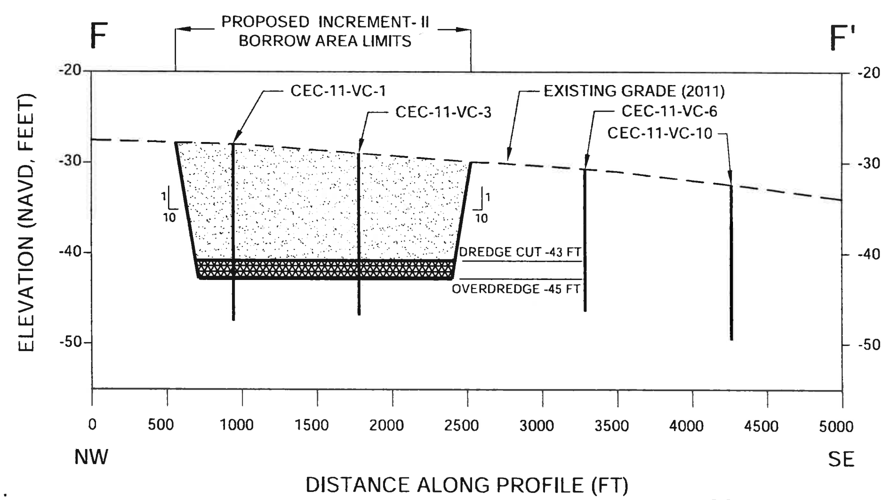
CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

SOUTH PELTO BORROW AREA PLAN VIEW

STATE PROJECT NUMBER: BA-143	DATE: AUGUST, 2012
FEDERAL PROJECT NUMBER:	SHEET 12 OF 34

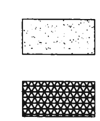
DRAWN BY: STEVE DARTEZ | DESIGNED BY: MICHAEL T. POFF, P.E. | APPROVED BY: SHANNON HAYNES, P.E.





SCALE
H: 1" = 1200'
V: 1" = 20'

LEGEND:



PROPOSED DREDGE CUT

OVERDREDGE TOLERANCE

NOTES:
1. PIPELINE DATA FROM OSI, 2011.
2. BATHYMETRIC SURVEY CONDUCTED BY OSI, 2011.
3. ELEVATIONS HEREON ARE REFERENCED TO NORTH AMERICAN VERITCAL DATUM 1988 (NAVD)
4. VIBRACORE DATA OBTAINED FROM CPE, 2005 AND OSI, 2011.
5. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP,C.U.P NO. P20111274.

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

SOUTH PELTO BORROW AREA DESIGN SECTIONS

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

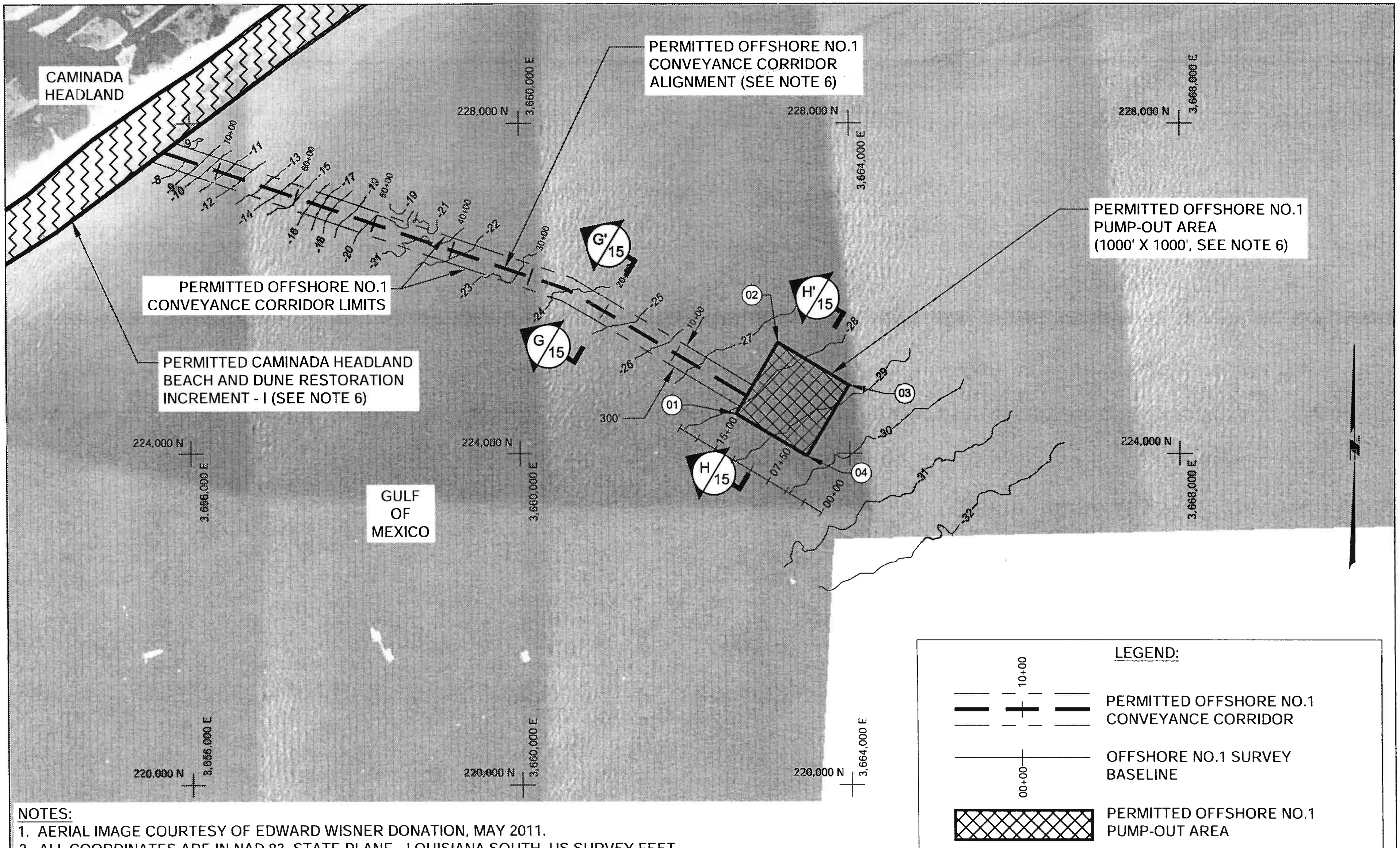
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 13 OF 34



NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
3. SURVEY CONDUCTED BY OCEAN SURVEY, INC., DECEMBER 2011.
4. THE LIMITS OF MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE OFFSHORE WEST PUMP-OUT AREA.
5. SEE SHEET 33 FOR OFFSHORE NO.1 PUMP-OUT AREA BOUNDARY COORDINATES.
6. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED) AS OFFSHORE WEST.

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

OFFSHORE NO.1 PUMP-OUT AREA PLAN VIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

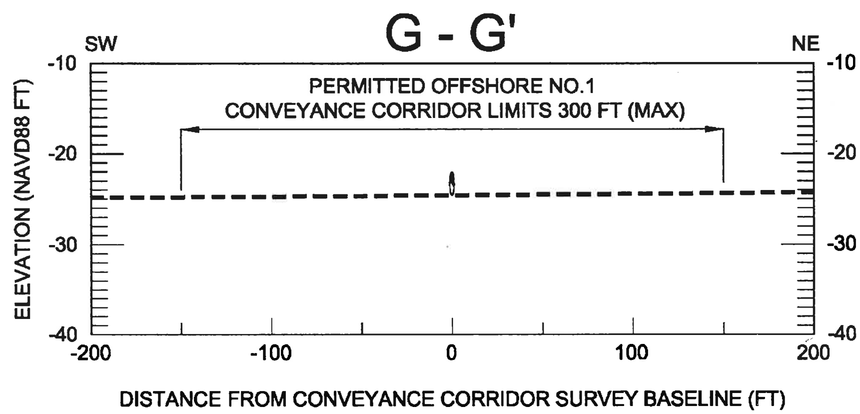
SHEET 14 OF 34

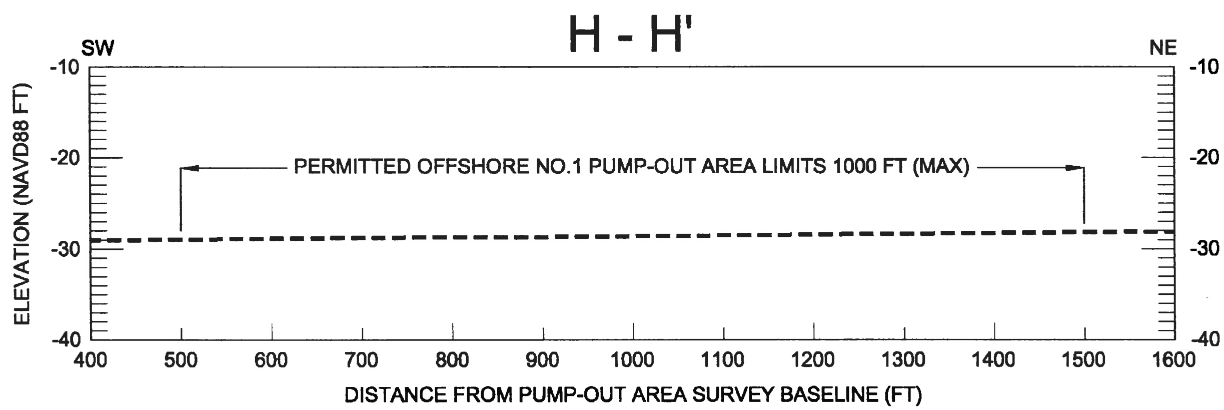
SCALE:
VERT: 1" = 20'
HORIZ: 1" = 100'

LEGEND:

- - - EXISTING GRADE (2011)

SUBMERGED SEDIMENT PIPELINE





NOTES:
1. SURVEY CONDUCTED BY OCEAN SURVEY, INC., DECEMBER 2011.
2. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 NAVD88.
3. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

OFFSHORE NO.1 PUMP-OUT AREA AND CORRIDOR TYPICAL SECTIONS

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

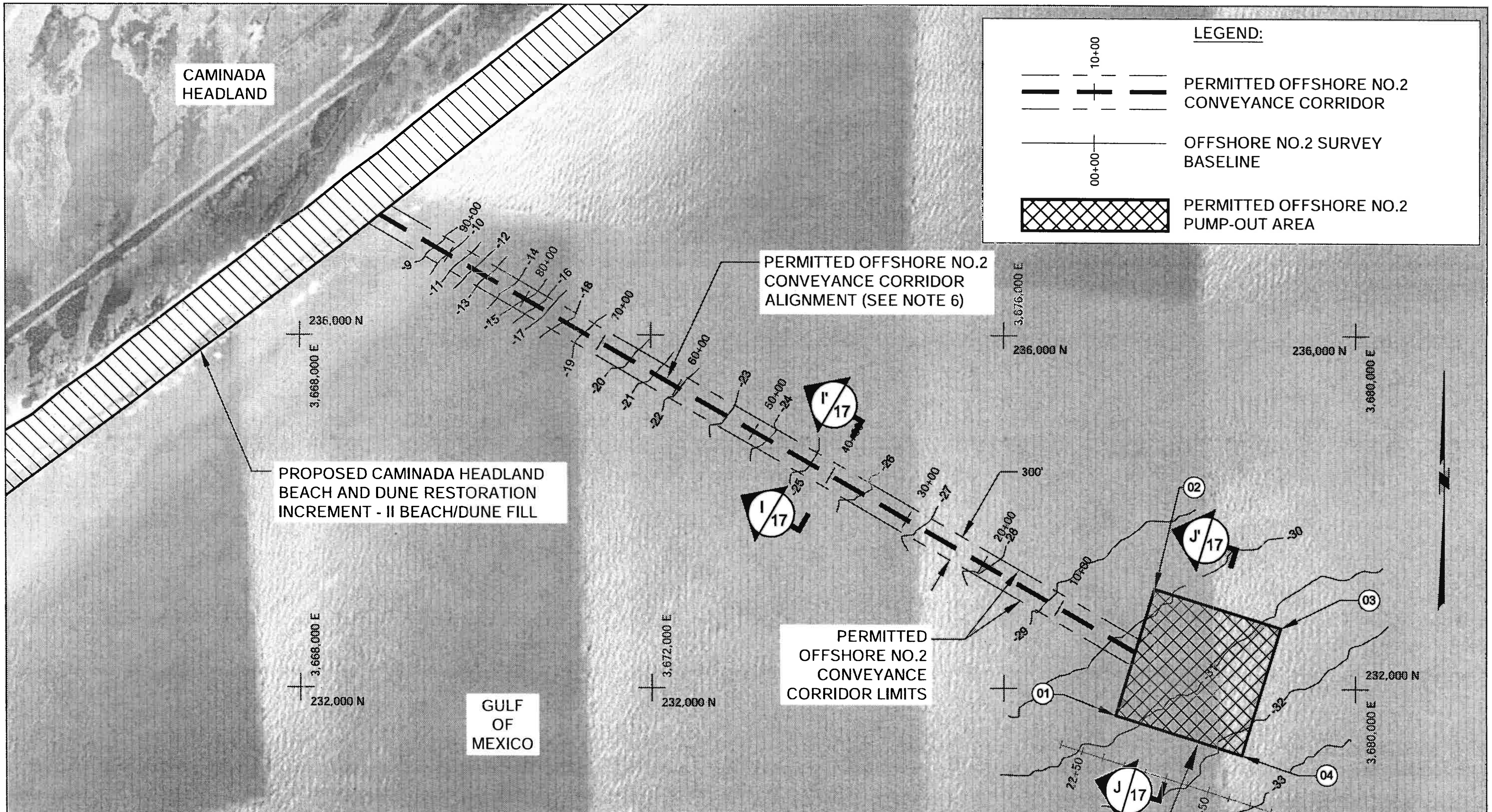
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 15 OF 34



NOTES:
1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
3. SURVEY CONDUCTED BY OCEAN SURVEY, INC., DECEMBER 2011.
4. THE LIMITS OF MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE OFFSHORE PUMP-OUT AREA.
5. SEE SHEET 33 FOR OFFSHORE NO.2 PUMP-OUT AREA BOUNDARY COORDINATES.
6. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED) AS OFFSHORE EAST

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

OFFSHORE NO.2 PUMP-OUT AREA PLAN VIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 16 OF 34

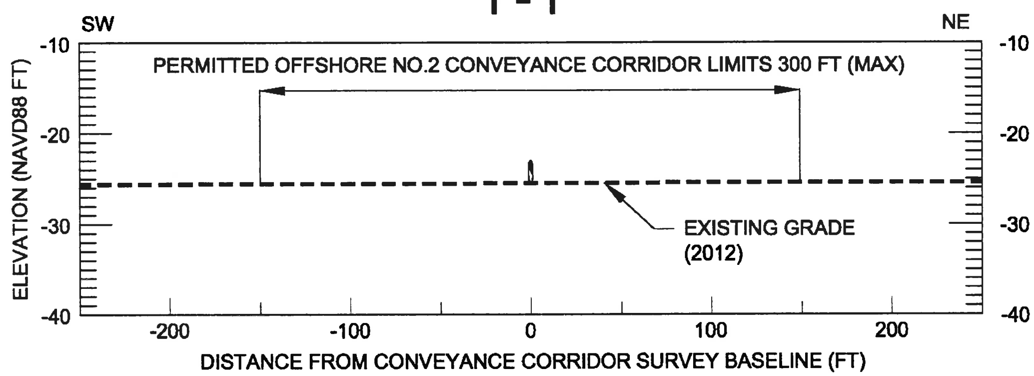
SCALE:
VERT: 1" = 20'
HORIZ: 1" = 100'

LEGEND:

EXISTING GRADE (2011)

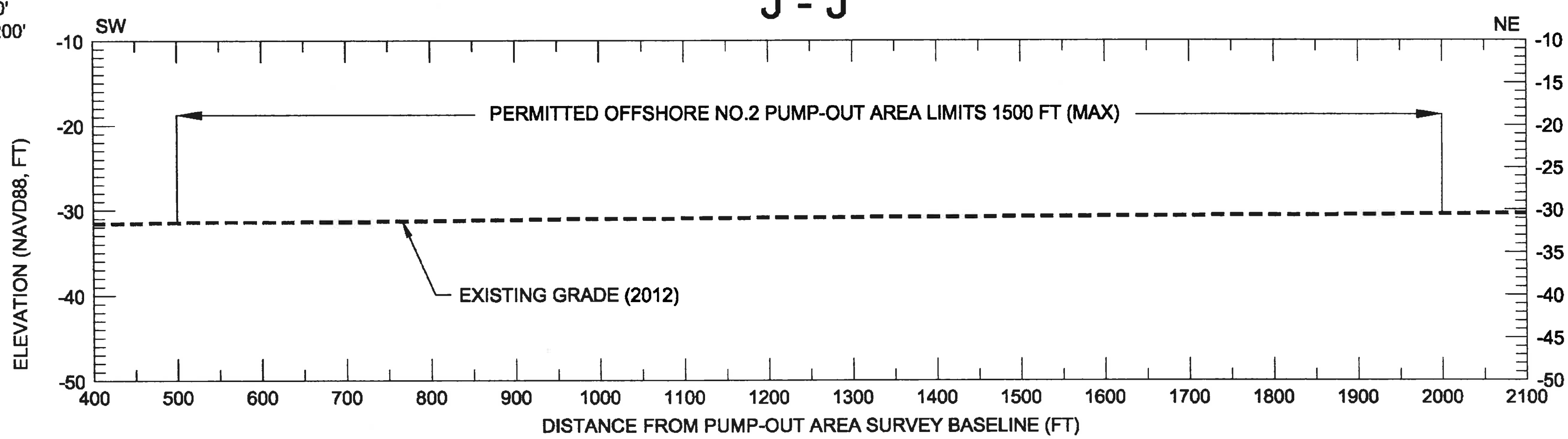
SUBMERGED SEDIMENT PIPELINE

I - I'



SCALE:
VERT: 1" = 20'
HORIZ: 1" = 200'

J - J'



NOTES:
1. SURVEY CONDUCTED BY OCEAN SURVEY, INC., DECEMBER 2011.
2. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 FT NAVD88.
3. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

OFFSHORE NO.2 PUMP-OUT AREA AND CORRIDOR TYPICAL SECTIONS

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

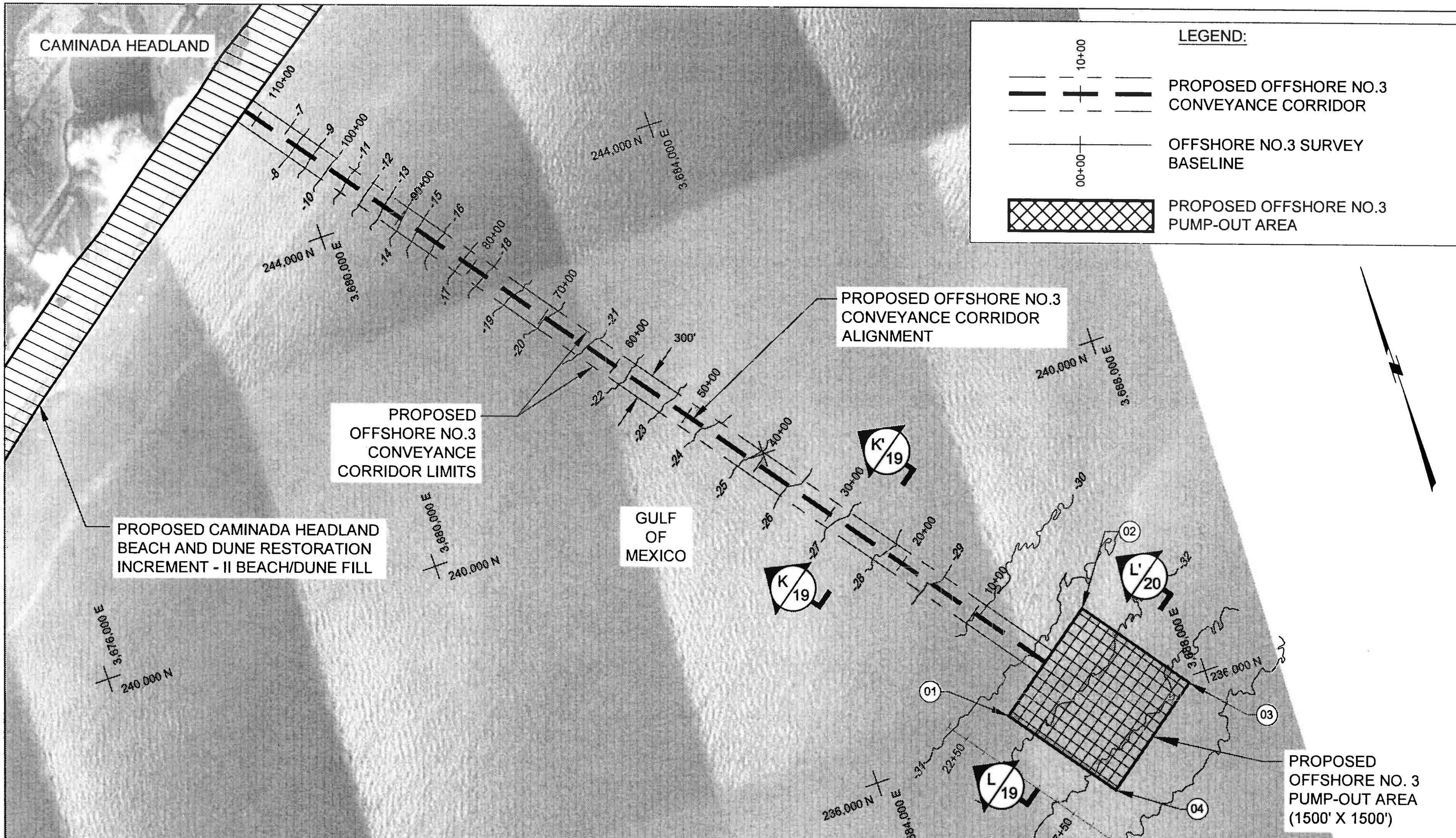
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 17 OF 34



NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
3. SURVEY CONDUCTED BY OCEAN SURVEYS, INC., APRIL 2012.
4. THE LIMITS OF MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE OFFSHORE PUMP-OUT AREA.
5. SEE SHEET 33 FOR OFFSHORE NO.3 PUMP-OUT AREA BOUNDARY COORDINATES.

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

OFFSHORE NO.3 PUMP-OUT AREA PLAN VIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

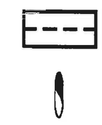
APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

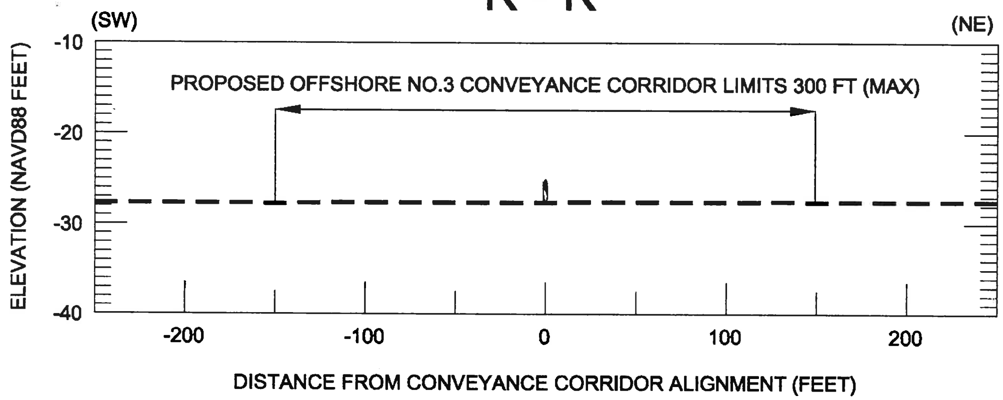
SHEET 18 OF 34

SCALE:
VERT: 1" = 20'
HORIZ: 1" = 100'

LEGEND:

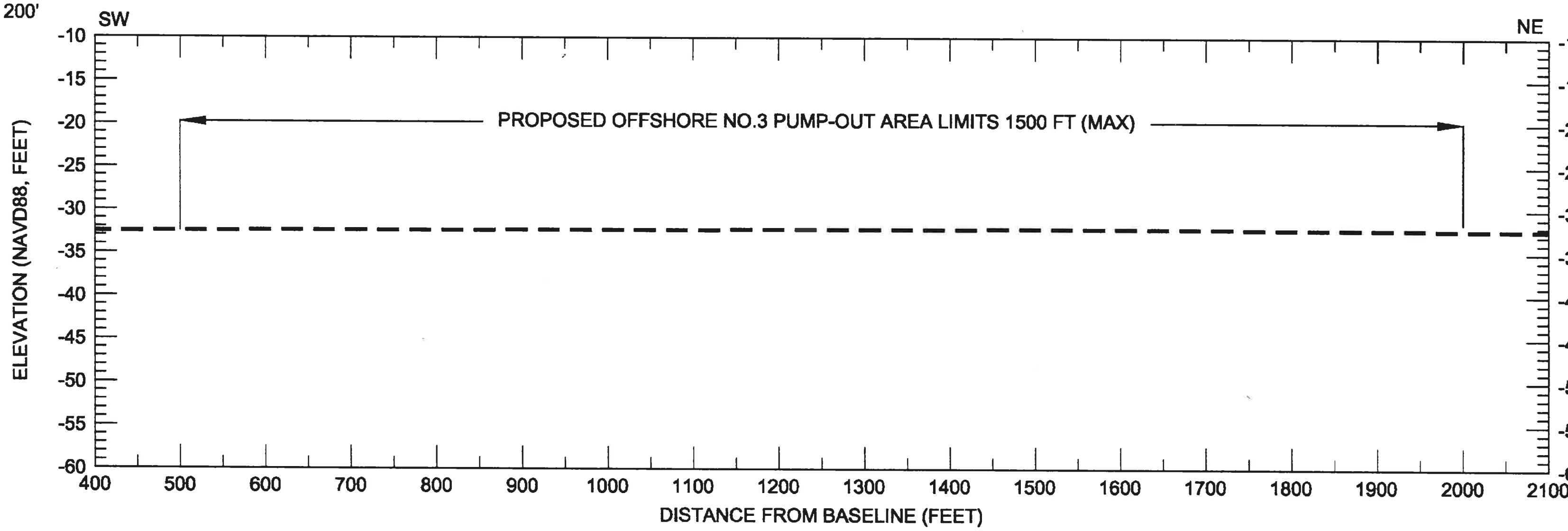


K - K'



SCALE:
VERT: 1" = 20'
HORIZ: 1" = 200'

L - L'



NOTES:
1. SURVEY CONDUCTED BY OCEAN SURVEY, INC., APRIL 2012.
2. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 NAVD88.

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION

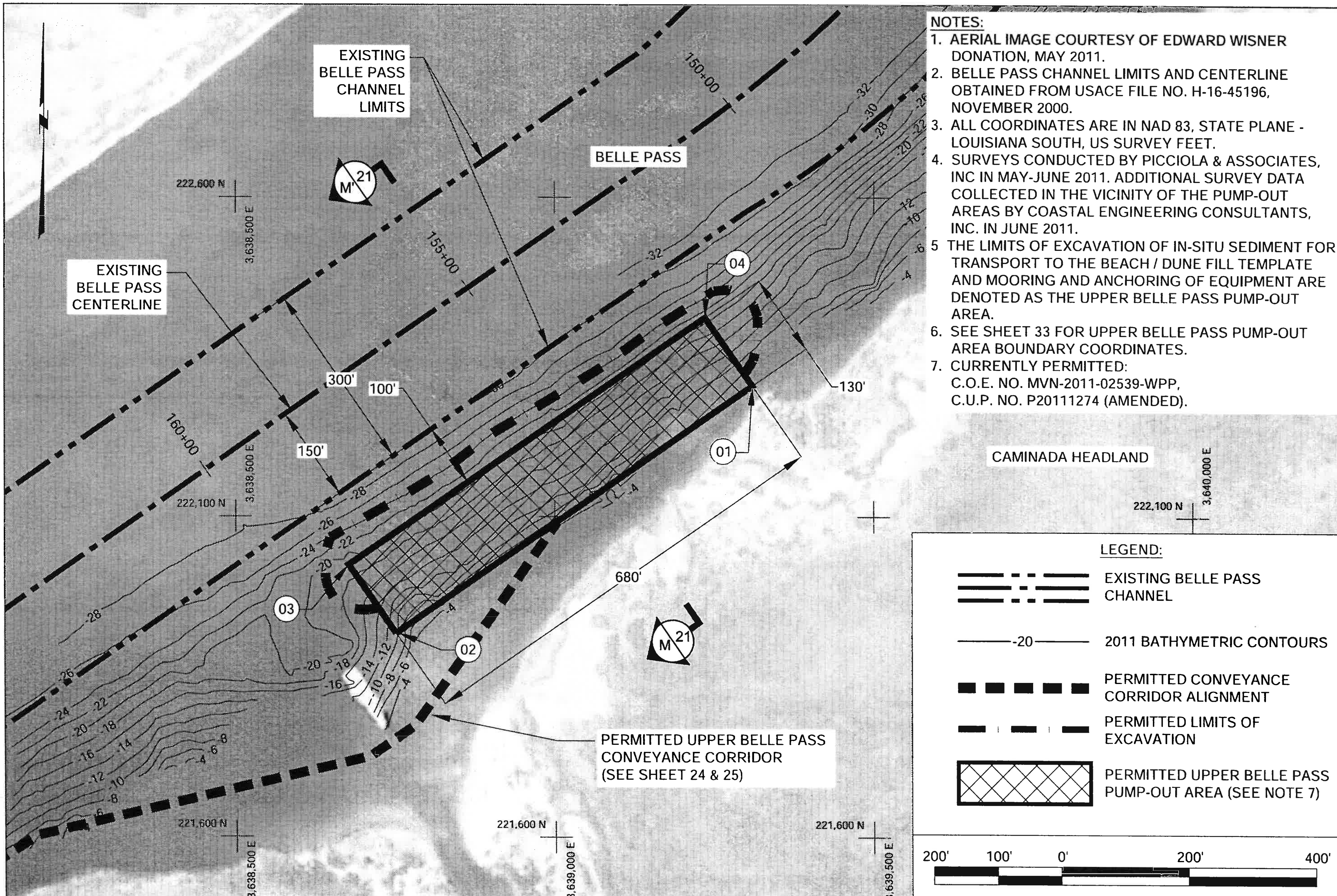
STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

OFFSHORE NO.3 PUMP-OUT AREA AND CORRIDOR TYPICAL SECTIONS

DATE: AUGUST, 2012

SHEET 19 OF 34



NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. BELLE PASS CHANNEL LIMITS AND CENTERLINE OBTAINED FROM USACE FILE NO. H-16-45196, NOVEMBER 2000.
3. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
4. SURVEYS CONDUCTED BY PICCIOLA & ASSOCIATES, INC IN MAY-JUNE 2011. ADDITIONAL SURVEY DATA COLLECTED IN THE VICINITY OF THE PUMP-OUT AREAS BY COASTAL ENGINEERING CONSULTANTS, INC. IN JUNE 2011.
5 THE LIMITS OF EXCAVATION OF IN-SITU SEDIMENT FOR TRANSPORT TO THE BEACH / DUNE FILL TEMPLATE AND MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE UPPER BELLE PASS PUMP-OUT AREA.
6. SEE SHEET 33 FOR UPPER BELLE PASS PUMP-OUT AREA BOUNDARY COORDINATES.
7. CURRENTLY PERMITTED:
C.O.E. NO. MVN-2011-02539-WPP,
C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

UPPER BELLE PASS PUMP-OUT AREA PLAN VIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

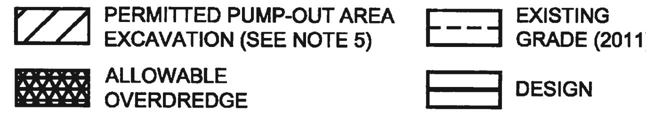
APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

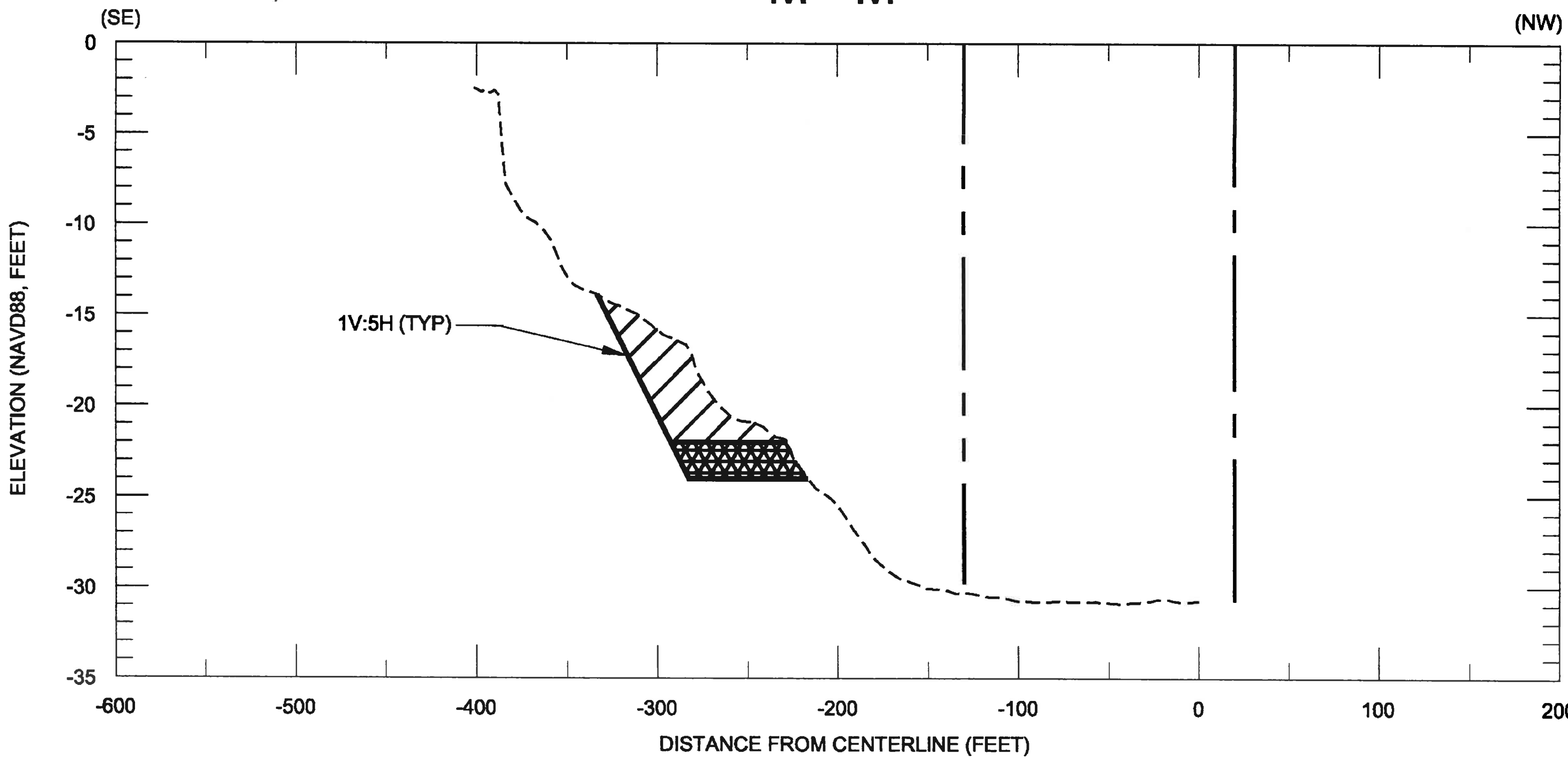
SHEET 20 OF 34

SCALE:
VERT: 1" = 10'
HORIZ: 1" = 100'

LEGEND:



M - M'



NOTES:
1. BELLE PASS CHANNEL LIMITS AND CENTERLINE OBTAINED FROM USACE FILE NO. H-16-45196, NOVEMBER 2000.
2. SURVEYS CONDUCTED BY PICCIOLA & ASSOCIATES, INC. AND COASTAL ENGINEERING CONSULTANTS, INC. MAY-JUNE, 2011.
3. THE LIMITS OF EXCAVATION OF IN-SITU SEDIMENT FOR TRANSPORT TO THE BEACH / DUNE FILL TEMPLATE AND MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE UPPER BELLE PASS PUMP-OUT AREA.
4. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 FT NAVD88.
5. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

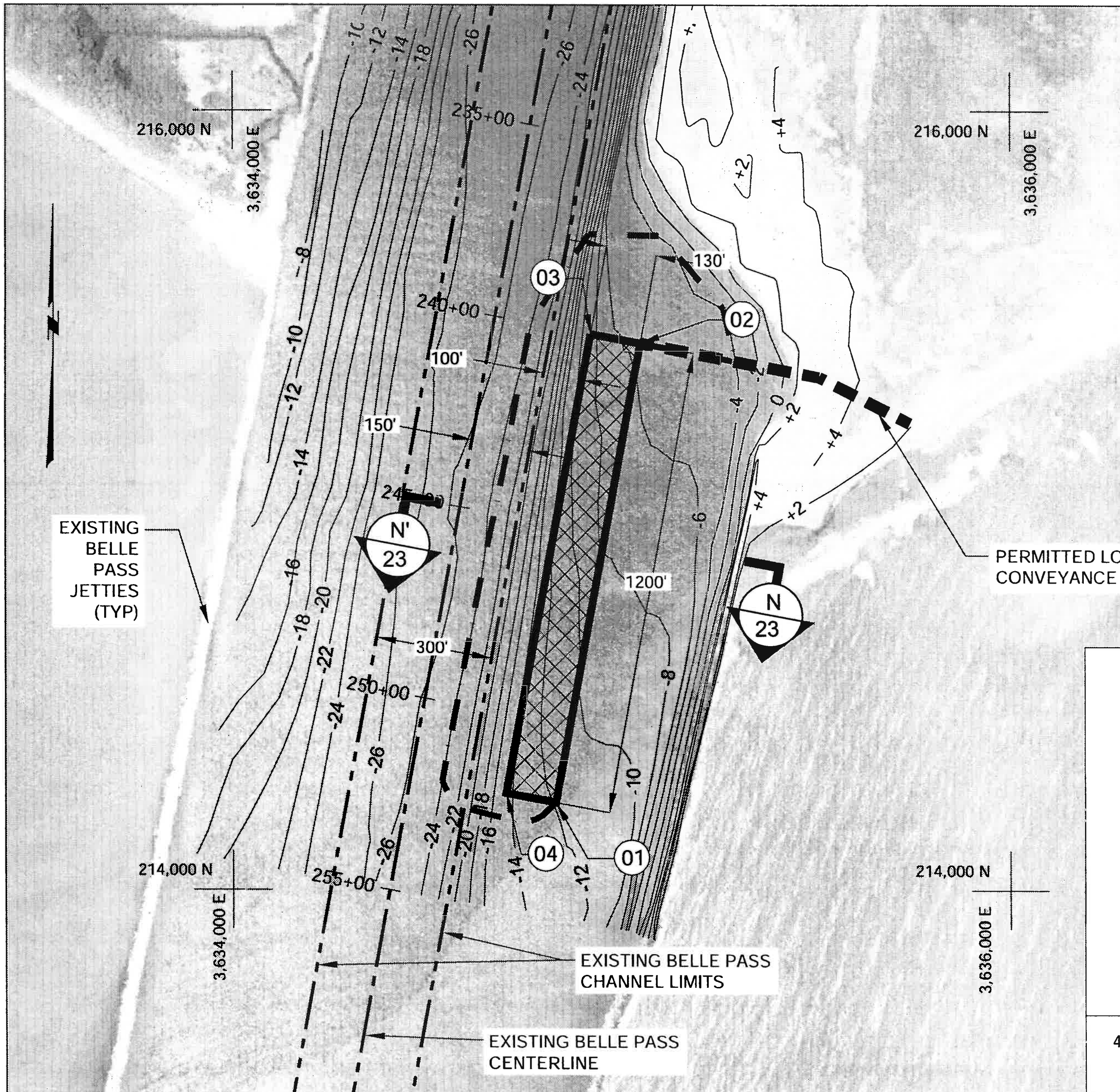
STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

UPPER BELLE PASS PUMP-OUT AREA TYPICAL SECTION

DATE: AUGUST, 2012

SHEET 21 OF 34



NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. BELLE PASS CHANNEL LIMITS AND CENTERLINE OBTAINED FROM USACE FILE NO. H-16-45196, NOVEMBER 2000.
3. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
4. SURVEYS CONDUCTED BY PICCIOLA & ASSOCIATES, INC IN MAY-JUNE 2011. ADDITIONAL SURVEY DATA COLLECTED IN THE VICINITY OF THE PUMP-OUT AREAS BY COASTAL ENGINEERING CONSULTANTS, INC. IN JUNE 2011.
5. THE LIMITS OF EXCAVATION OF IN-SITU SEDIMENT FOR TRANSPORT TO THE BEACH / DUNE FILL TEMPLATE AND MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE LOWER BELLE PASS PUMP-OUT AREA.
6. SEE SHEET 33 FOR LOWER BELLE PASS PUMP-OUT AREA BOUNDARY COORDINATES.
7. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP,
   C.U.P. NO. P20111274 (AMENDED).

LEGEND:

- EXISTING BELLE PASS CHANNEL
- -20 2011 BATHYMETRIC CONTOURS
- PERMITTED CONVEYANCE CORRIDOR ALIGNMENT
- PERMITTED LIMITS OF EXCAVATION
- PERMITTED LOWER BELLE PASS PUMP-OUT AREA (SEE NOTE 7)

400' 200' 0' 400' 800'

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

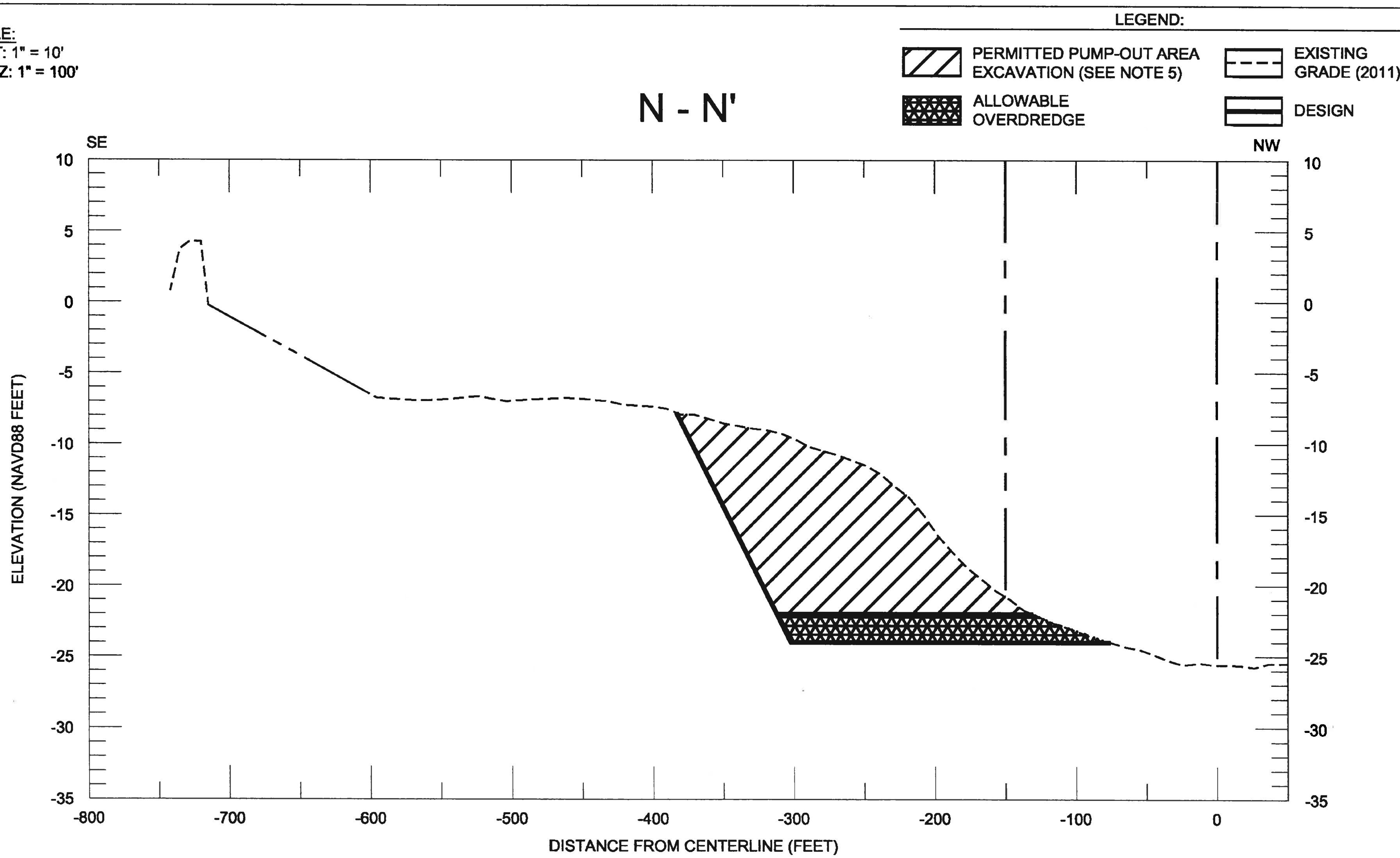
LOWER BELLE PASS PUMP-OUT AREA PLAN VIEW

DATE: AUGUST, 2012

SHEET 22 OF 34

SCALE:
VERT: 1" = 10'
HORIZ: 1" = 100'

N - N'



NOTES:
1. BELLE PASS CHANNEL LIMITS AND CENTERLINE OBTAINED FROM USACE FILE NO. H-16-45196, NOVEMBER 2000.
2. SURVEYS CONDUCTED BY PICCIOLA & ASSOCIATES, INC. AND COASTAL ENGINEERING CONSULTANTS, INC. MAY-JUNE, 2011.
3. THE LIMITS OF EXCAVATION OF IN-SITU SEDIMENT FOR TRANSPORT TO THE BEACH / DUNE FILL TEMPLATE AND MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE LOWER BELLE PASS PUMP-OUT AREA.
4. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 FT NAVD88.
5. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

LOWER BELLE PASS PUMP-OUT AREA TYPICAL SECTION

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

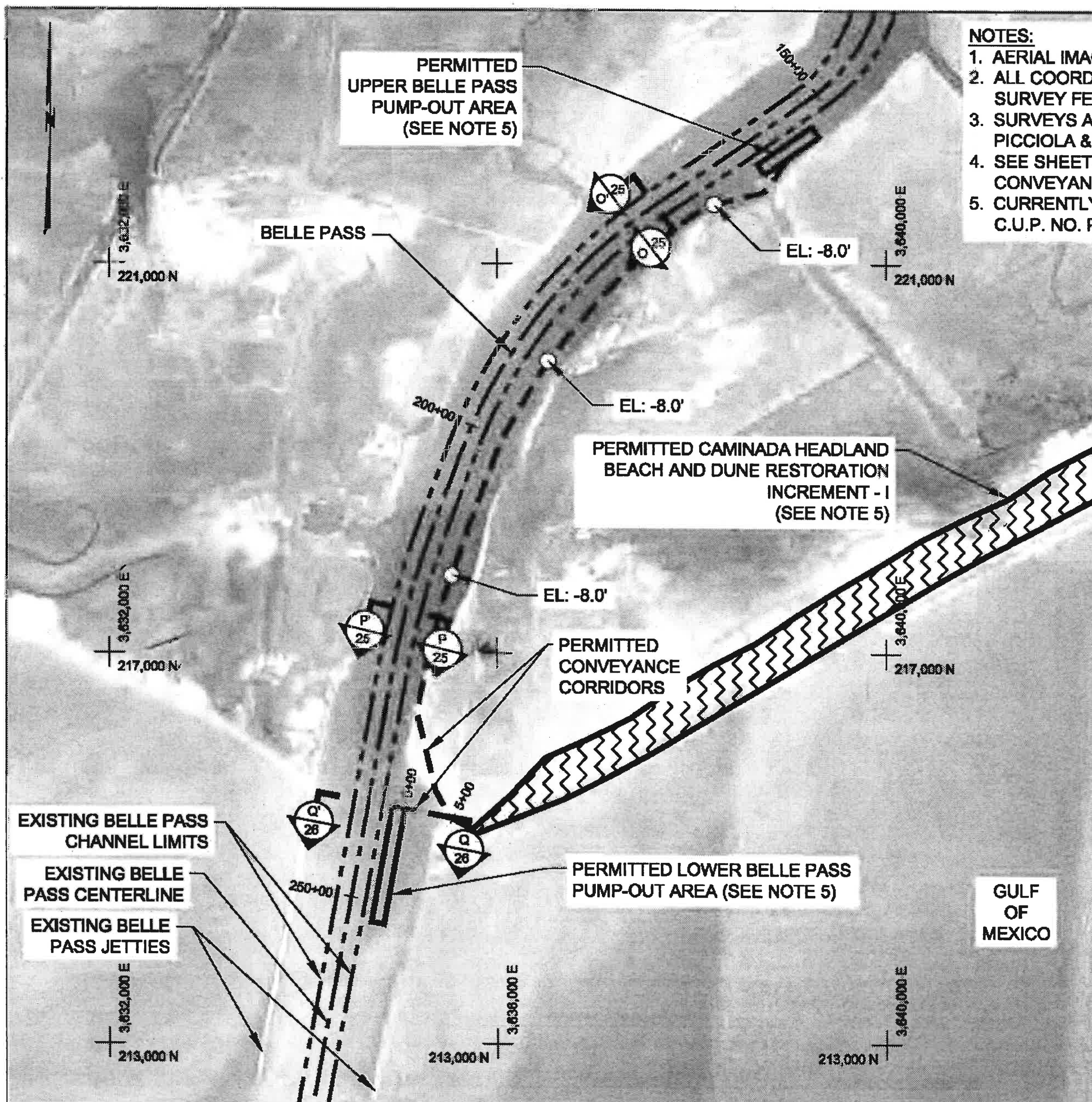
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 23 OF 34



NOTES:
1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
3. SURVEYS ALONG THE SURVEY TRANSECT LINES CONDUCTED BY PICCIOLA & ASSOCIATES, INC. IN MAY - JUNE 2011.
4. SEE SHEETS 33 & 34 FOR PUMP-OUT AREA BOUNDARIES AND CONVEYANCE CORRIDOR ALIGNMENTS COORDINATES.
5. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

LEGEND:

200+00 — EXISTING BELLE PASS CHANNEL

50+00 — PERMITTED CONVEYANCE CORRIDOR ALIGNMENTS

PERMITTED UPPER AND LOWER BELLE PASS PUMP-OUT AREAS

1600' 800' 0' 1600' 3200'

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

BELLE PASS CORRIDOR PLAN VIEW

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 24 OF 34

SCALE:
VERT: 1" = 20'
HORIZ: 1" = 100'

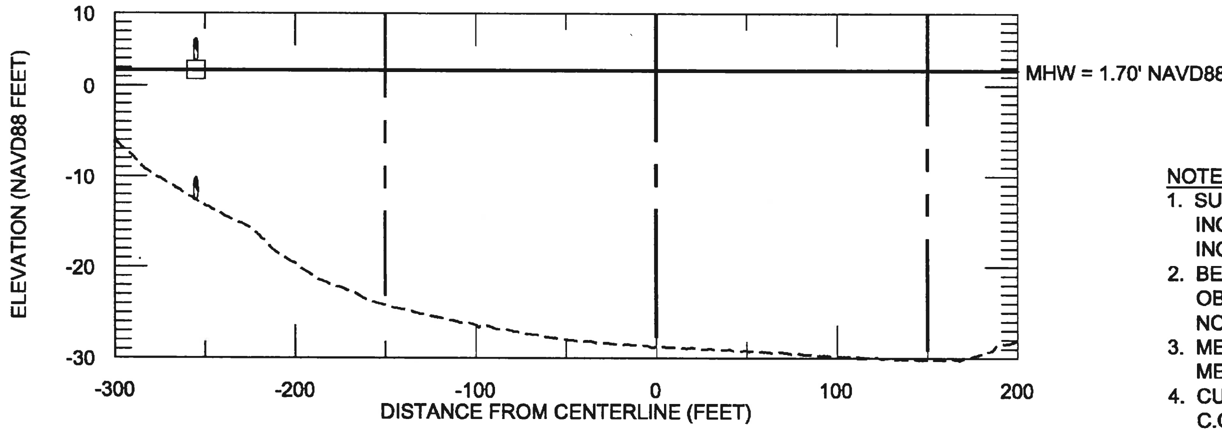
LEGEND:

EXISTING GRADE (2011)

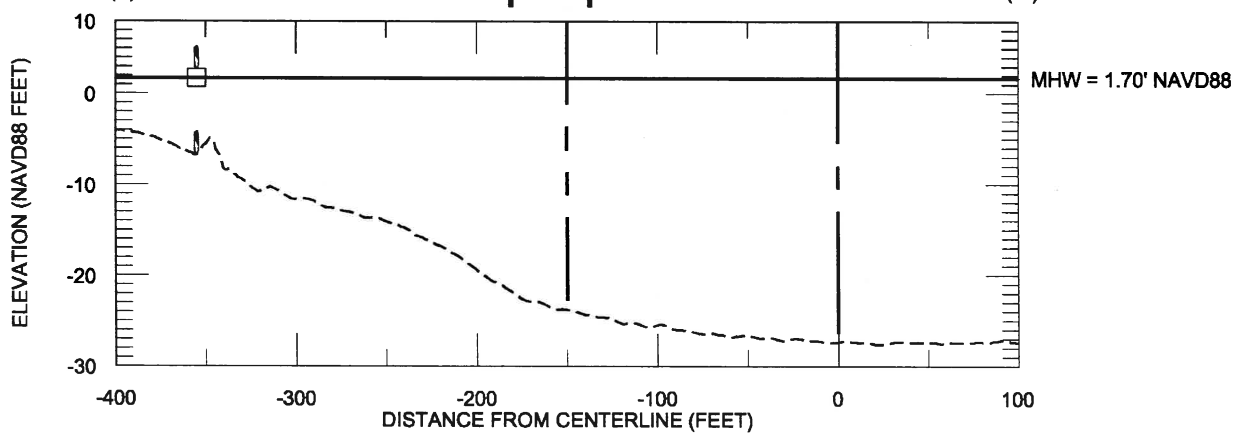
FLOATING SEDIMENT PIPELINE OPTION

SUBMERGED SEDIMENT PIPELINE OPTION

O - O'



P - P'



NOTES:
1. SURVEYS CONDUCTED BY PICCIOLA & ASSOCIATES, INC. AND COASTAL ENGINEERING CONSULTANTS, INC. MAY-JUNE, 2011.
2. BELLE PASS CHANNEL LIMITS AND CENTERLINE OBTAINED FROM USACE FILE NO. H-16-45196, NOVEMBER 2000.
3. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 FT NAVD88.
4. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP,
   C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

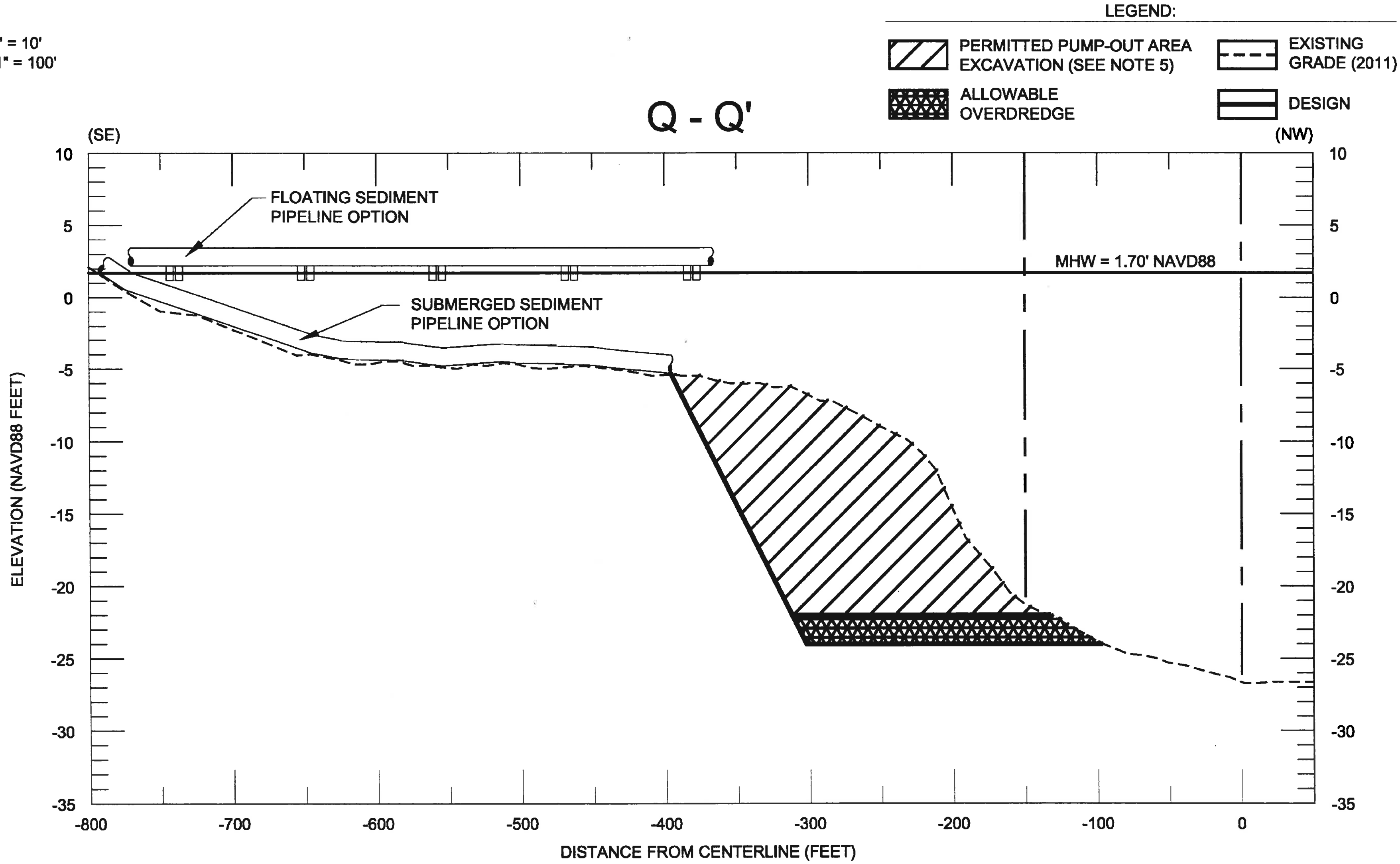
UPPER BELLE PASS CORRIDOR TYPICAL SECTION

DATE: AUGUST, 2012

SHEET 25 OF 34

SCALE:
VERT: 1" = 10'
HORIZ: 1" = 100'

Q - Q'



NOTES:
1. BELLE PASS CHANNEL LIMITS AND CENTERLINE OBTAINED FROM USACE FILE NO. H-16-45196, NOVEMBER 2000.
2. SURVEYS CONDUCTED BY PICCIOLA & ASSOCIATES, INC. AND COASTAL ENGINEERING CONSULTANTS, INC. MAY-JUNE, 2011.
3. THE LIMITS OF EXCAVATION OF IN-SITU SEDIMENT FOR TRANSPORT TO THE BEACH / DUNE FILL TEMPLATE AND MOORING AND ANCHORING OF EQUIPMENT ARE DENOTED AS THE LOWER BELLE PASS PUMP-OUT AREA.
4. MEAN HIGH WATER ELEVATION = +1.70 FT NAVD88, MEAN LOW WATER ELEVATION = +0.66 FT NAVD88.
5. CURRENTLY PERMITTED: C.O.E. NO. MVN-2011-02539-WPP, C.U.P. NO. P20111274 (AMENDED).

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

LOWER BELLE PASS CORRIDOR TYPICAL SECTION

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

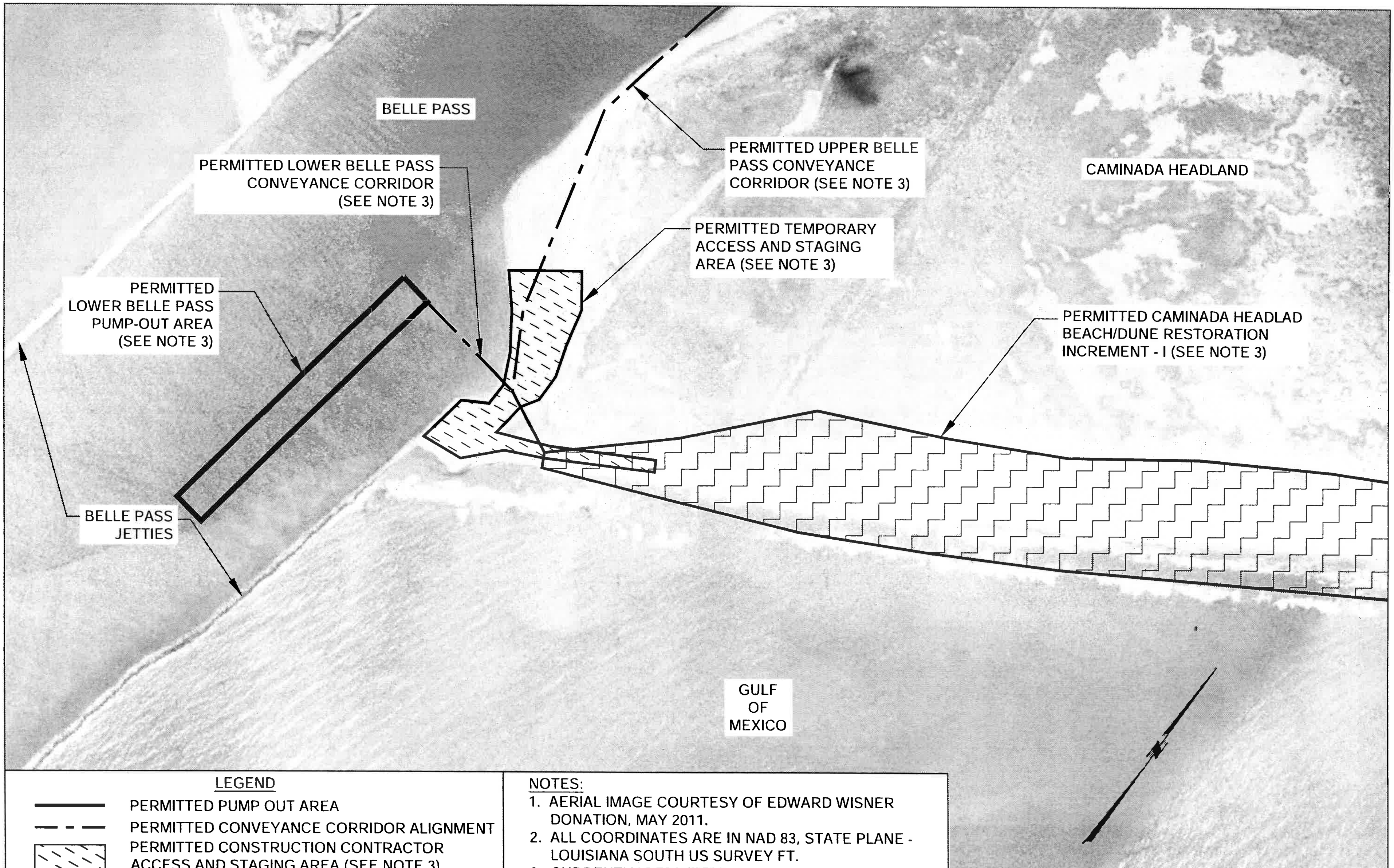
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 26 OF 34



LEGEND

- PERMITTED PUMP OUT AREA
- PERMITTED CONVEYANCE CORRIDOR ALIGNMENT
- PERMITTED CONSTRUCTION CONTRACTOR ACCESS AND STAGING AREA (SEE NOTE 3)
- PERMITTED INCREMENT - I BEACH / DUNE FILL (SEE NOTE 3)

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH US SURVEY FT.
3. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP
   C.U.P. NO. P20111274 (AMENDED)

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

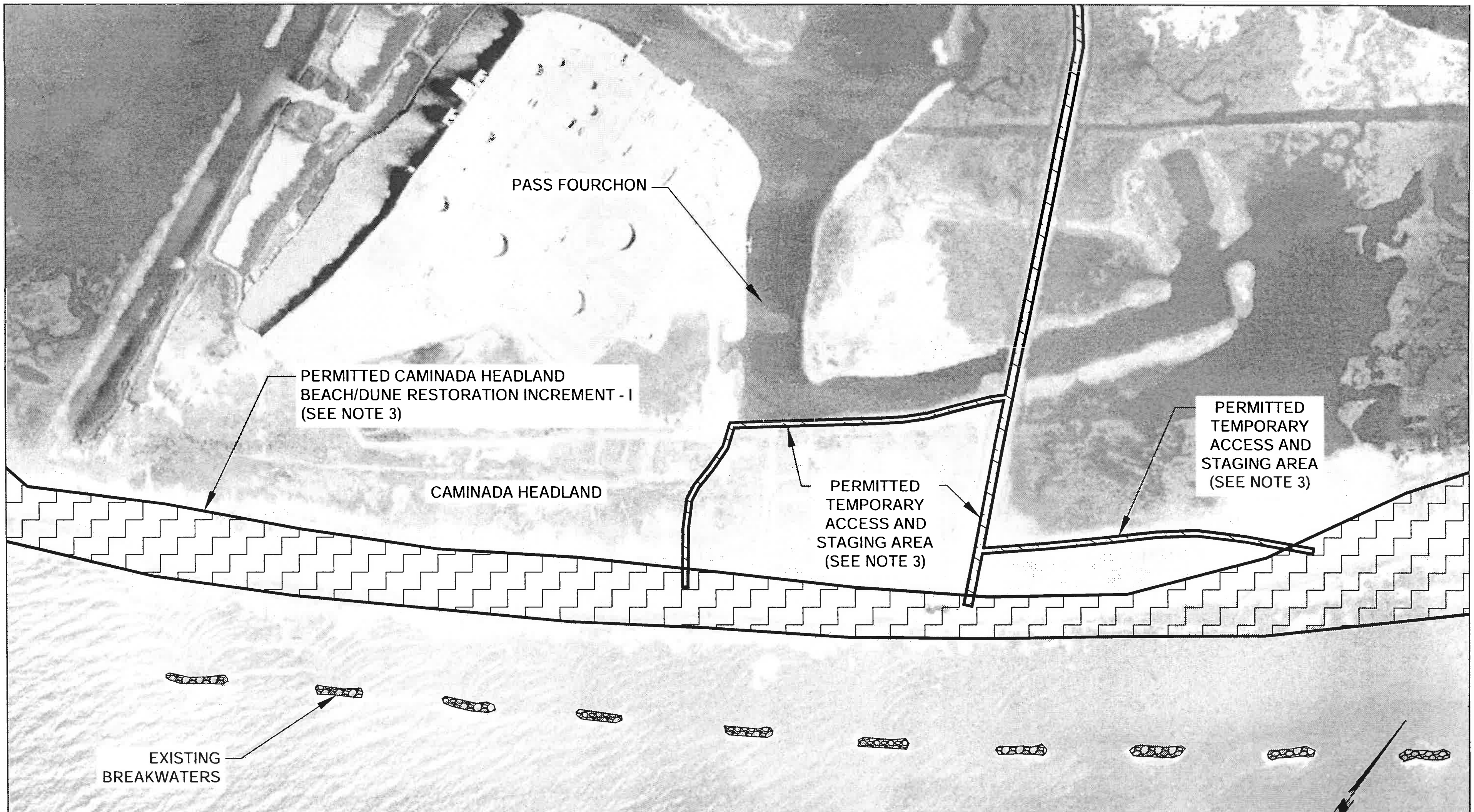
STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

TEMPORARY ACCESS/STAGING AREA LOWER BELLE PASS

DATE: AUGUST, 2012

SHEET 27 OF 34



LEGEND

PERMITTED CONSTRUCTION CONTRACTOR ACCESS AND STAGING AREA (SEE NOTE 3)

PERMITTED INCREMENT - 1 BEACH / DUNE FILL (SEE NOTE 3)

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH US SURVEY FT.
3. CURRENTLY PERMITTED:
   C.O.E. NO. MVN-2011-02539-WPP
   C.U.P. NO. P20111274 (AMENDED)

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

TEMPORARY ACCESS/STAGING AREA PARISH HWY 3090

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

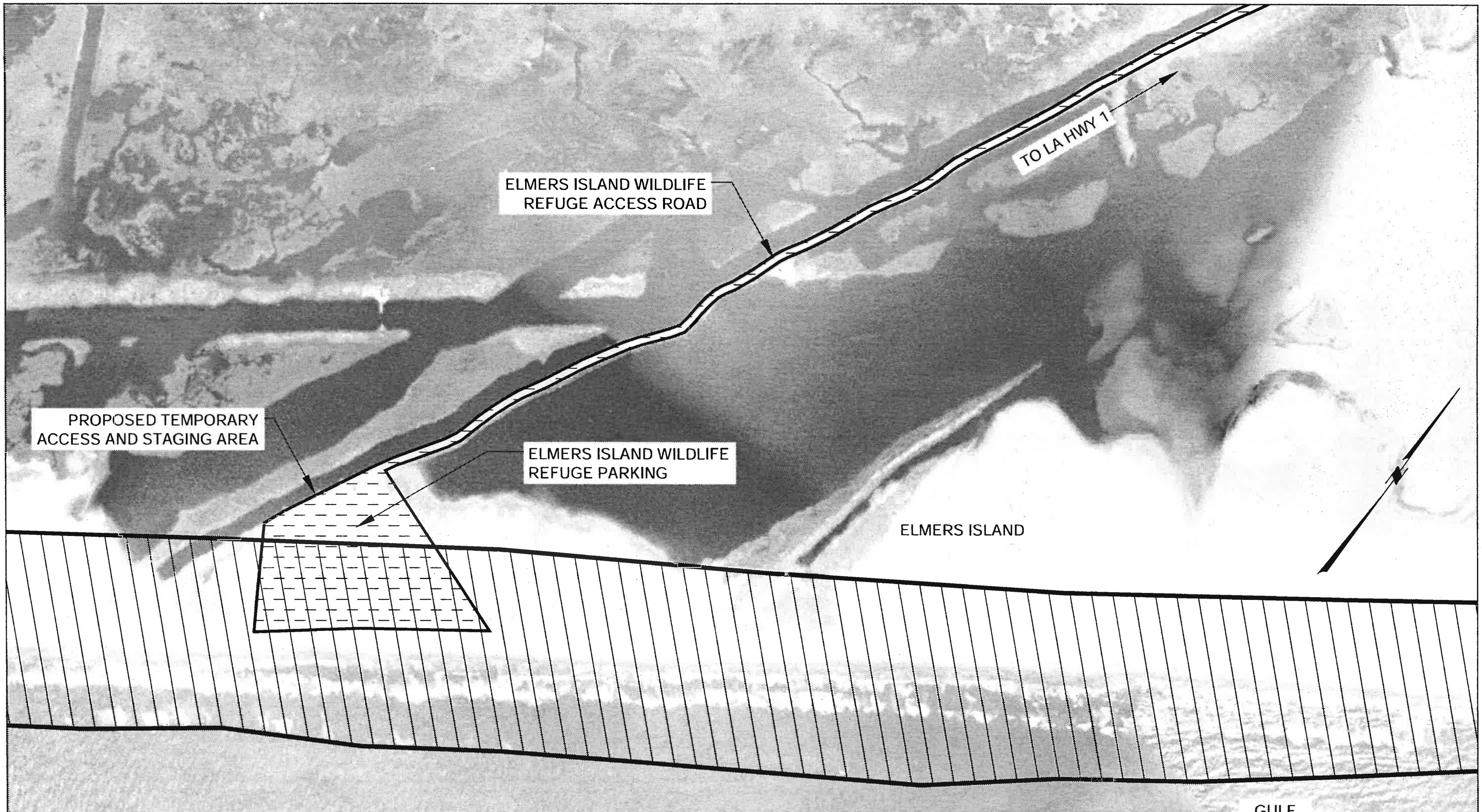
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 28 OF 34



LEGEND

PROPOSED CONSTRUCTION CONTRACTOR ACCESS AND STAGING AREA

PROPOSED INCREMENT - II BEACH / DUNE FILL

NOTES:

1. AERIAL IMAGE COURTESY OF EDWARD WISNER DONATION, MAY 2011.
2. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH US SURVEY FT.

500' 250' 0' 500' 1,000'

BY	DESCRIPTION	DATE
MTP	HEADLAND TEMPLATE RECONFIGURATION PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

TEMPORARY ACCESS/STAGING AREA ELMER'S ISLAND

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

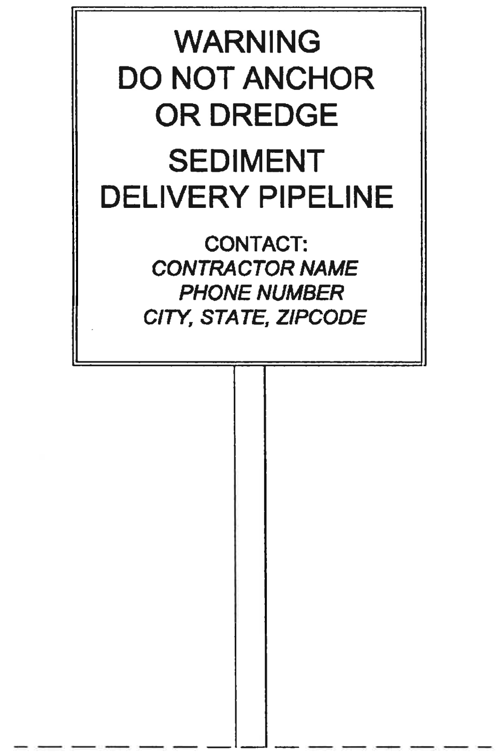
DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 29 OF 34



SEDIMENT DELIVERY
PIPELINE MARKER DETAIL

NOT TO SCALE

NOTES:

1. MARKERS SHALL BE PLACED ALONG THE LENGTH OF THE SEDIMENT DELIVERY PIPELINE AS REQUIRED BY U.S. COAST GUARD REGULATIONS.
2. MARKERS SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH LADOTD 2000 STANDARD SPECIFICATION 729.
3. A PROPOSED DRAWING SHALL BE SUBMITTED TO THE OWNER FOR APPROVAL IN THE WORK PLAN PRIOR TO CONSTRUCTION.
4. MARKERS SHALL BE PLACED IMMEDIATELY FOLLOWING TO SEDIMENT PIPELINE INSTALLATION AND REMOVED FOLLOWING TO SEDIMENT PIPELINE REMOVAL.

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

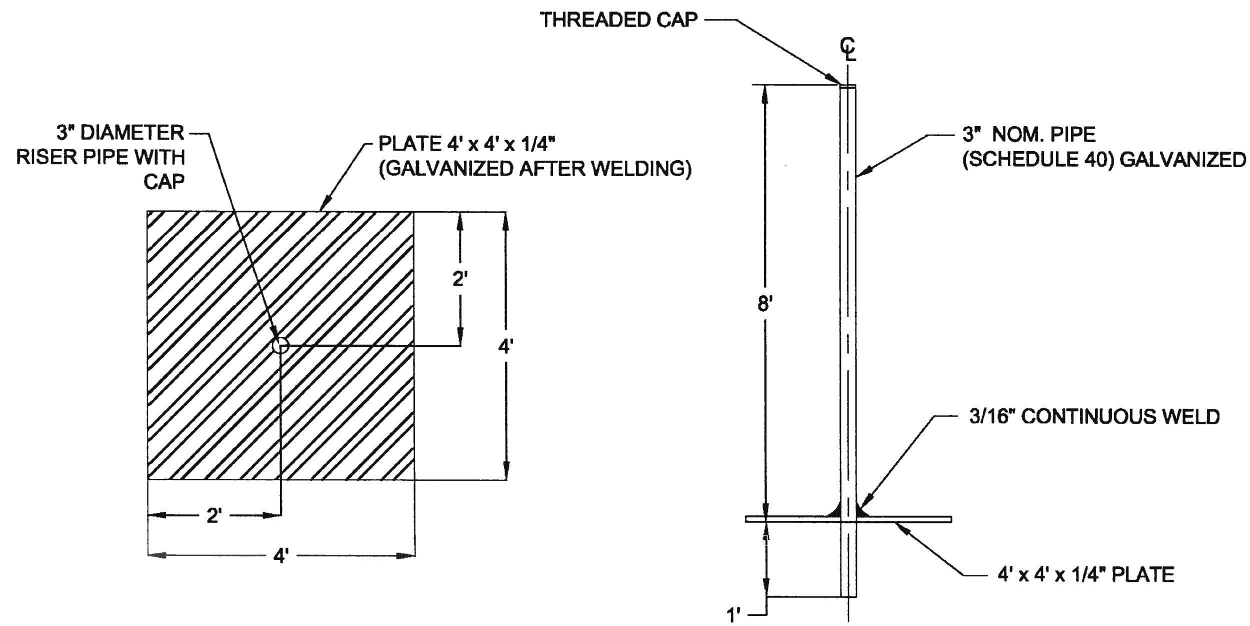
STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

SEDIMENT PIPELINE MARKER DETAILS

DATE: AUGUST, 2012

SHEET 30 OF 34



SETTLEMENT PLATE

NOT TO SCALE

NOTES:

1. SETTLEMENT PLATES SHALL BE CONSTRUCTED USING ASTM A36 STEEL AND HOT- DIPPED GALVANIZED AFTER FABRICATION.
2. ALL SETTLEMENT PLATES SHALL BE SURVEYED UNDER THE SUPERVISION OF THE RESIDENT PROJECT REPRESENTATIVE WITHIN A DAY OF INSTALLATION AND WEEKLY THROUGHOUT THE DURATION OF THE PROJECT.
3. ALL SETTLEMENT PLATES MUST BE INSTALLED AND MAINTAINED WITHIN 10.5 DEGREES OF VERTICAL.
4. ALL SETTLEMENT PLATES SHALL BE MARKED WITH SURVEY FLAGGING.
5. LENGTH OF THE SETTLEMENT PLATE RISER PIPE SHALL BE SUCH THAT THE ELEVATION OF THE TOP CAP BE NO LESS THAN 4 FEET ABOVE MAXIMUM FINAL DESIGN GRADE FOR ITS LOCATION.

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

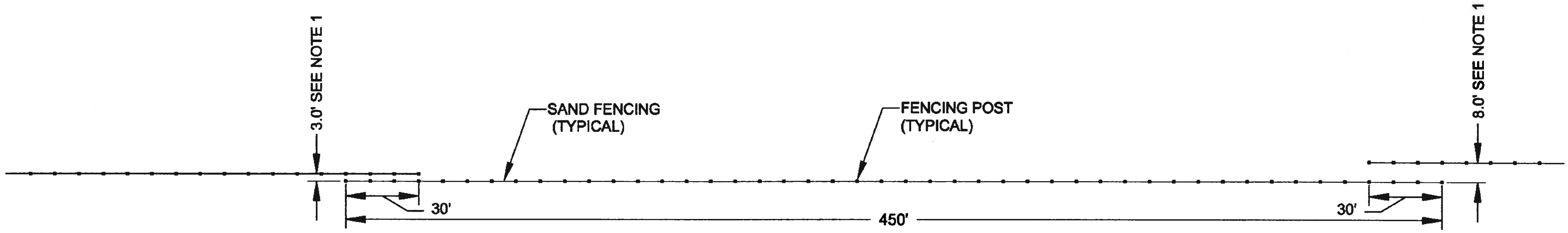
STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

SETTLEMENT PLATE DETAIL

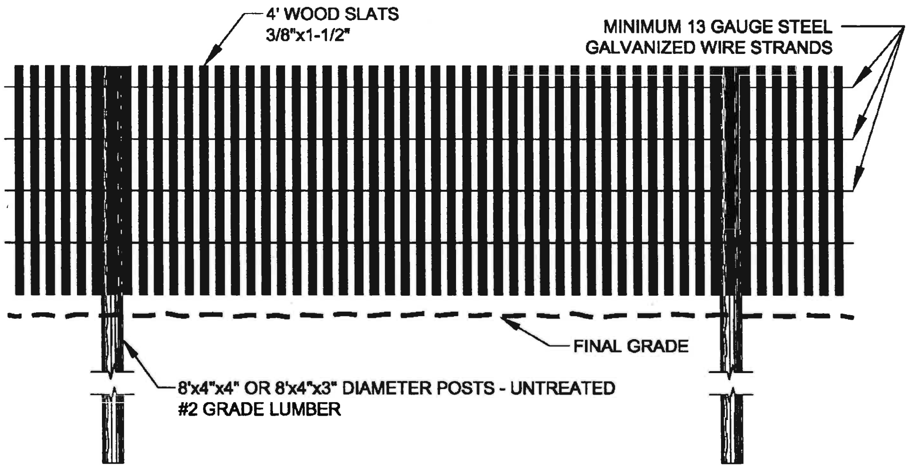
DATE: AUGUST, 2012

SHEET 31 OF 34

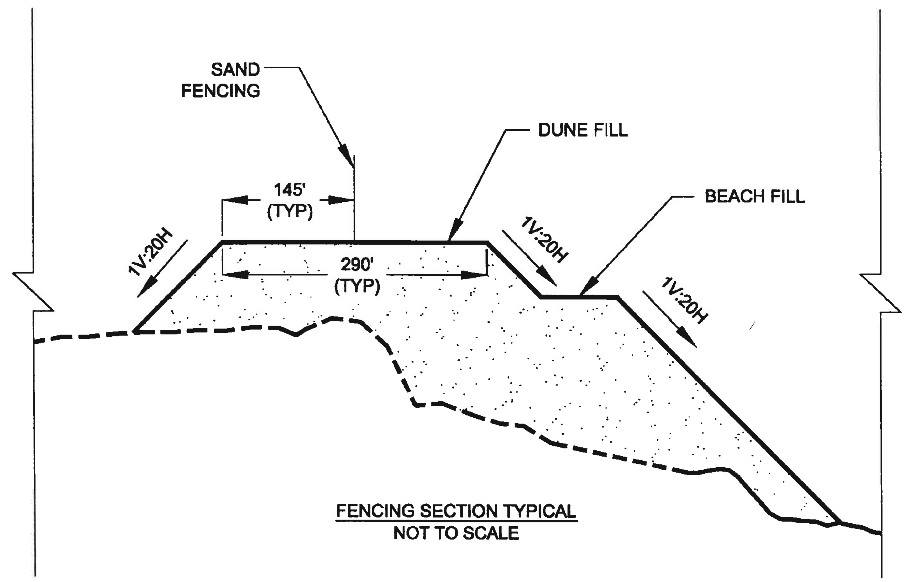


NOTES:
1. THE DISTANCE BETWEEN FENCES SHALL BE INCREASED FROM 3.0' TO 8.0' AT EVERY FIFTH GAP TO ALLOW ALL-TERRAIN VEHICLE ACCESS.

FENCING GAPPING DIMENSIONS
NOT TO SCALE



FENCING DETAIL
NOT TO SCALE



FENCING SECTION TYPICAL
NOT TO SCALE

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

SAND FENCING DETAIL

DATE: AUGUST, 2012

PERMITTED OFFSHORE NO.1 PUMPOUT AREA BOUNDARY

POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
01	224,003.55	3,663,238.45	29° 06' 37.61" N	90° 08' 09.17" W
02	225,340.71	3,663,135.55	29° 06' 50.86" N	90° 08' 10.18" W
03	224,827.34	3,663,993.74	29° 06' 45.69" N	90° 08' 00.56" W
04	223,969.17	3,663,480.36	29° 06' 37.25" N	90° 08' 06.45" W

PERMITTED OFFSHORE NO.2 PUMPOUT AREA BOUNDARY

POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
01	231,693.92	3,677,273.52	29° 07' 52.26" N	90° 05' 30.11" W
02	233,126.78	3,677,717.26	29° 08' 06.39" N	90° 05' 24.94" W
03	232,682.58	3,679,142.76	29° 08' 01.85" N	90° 05' 08.83" W
04	231,249.72	3,678,699.02	29° 07' 47.71" N	90° 05' 14.01" W

PROPOSED OFFSHORE NO.3 PUMPOUT AREA BOUNDARY

POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
01	231,693.92	3,677,273.52	29° 07' 52.26" N	90° 05' 30.11" W
02	233,126.78	3,677,717.26	29° 08' 06.39" N	90° 05' 24.94" W
03	232,682.58	3,679,142.76	29° 08' 01.85" N	90° 05' 08.83" W
04	231,249.72	3,678,699.02	29° 07' 47.71" N	90° 05' 14.01" W

PERMITTED UPPER BELLE PASS PUMPOUT AREA BOUNDARY

POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
01	222,303.78	3,639,310.10	29° 06' 23.19" N	90° 12' 39.17" W
02	221,917.25	3,638,751.02	29° 06' 19.41" N	90° 12' 45.51" W
03	222,024.18	3,638,677.08	29° 06' 20.47" N	90° 12' 46.33" W
04	222,411.15	3,639,236.16	29° 06' 24.25" N	90° 12' 39.99" W

PERMITTED LOWER BELLE PASS PUMPOUT AREA BOUNDARY

POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
01	214,224.44	3,634,831.36	29° 05' 03.64" N	90° 13' 30.53" W
02	215,404.23	3,635,050.70	29° 05' 15.29" N	90° 13' 27.93" W
03	215,427.93	3,634,922.88	29° 05' 15.54" N	90° 13' 29.37" W
04	214,252.18	3,634,704.23	29° 05' 03.92" N	90° 13' 31.96" W

PERMITTED OFFSHORE NO.1 CONVEYANCE CORRIDOR

POINT NO.	STATION	NORTHING	EASTING	LATITUDE	LONGITUDE
01	0+00.00	224691.63	3662743.20	29° 06' 44.52" N	90° 08' 14.68" W
02	25+25.56	225993.62	3660583.17	29° 06' 57.59" N	90° 08' 38.87" W
03	78+65.08	227705.67	3655525.56	29° 07' 15.05" N	90° 09' 35.69" W

PERMITTED OFFSHORE NO.2 CONVEYANCE CORRIDOR

POINT NO.	STATION	NORTHING	EASTING	LATITUDE	LONGITUDE
01	0+00.00	232,410.35	3,677,495.39	29° 07' 59.33" N	90° 05' 27.44" W
02	103+10.00	237,563.75	3,668,565.74	29° 08' 51.29" N	90° 07' 07.50" W

PROPOSED OFFSHORE NO.3 CONVEYANCE CORRIDOR

POINT NO.	STATION	NORTHING	EASTING	LATITUDE	LONGITUDE
01	0+00.00	236,685.46	3,686,288.45	29° 08' 40.69" N	90° 03' 47.77" W
02	111+56.57	245,650.65	3,679,648.19	29° 10' 10.16" N	90° 05' 01.62" W

BY	DESCRIPTION	DATE
MTP	OFFSHORE CONVEYANCE CORRIDOR NO.3 ADJUSTMENT PROJECT NUMBER CHANGE	09/20 2013

DRAWN BY: STEVE DARTEZ

COASTAL ENGINEERING CONSULTANTS, INC

DESIGNED BY: MICHAEL T. POFF, P.E.

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

APPROVED BY: SHANNON HAYNES, P.E.

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

STATE PROJECT NUMBER: BA-143

FEDERAL PROJECT NUMBER:

ALIGNMENT TABLES

DATE: AUGUST, 2012

SHEET 33 OF 34

PERMITTED LOWER BELLE PASS CONVEYANCE CORRIDOR					
POINT NO.	STATION	NORTHING	EASTING	LATITUDE	LONGITUDE
LBP1	0+00.00	215404.21	3635050.70	29° 05' 15.30" N	90° 13' 27.85" W
LBP2	4+68.30	215317.04	3635510.82	29° 05' 14.39" N	90° 13' 22.67" W
LBP3	7+30.14	215197.83	3635743.95	29° 05' 13.19" N	90° 13' 20.06" W

PERMITTED UPPER BELLE PASS CONVEYANCE CORRIDOR					
POINT NO.	STATION	NORTHING	EASTING	LATITUDE	LONGITUDE
01	0+00.00	222091.75	3639003.97	29° 06' 21.12" N	90° 12' 42.56" W
02	3+88.79	221773.45	3538780.71	29° 06' 17.99" N	90° 12' 45.11" W
03	4+74.39	221724.82	3638710.26	29° 06' 17.51" N	90° 12' 45.91" W
04	10+11.91	221601.22	3638187.15	29° 06' 16.34" N	90° 12' 51.82" W
05	14+55.81	221362.53	3637812.89	29° 06' 14.01" N	90° 12' 56.07" W
06	23+96.61	220714.86	3637130.51	29° 06' 07.67" N	90° 13' 03.83" W
07	33+31.19	220002.85	3636525.13	29° 06' 00.68" N	90° 13' 10.73" W
08	42+80.25	219182.04	3636048.70	29° 05' 52.60" N	90° 13' 16.19" W
09	52+57.05	218269.41	3635700.51	29° 05' 43.60" N	90° 13' 20.21" W
10	59+87.28	217578.75	3635463.41	29° 05' 36.78" N	90° 13' 22.96" W
11	66+76.94	216912.61	3635284.84	29° 05' 30.21" N	90° 13' 25.05" W
12	72+11.68	216389.41	3635174.33	29° 05' 25.04" N	90° 13' 26.35" W
13	80+29.91	215593.47	3635364.00	29° 05' 17.14" N	90° 13' 24.30" W
14	83+42.91	215317.04	3635510.82	29° 05' 14.39" N	90° 13' 22.67" W
15	86+04.75	215197.83	3635743.95	29° 05' 13.19" N	90° 13' 20.06" W

PROPOSED SOUTH PELTO BORROW AREA BOUNDARY				
POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
01	150,564.99	3,506,021.70	28° 54' 43.55" N	90° 37' 46.49" W
02	148,759.10	3,506,940.29	28° 54' 25.62" N	90° 37' 36.28" W
03	150,583.53	3,510,526.96	28° 54' 43.46" N	90° 36' 55.80" W
04	148,848.02	3,511,219.93	28° 54' 26.24" N	90° 36' 48.13" W
05	151,068.59	3,515,585.39	28° 54' 47.95" N	90° 35' 58.86" W
06	152,767.04	3,512,256.30	28° 55' 04.97" N	90° 36' 36.19" W
07	152,038.50	3,510,432.63	28° 54' 57.87" N	90° 36' 56.76" W
08	152,376.14	3,507,116.75	28° 55' 01.42" N	90° 37' 34.05" W

BY	DESCRIPTION	DATE
MTP	PROJECT NUMBER CHANGE	09/20 2013

COASTAL ENGINEERING CONSULTANTS, INC

COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

CAMINADA HEADLAND BEACH AND DUNE RESTORATION INCREMENT - II

ALIGNMENT TABLES

STATE PROJECT NUMBER: BA-143

DATE: AUGUST, 2012

DRAWN BY: STEVE DARTEZ

DESIGNED BY: MICHAEL T. POFF, P.E.

APPROVED BY: SHANNON HAYNES, P.E.

FEDERAL PROJECT NUMBER:

SHEET 34 OF 34

LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES

FILL MATERIAL LICENSE

LICENSE NO. WLF201413

In consideration of a royalty paid to the Department by the applicant, this license for the removal of fill material from water bottoms of the State of Louisiana is issued to:

Licensee Name and Address: *Coastal Protection & Restoration*
450 Laurel Street, Suite 1260
Baton Rouge, LA 70801
ATTN : Brad Miller

License Site Location: Bayou Lafourche; Port Fourchon, LA; Lafourche Parish

Project Description: 200,600 cubic yards of fill material and/or fill sand will be dredged to place a booster pump/pump out barge for conveyance of sand dredged from South Pelto Borrow Area for restoration of the western portion of the Caminada Headland.

The rights and privileges shall begin on the 1st day of January 2014 and expires on the 31st day of December 2014 or until you reach the amount applied for.

The use of the fill material authorized for removal by this license is subject to the following restrictions:
1. *The Department of Wildlife and Fisheries shall be notified prior to removal of the material and again be notified upon completion of the project.*
2. *All provisions of the Fill Material License shall be adhered to.*
3. *This Certificate shall be posted in a conspicuous place at the project site during the activities authorized.*

Jimmy L. Anthony, Assistant Secretary

BOBBY JINDAL
GOVERNOR

PEGGY M. HATCH
SECRETARY

State of Louisiana

DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES

RECEIVED
2012 NOV -7 PM 3: 02
OFFICE OF COASTAL MANAGEMENT

NOV - 1 2012

GEC, Inc.
8282 Goodwood Boulevard
Baton Rouge, LA 70806

Attention: Donna Rogers, Agent for the Louisiana Coastal Protection & Restoration Authority

RE: Water Quality Certification (WQC 120906-01/AI 183799/CER 20120001)
Corps of Engineers Permit (MVN-2012-2134-WPP)
Coastal Management Permit (P20121150)
Lafourche Parish

Dear Ms. Rogers:

The Louisiana Department of Environmental Quality (the Department) has reviewed your application to dredge waterbottoms and place spoil material for coastal dune restoration (Caminada Headland and Dune Restoration- Increment 2), in the vicinity south of Port Fourchon, Louisiana.

Based on the information provided in the application, the Department made a determination that the requirements for a Water Quality Certification have been met and concludes that the placement of the fill material will not violate water quality standards of Louisiana as provided for in LAC 33:IX.Chapter 11. Therefore, the Department hereby issues a Water Quality Certification to the Louisiana Coastal Protection & Restoration Authority.

If you have any questions, please call Jamie Phillippe at 225-219-3225.

Sincerely,

Melvin C. Mitchell, Sr.
Administrator
Water Permits Division

MCM/jjp

c: Corps of Engineers- New Orleans District
√ Coastal Management Division

Louisiana Coastal Area
Barataria Basin Barrier Shoreline Restoration Project
Jefferson, Lafourche, and Plaquemines Parishes, Louisiana

04EL1000-2012-F-0594
Biological Opinion
December 21, 2011

Prepared by:
U.S. Fish and Wildlife Service
646 Cajundome Boulevard, Suite 400
Lafayette, LA

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Acronyms

Act	Endangered Species Act
ATV	All-terrain vehicle
BA	Biological Assessment
BBBSR	Barataria Basin Barrier Shoreline Restoration
BO	Biological Opinion
CCSP	Climate Change Science Program
CEM	Coastal Engineering Manual
Corps	U.S. Army Corps of Engineers
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
cm	centimeters
CY	Cubic yards
LDNR	Louisiana Department of Natural Resources
DPS	Distinct Population Segment
EPA	Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FR	Federal Register
IPPC	International Piping Plover Census
km	kilometers
LCA	Louisiana Coastal Area
LDWF	Louisiana Department of Wildlife and Fisheries
m	meters
MBTA	Migratory Bird Treaty Act
MHW	Mean High Water
MLW	Mean Low Water
MLLW	Mean Low Low Water
NAVD	North American Vertical Datum 1988
NMFS	National Marine Fisheries Service
NPS	National Park Service
NRA	Natural Resource Advisor
NRDAR	Natural Resource Damage Assessment and Restoration
O&M	Operations and maintenance
ORV	Off-road vehicle
PCB	Polychlorinated Biphenol
PCE	Primary Constituent Element
SCAT	Shoreline Cleanup Assessment Team
Service	U.S. Fish and Wildlife Service
TSP	Tentatively Selected Plan
TY	Target Year
U.S.	United States
USC	United States Code
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

United States Department of the Interior
FISH AND WILDLIFE SERVICE
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December 21, 2011

Colonel Edward R. Fleming
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Fleming:

This document transmits the U.S. Fish and Wildlife Service's (Service) final biological opinion based on our review of the U.S. Army Corps of Engineers' (Corps) proposed Louisiana Coastal Area (LCA) – Barataria Basin Barrier Shoreline Restoration (BBBSR) project that would be located in Jefferson, Lafourche, and Plaquemines Parishes, Louisiana, and its effects on the threatened piping plover (*Charadrius melodus*) and its designated critical habitat, in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 United States Code [U.S.C.] 1531 *et seq*.). Your August 19, 2011, request for early (preliminary) consultation and attached revised biological assessment (BA) dated June 3, 2011, were received via mail on August 26, 2011.

This biological opinion is based on updated information provided in the Corps' revised June 3, 2011, BA; the Corps' August 9, 2010, supplemental BA; the Corps' April 24, 2009, BA; meetings; telephone conversations; electronic mails; field investigations; and other sources of information. This final biological opinion replaces the September 30, 2011, preliminary biological opinion for this project. A complete administrative record of this consultation (Service Log No. 04EL1000-2012-F-0594) is on file at the Service's Louisiana Ecological Services Office.

The Service concurs with the Corps' determination that the proposed project is not likely to adversely affect the endangered West Indian manatee (*Trichechus manatus*) because: (1) the project area does not contain suitable foraging habitat for that species; and (2) the Corps would implement, as part of the project construction plan, standard conditions for in-water work in the presence of manatees (Appendix A). The Service also concurs with the Corps' determination that the proposed project is not likely to adversely affect the endangered pallid sturgeon (*Scaphirhynchus albus*) and shovelnose sturgeon[1] (*Scaphirhynchus platorynchus*) because: (1) the species rarely occur within the lower portion of the Mississippi River near the Nairn Dune borrow site; and (2) the Corps would implement, as part of the project construction plan, protective measures for sturgeon during dredging operations within the river (Appendix B). Federally listed sea turtles (i.e., Kemp's ridley, hawksbill, loggerhead, leatherback, and green sea turtles) are not currently known to nest in Louisiana. It is our understanding that the Corps has conducted a separate consultation with the National Marine Fisheries Service (NMFS) regarding project-related effects to sea turtles offshore. The NMFS is also responsible for Section 7 consultation with the Corps for the threatened Gulf sturgeon (*Acipenser oxyrhynchus desotoi*) in estuarine and marine waters. Accordingly, none of the species mentioned in this paragraph will be discussed further in this biological opinion (Table 1).

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[1] For law enforcement purposes shovelnose sturgeon are classified as "Threatened due to Similarity of Appearance" wherever they coexist with the endangered pallid sturgeon. They are biologically neither endangered nor threatened but this designation extends the ESA take prohibitions to shovelnose sturgeon, shovelnose-pallid sturgeon hybrids, and their roe when associated with a commercial fishing activity.

Table 1. Species and critical habitat evaluated for effects from the proposed action but not discussed further in this biological opinion.

Species or Critical Habitat	Present in Action Area	Present in Action Area but "Not Likely to Adversely Affect"
West Indian manatee	Possible	Yes
Pallid sturgeon	Possible	Yes
Shovelnose sturgeon*	Possible	Yes

* For law enforcement purposes shovelnose sturgeon are classified as "Threatened due to Similarity of Appearance" wherever they coexist with the endangered pallid sturgeon. They are biologically neither endangered nor threatened but this designation extends the ESA take prohibitions to shovelnose sturgeon, shovelnose-pallid sturgeon hybrids, and their roe when associated with a commercial fishing activity.

Consultation History

On September 26, 2003, the Service provided the Corps with a detailed list of and habitat descriptions for federally threatened and endangered species, their critical habitat, and migratory birds that may be found in or near the study area for the draft LCA Comprehensive Study. On May 2, 2005, the Service provided a project-specific list of federally threatened and endangered species to the Corps in response to their request for our comments and participation as a cooperating agency in the preparation of their Draft Environmental Impact Statement for the BBBSR project.

On May 18, 2006, the Service and the Corps conducted a site visit to discuss potential project-related effects to the piping plover and its critical habitat. On July 11, 2006, the Service provided the Corps with additional specific biological information for the piping plover for preparation of their draft BA.

On May 11, 2009, the Service concurred with the Corps' determination that the originally proposed project as described in their April 24, 2009, BA, was not likely to adversely affect the piping plover or its designated critical habitat.

Proposed project modifications were presented to the Service via meetings, telephone calls, and ongoing coordination between the Service and the Corps in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). On August 5, 2010, the Service provided a supplemental letter to our April 30, 2009, draft Fish and Wildlife Coordination Act Report regarding the Corps' proposed changes in the Tentatively Selected Plan (TSP) for the BBBSR project. That letter recommended that the Corps re-initiate section 7 consultation due to the changes in the project scope and location.

On August 11, 2010, the Corps provided the Service with their August 9, 2010, supplemental BA regarding the proposed changes in the scope and location of the BBBSR project, as well as detailed information regarding a change in the environmental baseline due to the impacts to the project area as a result of the Deepwater Horizon Mississippi Canyon Well #252 oil spill. Due to the nature of the project changes and the change in the project-area environmental baseline, the Corps requested to initiate formal consultation. On August 19, 2010, the Service provided confirmation to the Corps that all information had been received and that a biological opinion would be issued no later than December 24, 2010.

On August 23, 2010, the Service and the Corps conducted a site visit to discuss the changes in the proposed project and its potential effects to existing piping plover habitat, as well as the effects to existing habitat related to the Deepwater Horizon oil spill. On September 16, 2010, the Corps provided the Service with additional clarification of the proposed project changes specifically regarding the proposed location and placement of the feeder beach berm.

On October 7, 2010, the Corps informed the Service that the project plan had changed and that the Corps would be rescinding its request for formal consultation. On December 6, 2010, the Corps rescinded its request for formal consultation and instead requested early consultation; that request also contained a revised version of their August 9, 2010, supplemental BA. On January 6, 2011, the Service provided confirmation to the Corps that all information had been received and that a preliminary biological opinion would be issued no later than April 24, 2011. On March 28, 2011, the Service issued a preliminary biological opinion (Service Log No. 43440-2010-R-2889) to the Corps.

On July 11, 2011, the Corps submitted a revised BA dated June 3, 2011, which included changes to the proposed action and a request to re-initiate early consultation due to changes in the frequency and quantity of nourishment for the Caminada Headland portion of the proposed project. On August 3, 2011, the Service provided confirmation to the Corps that all information had been received and that an updated preliminary biological opinion would be issued no later than November 23, 2011.

On July 27, 2011, the Service provided comments on the Corps' Draft Environmental Impact Statement (EIS) requesting that additional information regarding potential project-related effects to the endangered pallid sturgeon and shovelnose sturgeon be included in the Final EIS. Based on that information, the Corps re-submitted their June 3, 2011, BA with the additional information regarding those species with a request to include them in this consultation. On September 2, 2011, the Service provided confirmation to the Corps that all additional information for those species had been received and that an updated preliminary biological opinion would be issued no later than January 8, 2012. On September 30, 2011, the Service issued a preliminary biological opinion (Service Log No. 43440-2011-R-2621) to the Corps.

On December 14, 2011, the Service received the Corps' December 13, 2011, request to finalize the September 30, 2011, preliminary biological opinion. No public comments were received on the draft EIS that resulted in changes to the project or to the information used to develop this biological opinion. On December 21, 2011, the Service confirmed that this document transmits the final biological opinion for the proposed action.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Corps' 2004 LCA Report developed 3 hydrogeomorphic objectives: (1) maintaining salinity gradients; (2) increasing sediment input from sources outside the estuarine basins; and (3) maintaining or establishing natural landscape features and hydrologic processes that are critical to sustainable ecosystem structure and function. Accordingly, the goals of the proposed BBBSR project are: (1) to restore the geomorphic function and unique fish and wildlife habitats of the Caminada headland barrier system and Shell Island reach; and (2) to reverse the current trend of degradation in the Caminada headland and Shell Island reaches of the Barataria Basin (Figure 1) for a 50-year period (Corps 2009a). The Tentatively Selected Plan (TSP) consists of Caminada Headland Alternative 5 – Preferred Dune with Expanded Marsh and Subtidal Feeder Bar, and Shell Island Alternative 5 – One Island with Two Renourishments. The TSP would implement restoration of geomorphic form and function by separating the Gulf of Mexico from the interior estuaries and helping to regulate salinity gradients important to the range of estuarine and freshwater wetland species for the period of analysis. The geomorphic structures prevent open Gulf of Mexico wave energy from impacting the interior estuary and provide hydrodynamic stability to the system. Loss of those functions would have impacts beyond the project footprint within the Barataria Basin. The Corps anticipates beginning construction of the TSP in early 2012. For details on specific project features (i.e., dredging, sand fencing, planting) common to each alternative component, please refer to the **Restoration features common to the entire project** section of the project description on page 7. Each alternative component is described in detail below.

Caminada Headland Alternative 5: Restored Dune with Created Marsh and Subtidal Feeder Bar

The initial construction on the Caminada Headland will create 1,186 acres of saline marsh and 880 acres of dune/beach complex, for a total of 2,066 acres at target year (TY) 1. The newly created acres will cover much of the existing habitat acreages in the direct project footprint. Borrow material for construction would be used from the South Pelto Block of Ship Shoal located approximately 40 miles offshore, southwest of Belle Pass. The duration for dredging material for the Caminada portion of the project would be approximately 2.5 years. Onshore construction activities would occur concurrently with dredging operations but may extend for another 6 months after dredging is completed. Planting of native vegetation would require approximately 750 days over a 3-year period once all construction is completed.

Dune/Beach Complex

The dune height would be constructed to +7 feet (2.13 meters [m]) North American Vertical Datum 1988 (NAVD) which is higher than the existing (degraded) dune elevation of +3.4 feet (1.04 m) NAVD. The proposed dune width would be 290 feet (88.29 m). The majority of the dune would be located landward over existing higher elevations to maximize project acreage and longevity. The landward and seaward slopes are set at a 20-foot horizontal to 1-foot vertical slope (20H:1V). The beach fill design has a 65-foot-wide (19.81 m) seaward berm at an elevation of +4.5 feet (1.37 m) NAVD. Approximately 13 miles of dune and beach will be created. Fill quantity for the beach/dune complex is 5.1 million cubic yards (CY). Vegetative plantings will include a variety of native dune grass species. Sand fencing will be installed to promote deposition of windblown sand, create dune features, reduce trampling of existing dunes by beach visitors, and protect vegetative plantings.

The dune/beach complex feature of the Caminada headland would include repair and/or maintenance of sand fencing. The maintenance estimate for sand fencing includes complete replacement in TY5 with 20 percent replacement every 5 years for the 50-year period of analysis. In addition to this task, the non-Federal sponsor would monitor the project area and enforce the restrictions of the easements through yearly inspections of the project area. Sufficient land rights will be obtained to perform operations and maintenance (O&M) over 50 years.

Marsh Creation

The expanded marsh feature includes restoration and creation of a marsh platform located between the Chevron Canal to the north and the beach/dune component to the south (Figure 2). Approximately 5.36 million CY would be used to construct a marsh elevation of +2.0 feet (0.61 m) NAVD that would create a functioning intertidal marsh with no renourishment planned for the 50-year project life. The native marsh elevation for the back-barrier marsh is 0.94 feet (0.29 m) NAVD. The marsh platform would be planted with various native marsh grasses, and would provide substrate for over-wash splays and northward dune/beach migration.

Subtidal Feeder Bar

The Corps' Coastal Engineering Manual (CEM) (Corps 2006) describes feeder beaches as finite-length berms placed along a beach, usually at the up-drift end of a littoral cell that has strong unidirectional shore-parallel transport. They can also be placed at a nodal "hot spot" where shore-parallel transport divides, thus moving sediment in both directions away from the node. This concept involves placing a large volume of sediment in a limited area and relying on littoral processes to move it down the beach, thus gradually nourishing the beach at a distance from the placement site. The CEM describes feeder beaches in the same terms as normal beach restoration projects, with the sediment placed on the beach face, but not necessarily "…the same degree of along-shore uniformity as that provided by placing fill in a prescribed manner throughout the project area" (Corps 2006). The feeder beach concept has been expanded to include subsurface placement of sediment to create a "feeder bar," which relies on coastal processes to move the sediment onto the beach face naturally. A sub-tidally placed feeder bar that nourishes the beach profile without need for heavy grading machinery and/or disturbance to environmentally sensitive habitats can be more desirable and is typically less expensive than a conventional feeder beach. In addition, as wave action carries fine sediment onto the beach face and deposits it, an opportunity is afforded for Aeolian transport to move fine sands up the beach and onto the dune, thus, nourishing the system. The fine grained sediment that will be placed in the subtidal feeder bar would move onto the beach face in a gradual manner; consequently the feeder bar is not expected to cause extensive stacking of sediment on the beach which could smother the benthic fauna and contribute additional stress to the remaining benthic community within piping plover critical habitat.

Modeling was used to compare initial and final shorelines with and without the feeder bar. The results indicate that, by the end of the 2-year period between material placement events, the feeder bar diffuses to the east and west of its initial placement by approximately 2,000 feet (609.6 m). The percent reduction in volume losses from the modeled design storms that were attributed to the feeder bar ranged from 54 percent to 90 percent and the percent reduction in beach/dune erosion ranged from 49 percent to 81 percent. While the storm damage to the headland remains significant from storms of these magnitudes, the feeder bar does provide a quantifiable benefit for storm damage reduction. It is noted that these model results should be interpreted carefully for several reasons. First, the material will be placed as unconfined disposal thus the profile shape may vary significantly from the assumed bar configuration. Second, lateral diffusion will occur relatively quickly reducing the "density" of the feeder bar along the placement area. Third, the storm damage reduction benefit will be localized to the nodal zone and adjacent beaches as the feeder bar diffuses, which is approximately 13 percent of the entire Caminada Headland shoreline.

Based on the sediment budget prepared for the Caminada headland, the loss of sediment from the headland is estimated to be 379,000 CY per year. Thus, maintenance of the headland would include the beneficial placement of dredged material from O&M dredging of the bar channel of Bayou Lafourche, Louisiana (i.e., Belle Pass) in a feeder bar disposal area (Corps 2011). Dredging of Belle Pass yields an average of 650,000 CY of material, which would be used to nourish the offshore feeder bar every 1.5 to 2 years. Historically this material has been placed immediately east and west of the jetties at beach nourishment disposal sites. As part of the adaptive management plan, shoreline imagery will be evaluated to determine the renourishment approach. Based on shoreline conditions one of two basic approaches will be used:

1. When monitoring data indicate that the shoreline is relatively intact (i.e., no breaches), the 650,000 cy of dredged material from Belle Pass will be placed at the feeder bar disposal area located in the littoral drift south of Bayou Moreau (Figure 2) where the sediment budget indicates that the long-shore transport of material splits going east and west (Figure 4). Placement of material at this location sustains the project by building out the shoreline at the nodal point, which is an area of more rapid shoreline erosion, and by feeding material along the entire reach through existing long-shore transport patterns. Material would be placed unconfined for a length of 13,000 feet (3,962.4 m) located between 100 and 300 feet (30.48 and 91.44 m, respectively) from the mean high water (MHW) mark to allow long-shore transport and wave action to move and place the sediment along the headland. There would be no direct placement of sediment onto the beach during the dredged material placement events. All dredged material for the feeder bar would be placed seaward of mean low low water (MLLW) (horizontal) and at, or below, MLLW (vertical) located offshore of the nodal point. The material would be stacked no higher than + 6 feet (1.83 m) mean low grade, but would be quickly reworked by the wind and waves (due to the high energy environment of that area). The pumping of the material would take approximately 54 days, with placement and removal of the pipeline taking a total of approximately 98 days. The pipe would be placed offshore. The material would be dredged from the Bayou Lafourche channel (a federal navigation channel) which previously received clearance under the National Environmental Policy Act for maintenance dredging. Over each 10 year period, an estimated 3.9 million CY of material would be returned to the headland.

2. When monitoring data indicate that the shoreline has been breached or severely damaged by over-wash and/or other erosion, dredged material would be beneficially placed to repair breaches and/or other highly eroded areas. The material would be placed in a manner which restores the shoreline to conditions similar to what existed prior to breaching. Each breach or over-wash restoration action would be coordinated with the Service on a case by case basis. If the volume of material available is greater than the quantity required to repair breaches and erosional hot spots, then the remaining material will be placed in the feeder bar disposal area at the nodal point of the shoreline.

Timing of the renourishment will be dependent upon the maintenance dredging requirements of the Bayou Lafourche, Louisiana project. If maintenance dredging of Bayou Lafourche is not scheduled when the Corps determines that renourishment is required, the non-federal sponsor would provide another source of material. Any changes to the Corps O&M plan would receive environmental clearances, including section 7 consultation under the Act with the appropriate agencies.

Shell Island Alternative 5: One Island with Two Renourishments

Shell Island Alternative 5 would restore the Shell Island reach as a 783-acre island (Figure 3), including a beach berm, dune ridge, and saline marsh platform. The east end of the new island would be located near the Empire waterway, and the west end would be terminated approximately 0.5-mile before Grand Bayou. The alternative would attempt to restore existing island remnants to a pre-Hurricane Bob (1979) condition, and the shortest and shallowest route across Coupe Bob would be utilized. The Corps anticipates that the closure of Coupe Bob would return the tidal prism to its pre-1979 path which flowed through Grand Bayou; thus, Grand Bayou would increase in size in response to the altered tidal flow pattern. The borrow source for the dune/beach complex would be a large sand deposit in the Mississippi River near Nairn between mile markers 32 and 34, which is located approximately 11 miles north of the Shell Island reach. The sand, which is comparable in grain size to sand found at the project site, would be pumped to the project area via pipeline. The borrow source for marsh creation would be the Empire deposit located 1.5 miles from the Empire jetties; that site contains material more suitable for marsh construction.

The duration for construction activities for the Shell Island reach is approximately 2.17 years. Onshore construction activities would occur concurrently with dredging operations but may extend for another 6 months after dredging is completed. Planting of native vegetation would require approximately 360 days over a 3-year period once all construction is completed. Periodic renourishment would be implemented at TY 20 and TY 40. The Corps estimates that approximately 1.5 million CY of beach fill would be needed for each renourishment cycle in TY 20 and TY 40, approximately 907,200 CY of marsh fill would be needed for renourishment in TY20, and 604,700 CY of marsh fill would be needed in TY 40.

Dune/Beach Complex

The landward edge of the dune would be located seaward of the existing shoreline. The dune height would be constructed to +6 feet (1.83 m) NAVD and dune width would be 189 feet (57.6 m). The landward and seaward slopes are set at a 45-foot horizontal to 1-foot vertical slope (45H:1V). The beach fill design has not yet been selected, and would vary as a non-uniform 300-foot-wide (91.44 m) seaward berm at an elevation of greater than +2 feet (0.61 m) and less than +4.5 feet (1.37 m) NAVD. Approximately 317 acres of shoreline/dune (area above +2 feet NAVD) would be created. The anticipated fill quantity for the beach/dune complex is 5.6 million CY. Vegetative plantings will include a variety of native dune grass species. Sand fencing will be installed to promote deposition of windblown sand, create dune features, reduce trampling of existing dunes by beach visitors, and protect vegetative plantings.

Marsh Creation

The marsh feature includes creation of a marsh platform located north of the beach/dune component. However, in deeper water (bathymetry below -3 feet NAVD, as found across Coupe Bob) marsh fill cannot be used because as the material de-waters there would be rapid and non-uniform settling, which would preclude marsh creation. Therefore, at depths of -3 feet and deeper (i.e., across Coupe Bob), a sand base would be constructed and a sand-filled geotextile tube would be used as containment prior to placement of marsh fill material. For areas in shallow water (bathymetry up to -2 or -3 feet NAVD) there is no need for a sand base, and containment dikes would be constructed with waterbottom material within the marsh fill footprint. A uniform marsh width of 735 feet (224 m) would be constructed to result in an island width of approximately 1,240 feet (377.95 m) following equilibration of the shoreline. Approximately 2.1 million CY would be used to construct 466 acres of marsh to an elevation of +2.0 feet (0.61 m) NAVD, which would result in a functioning intertidal marsh. The marsh platform would be planted with various native marsh grasses, and would provide substrate for over-wash splays and northward dune/beach migration.

Restoration features common to the entire project

Dredging of all offshore borrow areas would be conducted using a hydraulic cutter-head dredge, for which the Corps has already conducted section 7 consultation with the NMFS. For the proposed dredging site within the Mississippi River, the Corps would implement protective measures for sturgeon (Appendix B). The dredged material would be transported to an island or headland using a booster pump(s), if needed, and submerged sediment pipeline. Borrow locations are located sufficient distance from the restoration sites that they will not impact littoral drift or project longevity. The following construction actions would be implemented for all of the above-listed alternative features:

a) For the dune areas, the dredged material would be deposited on the beach and re-worked by bulldozers and front-end loaders.
b) For the marsh creation areas, temporary containment dikes would be constructed to contain the marsh fill material during construction. The material for dike construction will be dredged from within the footprint of the marsh creation area so that the excavated area is filled during construction. The dike volume is included within the marsh fill volume. (A second option for the Shell Island reach only is to contain marsh fill using a sand-filled geotextile tube along the perimeter of the constructed sand base in areas where water depths are deeper than -3 feet NAVD.)
c) All dredging and discharge operations will be completed in a manner that will minimize turbidity of the water at the dredge and discharge sites.
d) Sand fencing will be installed to promote capture of Aeolian sand. One shore-parallel fence will be installed approximately 50 feet (15.24 m) north of the southern toe of the dune to continue the capture of transported sand until the surface is vegetated. The sand fence will extend along the total length of the constructed dune. Sand fences will be installed in sequences/phases. The installation would start from the southern side of the dune so as to build dune towards the Gulf and proceed north. Additional rows of sand fencing may be added once the sand is stacked almost to the top of the fence.
e) Vegetative plantings along the created dune and marsh project features will include a variety of native dune and marsh grass species. The recommended planting density is no greater than 8-foot centers.

Project effects would occur along the entire length of the Caminada headland and the Shell Island reach due to the dynamic nature of coastal processes and the long-shore transport of sediments within the Barataria Basin barrier system. The Shell Island reach is not designated as critical habitat for the piping plover; however, it does consist of suitable habitat for the species. Portions of the Caminada headland are included in critical habitat Unit LA-5 (described in detail in the **Species/critical habitat description** and **Status of the species within the action area** sections of this document). The Service has described the action area to include all of the Caminada headland and Shell Island reach, and their associated sand and mud flats, for reasons that will be explained and discussed in detail in the **EFFECTS OF THE ACTION** section of this consultation.

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

The piping plover is a small (7 inches [17.78 centimeters (cm)] long), pale, sand-colored shorebird with a wingspan of 15 inches (38.1 cm) (Palmer 1967). On January 10, 1986, the piping plover was listed as endangered in the Great Lakes watershed and threatened elsewhere within its range, including migratory routes outside of the Great Lakes watershed and wintering grounds (Service 1985). Piping plovers were listed principally because of habitat destruction and degradation, predation, and human disturbance. Protection of the species under the Act reflects the species' precarious status range-wide. Three separate breeding populations have been identified, each with its own recovery criteria: the northern Great Plains (threatened), the Great Lakes (endangered), and the Atlantic Coast (threatened). The piping plover winters in coastal areas of the United States (U.S.) from North Carolina to Texas, and along the coast of eastern Mexico and on Caribbean islands from Barbados to Cuba and the

Bahamas (Haig and Elliott-Smith 2004). Piping plover subspecies are phenotypically indistinguishable, and most studies in the nonbreeding range report results without regard to breeding origin. Although a recent analysis shows strong patterns in the wintering distribution of piping plovers from different breeding populations, partitioning is not complete and major information gaps persist. Therefore, information summarized here pertains to the species as a whole (i.e., all three breeding populations), except where a particular breeding population is specified (Figure 6).

The Service has designated critical habitat for the piping plover on three occasions. Two of these designations protected different breeding populations. Critical habitat for the Great Lakes breeding population was designated May 7, 2001 (66 Federal Register (FR) 22938; Service 2001a), and critical habitat for the northern Great Plains breeding population was designated September 11, 2002 (67 FR 57637; Service 2002). The Service designated critical habitat for wintering piping plovers on July 10, 2001 (66 FR 36038; Service 2001b). Wintering piping plovers may include individuals from the Great Lakes and northern Great Plains breeding populations as well as birds that nest along the Atlantic coast.

Designated wintering piping plover critical habitat originally included 142 areas (the rule states 137 units; this is in error) encompassing about 1,793 miles of mapped shoreline and 165,211 acres of mapped areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. Since the designation of wintering critical habitat, 19 units (TX-3,4,7-10, 14-19, 22, 23, 27,28, and 31-33) in Texas have been vacated and remanded back to the Service for reconsideration by Court order (Texas General Land Office v. U.S. Department of Interior, Case No. V-06-CV-00032). On May 19, 2009, the Service published a final rule designating 18 revised critical habitat units in Texas, totaling approximately 139,029 acres (74 FR 23476). The Courts also vacated and remanded back to the Service for reconsideration, four units in North Carolina (Cape Hatteras Access Preservation Alliance v. U.S. Department of Interior, 344 F. Supp. 2d 108 (D.D.C. 2004)). The four critical habitat units vacated were NC-1, 2, 4, and 5, and all occurred within Cape Hatteras National Seashore (CAHA). A revised designation for these four units was published on October 21, 2008 (73 FR 62816).

The primary constituent elements (PCEs) for piping plover wintering habitat are those biological and physical features that are essential to the conservation of the species. The PCEs are those habitat components that support foraging, roosting, and sheltering and the physical features necessary for maintaining the natural processes that support these habitat components. These areas typically include coastal areas that support intertidal beaches and flats and associated dune systems and flats above annual high tide (Service 2001a). PCEs of wintering piping plover critical habitat include sand or mud flats (or both) with no or sparse emergent vegetation. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting piping plovers (Service 2001a). Important components of the beach/dune ecosystem include surf-cast algae, sparsely vegetated back beach and salterns, spits, and washover areas. Washover areas are broad, unvegetated zones, with little or no topographic relief, that are formed and maintained by the action of hurricanes, storm surge, or other extreme wave action. The units designated as critical habitat are those areas that have consistent use by piping plovers and that best meet the biological needs of the species. The amount of wintering habitat included in the designation appears sufficient to support future recovered populations, and the existence of this habitat is essential to the conservation of the species. Additional information on each specific unit included in the designation can be found at 66 FR 36038 (Service 2001a).

Activities that affect PCEs include those that directly or indirectly alter, modify, or destroy the processes that are associated with the formation and movement of barrier islands, inlets, and other coastal landforms. Those processes include erosion, accretion, succession, and sea-level change. The integrity of the habitat components also depends upon daily tidal events and regular sediment transport processes, as well as episodic, high-magnitude storm events (Service 2001b).

Life History

Piping plovers live an average of five years, although studies have documented birds as old as 11 (Wilcox 1959) and 15 years. Breeding activity begins in mid-March when birds begin returning to their nesting areas (Coutu et al. 1990; Cross 1990; Goldin et al. 1990; MacIvor 1990; Hake 1993). Plovers are known to begin breeding as early as one year of age (MacIvor 1990; Haig 1992); however, the percentage of birds that breed in their first adult year is unknown. Piping plovers generally fledge only a single brood per season, but may re-nest several times if previous nests are lost.

The most consistent finding in the various population viability analyses conducted for piping plovers indicates that even small declines in adult and juvenile survival rates will cause very substantial increases in extinction risk (Ryan et al. 1993; Melvin and Gibbs 1996; Plissner and Haig 2000; Wemmer et al. 2001; Larson et al. 2002; Amirault et al. 2005; Calvert et al. 2006; Brault 2007). A banding study conducted between 1998 and 2004 in Atlantic Canada found lower return rates of juvenile (first year) birds to the breeding grounds than was documented for Massachusetts (Melvin and Gibbs 1994; Service 1996), Maryland (Loegering 1992), and Virginia (Cross 1996) breeding populations in the mid-1980s and very early 1990s. This is consistent with failure of the Atlantic Canada population to increase in abundance despite very high productivity (relative to other breeding populations) and extremely low rates of dispersal to the U.S. over the last 15 plus years (Amirault et al. 2005). Simply stated, this suggests that maximizing productivity does not ensure population increases.

Efforts to partition survival within the annual cycle are beginning to receive more attention, but current information remains limited. Drake et al. (2001) observed no mortality among 49 radio-marked piping plovers (total of 2,704 transmitter days) in Texas in 2007-2008. Cohen et al. (2008a) documented no mortality of 7 radio-tracked wintering piping plovers at Oregon Inlet from December 2005 to March 2006. They speculate their high survival rate was attributed to plover food availability much of the day as well as the low occurrence of days below freezing and infrequent wet weather. Analysis of South Carolina resighting data for 87 banded piping plovers (78 percent Great Lakes breeders) in 2006-2007 and 2007-2008 found 100 percent survival from December to April[2] (J. Cohen, Virginia Polytechnic Institute and State University, pers. comm. 2009). Noel et al. (2007) inferred two winter (November to February) mortalities[3] among 21 banded (but not radio-tagged) overwintering piping plovers in 2003-2004 and 9 mortalities among 19 overwintering birds during the winter of 2004-2005 at Little St. Simons Island, Georgia. LeDee (2008) found higher apparent survival[4] rates during breeding and southward migration than during winter and northward migration for 150 adult (i.e., after-hatch year) Great Lakes piping plovers.

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[2] Of those birds, one unique and one non-uniquely banded piping plover were seen in the first winter and were resighted multiple times in the second fall at the same location but were not seen during the second winter; whether these two birds died in the fall or shifted their wintering location is unknown (Maddock et al. 2009).

[3] Noel et al. (2007) inferred mortality if a uniquely banded piping plover with multiple November to February sightings on the survey site disappeared during that time and was never observed again in either it's nonbreeding or breeding range. Note that most of these birds were from the Great Lakes breeding population, where detectability during the breeding season is very high.

[4] "Apparent survival" does not account for permanent emigration. If marked individuals leave a survey site, apparent survival rates will be lower than true survival. If a survey area is sufficiently large, such that emigration out of the site is unlikely, apparent survival will approach true survival.

Mark-recapture analysis of resightings of uniquely banded piping plovers from seven breeding areas by Roche et al. (2010) found that apparent adult survival declined in four populations and increased in none over the life of the studies[5]. Some evidence of correlation in year-to-year fluctuations in annual survival of Great Lakes and eastern Canada populations, both of which winter primarily along the southeastern U.S. Atlantic Coast, suggests that shared over-wintering and/or migration habitats may influence annual variation in survival. Further concurrent mark-resighting analysis of color-banded individuals across piping plover breeding populations has the potential to shed light on threats that affect survival in the migration and wintering range. However, very little to no information exists specifically for birds wintering along the northern Gulf of Mexico. An ongoing Natural Resource Damage Assessment and Restoration (NRDAR) study of piping plovers that are potentially affected by the 2010 Deepwater Horizon oil spill may provide such information once the data gathered are eligible for release to the public.

Migration

Plovers depart their breeding grounds for their wintering grounds from July through late August, but southward migration extends through November. Piping plovers spend up to 10 months of their life cycle on their migration and winter grounds, generally July 15 through as late as May 15. Piping plovers migrate through and winter in coastal areas of the U.S. from North Carolina to Texas and in portions of Mexico and the Caribbean. Both spring and fall migration routes of Atlantic Coast breeders are believed to occur primarily within a narrow zone along the Atlantic Coast (Service 1996). The pattern of both fall and spring counts at many Atlantic Coast sites demonstrates that many piping plovers make intermediate stopovers lasting from a few days up to one month during their migrations (Noel et al. 2005; Stucker and Cuthbert 2006). Some mid-continent breeders travel up or down the Atlantic Coast before or after their overland movements (Stucker and Cuthbert 2006). Use of inland stopovers during migration is also documented (Pompei and Cuthbert 2004). The source breeding population of a given wintering individual cannot be determined in the field unless it has been banded or otherwise marked. Information from observation of color-banded piping plovers indicates that the winter ranges of the breeding populations overlap to a significant degree. See the **Status and Distribution** section for additional information pertaining to population distribution on the wintering grounds. While piping plover migration patterns and needs remain poorly understood and occupancy of a particular habitat may involve shorter periods relative to wintering, information about the energetics of avian migration indicates that this might be a particularly critical time in the species' life cycle.

Foraging (nonbreeding portion of annual cycle)

Behavioral observation of piping plovers on the wintering grounds suggests that they spend the majority of their time foraging (Nicholls and Baldassarre 1990a; Drake 1999a, 1999b). Feeding activities may occur during all hours of the day and night (Staine and Burger 1994; Zonick 1997), and at all stages in the tidal cycle (Goldin 1993; Hoopes 1993). Wintering plovers primarily feed on invertebrates such as polychaete marine worms, various crustaceans, fly larvae, beetles, and occasionally bivalve mollusks (Bent 1929; Nicholls 1989; Zonick and Ryan 1995). They peck these invertebrates on top of the soil or just beneath the surface. Plovers forage on moist substrate features such as intertidal portions of ocean beaches, washover areas, mudflats, sand flats, algal flats, shoals, wrack lines, sparse vegetation, shorelines of coastal ponds, lagoons, ephemeral pools and adjacent to

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[5] Data were analyzed for 3 to 11 years per breeding area, all between 1998 and 2008.

salt marshes (Gibbs 1986; Zivojnovich 1987; Nichols 1989; Nicholls and Baldassarre 1990a; Nicholls and Baldassarre 1990b; Coutu et al. 1990; Hoopes et al. 1992; Loegering 1992; Goldin 1993; Elias-Gerken 1994; Wilkinson and Spinks 1994; Zonick 1997; Service 2001a). Studies from the coastal breeding range have shown that the relative importance of various feeding habitat types may vary by site (Gibbs 1986; Coutu et al. 1990; McConnaughey et al. 1990; Loegering 1992; Goldin 1993; Hoopes 1993). Cohen et al. (2006) documented more abundant prey items and biomass on sound island and sound beaches than the ocean beach. On the wintering grounds, Ecological Associates, Inc. (2009) observed that during piping plover surveys at St. Lucie Inlet, Martin County, Florida, intertidal mudflats and/or shallow subtidal grass flats appear to have greater value as foraging habitat than the unvegetated intertidal areas of a flood shoal.

Roosting

Several studies identified wrack (organic material including seaweed, seashells, driftwood, and other materials deposited on beaches by tidal action) as an important component of roosting habitat for nonbreeding piping plovers. Lott et al. (2009) found greater than 90 percent of roosting piping plovers in southwest Florida in old wrack with the remainder roosting on dry sand. In South Carolina, 45 percent of roosting piping plovers were in old wrack, and 18 percent were in fresh wrack. The remainder of roosting birds used intertidal habitat (22 percent), backshore (defined as zone of dry sand, shell, cobble and beach debris from mean high water line up to the toe of the dune)(8 percent), washover and ephemeral pools 2 percent and 1 percent respectively (Maddock et al. 2009). Thirty percent of roosting piping plovers in northwest Florida were observed in wrack substrates with 49 percent on dry sand and 20 percent using intertidal habitat (Smith 2007). In Texas, sea grass debris (bay-shore wrack) was an important feature of piping plover roost sites (Drake 1999b). Mean abundance of two other plover species in California, including the listed western snowy plover (*Charadrius alexandrinus nivosus*), was positively correlated with abundance of wrack during the nonbreeding season (Dugan et al. 2003).

Natural protection

Cryptic coloration is a primary defense mechanism for this species. Nests, adults, and chicks all blend in with their typical beach surroundings. Piping plovers on wintering and migration grounds respond to intruders (pedestrian, avian and mammalian) usually by squatting, running, and flushing (flying).

Wintering habitat

Wintering piping plovers prefer coastal habitat that include sand spits, islets (small islands), tidal flats, shoals (usually flood tidal deltas), and sandbars that are often associated with inlets (Harrington 2008). Sandy mud flats, ephemeral pools, and over-wash areas are also considered primary foraging habitats. These substrate types have a richer infauna than the foreshore of high energy beaches and often attract large numbers of shorebirds (Cohen et al. 2006). Wintering plovers are dependent on a mosaic of habitat patches and move among these patches depending on local weather and tidal conditions (Nicholls and Baldassarre 1990a).

Recent study results in North Carolina, South Carolina, and Florida complement information from earlier investigations in Texas and Alabama (summarized in the 1996 Atlantic Coast and 2003 Great Lakes Recovery Plans) regarding habitat use patterns of piping plovers in their coastal migration and wintering range. Maddock et al. (2009) observed shifts to roosting habitats and behaviors during high-tide periods in South Carolina. In South Carolina, exposed intertidal areas were the dominant foraging substrate (accounting for 94 percent of observed foraging piping plovers; Maddock et al. 2009). As observed in Texas studies, Lott et al. (2009) identified bay beaches (bay shorelines as opposed to ocean-facing beaches) as the most common landform used by foraging piping plovers in southwest Florida. In northwest Florida, however, Smith (2007) reported landform use by foraging piping plovers about equally divided between Gulf of Mexico (ocean-facing) and bay beaches. Exposed intertidal areas were the dominant foraging substrate in South Carolina (accounting for 94 percent of observed foraging piping plovers; Maddock et al. 2009) and in northwest Florida (96 percent of foraging observations; Smith 2007). In southwest Florida, Lott et al. (2009) found approximately 75 percent of foraging piping plovers on intertidal substrates.

Atlantic Coast and Florida studies highlighted the importance of inlets for non-breeding piping plovers. Almost 90 percent of observations of roosting piping plovers at ten coastal sites in southwest Florida were on inlet shorelines (Lott et al. 2009). Piping plovers were among seven shorebird species found more often than expected ($p = 0.0004$; Wilcoxon Scores test) at inlet locations versus non-inlet locations in an evaluation of 361 International Shorebird Survey sites from North Carolina to Florida (Harrington 2008).

Recent geographic analysis of piping plover distribution on the upper Texas coast noted major concentration areas at the mouths of rivers and washover passes (low, sparsely vegetated barrier island habitats created and maintained by temporary, storm-driven water channels) into major bay systems (Arvin 2008). Earlier studies in Texas have drawn attention to washover passes, which are commonly used by piping plovers during periods of high bay-shore tides and during the spring migration period (Zonick 1997; Zonick 2000). Cobb (*in* Elliott-Smith et al. 2009) reported piping plover concentrations on exposed sea grass beds and oyster reefs during seasonal low water periods in 2006.

The effects of dredge-material deposition merit further study. Drake et al. (2001) concluded that conversion of southern Texas mainland bay-shore tidal flats to dredged material impoundments results in a net loss of habitat for wintering piping plovers, because impoundments eventually convert to upland habitat not used by piping plovers. Zonick et al. (1998) reported that dredged material placement areas along the Intracoastal Waterway in Texas were rarely used by piping plovers, and noted concern that dredge islands block wind-driven water flows, which are critical to maintaining important shorebird habitats. By contrast, most of the sound islands used by foraging piping plovers at Oregon Inlet, North Caroline, were created by the Corps by deposition of dredged material in the subtidal bay bottom, with the most recent deposition ranging from 28 to less than 10 years prior to the study (Cohen et al. 2008a).

Mean home range size (95 percent of locations) for 49 radio-marked piping plovers in southern Texas in 1997-98 was 12.6 square-kilometers (km^2) (3,113 acres), mean core area (50 percent of locations) was 2.9 km^2 (717 acres), and mean linear distance moved between successive locations (1.97 ± 0.04 days apart), averaged across seasons, was 3.3 km (2.1 miles) (Drake 1999b; Drake et al. 2001). Seven radio-tagged piping plovers used a 20.1 km^2 (4,967 acres) area (100 percent minimum convex polygon) at Oregon Inlet in 2005-2006, and piping plover activity was concentrated in 12 areas totaling 2.2 km^2 (544 acres) (Cohen et al. 2008a). Noel and Chandler (2008) observed high fidelity of banded piping plovers to 1 km to 4.5 km (0.62 to 2.8 miles) sections of beach on Little St. Simons Island, Georgia.

Population dynamics

The 2006 Piping Plover Breeding Census, the last comprehensive survey throughout the breeding grounds, documented 3,497 breeding pairs with a total of 8,065 birds throughout Canada and U.S (Elliott-Smith et al. 2009).

Northern Great Plains Population

The Northern Great Plains plover breeds from Alberta to Manitoba, Canada, and south to Nebraska; although some nesting has recently occurred in Oklahoma. Currently the most westerly breeding piping plovers in the United States occur in Montana and Colorado. The decline of piping plovers on rivers in the Northern Great Plains has been largely attributed to the loss of sandbar island habitat and forage base due to dam construction and operation. Nesting occurs on sand flats or bare shorelines of rivers and lakes, including sandbar islands in the upper Missouri River system, and patches of sand, gravel, or pebbly-mud on the alkali lakes of the northern Great Plains. Plovers do nest on shorelines of reservoirs created by the dams, but reproductive success is often low and reservoir habitat is not available in many years due to high water levels or vegetation. Dams operated with steady constant flows allow vegetation to grow on potential nesting islands, making these sites unsuitable for nesting. Population declines in alkali wetlands are attributed to wetland drainage, contaminants, and predation.

The International Piping Plover Census (IPPC), conducted every five years, also estimates the number of piping plover pairs in the Northern Great Plains. As illustrated in Table 2 (next page), none of the IPPC estimates of the number of pairs in the U.S. suggests that the Northern Great Plains population has yet satisfied the recovery criterion of 2,300 pairs (Plissner and Haig 1997; Ferland and Haig 2002; Elliot-Smith et al. 2009). The IPPC count in prairie Canada reported 1,703 adult birds in 2006, which is also short of the goal of 2,500 adult piping plover as stated in the Service's Recovery Plan (Service 1988).

Table 2. The number of adult piping plovers and breeding pairs reported in the U.S. Northern Great Plains by the IPPC efforts (Plissner and Haig 1997; Ferland and Haig 2002; Elliot-Smith et al. 2009).

Year	Adults	Pairs Reported by the Census
1991	2,023	891
1996	1,599	586
2001	1,981	899
2006	2,959	1,212

The IPPC indicates that the U.S. population decreased between 1991 and 1996, then increased in 2001 and 2006. The Canadian population showed the reverse trend for the first three censuses, increasing slightly as the U.S. population decreased, and then decreasing in 2001. Combined, the IPPC numbers suggest that the population declined from 1991 through 2001, then increased almost 58 percent between 2001 and 2006 (Elliott-Smith et al. 2009).

The increase in 2006 is likely due in large part to a multi-year drought across much of the region starting in 2001 that exposed thousands of acres of nesting habitat. The Corps ran low flows on the riverine stretches of the Missouri River for most of the years between censuses, allowing more habitat to be exposed and resulting in relatively high fledging ratios (Corps 2009b). The Corps also began to construct habitat using mechanical means (dredging sand from the riverbed) on the Missouri River in 2004, providing some new nesting and foraging habitat. The drought also caused reservoir levels to drop on many reservoirs throughout the Northern Great Plains (e.g., Missouri River Reservoirs in North and South Dakota, and Lake McConaughey in Nebraska), providing previously unavailable shoreline habitat. The population increase may also be partially due to more intensive management activities on the alkali lakes, with increased management actions to improve habitat and reduce predation pressures.

While the IPPC provides an index to the piping plover population, the design does not always provide sufficient information to understand the population's dynamics. The five-year time interval between IPPC efforts may be too long to allow managers to get a clear picture of what the short-term population trends are and to respond accordingly if needed. As noted above, the first three IPPCs (1991, 1996, and 2001) showed a declining population, while the fourth (2006) indicated a dramatic population rebound of almost 58 percent for the combined U.S. and Canada Northern Great Plains population between 2001 and 2006. With only four data points over 15 years, it is impossible to determine if and to what extent the apparent upswing reflects a real population trend versus error(s) in the 2006 census count and/or a previous IPPC. The 2006 IPPC included a detectability component, in which a number of pre-selected sites were visited twice by the same observer(s) during the two-week window to get an estimate of error rate. This study found an approximately 76 percent detectability rate through the entire breeding area, with a range of between 39 percent to 78 percent detectability among habitat types in the Northern Great Plains.

Such a reported large increase in population may indeed indicate a positive population trend, but with the limited data available, it is impossible to determine how much. Furthermore, with the next IPPC not scheduled until 2011, there is limited feedback in many areas on whether this increase is being maintained or if the population is declining in the interim. Additionally, the results from the IPPC have been slow to be released, adding to the time lag between data collection and possible management response.

Great Lakes Population

The Great Lakes plovers once nested on Great Lakes beaches in Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario. Great Lakes piping plovers nest on wide, flat, open, sandy or cobble shoreline with very little grass or other vegetation. Reproduction is adversely affected by human disturbance of nesting areas and predation by foxes, gulls, crows and other avian species. Shoreline development, such as the construction of marinas, breakwaters, and other navigation structures, has adversely affected nesting and brood rearing.

The Recovery Plan (Service 2003) sets a population goal of at least 150 pairs (300 individuals), for at least 5 consecutive years, with at least 100 breeding pairs (200 individuals) in Michigan and 50 breeding pairs (100 individuals) distributed among sites in other Great Lakes states.

The Great Lakes piping plover population, which has been traditionally represented as the number of breeding pairs, has increased since the completion of the recovery plan in 2003 (Cuthbert and Roche 2007; 2006; Westbrock et al. 2005; Stucker and Cuthbert 2004; Stucker et al. 2003). The Great Lakes piping plover recovery plan documents the 2002 population at 51 breeding pairs (Service 2003). The census conducted in 2008 found 63 breeding pairs, an increase of approximately 23 percent. Of these, 53 pairs were found nesting in Michigan, while 10 were found outside the state, including six pairs in

Wisconsin and four in Ontario, Canada. The 53 nesting pairs in Michigan represent approximately 50 percent of the recovery criterion. The 10 breeding pairs outside Michigan in the Great Lakes basin, represents 20 percent of the goal, albeit the number of breeding pairs outside Michigan has continued to increase over the past five years. The single breeding pair discovered in 2007 in the Great Lakes region of Canada represented the first confirmed piping plover nest there in over 30 years, and in 2008 the number of nesting pairs further increased to four. Breeding pairs increased to 71 in 2009, but fell to 61 pairs in 2010. The decline from 2009 to 2010 is of particular concern because productivity of the Great Lakes population in 2008 and 2009 was very close to rates associated with earlier population growth.

In addition, the number of non-nesting individuals has increased annually since 2003. Between 2003-2008 an annual average of approximately 26 non-nesting piping plovers were observed, based on limited data from 2003, 2006, 2007, and 2008. Although there was some fluctuation in the total population from 2002 to 2008 the overall increase from 51 to 63 pairs combined with the increased observance of non-breeding individuals indicates the population is increasing.

Atlantic Coast Population

The Atlantic Coast piping plover breeds on coastal beaches from Newfoundland and southeastern Quebec to North Carolina. Historical population trends for the Atlantic Coast piping plover have been reconstructed from scattered, largely qualitative records. Nineteenth-century naturalists, such as Audubon and Wilson, described the piping plover as a common summer resident on Atlantic Coast beaches (Haig and Oring 1987). However, by the beginning of the 20th Century, egg collecting and uncontrolled hunting, primarily for the millinery trade, had greatly reduced the population, and in some areas along the Atlantic Coast, the piping plover was close to extirpation. Following passage of the Migratory Bird Treaty Act (40 Stat. 775; 16 U.S.C. 703-712) in 1918, and changes in the fashion industry that no longer exploited wild birds for feathers, piping plover numbers recovered to some extent (Haig and Oring 1985).

Available data suggest that the most recent population decline began in the late 1940s or early 1950s (Haig and Oring 1985). Reports of local or statewide declines between 1950 and 1985 are numerous, and many are summarized by Cairns and McLaren (1980) and Haig and Oring (1985). While Wilcox (1939) estimated more than 500 pairs of piping plovers on Long Island, New York, the 1989 population estimate was 191 pairs (Service 1996). There was little focus on gathering quantitative data on piping plovers in Massachusetts through the late 1960s because the species was commonly observed and presumed to be secure. However, numbers of piping plover breeding pairs declined 50 to 100 percent at seven Massachusetts sites between the early 1970s and 1984 (Griffin and Melvin 1984). Piping plover surveys in the early years of the recovery effort found that counts of these cryptically colored birds sometimes went up with increased census effort, suggesting that some historic counts of piping plovers by one or a few observers may have underestimated the piping plover population. Thus, the magnitude of the species decline may have been more severe than available numbers imply.

Annual estimates of breeding pairs of Atlantic Coast piping plovers are based on multiple surveys at most occupied sites. Sites that cannot be monitored repeatedly in May and June (primarily sites with few pairs or inconsistent occupancy) are surveyed at least once during a standard nine-day count period (Hecht and Melvin 2009).

Since its 1986 listing under the ESA, the Atlantic Coast population estimate (Service 2011) has increased 234 percent, from approximately 790 pairs to an estimated 1,849 pairs in 2009, and the U.S.

portion of the population has almost tripled, from approximately 550 pairs to an estimated 1,597 pairs. Even discounting apparent increases in New York, New Jersey, and North Carolina between 1986 and 1989, which likely were due in part to increased census effort (Service 1996), the population nearly doubled between 1989 and 2008. The largest population increase between 1989 and 2009 has occurred in New England (266 percent), followed by New York-New Jersey (70 percent). In the Southern (DE-MD-VA-NC) Recovery Unit, net growth between 1989 and 2009 was 52 percent, but almost all of this increase occurred in two years, 2003 to 2005. The eastern Canada population fluctuated from year to year, with increases often quickly eroded in subsequent years; net growth between 1989 and 2009 was 8 percent.

The overall population growth pattern was tempered by periodic rapid declines in the Southern and Eastern Canada Recovery Units. The eastern Canada population decreased 21 percent in just three years (2002 to 2005), and the population in the southern half of the Southern Recovery Unit declined 68 percent in seven years (1995 to 2001). The recent 64 percent decline in the Maine population, from 66 pairs in 2002 to 24 pairs in 2008, following only a few years of decreased productivity, provides another example of the continuing risk of rapid and precipitous reversals in population growth.

Status and distribution

Nonbreeding (migrating and wintering) Range

Piping plovers spend up to 10 months of their life cycle on their migration and winter grounds, generally July 15 through as late as May 15. Piping plover migration routes and habitats overlap breeding and wintering habitats, and, unless banded, migrants passing through a site usually are indistinguishable from breeding or wintering piping plovers. Migration stopovers by banded piping plovers from the Great Lakes have been documented in New Jersey, Maryland, Virginia, and North Carolina (Stucker and Cuthbert 2006). Migrating breeders from eastern Canada have been observed in Massachusetts, New Jersey, New York, and North Carolina (Amirault et al. 2005). As many as 85 staging piping plovers have been tallied at various sites in the Atlantic breeding range (Perkins 2008 pers. communication), but the composition (e.g., adults that nested nearby and their fledged young of the year versus migrants moving to or from sites farther north), stopover duration, and local movements are unknown. Review of published records of piping plover sightings throughout North America by Pompei and Cuthbert (2004) found more than 3,400 fall and spring stopover records at 1,196 sites. Published reports indicated that piping plovers do not concentrate in large numbers at inland sites and that they seem to stop opportunistically. In most cases, reports of birds at inland sites were single individuals. In general, distance between stopover locations and duration of stopovers throughout the coastal migration range remains poorly understood.

Piping plovers migrate through and winter in coastal areas of the U.S. from North Carolina to Texas and in portions of Mexico and the Caribbean. Four range-wide, mid-winter (late January to early February) population surveys, conducted at five-year intervals starting in 1991, are summarized in Table 3. Total numbers have fluctuated over time, with some areas experiencing increases and others decreases. In 2001, 2,389 piping plovers were located during a winter census, accounting for only 40 percent of the known breeding birds recorded during a breeding census (Ferland and Haig 2002). About 89 percent of birds that are known to winter in the U.S. do so along the Gulf Coast (Texas to Florida), while 8 percent winter along the Atlantic Coast (North Carolina to Florida).

Table 3. Results of the 1991, 1996, 2001, and 2006 International Piping Plover Winter Censuses (Haig et al. 2005, Elliott-Smith et al. 2009).

Location	1991	1996	2001	2006
Virginia	not surveyed (NS)	NS	NS	1
North Carolina	20	50	87	84
South Carolina	51	78	78	100
Georgia	37	124	111	212
Florida	551	375	416	454
-Atlantic	*70*	*31*	*111*	*133*
-Gulf	*481*	*344*	*305*	*321*
Alabama	12	31	30	29
Mississippi	59	27	18	78
Louisiana	750	398	511	226
Texas	1,904	1,333	1,042	2,090
Puerto Rico	0	0	6	NS
U.S. Total	3,384	2,416	2,299	3,355
Mexico	27	16	NS	76
Bahamas	29	17	35	417
Cuba	11	66	55	89
Other Caribbean Islands	0	0	0	28
GRAND TOTAL	3,451	2,515	2,389	3,884
Percent of Total International Piping Plover Breeding Census	62.9%	42.4%	40.2%	48.2%

Regional and local fluctuations may reflect the quantity and quality of suitable foraging and roosting habitat, which vary over time in response to natural coastal formation processes as well as anthropogenic habitat changes (e.g., inlet relocation, dredging of shoals and spits). See, for example, discussions of survey number changes in Mississippi, Louisiana, and Texas by Winstead, Baka, and Cobb, respectively, *in* Elliott-Smith et al. (2009). Fluctuations may also represent localized weather conditions (especially wind) during surveys, or unequal survey coverage. For example, airboats facilitated first-time surveys of several central Texas sites in 2006 (Cobb *in* Elliott-Smith et al. 2009). Similarly, the increase in the 2006 numbers in the Bahamas is attributed to greatly increased census efforts; the extent of additional habitat not surveyed remains undetermined (Maddock and Wardle *in* Elliott-Smith et al. 2009). Changes in wintering numbers may also be influenced by growth or decline in the particular breeding populations that concentrate their wintering distribution in a given area. Major opportunities to locate previously unidentified wintering sites are concentrated in the Caribbean and Mexico (see pertinent sections in Elliott-Smith et al. 2009). Further surveys and assessment of seasonally emergent habitats (e.g., sea grass beds, mudflats, oyster reefs) within bays lying between the mainland and barrier islands in Texas are also needed.

Mid-winter surveys may substantially underestimate the abundance of nonbreeding piping plovers using a site or region during other months. In late September 2007, 104 piping plovers were counted at the south end of Ocracoke Island, North Carolina (NPS 2007), where none were seen during the 2006 International Piping Plover Winter Census (Elliott-Smith et al. 2009). Noel et al. (2007) observed up to 100 piping plovers during peak migration at Little St. Simons Island, Georgia, where approximately 40 piping plovers wintered in 2003 to 2005. Differences among fall, winter, and spring counts in South Carolina were less pronounced, but inter-year fluctuations (e.g., 108 piping plovers in spring 2007 versus 174 piping plovers in spring 2008) at 28 sites were striking (Maddock et al. 2009). Even as far south as the Florida Panhandle, monthly counts at Phipps Preserve in Franklin County ranged from a mid-winter low of four piping plovers in December 2006 to peak counts of 47 in October 2006 and March 2007 (Smith 2007). Pinkston (2004) observed much heavier use of Texas Gulf Coast (ocean-facing) beaches between early September and mid-October (approximately 16 birds per mile) than during December to March (approximately two birds per mile).

Local movements of nonbreeding piping plovers may also affect abundance estimates. At Deveaux Bank, one of South Carolina's most important piping plover sites, five counts at approximately 10-day intervals between August 27 and October 7, 2006, oscillated from 28 to 14 to 29 to 18 to 26 (Maddock et al. 2009). Noel and Chandler (2008) detected banded Great Lakes piping plovers known to be wintering on their Georgia study site in 73.8 ± 8.1 percent of surveys over three years.

Abundance estimates for nonbreeding piping plovers may also be affected by the number of surveyor visits to the site. Preliminary analysis of detection rates by Maddock et al. (2009) found 87 percent detection during the mid-winter period on core sites surveyed three times a month during fall and spring and one time per month during winter, compared with 42 percent detection on sites surveyed three times per year (Cohen 2009 pers. communication).

Gratto-Trevor et al. (2009; Figure 7) found strong patterns (but no exclusive partitioning) in winter distribution of uniquely banded piping plovers from four breeding populations. All eastern Canada and 94 percent of Great Lakes birds wintered from North Carolina to southwest Florida. However, eastern Canada birds were more heavily concentrated in North Carolina, and a larger proportion of Great Lakes piping plovers were found in South Carolina and Georgia. Northern Great Plains populations were primarily seen farther west and south, especially on the Texas Gulf Coast. Although the great majority of Prairie Canada individuals were observed in Texas, particularly southern Texas, individuals from the U.S. Great Plains were more widely distributed on the Gulf Coast from Florida to Texas.

The findings of Gratto-Trevor et al. (2009) provide evidence of differences in the wintering distribution of piping plovers from these four breeding areas. However, the distribution of birds by breeding origin during migration remains largely unknown. Other major information gaps include the wintering locations of the U.S. Atlantic Coast breeding population (banding of U.S. Atlantic Coast piping plovers has been extremely limited) and the breeding origin of piping plovers wintering on the Caribbean islands and in much of Mexico. Banded piping plovers from the Great Lakes, Northern Great Plains, and eastern Canada breeding populations showed similar patterns of seasonal abundance at Little St. Simons Island, Georgia (Noel et al. 2007). However, the number of banded plovers originating from the latter two populations was relatively small at this study area.

This species exhibits a high degree of intra- and inter-annual wintering site fidelity (Nicholls and Baldassarre 1990a; Drake et al. 2001; Noel et al. 2005; Stucker and Cuthbert 2006). Gratto-Trevor et al. (2009) reported that six of 259 banded piping plovers observed more than once per winter moved across boundaries of the seven U.S. regions. Of 216 birds observed in different years, only eight changed regions between years, and several of these shifts were associated with late summer or early spring migration periods (Gratto-Trevor et al. 2009; Figure 7).
Local movements are more common. In South Carolina, Maddock et al. (2009) documented many cross-inlet movements by wintering banded piping plovers as well as occasional movements of up to 18 km (11 miles) by approximately 10 percent of the banded population; larger movements within South Carolina were seen during fall and spring migration. Similarly, eight banded piping plovers that were observed in two locations during 2006-2007 surveys in Louisiana and Texas were all in close

proximity to their original location, such as on the bay and ocean side of the same island or on adjoining islands (Maddock 2008).

The 2004 and 2005 hurricane seasons affected a substantial amount of habitat along the Gulf Coast. Habitats such as those along Gulf Islands National Seashore have benefited from increased washover events, which created optimal habitat conditions for piping plovers. Conversely, hard shoreline structures put into place following storms throughout the species range to prevent such shoreline migration prevent habitat creation. Four hurricanes between 2002 and 2005 are often cited in reference to rapid erosion of the Chandeleur Islands, a chain of low-lying islands in Louisiana where the 1991 IPPC tallied more than 350 piping plovers. Those same storms, however, created habitats such as over-wash fans and sand spits on barrier islands and headlands in other portions of Louisiana. (See the Storm events section below for more details on their effects to habitat.)

The Service is aware of the following site-specific conditions that benefit several habitats piping plover use while wintering and migrating, including critical habitat units. In Texas, one critical habitat unit was afforded greater protection due to the acquisition of adjacent upland properties by the local Audubon chapter. In another unit in Texas, vehicles were removed from a portion of the beach decreasing the likelihood of automobile disturbance to plovers. Exotic plant removal that threatens to invade suitable piping plover habitat is occurring in a critical habitat unit in South Florida. The Service and other government agencies remain in a contractual agreement with the U.S. Department of Agriculture (USDA) for predator control within limited coastal areas in the Florida panhandle, including portions of some critical habitat units. Continued removal of potential terrestrial predators is likely to enhance survivorship of wintering and migrating piping plovers. In North Carolina, one critical habitat unit was afforded greater protection when the local Audubon chapter agreed to manage the area specifically for piping plovers and other shorebirds following the relocation of the nearby inlet channel.

Recovery criteria

Northern Great Plains Population (Service 1988, 1994)

1. Increase the number of birds in the U.S. northern Great Plains states to 2,300 pairs (Service 1994).
2. Increase the number of birds in the prairie region of Canada to 2,500 adult piping plovers (Service 1988).
3. Secure long term protection of essential breeding and wintering habitat (Service 1994).

Great Lakes Population (Service 2003)

1. At least 150 pairs (300 individuals), for at least 5 consecutive years, with at least 100 breeding pairs (200 individuals) in Michigan and 50 breeding pairs (100 individuals) distributed among sites in other Great Lakes states.
2. Five-year average fecundity within the range of 1.5-2.0 fledglings per pair, per year, across the breeding distribution, and ten-year population projections indicate the population is stable or continuing to grow above the recovery goal.
3. Protection and long-term maintenance of essential breeding and wintering habitat is ensured, sufficient in quantity, quality, and distribution to support the recovery goal of 150 pairs (300 individuals).
4. Genetic diversity within the population is deemed adequate for population persistence and can be maintained over the long-term.

5. Agreements and funding mechanisms are in place for long-term protection and management activities in essential breeding and wintering habitat.

Atlantic Coast Population (Service 1996)

1. Increase and maintain for 5 years a total of 2,000 breeding pairs, distributed among 4 recovery units.

Recovery Unit	Minimum Subpopulation
Atlantic (eastern) Canada	400 pairs
New England	625 pairs
New York-New Jersey	575 pairs
Southern (DE-MD-VA-NC)	400 pairs

2. Verify the adequacy of a 2,000 pair population of piping plovers to maintain heterozygosity and allelic diversity over the long term.
3. Achieve a 5-year average productivity of 1.5 fledged chicks per pair in each of the 4 recovery units described in criterion 1, based on data from sites that collectively support at least 90 percent of the recover unit's population.
4. Institute long-term agreements to assure protection and management sufficient to maintain the population targets and average productivity in each recovery unit.
5. Ensure long-term maintenance of wintering habitat, sufficient in quantity, quality, and distribution to maintain survival rates for a 2,000-pair population.

Threats to piping plovers/critical habitat

In the following sections, we provide an analysis of threats to piping plovers in their migration and wintering range. We update information obtained since the 1985 listing rule, the 1991 and 2009 status reviews, and the three breeding population recovery plans. Both previously identified and new threats are discussed. With minor exceptions, this analysis is focused on threats to piping plovers within the continental U.S. portion of their migration and wintering range. Threats in the Caribbean and Mexico remain largely unknown.

Present or threatened destruction, modification, or curtailment of its habitat or range

The status of piping plovers on winter and migration grounds is difficult to assess, but threats to piping plover habitat used during winter and migration (identified by the Service during its designation of critical habitat) continue to affect the species. Unregulated motorized and pedestrian recreational use, inlet and shoreline stabilization projects, beach maintenance and nourishment, and pollution affect most winter and migration areas. Conservation efforts at some locations have likely resulted in the enhancement of wintering habitat.

The 1985 final listing rule stated that the number of piping plovers on the Gulf of Mexico coastal wintering grounds might be declining as indicated by preliminary analysis of Christmas Bird Count data. Independent counts of piping plovers on the Alabama coast indicated a decline in numbers between the 1950s and early 1980s. At the time of listing, the Texas Parks and Wildlife Department stated that 30 percent of wintering habitat in Texas had been lost over the previous 20 years. The final rule also stated that in addition to extensive breeding area problems, the loss and modification of wintering habitat was a significant threat to the piping plover.

The three recovery plans state that shoreline development throughout the wintering range poses a threat to all populations of piping plovers. The plans further state that beach maintenance and nourishment, inlet dredging, and artificial structures, such as jetties and groins, could eliminate wintering areas and alter sedimentation patterns leading to the loss of nearby habitat. Priority 1 actions in the 1996 Atlantic Coast and 2003 Great Lakes Recovery Plans identify tasks to protect natural processes that maintain coastal ecosystems and quality wintering piping plover habitat and to protect wintering habitat from shoreline stabilization and navigation projects. The 1988 Northern Great Plains Recovery Plan states that, as winter habitat is identified, current and potential threats to each site should be determined.

Important components of ecologically sound barrier beach management include perpetuation of natural dynamic coastal formation processes. Structural development along the shoreline or manipulation of natural inlets upsets the dynamic processes and results in habitat loss or degradation (Melvin et al. 1991). Throughout the range of migrating and wintering piping plovers, inlet and shoreline stabilization, inlet dredging, beach maintenance and nourishment activities, and seawall installations continue to constrain natural coastal processes. Dredging of inlets can affect spit formation adjacent to inlets and directly remove or affect ebb and flood tidal shoal formation. Jetties, which stabilize an island, cause island widening and subsequent growth of vegetation on inlet shores. Seawalls restrict natural island movement and exacerbate erosion. As discussed in more detail below, all these efforts result in loss of piping plover habitat. Construction of these projects during months when piping plovers are present also causes disturbance that disrupts the birds' foraging efficiency and hinders their ability to build fat reserves over the winter and in preparation for migration, as well as their recuperation from migratory flights. Additional investigation is needed to determine the extent to which these factors cumulatively affect piping plover survival and how they may impede conservation efforts for the species.

Any assessment of threats to piping plovers from loss and degradation of habitat must recognize that up to 24 shorebird species migrate or winter along the Atlantic Coast and almost 40 species of shorebirds are present during migration and wintering periods in the Gulf of Mexico region (Helmers 1992). Continual degradation and loss of habitats used by wintering and migrating shorebirds may cause an increase in intra-specific and inter-specific competition for remaining food supplies and roosting habitats. In Florida, for example, approximately 825 miles of coastline and parallel bayside flats (unspecified amount) were present prior to the advent of high human densities and beach stabilization projects. We estimate that only about 35 percent of the Florida coastline continues to support natural coastal formation processes, thereby concentrating foraging and roosting opportunities for all shorebird species and forcing some individuals into suboptimal habitats. Thus, intra- and inter-specific competition most likely exacerbates threats from habitat loss and degradation.

Sand placement projects

In the wake of episodic storm events, managers of lands under public, private, and county ownership often protect coastal structures using emergency storm berms; this is frequently followed by beach nourishment or renourishment activities (nourishment projects are considered "soft" stabilization versus "hard" stabilization such as seawalls). Berm placement and beach nourishment deposit substantial amounts of sand along Gulf of Mexico and Atlantic beaches to protect local property in anticipation of preventing erosion and what otherwise will be considered natural processes of over-wash and island migration (Schmitt and Haines 2003). On unpopulated islands, the addition of sand and creation of marsh are sometimes used to counteract the loss of roosting and nesting habitat for shorebirds and wading birds as a result of erosional storm events.

Past and ongoing stabilization projects may fundamentally alter the naturally dynamic coastal processes that create and maintain beach strand and bayside habitats, including those habitat components that piping plovers rely upon. Although impacts may vary depending on a range of factors, stabilization projects may directly degrade or destroy piping plover roosting and foraging habitat in several ways. Front beach habitat may be used to construct an artificial berm that is densely planted in grass, which can directly reduce the availability of roosting habitat. Over time, if the beach narrows due to erosion, additional roosting habitat between the berm and the water can be lost. Berms can also prevent or reduce the natural over-wash that creates roosting habitats by converting vegetated areas to open sand areas. The vegetation growth caused by impeding natural over-wash can also reduce the maintenance and creation of bayside intertidal feeding habitats. In addition, stabilization projects may indirectly encourage further development of coastal areas and increase the threat of disturbance.

At least 668 of 2,340 coastal shoreline miles (29 percent of beaches throughout the piping plover winter and migration range in the U.S.) are bermed, nourished, or renourished, generally for recreational purposes and to protect commercial and private infrastructure (Table 4, next page). However, only approximately 54 miles or 2.31 percent of these impacts have occurred within critical habitat.

Table 4. Summary of the extent of nourished beaches in piping plover wintering and migrating habitat within the conterminous United States. Data extracted from Service unpublished data (project files, gray literature, and field observations) as of 2009.

State	**Sandy beach shoreline miles available**	**Sandy beach shoreline miles nourished to date (within CH[g] units)**	**Percent of sandy beach shoreline affected (within CH[g] units)**
North Carolina	301[a]	117[e] (unknown)	39 (unknown)
South Carolina	187[a]	56 (0.6)	30 (0.32))
Georgia	100[a]	8 (0.4)	8 (0.40)
Florida	825[b]	404 (6)[f]	49 (0.72)
Alabama	53[a]	12 (2)	23 (3.77)
Mississippi	110[c]	$\geq$6 (0)	5 (0)
Louisiana	397[a]	Unquantified (generally restoration-oriented)	Unknown
Texas	367[d]	65 (45)	18 (12.26)
Overall Total	2,340 (does not include Louisiana)	$\geq$668 does not include Louisiana (54 in CH)	29% ($\geq$2.31% in CH)

(a) Data from www.50states.com; (b) Clark 1993; (c) N. Winstead, Mississippi Museum of Natural Science, in lit. 2008; (d) www.Surfrider.org; (e) H. Hall, Service, pers. comm. 2009; (f) Partial data from Lott et al. (2007 in review); (g) CH = critical habitat.

In Louisiana, the sustainability of the coastal ecosystem is threatened by the inability of the barrier islands to maintain geomorphologic functionality (Corps 2011). Consequently, most of the planned sediment placement projects are conducted as environmental restoration projects by various Federal and State agencies because without the sediment many areas would erode below sea level since the Louisiana coastal systems are starved for sediment sources. Agencies conducting coastal restoration projects aim to design projects that mimic the natural existing elevations of coastal habitats (e.g., beach, dune, and marsh) in order to allow their projects to work within and be sustained by the natural ecosystem processes that maintain those coastal habitats. Due to the low elevation of barrier islands and coastal headlands, placement of additional sediment in those areas generally does not reach an elevation that would prevent the formation of washover areas or impede natural coastal processes, especially during storm events. Such careful design of these restoration projects allows daily tidal processes or storm events to re-work the sediments to reform the Gulf/beach interface and create washover areas, sand flats, and mud flats on the bay-side of the islands, as well as sand spits on the ends of the islands; thus, the added sediment aids in sustaining the barrier island system.

Sediment placement also temporarily affects the benthic fauna found in intertidal systems by covering them with a layer of sediment. Some benthic species can burrow through a thin layer (varies from 15 to 35 inches for different species) of additional sediment since they are adapted to the turbulent environment of the intertidal zone; however, thicker layers (i.e., greater than 40 inches) of sediment are likely to smother the benthic fauna (Greene 2002). Various studies of such effects indicate that the recovery of benthic fauna after beach renourishment or sediment placement can take anywhere from 6 months to 2 years (Rakocinski et al. 1996; Peterson et al. 2000; Peterson et al. 2006). Such delayed recovery of benthic prey species temporarily affects the quality of piping plover foraging habitat.

Inlet stabilization/relocation

Many navigable mainland or barrier island tidal inlets along the Atlantic and Gulf of Mexico coasts are stabilized with jetties, groins, or by seawalls and/or adjacent industrial or residential development. Jetties are structures built perpendicular to the shoreline that extend through the entire nearshore zone and past the breaker zone to prevent or decrease sand deposition in the channel (Hayes and Michel 2008). Inlet stabilization with rock jetties and associated channel dredging for navigation alter the dynamics of long-shore sediment transport and affect the location and movement rate of barrier islands (Camfield and Holmes 1995), typically causing down-drift erosion. Sediment is then dredged and added back to the islands which are subsequently widened. Once the island becomes stabilized, vegetation encroaches on the bayside habitat, thereby diminishing and eventually destroying its value to piping plovers. Accelerated erosion may compound future habitat loss, depending on the degree of sea-level rise. Unstabilized inlets naturally migrate, re-forming important habitat components, whereas jetties often trap sand and cause significant erosion of the down-drift shoreline. These combined actions affect the availability of piping plover habitat (Cohen et al. 2008b).

Using Google Earth© (accessed April 2009), Service biologists visually estimated the number of navigable mainland or barrier island tidal inlets throughout the wintering range of the piping plover in the conterminous U.S. that have some form of hardened structure. This includes seawalls or adjacent development, which lock the inlets in place (Table 5).

[*This area is intentionally left blank.*]

Table 5. Visually estimated numbers of navigable mainland and barrier island inlets and hardened inlets by state.

State	Number of navigable mainland and barrier island inlets	Number of hardened inlets	Percent of inlets affected
North Carolina	20	2.5*	12.5%
South Carolina	34	3.5*	10.3%
Georgia	26	2	7.7%
Florida	82	41	50%
Alabama	14	6	42.9%
Mississippi	16	7	43.8%
Louisiana	40	9	22.5%
Texas	17	10	58.8%
Overall Total	249	81	32.5%

*An inlet at the state line is considered to be half an inlet counted in each state.

Tidal inlet relocation can cause loss and/or degradation of piping plover habitat; although less permanent than construction of hard structures, effects can persist for years. For example, a project on Kiawah Island, South Carolina, degraded one of the most important piping plover habitats in the State by reducing the size and physical characteristics of an active foraging site, changing the composition of the benthic community, decreasing the tidal lag in an adjacent tidal lagoon, and decreasing the exposure time of the associated sand flats (Service and Town of Kiawah Island 2006). In 2006, pre-project piping plover numbers in the project area recorded during four surveys conducted at low tide averaged 13.5 piping plovers. This contrasts with a post-project average of 7.1 plovers during eight surveys (four in 2007 and four in 2008) conducted during the same months (Service and Town of Kiawah Island 2006), indicating that habitat quality was reduced. Service biologists are aware of at least seven inlet relocation projects (two in North Carolina, three in South Carolina, two in Florida), but this number likely under-represents the extent of this activity.

Sand mining/dredging

Sand mining, the practice of extracting (dredging) sand from sand bars, shoals, and inlets in the nearshore zone, is a less expensive source of sand than obtaining sand from offshore shoals for beach nourishment. Sand bars and shoals are sand sources that move onshore over time and act as natural breakwaters. Inlet dredging reduces the formation of exposed ebb and flood tidal shoals considered to be primary or optimal piping plover roosting and foraging habitat. Removing these sand sources can alter depth contours and change wave refraction as well as cause localized erosion (Hayes and Michel 2008). Exposed shoals and sandbars are also valuable to piping plovers, as they tend to receive less human recreational use (because they are only accessible by boat) and therefore provide relatively less disturbed habitats for birds. We do not have a good estimate of the amount of sand mining that occurs across the piping plover wintering range, nor do we have a good estimate of the number of inlet dredging projects that occur. This number is likely greater than the number of total jettied inlets shown in Table 5, since most jettied inlets need maintenance dredging, but non-hardened inlets are often dredged as well.

Groins

Groins (structures made of concrete, rip rap, wood, or metal built perpendicular to the beach in order to trap sand) are typically found on developed beaches with severe erosion. Although groins can be individual structures, they are often clustered along the shoreline. Groins can act as barriers to long-shore sand transport and cause down-drift erosion (Hayes and Michel 2008), which prevents piping plover habitat creation by limiting sediment deposition and accretion. These structures are found throughout the southeastern Atlantic Coast, and although most were in place prior to the piping plover's 1986 listing under the Act, installation of new groins continues to occur.

Seawalls and revetments

Seawalls and revetments are vertical hard structures built parallel to the beach in front of buildings, roads, and other facilities to protect them from erosion. However, these structures often accelerate erosion by causing scouring in front of and down-drift from the structure (Hayes and Michel 2008), which can eliminate intertidal foraging habitat and adjacent roosting habitat. Physical characteristics that determine microhabitats and biological communities can be altered after installation of a seawall or revetment, thereby depleting or changing composition of benthic communities that serve as the prey base for piping plovers. At four California study sites, each comprised of an unarmored segment and a segment seaward of a seawall, Dugan and Hubbard (2006) found that armored segments had narrower intertidal zones, smaller standing crops of macrophyte wrack, and lower shorebird abundance and species richness. Geotubes (long cylindrical bags made of high-strength permeable fabric and filled with sand) are softer alternatives, but act as barriers by preventing over-wash. We did not find any sources that summarize the linear extent of seawall, revetment, and geotube installation projects that have occurred across the piping plover's wintering and migration habitat.

Exotic/invasive vegetation

A recently identified threat to piping plover habitat, not described in the listing rule or recovery plans, is the spread of coastal invasive plants into suitable piping plover habitat. Like most invasive species, coastal exotic plants reproduce and spread quickly and exhibit dense growth habits, often outcompeting native plant species. If left uncontrolled, invasive plants cause a habitat shift from open or sparsely vegetated sand to dense vegetation, resulting in the loss or degradation of piping plover roosting habitat, which is especially important during high tides and migration periods.

Beach vitex (*Vitex rotundifolia*) is a woody vine introduced into the southeastern U.S. as a dune stabilization and ornamental plant (Westbrooks and Madsen 2006). It currently occupies a very small percentage of its potential range in the U.S.; however, it is expected to grow well in coastal communities throughout the southeastern U.S. from Virginia to Florida, and west to Texas (Westbrooks and Madsen 2006). In 2003, the plant was documented in New Hanover, Pender, and Onslow counties in North Carolina, and at 125 sites in Horry, Georgetown, and Charleston counties in South Carolina. One Chesapeake Bay site in Virginia was eradicated, and another site on Jekyll Island, Georgia, is about 95 percent controlled (Suiter 2009 pers. communication). Beach vitex has been documented from two locations in northwest Florida, but one site disappeared after erosional storm events. The landowner of the other site has indicated an intention to eradicate the plant, but follow through is unknown (Farley 2009 pers. communication). The task forces formed in North and South Carolina in 2004 and 2005 have made great strides to remove this plant from their coasts. To date, about 200 sites in North Carolina have been treated, with 200 additional sites in need of treatment. Similar efforts are underway in South Carolina.

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

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

<u>Wrack removal and beach cleaning</u>

Wrack on beaches and baysides provides important foraging and roosting habitat for piping plovers (Drake 1999a; Smith 2007; Maddock et al. 2009; Lott et al. 2009) and many other shorebirds on their winter, breeding, and migration grounds. Because shorebird numbers are positively correlated with wrack cover and biomass of their invertebrate prey that feed on wrack (Tarr and Tarr 1987; Hubbard and Dugan 2003; Dugan et al. 2003), beach grooming will lower bird numbers (Defeo et al. 2009).

There is increasing popularity along developed beaches in the Southeast, especially in Florida, for beach communities to carry out “beach cleaning” and “beach raking” actions. Beach cleaning occurs on private beaches, where piping plover use is not well documented, and on some municipal or county beaches that are used by piping plovers. Most wrack removal on state and federal lands is limited to post-storm cleanup and does not occur regularly.

Man-made beach cleaning and raking machines effectively remove seaweed, fish, glass, syringes, plastic, cans, cigarettes, shells, stone, wood, and virtually any unwanted debris (Barber Beach Cleaning Equipment 2009). These efforts remove accumulated wrack, topographic depressions, and sparse vegetation nodes used by roosting and foraging piping plovers. Removal of wrack also eliminates a beach’s natural sand-trapping abilities, further destabilizing the beach. In addition, sand adhering to seaweed and trapped in the cracks and crevices of wrack is removed from the beach. Although the amount of sand lost due to single sweeping actions may be small, it adds up considerably over a period of years (Nordstrom et al. 2006; Neal et al. 2007). Beach cleaning or grooming can result in abnormally broad unvegetated zones that are inhospitable to dune formation or plant colonization, thereby enhancing the likelihood of erosion (Defeo et al. 2009).

Currently, the Florida Department of Environmental Protection’s Beaches and Coastal Management Systems section has issued 117 permits for beach raking or cleaning to multiple entities. We estimate that 240 of 825 miles (29 percent) of sandy beach shoreline in Florida are cleaned or raked on various schedules (i.e., daily, weekly, monthly) (FDEP 2008). Service biologists estimate that South Carolina mechanically cleans approximately 34 of its 187 shoreline miles (18 percent), and Texas mechanically cleans approximately 20 of its 367 shoreline miles (5.4 percent). In Louisiana, beach raking occasionally occurs on Grand Isle (the state’s only inhabited island) along approximately 8 miles of shoreline, roughly 2 percent of the state’s 397 sandy shoreline miles. We are not aware of what percentage of mechanical cleaning occurs elsewhere in piping plover critical habitat.

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

Disease

Neither the final listing rule nor the recovery plans state that disease is an issue for the species, and no plan assigns recovery actions to this threat factor. Based on information available to date, West Nile virus and avian influenza are a minor threat to piping plovers (Service 2009a).

Predation

The impact of predation on migrating or wintering piping plovers remains largely undocumented. Except for one incident reported in 2007 by the New York Times involving a cat in Texas, no depredation of piping plovers during winter or migration has been noted, although it would be difficult to document. Avian and mammalian predators are common throughout the species' wintering range. Predatory birds are relatively common during fall and spring migration, and it is possible that raptors occasionally take piping plovers (Drake et al. 2001). It has been noted, however, that the behavioral response of crouching when in the presence of avian predators may minimize avian predation on piping plovers (Morrier and McNeil 1991; Drake 1999a; Drake et al. 2001).

The 1996 Atlantic Coast Recovery Plan summarized evidence that human activities affect types, numbers, and activity patterns of some predators, thereby exacerbating natural predation on breeding piping plovers. Nonbreeding piping plovers may reap some collateral benefits from predator management conducted for the primary benefit of other species. In 1997, the USDA implemented a public lands predator control partnership in northwest Florida that included the Department of Defense, National Park Service (NPS), the State of Florida (state park lands) and Service (National Wildlife Refuges and Ecological Services). The program continues with all partners except Florida – in 2008, lack of funding precluded inclusion of Florida state lands (although Florida Department of Environmental Protection staff conduct occasional predator trapping on state lands, trapping is not implemented consistently).

The NPS and individual state park staff in North Carolina participate in predator control programs (Rabon 2009 pers. communication). The Service issued permit conditions for raccoon eradication to Indian River County staff in Florida as part of a coastal Habitat Conservation Plan (Adams 2009 pers. communication). Destruction of turtle nests by dogs or coyotes in the Indian River area justified the need to amend the permit to include an education program targeting dog owners regarding the appropriate means to reduce impacts to coastal species caused by their pets. The Service partnered with Texas Audubon and the Coastal Bend Bays and Estuaries Program in Texas to implement predator control efforts on colonial waterbird nesting islands (Cobb 2009 pers. communication). Some of these predator control programs may provide very limited protection to piping plovers, should they use these areas for roosting or foraging. Table 6 summarizes predator control actions on a state-by-state basis. The Service is not aware of any current predator control programs targeting protection of coastal species in Georgia, Alabama, Mississippi, or Louisiana.

Regarding predation, the magnitude of this threat to nonbreeding piping plovers remains unknown, but given the pervasive, persistent, and serious impacts of predation on other coastal reliant species, it remains a potential threat. Focused research to confirm impacts as well as to ascertain effectiveness of predator control programs may be warranted, especially in areas frequented by Great Lakes birds during migration and wintering months. We consider predator control on their wintering and migration grounds to be a low priority at this time.[6]

Table 6. Summary of predator control programs that may benefit piping plovers on winter and migration grounds (as of 2009).

State	Entities with Predator Control Programs
North Carolina	State Parks, Cape Lookout and Cape Hatteras National Seashores.
South Carolina	As needed throughout the state, targets raccoons and coyotes.
Georgia	No programs known.
Florida	Merritt Island NWR, Cape Canaveral AFS, Indian River County, Eglin AFB, Gulf Islands NS, northwest Florida state parks (up until 2008), St. Vincent NWR, Tyndall AFB.
Alabama	Late 1990's Gulf State Park and Orange Beach for beach mice, no current programs known.
Mississippi	No programs known.
Louisiana	No programs known.
Texas	Aransas NWR (hog control for habitat protection), Audubon (mammalian predator control on colonial waterbird islands that have occasional piping plover use).

Disturbance

Disturbance (i.e., human and pet presence that alters bird behavior) disrupts piping plovers as well as other shorebird species. Intense human disturbance in shorebird winter habitat can be functionally equivalent to habitat loss if the disturbance prevents birds from using an area for a significant amount of time (Goss-Custard et al. 1996), which can lead to roost abandonment and local population declines (Burton et al. 1996). Pfister et al. (1992) implicate anthropogenic disturbance as a factor in the long-term decline of migrating shorebirds at staging areas. Disturbance can also cause shorebirds to spend less time roosting or foraging and more time in alert postures or fleeing from the disturbances (Johnson and Baldassarre 1988; Burger 1991; Burger 1994; Elliott and Teas 1996; Lafferty 2001a, 2001b; Thomas et al. 2002), which limits the local abundance of piping plovers (Zonick and Ryan 1995; Zonick 2000). Shorebirds that are repeatedly flushed in response to disturbance expend energy on costly short flights (Nudds and Bryant 2000) and may not feed enough to support migration and/or subsequent breeding efforts (Puttick 1979; Lafferty 2001b).

Elliott and Teas (1996) found a significant difference in actions between piping plovers encountering pedestrians and those not encountering pedestrians. Piping plovers encountering pedestrians spend proportionately more time in non-foraging behavior. This study suggests that interactions with pedestrians on beaches cause birds to shift their activities from calorie acquisition to calorie expenditure. In wintering and migration sites, human disturbance continues to decrease the amount of undisturbed habitat and appears to limit local piping plover abundance (Zonick and Ryan 1995).

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[6] The threat of direct predation should be distinguished from the threat of disturbance to roosting and feeding piping plovers posed by dogs off leash.

Shorebirds are more likely to flush from the presence of dogs than people, and birds react to dogs from farther distances than people (Lafferty 2001a, 2001b; Thomas et al. 2002). Dogs off leash are more likely to flush piping plovers from farther distances than are dogs on leash; nonetheless, dogs both on and off leashes disturb piping plovers (Hoopes 1993). Pedestrians walking with dogs often go through flocks of foraging and roosting shorebirds; some even encourage their dogs to chase birds.

Off-road vehicles can significantly degrade piping plover habitat (Wheeler 1979) or disrupt the birds' normal behavior patterns (Zonick 2000). The 1996 Atlantic Coast Recovery Plan cites tire ruts crushing wrack into the sand, making it unavailable as cover or as foraging substrate (Hoopes 1993; Goldin 1993). The plan also notes that the magnitude of the threat from off-road vehicles is particularly significant, because vehicles extend impacts to remote stretches of beach where human disturbance will otherwise be very slight. Godfrey et al. (1978, 1980 as cited *in* Lamont et al. 1997) postulated that vehicular traffic along the beach may compact the substrate and kill marine invertebrates that are food for the piping plover. Zonick (2000) found that the density of off-road vehicles negatively correlated with abundance of roosting piping plovers on the ocean beach. Cohen et al. (2008a) found that radio-tagged piping plovers using ocean beach habitat at Oregon Inlet in North Carolina were far less likely to use the north side of the inlet where off-road vehicle use is allowed, and recommended controlled management experiments to determine if recreational disturbance drives roost site selection. Ninety-six percent of piping plover detections was on the south side of the inlet even though it was farther away from foraging sites (1.8 km from the sound side foraging site to the north side of the inlet versus 0.4 km from the sound side foraging site to the north side of the inlet (Cohen et al. 2008a).

Based on surveys with land managers and biologists, knowledge of local site conditions, and other information, the Service has estimated the levels of eight types of disturbance at sites in the U.S. with wintering piping plovers. Table 7 summarizes the disturbance analysis results (Service 2009b). Data are not available on human disturbance at wintering sites in the Bahamas, other Caribbean countries, or Mexico. There are few areas used by wintering piping plovers that are devoid of human presence, and just under half have leashed and unleashed dog presence (Smith 2007; Lott et al. 2009, Service unpublished data 2009; Maddock and Bimbi unpublished data).

Table 7. Percent of known piping plover winter and migration habitat locations, by state, where various types of anthropogenic disturbance have been reported.

	Percent by State							
Disturbance Type	AL	FL	GA	LA	MS	NC	SC	TX
Pedestrians	67	92	94	25	100	100	88	54
Dogs on leash	67	69	31	25	73	94	25	25
Dogs off leash	67	81	19	25	73	94	66	46
Bikes	0	19	63	25	0	0	28	19
ATVs[a]	0	35	0	25	0	17	25	30
ORVs[b]	0	21	0	25	0	50	31	38
Boats	33	65	100	100	0	78	63	44
Kite surfing	0	10	0	0	0	33	0	0

(a) ATV = all-terrain vehicle; (b) ORV = off-road vehicle

Although the timing, frequency, and duration of human and dog presence throughout the wintering range are unknown, studies in Alabama and South Carolina suggest that most disturbances to piping plovers occurs during periods of warmer weather, which coincides with piping plover migration

(Johnson and Baldassarre 1988; Lott et al. 2009; Maddock et al. 2009). Smith (2007) documents varying disturbance levels throughout the nonbreeding season at northwest Florida sites.

LeDee et al. (2010) collected survey responses in 2007 from 35 managers (located in seven states) at sites that were designated as critical habitat for wintering piping plovers. Ownership included federal, state, and local governmental agencies and non-governmental organizations managing national wildlife refuges; national, state, county, and municipal parks; state and estuarine research reserves; state preserves; state wildlife management areas; and other types of managed lands. Of 43 reporting sites, 88 percent allowed public beach access year-round and four sites were closed to the public. Sixty-two percent of site managers reported greater than 10,000 visitors from September through March, and 31 percent reported greater than 100,000 visitors. Restrictions on visitor activities on the beach included automobiles (at 81 percent of sites), all-terrain vehicles (89 percent), and dogs during the winter season (50 percent). Half of the survey respondents reported funding as a primary limitation in managing piping plovers and other threatened and endangered species at their sites. Other limitations included "human resource capacity" (24 percent), conflicting management priorities (12 percent), and lack of research (3 percent).

Disturbance can be addressed by implementing recreational management techniques such as vehicle and pet restrictions and symbolic fencing (usually sign posts and string) of roosting and feeding habitats. In implementing conservation measures, managers need to consider a range of site-specific factors, including the extent and quality of roosting and feeding habitats and the types and intensity of recreational use patterns. In addition, educational materials such as informational signs or brochures can provide valuable information so that the public understands the need for conservation measures.

In summary, although there is some variability among states, disturbance from human activities and pets poses a moderate to high and escalating threat to migrating and wintering piping plovers. Systematic review of recreation policy and beach management across the nonbreeding range will assist in better understanding cumulative impacts. Site-specific analysis and implementation of conservation measures should be a high priority at piping plover sites that have moderate or high levels of disturbance. The Service and state wildlife agencies should increase technical assistance to land managers to implement management strategies and monitor their effectiveness.

Military Actions

Twelve coastal military bases are located in the Southeast. To date, five bases have consulted with the Service under section 7 of the Act, on military activities on beaches and baysides that may affect piping plovers or their habitat (Table 8). Camp Lejeune in North Carolina consulted formally with the Service in 2002 on troop activities, dune stabilization efforts, and recreational use of Onslow Beach. The permit conditions require twice-monthly piping plover surveys and use of buffer zones and work restrictions within buffer zones. Naval Station Mayport in Duval County, Florida, consulted with the Service on Marine Corps training activities that included beach exercises and use of amphibious assault vehicles. The area of impact was not considered optimal for piping plovers, and the consultation was concluded informally. Similar informal consultations have occurred with Tyndall Air Force Base (Bay County) and Eglin Air Force Base (Okaloosa and Santa Rosa counties) in northwest Florida. Both consultations dealt with occasional use of motorized equipment on the beaches and associated baysides. Tyndall Air Force Base has minimal on-the-ground use, and activities, when conducted, occur on the Gulf of Mexico beach, which is not considered the optimal area for piping plovers within this region. Eglin Air Force Base conducts bi-monthly surveys for piping plovers, and habitats consistently documented with piping plover use are posted with avoidance requirements to minimize direct disturbance from troop activities. A 2001 consultation with the Navy for one-time training and retraction operations on Peveto Beach, in Cameron Parish, Louisiana, concluded informally.

Table 8. Military bases that occur within the wintering/migration range of piping plovers and contain piping plover habitat.

State	Coastal Military Bases
North Carolina	Camp Lejeune*
South Carolina	No coastal beach bases
Georgia	Kings Bay Naval Base
Florida	Key West Base, Naval Station Mayport*, Cape Canaveral Air Force Station, Patrick AFB, MacDill AFB, Eglin AFB*, Tyndall AFB*
Alabama	No coastal beach bases
Mississippi	Keesler AFB
Louisiana	No coastal beach bases
Texas	Corpus Christi Naval Air Station

*Bases which conduct activities that may affect piping plovers or their habitat.

Overall, project avoidance and minimization actions currently reduce threats from military activities to wintering and migrating piping plovers to a minimal threat level. However, prior to removal of the piping plover from protection under the Act, Integrated Resource Management Plans or other agreements should clarify if and how a change in legal status would affect plover protections.

Contaminants

Contaminants have the potential to cause direct toxicity to individual birds or negatively affect their invertebrate prey base (Rattner and Ackerson 2008). Depending on the type and degree of contact, contaminants can have lethal and sub-lethal effects on birds, including behavioral impairment, deformities, and impaired reproduction (Rand and Petrocelli 1985; Gilbertson et al. 1991; Hoffman et al. 1996).

The Great Lakes Recovery Plan states that concentration levels of polychlorinated biphenol (PCB) detected in Michigan piping plover eggs have the potential to cause reproductive harm. They further state that analysis of prey available to piping plovers at representative Michigan breeding sites indicated that breeding areas along the upper Great Lakes region are not likely the major source of contaminants to this population.

Petroleum products are the contaminants of primary concern, as opportunities exist for petroleum to pollute intertidal habitats that provide foraging substrate. Impacts to piping plovers from oil spills have been documented throughout their life cycle (Chapman 1984; Service 1996; Burger 1997; Massachusetts Audubon 2003; Amirault-Langlais et al. 2007; Amos 2009 pers. communication). This threat persists due to the high volume of shipping vessels (from which most documented spills have originated) traveling offshore and within connected bays along the Atlantic Coast and the Gulf of Mexico. Additional risks exist for leaks or spills from offshore oil rigs, associated undersea pipelines, and onshore facilities such as petroleum refineries and petrochemical plants. Beach-stranded 55-gallon barrels and smaller containers, which may fall from moving cargo ships or offshore rigs and are not uncommon on the Texas coast, contain primarily oil products (gasoline or diesel), as well as other chemicals such as methanol, paint, organochlorine pesticides, and detergents (Lee 2009 pers.

communication). Federal and state land managers have protective provisions in place to secure and remove the barrels, thus reducing the likelihood of contamination.

Lightly oiled piping plovers have survived and successfully reproduced (Chapman 1984; Amirault-Langlais et al. 2007; Amos pers. comm. 2009). Chapman (1984) noted shifts in habitat use as piping plovers moved out of spill areas. This behavioral change was believed to be related to the demonstrated decline in benthic infauna (prey items) in the intertidal zone and may have decreased the direct impact to the species. To date, no plover mortality has been attributed to oil contamination outside the breeding grounds, but latent effects would be difficult to prove.

<u>Deepwater Horizon Mississippi Canyon Well #252 Oil Spill</u>

The Deepwater Horizon Mississippi Canyon Well #252 oil spill (Deepwater Horizon), which started April 20, 2010, discharged into the Gulf of Mexico through July 15, 2010. According to government estimates, the leak released between 100 and 200 million gallons of oil into the Gulf of Mexico due to the Deepwater Horizon accident. The U.S. Coast Guard (USCG) estimates that more than 50 million gallons of oil have been removed from the Gulf, or roughly a quarter of the spill amount. Additional impacts to natural resources may also be attributed to the 1.84 million gallons of dispersant that were utilized during the spill. The USCG, the states, and responsible parties that form the Unified Area Command (with advice from federal and state natural resource agencies) initiated protective measures and clean-up efforts per prepared contingency plans to deal with petroleum and other hazardous chemical spills for each state's coastline. The contingency plans identify sensitive habitats, including all federally listed species' habitats, which receive a higher priority for response actions. Those plans allow for immediate habitat protective measures for clean-up activities in response to large contaminant spills. While such plans usually ameliorate the threat to piping plovers, they will not likely provide much improvement in this case given the breadth of the impacts associated with the Deepwater Horizon incident.

As of October 6, 2010, approximately 104 miles of Gulf of Mexico shoreline were affected by moderate to heavy oil (approximately 95 miles in Louisiana, 9 miles in Mississippi, and 1 mile in Florida) and approximately 485 miles of shoreline were affected by light to trace amounts of oil (approximately 224 miles in Louisiana, 81 miles in Mississippi, 60 miles in Alabama, and 114 miles in Florida) (October 6, 2010, Unified Area Command Weekly Update, www.RestoreTheGulf.gov). Those numbers reflect a daily snapshot of shoreline experiencing impacts from oil; they do not include cumulative impacts to date, or shoreline that has already been cleaned. The Operational Science Advisory Team (OSAT-2) of the Gulf Coast Incident Management Team published the *Summary Report for Fate and Effects of Remnant Oil Remaining in the Beach Environment* on February 10, 2011. The OSAT-2 report indicates that:

> "Much of the oil residue on and near the shoreline has been cleaned during the Response phase of the oil spill. As the Gulf shoreline is a dynamic environment, oil residue that is uncovered or moved onto beaches (for example, tar residue balls) will continue to be removed as part of the Monitoring and Maintenance phase of the recovery. Three types of located oil residue were identified as particularly challenging, or potentially damaging to the environment if removed. These three types are the following: supratidal buried oil (SBO), small surface residual balls (SSRBs), and surf zone submerged oil mats (SOM). Previous oil spills have demonstrated that removing oil residue from shoreline environments can cause more harm to the ecosystem than leaving the residue in place."

Thus, specific guidelines for the Monitoring and Maintenance phase of recovery are being developed to determine whether certain oiled habitats warrant further cleaning depending upon the anticipated damage to the environment by oil removal activities. In addition, NRDAR studies regarding potential effects to fish and wildlife resources are currently being conducted along the northern Gulf of Mexico coast.

Throughout the 2010-2011 wintering season piping plovers have been observed along the northern Gulf of Mexico coast. Casual observations from local birders and surveys conducted by oil spill responders have reported visibly oiled piping plovers at various locations in Louisiana. However, exact numbers of oiled piping plovers documented from this spill and the potential expanse of effects to those birds are currently being assessed through specific NRDAR studies; those results have yet to be analyzed or released to the public. Impacts to the species and its habitat are expected but the extent of those impacts remains hard to predict. Based on all available data prior to the Deepwater Horizon oil spill, the risk of impacts from contamination to piping plovers and their habitat was recognized, but the safety contingency plans were considered adequate to alleviate most of these concerns. The Deepwater Horizon incident has brought heightened awareness of the intensity and extent to fish and wildlife habitat from large-scale releases. In addition to potential direct habitat degradation from oiling of intertidal habitats and retraction of stranded boom, impacts to piping plovers may occur from ingestion of oiled benthic prey, loss of benthic prey from shoreline/beach cleaning, and the prolonged human disturbance associated with boom deployment and retraction, clean-up activities, wildlife response, and damage assessment crews working along affected shorelines.

Pesticides

In 2000, mortality of large numbers of wading birds and shorebirds, including one piping plover, at Audubon’s Rookery Bay Sanctuary on Marco Island, Florida, occurred following the county’s aerial application of the organophosphate pesticide Fenthion for mosquito control purposes (Williams 2001). Fenthion, a known toxin to birds, was registered for use as an avicide by Bayer, a chemical manufacturer. Subsequent to a lawsuit being filed against the Environmental Protection Agency (EPA) in 2002, the manufacturer withdrew Fenthion from the market, and EPA declared all uses of the chemical were to end by November 30, 2004 (American Bird Conservancy 2007). All other counties in the U.S. now use less toxic chemicals for mosquito control. It is unknown whether pesticides are a threat for piping plovers wintering in the Bahamas, other Caribbean countries, or Mexico.

Climate Change (sea-level rise)

Over the past 100 years, the globally averaged sea level has risen approximately 10 to 25 centimeters (cm) (Rahmstorf et al. 2007), a rate that is an order of magnitude greater than that seen in the past several thousand years (Douglas et al. 2001 as cited in Hopkinson et al. 2008). The IPCC suggests that by 2080 sea-level rise could convert as much as 33 percent of the world’s coastal wetlands to open water (IPCC 2007). Although rapid changes in sea level are predicted, estimated time frames and resulting water levels vary due to the uncertainty about global temperature projections and the rate of ice sheets melting and slipping into the ocean (IPCC 2007; CCSP 2008).

Potential effects of sea-level rise on coastal beaches may vary regionally due to subsidence or uplift as well as the geological character of the coast and nearshore (CCSP 2009; Galbraith et al. 2002). In the last century, for example, sea-level rise along the U.S. Gulf Coast exceeded the global average by 13 to 15 cm, because coastal lands west of Florida are subsiding (EPA 2009). Sediment compaction and oil and gas extraction compound tectonic subsidence (Penland and Ramsey 1990; Morton et al. 2003;

Hopkinson et al. 2008). Low elevations and proximity to the coast make all nonbreeding coastal piping plover foraging and roosting habitats vulnerable to the effects of rising sea level. Furthermore, areas with small astronomical tidal ranges (e.g., portions of the Gulf Coast where intertidal range is less than 1 meter) are the most vulnerable to loss of intertidal wetlands and flats induced by sea-level rise (EPA 2009). Sea-level rise was cited as a contributing factor in the 68 percent decline in tidal flats and algal mats in the Corpus Christi area (i.e., Lamar Peninsula to Encinal Peninsula) in Texas between the 1950s and 2004 (Tremblay et al. 2008). Mapping by Titus and Richman (2001) showed that more than 80 percent of the lowest land along the Atlantic and Gulf coasts was in Louisiana, Florida, Texas, and North Carolina, where 73.5 percent of all wintering piping plovers were tallied during the 2006 IPPC (Elliott-Smith et al. 2009).

Inundation of piping plover habitat by rising seas could lead to permanent loss of habitat if natural coastal dynamics are impeded by numerous structures or roads, especially if those shorelines are also armored with hardened structures. Without development or armoring, low undeveloped islands can migrate toward the mainland, pushed by the over-washing of sand eroding from the seaward side and being re-deposited in the bay (Scavia et al. 2002). Overwash and sand migration are impeded on developed portions of islands. Instead, as sea-level increases, the ocean-facing beach erodes and the resulting sand is deposited offshore. The buildings and the sand dunes then prevent sand from washing back toward the lagoons, and the lagoon side becomes increasingly submerged during extreme high tides (Scavia et al. 2002), diminishing both barrier beach shorebird habitat and protection for mainland developments.

Modeling for three sea-level rise scenarios (reflecting variable projections of global temperature rise) at five important U.S. shorebird staging and wintering sites predicted loss of 20 to 70 percent of current intertidal foraging habitat (Galbraith et al. 2002). These authors estimated probabilistic sea-level changes for specific sites partially based on historical rates of sea-level change (from tide gauges at or near each site); they then superimposed this on projected 50 percent and 5 percent probability of global sea-level changes by 2100 of 34 cm and 77 cm, respectively. The 50 percent and 5 percent probability sea level change projections were based on assumed global temperature increases of 2° C (50 percent probability) and 4.7° C (5 percent probability). The most severe losses were projected at sites where the coastline is unable to move inland due to steep topography or seawalls. The Galbraith et al. (2002) Gulf Coast study site at Bolivar Flats, Texas, is a designated critical habitat unit known to host high numbers of piping plovers during migration and throughout the winter (e.g., 275 individuals were tallied during the 2006 IPPC) (Elliott-Smith et al. 2009). Under the 50 percent likelihood scenario for sea-level rise, Galbraith et al. (2002) projected approximately 38 percent loss of intertidal flats at Bolivar Flats by 2050; however, after initially losing habitat, the area of tidal flat habitat was predicted to slightly increase by the year 2100, because Bolivar Flats lacks armoring, and the coastline at this site can thus migrate inland. Although habitat losses in some areas are likely to be offset by gains in other locations, Galbraith et al. (2002) noted that time lags may exert serious adverse effects on shorebird populations. Furthermore, even if piping plovers are able to move their wintering locations in response to accelerated habitat changes, there could be adverse effects on the birds' survival rates or reproductive fitness.

Table 9 displays the potential for adjacent development and/or hardened shorelines to impede response of habitat to sea-level rise in the eight states supporting wintering piping plovers. Although complete linear shoreline estimates are not readily obtainable, almost all known piping plover wintering sites in the U.S. were surveyed during the 2006 IPPC. To estimate effects at the census sites, as well as additional areas where piping plovers have been found outside of the census period, Service biologists reviewed satellite imagery and spoke with other biologists familiar with the sites. Of 406 sites, 204

(50 percent) have adjacent structures that may prevent the creation of new habitat if existing habitat were to become inundated. These threats will be perpetuated in places where damaged structures are repaired and replaced, and exacerbated where the height and strength of structures are increased. Data do not exist on the amount or types of hardened structures at wintering sites in the Bahamas, other Caribbean countries, or Mexico.

Table 9. Number of sites surveyed during the 2006 winter IPPC with hardened or developed structures adjacent to the shoreline. Those marked with an asterisk (*) are additional sites that were not surveyed in the 2006 IPPC.

State	Number of sites surveyed during the 2006 winter Census	Number of sites with some armoring or development	Percent of sites affected
North Carolina	37 (+2)*	20	51
South Carolina	39	18	46
Georgia	13	2	15
Florida	188	114	61
Alabama	4 (+2)*	3	50
Mississippi	16	7	44
Louisiana	25 (+2)*	9	33
Texas	78	31	40
Overall Total	406	204	50

Sea-level rise poses a significant threat to all piping plover populations during the migration and wintering portion of their life cycle. Ongoing coastal stabilization activities may strongly influence the effects of sea-level rise on piping plover habitat. Improved understanding of how sea-level rise will affect the quality and quantity of habitat for migrating and wintering piping plovers is an urgent need.

Storm events

Although coastal piping plover habitats are storm-created and maintained, the 1996 Atlantic Coast Recovery Plan also notes that storms and severe cold weather may take a toll on piping plovers, and the 2003 Great Lakes Recovery Plan postulates that loss of habitats, such as over-wash passes or wrack, where birds shelter during harsh weather, poses a threat. Storms are a component of the natural processes that form coastal habitats used by migrating and wintering piping plovers, and positive effects of storm-induced over-wash and vegetation removal have been noted in portions of the wintering range. For example, Gulf Islands National Seashore habitats in Florida benefited from increased washover events that created optimal habitat conditions during the 2004 and 2005 hurricane seasons, with biologists reporting piping plover use of these habitats within six months of the storms (Nicholas 2005 pers. communication). Hurricane Katrina (2005) over-washed the mainland beaches of Mississippi, creating many tidal flats where piping plovers were subsequently observed (Winstead 2008). Hurricane Katrina also created a new inlet and improved habitat conditions on some areas of Dauphin Island, Alabama (LeBlanc 2009 pers. communication). Conversely, localized storms, since Katrina, have induced habitat losses on Dauphin Island (LeBlanc 2009 pers. communication).

Noel et al. (2005) suspect that changes in habitat caused by multiple hurricanes along the Georgia coastline altered the spatial distribution of piping plovers and may have contributed to mortality of three Great Lakes piping plovers wintering along the Georgia coastline. Following Hurricane Ike in 2008, Arvin (2009) reported decreased numbers of piping plovers at some heavily eroded Texas beaches in the center of the storm impact area and increases in plover numbers at sites about 100 miles to the southwest. However, piping plovers were observed later in the season using tidal lagoons and pools that Ike created behind the eroded beaches (Arvin 2009).

The adverse effects on piping plovers attributed to storms are sometimes due to a combination of storms and other environmental changes or human use patterns. For example, four hurricanes between 2002 and 2005 are often cited in reference to rapid erosion of the Chandeleur Islands, a chain of low-lying islands in Louisiana where the 1991 IPPC tallied more than 350 piping plovers. Comparison of imagery taken three years before and several days after Hurricane Katrina found that the Chandeleur Islands lost 82 percent of their surface area (Sallenger et al. 2009), and a review of aerial photography prior to the 2006 IPPC suggested little piping plover habitat remained (Elliott-Smith et al. 2009). However, Sallenger et al. (2009) noted that habitat changes in the Chandeleur Islands stem not only from the effects of these storms but rather from the combined effects of the storms, long-term (i.e., greater than 1,000 years) diminishing sand supply, and sea-level rise relative to the land. Sallenger et al. (2009) went on to explain that although the marsh platform of the Chandeleur Islands continued to erode for 22 months post-Katrina, some sand was released from the marsh sediments which in turn created beaches, spits, and welded swash bars that advanced the shoreline seaward. Thus, although intense erosional forces have affected the Chandeleur Islands, they are still providing high quality shorebird habitat in the form of sand flats, spits, and beaches, until they are eroded below sea level. On January 18 and 19, 2011, piping plover surveys of the Chandeleur Islands were conducted by the piping plover NRDAR study team. Catlin et al. (2011) observed 194 piping plovers utilizing the Chandeleur Islands, and the birds were not distributed uniformly across the islands but were clumped mostly in three locations. Because the survey was conducted within a two-day window, Catlin et al. (2011) believe that higher numbers of piping plovers are likely using the islands during spring and fall migration.

Other storm-induced adverse effects include post-storm acceleration of human activities such as beach nourishment, sand scraping, and berm and seawall construction. Such stabilization activities can result in the loss and degradation of feeding and resting habitats. Storms also can cause widespread deposition of debris along beaches. Removal of debris often requires large machinery, which can cause extensive disturbance and adversely affect habitat elements such as wrack. Another example of indirect adverse effects linked to a storm event is the increased access to Pelican Island (LeBlanc 2009 pers. communication) due to merging with Dauphin Island following a 2007 storm (Gibson et al. 2009).

Recent climate change studies indicate a trend toward increasing hurricane numbers and intensity (Emanuel 2005; Webster et al. 2005). When combined with predicted effects of sea-level rise, there may be increased cumulative impacts from future storms. Storms can create or enhance piping plover habitat while causing localized losses elsewhere in the wintering and migration range. Available information suggests that some birds may have resiliency to storms and move to unaffected areas without harm, while other reports suggest birds may perish from storm events. Significant concerns include disturbance to piping plovers and habitats during cleanup of debris along shorelines and post-storm acceleration of shoreline stabilization activities, which can cause persistent habitat degradation and loss.

Threats Summary

Habitat loss and degradation on winter and migration grounds from shoreline and inlet stabilization efforts, both within and outside of designated critical habitat, remain a serious threat to all piping plover populations. Modeling strongly suggests that the population is very sensitive to adult and juvenile survival. Therefore, while there is a great deal of effort extended to improve breeding success, and thus improve and maintain a higher population over time, it is also necessary to ensure that the wintering habitat, where birds spend most of their time, is secure. On some of the wintering grounds, the shoreline areas used by wintering piping plovers are being developed, stabilized, or otherwise altered, generally making the habitat unsuitable. Even in areas where habitat conditions are appropriate, human disturbance on beaches may negatively impact piping plovers' energy budget, as they may spend more time being vigilant and less time in foraging and roosting behavior. In many cases, the disturbance is severe enough that piping plovers appear to avoid some areas altogether. In addition, natural events (e.g., climate change, hurricanes, etc.) can pose a potential threat to piping plover habitat on an irregular basis. Threats on the wintering grounds may impact piping plovers' breeding success if they start migration or arrive at the breeding grounds with a poor body condition.

Analysis of the species/critical habitat likely to be affected

The proposed action has the potential to adversely affect wintering piping plovers and their habitat, including designated critical habitat in Unit LA-5, within the action area. The construction activities may lead to temporarily diminished quantity and quality of intertidal foraging and roosting habitats within the project area and action area, resulting in decreased survivorship of migrating and wintering plovers and temporary adverse effects to critical habitat. The length of construction activities (which varies from 2 to 3 years) may delay the recovery of benthic species due to the prolonged disturbance of the benthic fauna. Ultimately, the project goal is to restore the diversity of coastal barrier headland and island habitats, but the temporary effects of construction will require time for natural recovery and would extend beyond one wintering season. The detailed effects of the proposed action on piping plovers and critical habitat will be considered further in the remaining sections of this opinion.

ENVIRONMENTAL BASELINE

Louisiana's loss of wetlands and barrier islands to open water is now a well-documented fact in numerous studies. Since the 1930s Louisiana has lost 1,900 square miles of land (approximately 1.2 million acres). From 1990 to 2000, approximately 24 square miles of coastal land were lost each year. The 2004 Louisiana Coastal Area Ecosystem Restoration Study projected that 513 square miles of land would disappear by 2050, including a gain of 161 square miles from projects constructed under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) (Corps 2004). In Louisiana, barrier headland and island erosion is attributable to increasing tidal prism, insufficient volumes of sediment supplied by littoral currents, land subsidence, and sea-level rise (Boesch 1982). Although increases in the tidal prism may be primarily responsible for enlargement of tidal passes, the insufficient supply of sand available to rebuild eroded areas has also contributed to increased tidal pass widths and shoreline retreat (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority 1999). Where insufficient supplies of sand prevail, measures to maximize sand retention, such as sand fencing and vegetative planting, are used to effectively rebuild and maintain such eroded areas.

Louisiana barrier headlands and islands are part of a complex and dynamic coastal system that continually respond to tidal passes, tides, wind, waves, erosion and deposition, long-shore sediment transport and depletion, fluctuations in sea level, and weather events. During storm events, over-wash is common across the barrier islands and headlands, depositing sediments on the bay-side or landward side, clearing vegetation and increasing the amount of open, sand flat habitat ideal for shoreline dependent shorebirds. Winds move sediment across the dry beaches forming low dunes. The natural communities contain plants and animals that are subject to shoreline erosion and deposition, salt spray, wind, drought conditions, and sandy soils. Vegetative communities include fore dunes, occasional primary dunes, salt marsh, and black mangroves.

The Caminada headland and Shell Island provide important geomorphic, hydrologic and habitat functions in the Barataria basin. The Corps' modeling results have shown that barrier islands decrease wave energy landward of the island during tropical events. When the barrier islands were degraded in the models, the modeled wave heights increased, thus heightening the potential for overtopping levees and inundation of protected areas. Sustaining the geomorphic form of the barrier islands will provide storm surge protection for the interior wetlands and the surrounding coastal communities. Modeling (which excluded the BBBSR project in its future projections) also estimated that by 2060, 75 percent of the land between the Caminada headland and the Larose to Golden Meadow Hurricane Risk Reduction levees would be lost. In addition, the barrier islands in Plaquemines Parish, including Shell Island, will have disappeared as well as the marshes between the islands and the Mississippi River levees. Salinity modeling reflecting a without-project condition demonstrates the function of the barrier islands in separating the marine from the estuarine environments. On the eastern side of the basin, in areas where the barrier islands are severely eroded (e.g., the Shell Island reach), the salinity fields grow proportionally larger.

The Caminada barrier headland is the predominant feature of the Bayou Lafourche barrier system that includes flanking islands and the retreating headland of the Bayou Lafourche distributary of the Mississippi River (Figure 2) along the southwestern portion of the Barataria Basin. The southwest to northwest-oriented Caminada headland extends approximately 13.18 miles (21.21 km) between Belle Pass to the west and Caminada Pass to the east. Historic maps show that the west end of the Caminada headland is retreating more rapidly than the east end of the headland (Williams et al. 1992). It is one of the most rapidly eroding shorelines in the United States (McBride et al. 1992; Connor et al. 2004). The headland has historically suffered loss of wildlife habitat value and diminished function due to storm overtopping and breaching, saltwater intrusion, wind and wave induced erosion, sea level rise, subsidence, and man-made structures. The observed average shoreline erosion rate at the Caminada Headland is approximately 45 feet per year, and increased stress on the fish and wildlife in the area is expected as habitats continue to be lost.

The Caminada headland consists of narrow and low-lying sand dunes and beaches, barrier marshes, chenier ridges interspersed with mangrove thickets, coastal dune shrub thickets, lagoons, and small bayous. The Corps estimates the average dune elevation to be 3.4 feet NAVD and the back-barrier marsh is approximately 0.94 feet NAVD. Port Fourchon and a Chevron oil and gas facility are located at the western end of the headland and north of the action area. Several marsh restoration projects have occurred on the landward side of the dune along portions of the headland, and multiple sand fencing projects have occurred on the remnant dunes along much of the headland. An existing shoreline protection project consisting of cement-filled geotextile tubing and submarine cement mats extends from the east jetty of Belle Pass to Bay Champagne. That project was constructed in the early-1980s, prior to the piping plover's listing as a threatened species, and the Port Commission along with the local parish government plan to restore it as a result of damage from the 2005 and 2008 hurricane seasons. The Corps also conducts maintenance dredging every 2 years (if needed) within Belle Pass, and deposits material every other cycle along the Caminada headland adjacent to the east jetty. That material is placed unconfined, no closer than 100 feet from the top-of-bank (i.e., in the surf zone), and to an elevation of +6 feet Mean Low Gulf (MLG) (approximately +5 feet NAVD). The linear distance of shoreline nourished varies for each event, and the material is allowed to be naturally re-worked by wind and wave action. Once the BBBSR project is implemented that material would no longer be placed adjacent to the east jetty but would be used for the sub-tidal feeder bar.

Although much of the headland is privately owned, the beaches are easily accessible by vehicle, foot, or boat, and are generally open to the public for recreation, birding, and fishing. The eastern end of the Caminada headland consists of Elmer's Island which is partially owned by the State, actively managed by LDWF, and is separated from Grand Isle (the State's only inhabited island) by Caminada Pass. That beach is also accessible by vehicle, foot, or boat and open to the general public for recreation, birding, and fishing. As a result of the Deepwater Horizon oil spill and since May 2010, the State and private landowners along the Caminada headland restrict public access when legacy cleanup and O&M activities are necessary.

The Shell Island reach is part of the Plaquemines barrier system along the southeastern portion of the Barataria Basin. Prior to Hurricane Bob in 1979, Shell Island (formerly Lanaux Island) was a continuous barrier island that helped to protect the interior coastal wetlands of the eastern Barataria Basin. The Corps estimates a shoreline recession rate of approximately 10 feet per year along the easternmost 5,000 to 8,000 feet of Shell Island, and indicates that rate is most likely due to installation of the Empire jetties (built in 1950) at the mouth of Fontanelle Pass. Shell Island is now characterized as an undeveloped, rapidly retreating, remnant barrier island (and associated spits and shoals) which partially encloses shallow bays such as Shell Island Bay and Bastian Bay (Figure 3). The Shell Island reach extends approximately 5.24 miles (8.43 km) between Grand Bayou Pass to the west and the Empire jetties to the east. The remnant island along the western edge of the Shell Island reach is approximately 1.41 (2.27 km) miles long and extends from Grand Bayou Pass to Coupe Bob; it is composed primarily of reworked oyster shells that formed into ridges and swales produced by waves refracting into the entrance to Grand Bayou Pass. The remnant island along the eastern edge of the Shell Island reach is approximately 2.54 miles long (4.09 km) and extends from Coupe Bob to Fontanelle Pass; it consists of marsh with a narrow strip of beach along its Gulf-ward side. These rapidly retreating barrier islands are becoming increasingly narrower and are completely separated from the remnants of Plaquemines Parish interior marshes.

Any exposed land (i.e., land above mean high tide) within the Shell Island reach is likely to be privately owned; however, much of the reach has been severely eroded and claimed as State water bottoms. Access to the area is by boat only; thus, human disturbance in the area generally consists of nearby recreational and commercial fishing, occasional oil and gas activity, and annual aerial surveys of nesting shorebird colonies conducted by LDWF. Since the Deepwater Horizon oil spill in April 2010, human activity in the area has increased due to cleanup and O&M activities, as well as construction of 8,439 linear feet (to an elevation of +6 NAVD) of a protective sand berm (as part of the emergency response) along the eastern end of the reach.

The Corps anticipates that the TSP would prevent the fragmentation of the Caminada headland and greatly ameliorate impacts on several important socio-economic sectors such as: Port Fourchon, the largest base for offshore oil and gas operations in coastal Louisiana and the largest coastal fishing port; major oil and gas infrastructure, such as regional transportation and storage facilities, the LOOP, and the Mars pipeline; and the regional hurricane evacuation route serving residents of southern Lafourche Parish, the community of Grand Isle, and approximately 6,000 workers stationed at offshore facilities in the central Gulf of Mexico. By decreasing the rate of erosion and preventing the splintering of the headland, the investment in infrastructure located at Port Fourchon will be less vulnerable to storm surges. Oil and gas pipelines and Louisiana Highway 1 maintenance requirements will lessen compared to the future-without-project conditions. Closure of the Shell Island reach would also aid in protection of interior marshes within the eastern Barataria Basin and restoration of the tidal prism through Grand Bayou, Bastian Bay, and Shell Island Bay.

Status of the species within the action area

Assessing the number of piping plovers within the action area during winter is difficult for two main reasons: (1) the number of birds utilizing both the Caminada headland and Shell Island reach varies from year to year and throughout each wintering season; and (2) suitable habitat within the Shell Island reach is difficult to assess due to its remote location and generally poor winter weather conditions. Because winter generally produces inclement weather conditions, daily surveys over any length of time during the wintering season are also difficult to coordinate. Consequently, surveys for non-breeding (e.g., over-wintering and migrating) plovers within the Shell Island reach of the action area have been sporadic.

Because the 2005 hurricane season severely damaged much of the piping plover critical habitat across the state, the Service provided funding to the LDWF to conduct post-hurricane impact assessments of piping plovers and their habitat across the Louisiana coast for a three-year period. The LDWF conducted annual, one-day-count piping plover surveys between January 1 and February 18 from 2007 through 2010 (they were able to add a fourth year with the funding provided). Due to lack of manpower and inclement weather (e.g., dangerous boating conditions) LDWF was unable to survey the Shell Island reach in 2007, 2008, and 2009. For surveys that have been successful, results indicate that piping plovers utilize any non-vegetated or sparsely vegetated portions of the subject barrier headlands and islands. Such habitat consists of sand beaches, spits, and flats, mud flats, shell beaches, and oyster reefs associated with both the Gulf- and bay-sides of headlands and islands, as well as washover areas created by storm events. We have also gained access to preliminary survey data related to the Deepwater Horizon oil spill[7]. Survey results from the past 20 years are depicted in Table 10.

Table 10. Piping plover survey results within the action area and nearby beaches and headlands.

	Fourchon Beach and/or Bay Champagne[a]	Elmer's Island[a]	Shell Island[a]	West Belle Pass[b]	Chaland Beach[c]
1991 IPPC[d] Winter Survey	42	1	NS	NS[g]	NS
1996 IPPC Winter Survey	0	0	NS	15	NS
2001 IPPC Winter Survey	0	19	NS	18	NS
2006 IPPC Winter Survey	21	15	NS	1	NS
2006-07 CWS[e] Winter Survey	38	5	NS	0	NS
2007 LDWF[f] Winter Survey	0	14	NS	0	NS
2008 LDWF Winter Survey	41	17	NS	13	NS
2009 LDWF Winter Survey	13	23	NS	25	NS
2010 LDWF Winter Survey	13	38	6	46	6
2010 MC252 Fall Surveys	11	25	1	30	7
2011 MC252 Winter Surveys	20	51	NS	42	NS

(a) Beaches within the action area; (b) West Belle Pass is the small remnant strip of headland on the west side of Belle Pass (just west of the Caminada headland); (c) Chaland Beach is the headland west of Shell Island and Grand Bayou; (d) IPPC = International Piping Plover Census; (e) CWS = Canadian Wildlife Service, Maddock 2008; (f) LDWF = Louisiana Department of Wildlife and Fisheries-Natural Heritage Program; (g) NS = Not Surveyed.

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[7] The data depicted in Table 10 for the Deepwater Horizon oil spill were collected from three sources: (1) deployed Service biologists, (2) contracted Natural Resource Advisors (NRAs), or (3) the NRDAR study team. The NRDAR study team followed specific survey protocols and surveys were conducted on a regular basis, as weather permitted. Surveys conducted by the Service or NRAs were done on an irregular basis, although daily surveys were attempted for some areas, and no specific survey methodology was used. Therefore, the survey methodologies used in collecting the oil spill data are not the same as the survey methodology used in the IPPC or LDWF winter surveys. Any data comparisons should carefully note differences in survey methodologies before any conclusions can be drawn from such comparisons.

The Final Determinations of Critical Habitat for Wintering Piping Plovers (Service 2001b) describes critical habitat within the project action area as:

> “. . . the Gulf shoreline extending approximately 11 km (6.8 miles) east from the east side of Belle Pass bounded on the seaward side by MLLW [mean low low water] and on the landward side to where densely vegetated habitat, not used by the piping plover, begins and where the constituent elements no longer occur; all of Elmer’s Island peninsula where primary constituent elements occur to MLLW and the Gulf shoreline from Elmer’s Island to approximately 0.9-km (0.56-mile) west of Bayou Thunder Von Tranc bounded on the seaward side by MLLW and on the landward side to where densely vegetated habitat, not used by the piping plover, begins and where the constituent elements no longer occur . . .”

At the time of designation approximately 24,964 acres of wintering habitat were designated in Louisiana, and Unit LA-5 consisted of approximately 5,735 acres of that total. Large portions of the Caminada headland are included in that acreage for Unit LA-5. Approximately 1,558 acres of the Caminada barrier headland consisted of sparsely or non-vegetated habitat suitable for piping plovers (based upon 1998 aerial photography), of which approximately 370 acres existed on Elmer’s Island and the remaining 1,188 acres existed on Fourchon Beach/Bay Champagne. The Shell Island reach is not included in designated piping plover critical habitat; however, it does provide some amount of suitable habitat for piping plovers. The current acreage of the exposed land along the Shell Island reach has not been estimated; however, 8,439 linear feet (elevation of +6 NAVD) of a protective sand berm has been constructed along the eastern remnant island of the reach as a result of the Deepwater Horizon oil spill. Until that sand berm is eroded below sea level, it will provide suitable habitat for piping plovers.

Based on 2008 aerial photography, the Corps estimates that approximately 485 acres (29 acres dune, 356 acres supratidal, and 100 acres Gulf intertidal) of critical habitat currently exist within the proposed project footprint on the Caminada headland. According to conversations with the Service’s coastal restoration biologist working directly with the Corps on this project, the dune, supratidal, and intertidal habitat designations were defined by the Corps during habitat assessments as follows: (1) dune habitat includes any elevations within the project footprint at or above 5 feet NAVD; (2) supratidal habitat includes any elevations within the project footprint at or between 2 and 4.9 feet NAVD; and (3) Gulf intertidal habitat includes any elevations within the project footprint between zero and 2 feet NAVD. Based on evaluations of digital orthophoto quarter quadrangle (DOQQ) imagery dating from 2005 to 2010, light detection and ranging (LIDAR) imagery, and January 2009 and August 2010 site visits, the Service determined that the Corps’ habitat acreages need to be defined in terms of suitable piping plover habitat instead of in terms of habitat designations for wetland value assessments. In order to interpret the Corps’ habitat designations in terms of suitable habitat for piping plovers, the Service describes the Corps’ habitat designations more specifically as follows:

1. The existing dune habitat within the project footprint consists of clumps of remnant dune generally dispersed throughout the high marsh/high beach interface. Those 29 acres of dune should not be considered as suitable piping plover habitat because those areas are densely vegetated and do not exhibit features of suitable piping plover habitat as described above.

2. The supratidal habitat classification includes both the high marsh on the landward side and the high beach along the Gulf side of the remnant dune within the project footprint (i.e., 356 acres). The high marsh consists of densely vegetated areas that are not suitable for the piping plover and are specifically excluded from designated critical habitat as described above. The high

beach consists of bare or sparsely vegetated sand flats above the high tide mark. Because the supratidal habitat area is roughly divided along the centerline of the remnant dune, we believe that no more than half (i.e., 178 acres) of the supratidal habitat classification acreage actually consists of high beach that is suitable roosting habitat for the piping plover.

3. The 100 acres of Gulf intertidal habitat does consist of suitable foraging habitat for the piping plover and is included within the critical habitat designation. That acreage is inclusive of tidal fluctuations throughout the year.

Based on the above information, the Service estimates that approximately 278 acres (178 acres of high beach and 100 acres of Gulf intertidal habitat) of designated critical habitat would be affected by the Caminada Headland-portion of the proposed project. That acreage is approximately 1.1 percent and 4.8 percent of the total acreage of wintering habitat in Louisiana and Unit LA-5, respectively.

Factors affecting species environment within the action area

As mentioned previously, the Caminada headland is the southernmost edge of the mainland and is easily accessed by the public via foot, vehicle, or boat. Only a portion of Elmer's Island (the eastern edge of the headland) is actively managed by LDWF. Port Fourchon and a Chevron facility are located adjacent to the action area on the northwestern portion of the headland. The entire headland receives regular visitors for fishing and bird watching year round and has persistent boat and helicopter traffic to and from the port and nearby support facilities for offshore oil and gas structures. In contrast, the Shell Island reach remains undeveloped and is isolated from the mainland. Any exposed land is afforded protection from major disturbance activities solely due to its remoteness since it is only accessible by boat. Other than infrequent bird surveys (usually conducted from helicopter or fixed-wing aircraft) and nearby boat traffic from fishing and offshore oil and gas activities, the remnant islands within the Shell Island reach do not receive regular visitors.

Mammalian predators (e.g., raccoons, coyotes) occur throughout the Caminada headland, but have limited access to the Shell Island reach. Mammalian predators may swim back and forth to the remnant islands of the Shell Island reach from the nearest mainland, but the islands do not provide enough shelter or forage to sustain a constant predator population. Somewhat regular storm events (e.g., flooding) also tend to discourage mammals from persisting on the remnant islands. Avian predators may also be present within both portions of the action area throughout the year but likely peak during fall and spring migration periods.

A nearby coastal restoration project would also occur in proximity to the action area. In the fall and winter of 2011, the NMFS plans to construct the West Belle Pass Headland Restoration Project under the authority of the CWPPRA program. Piping plovers that normally utilize that area may be temporarily dislocated to the Caminada headland during that project's construction period.

The Deepwater Horizon spill, which started April 20, 2010, discharged into the Gulf of Mexico through July 15, 2010. In May and early June 2010, the presence of oil was confirmed on the Caminada headland and Shell Island reach; those areas were oiled repeatedly throughout the summer months until the damaged oil well was sealed. Shoreline Cleanup Assessment Team (SCAT) reports throughout the duration of the spill documented various degrees of oiling along each of those areas (Table 11). At the time this document is being written, oil spill response efforts are ongoing in the form of continued SCAT surveys, Stage III cleanup efforts, Stage IV maintenance and monitoring efforts, and early stages of developing legacy cleanup procedures.

Table 11. Results of the SCAT reports for the Deepwater Horizon oil spill and cleanup activities along the Caminada headland and Shell Island reach.

Location	Extent of Oil	Cleanup Actions Proposed or Implemented
Elmer's Island	Tar balls; small pools of oil; 11 major tar mats; mousse	Mechanical cleanup with heavy machinery; removal of oiled wrack; beach tilling
Fourchon Beach	Tar balls; tar mats; surface oil residue; partially buried oiled seaweed; oil onshore	Mechanical cleanup with heavy machinery; removal of oiled wrack; beach tilling
West Bay Champagne	10 to 12 discreet patches of oil; tar patties	Mechanical cleanup with heavy machinery; removal of oiled wrack; beach tilling
Shell Island reach (Lanaux Island)	Tar balls; mousse on sand beaches and in marsh areas	Manual cleanup with shovels; removal of oiled wrack

At this time, it is unknown if there are any current or lasting effects to piping plovers migrating or wintering within the action area (i.e., the number of oiled piping plovers observed during NRDAR studies has not yet been released) or to the inter-tidal invertebrate food source used by piping plovers from either oil or oil dispersants and resulting cleanup activities within the action area. A greater impact to the piping plover and its habitat might be the prolonged human disturbance associated with ongoing cleanup activities, wildlife response, and damage assessment crews highly visible on the shorelines, as well as ongoing SCAT surveys and legacy cleanup activities.

EFFECTS OF THE ACTION

The proposed action includes marsh creation and dune and beach restoration along 13.18 miles of headland and 5.24 miles of mixed open water and remnant barrier islands, as well as placement of a 13,000-foot-long subtidal feeder bar offshore of the Caminada headland. The proposed project intends to lengthen and widen the Gulf shorelines of the Caminada headland and Shell Island reach in order to add much-needed sediment to the barrier coastal system of the Barataria Basin, prolong the existence of those land features, and restore barrier headland and island habitat, function, and morphology. Much of the proposed project would occur in habitat that is used regularly by piping plovers and designated as critical habitat for the species. Construction of the fully proposed TSP will overlap with multiple piping plover wintering seasons for both portions of the project. Short-term and temporary construction impacts to piping plovers will occur when the birds are roosting and feeding in the area.

The deposition of sand and marsh material will temporarily deplete the intertidal food base along the Gulf beach and bay-side flats, respectively, and temporarily disturb foraging and roosting birds during project construction on the headland and Shell Island. The shaping and grading of the restored beach and dune would cause disturbance and also remove wrack that has accumulated on the Gulf-side of the headland and remnant islands of the Shell Island reach. This would affect feeding and roosting habitat for piping plovers, since they often use wrack for cover and foraging. The construction of the marsh creation area will cover any existing bay-side flats used by foraging plovers and will render that area unusable until natural processes re-work the sediments and washover areas are again created by tidal and storm events and benthic prey species re-colonize those areas. Similar effects will occur again during renourishment periods (see project plan descriptions on pages 3 through 8 for target years) and benthic effects would extend for up to 2 years beyond the renourishment period until the benthic fauna recovers. The temporary increase in human presence and construction activity on the headland and remnant islands may also disturb piping plovers from utilizing adjacent areas outside of the project footprints, such as nearby sand spits and washover areas. Construction of the subtidal feeder bar would occur completely offshore of the Caminada headland. Placement of O&M dredged material from the West Belle Pass channel every 1.5 to 2 years would be used to maintain the subtidal feeder bar. According to the Corps, the fine sediment placed in the subtidal feeder bar is not expected to cause extensive stacking of sediment on the beach which could smother benthic fauna. Thus, the subtidal feeder bar would not contribute additional stress to the remaining benthic community within piping plover critical habitat. Overall, the entire project would ultimately benefit piping plover habitat by creating new beach habitat and adding sediment to the Barataria Basin barrier system to be re-worked by natural forces.

The geomorphic characteristics of barrier headlands and islands, dunes, over-wash fans, and inlets are critical to a variety of natural resources and influence a barrier system's ability to respond to wave action, including storm over-wash and sediment transport. The protection or persistence of these important natural processes and wildlife resources are part of the goal of this restoration project. The newly created beach, dune, and marsh will not impede over-wash but may temporarily consist of less optimal roosting and foraging habitat until natural wrack is restored, the benthic prey base is able to recover from the construction activities, and washover areas are again created by natural tidal and weather events. The newly added sediment will be reworked by natural wind and wave processes which will, given time, create sand spits and flats on the ends and bay-sides of the islands, or as sediment is lost from one island, it will be carried by long-shore transport to another island. Thus, piping plover foraging, roosting, and critical habitat will continue to be lost and created through the natural processes associated with daily tidal events and future storm events.

Factors to be considered

Proximity of the action

Lack of regular surveys, fluctuation of use by piping plovers from year to year, and differences in numbers of birds migrating through versus those over-wintering, make it difficult to estimate the number of birds actually using any particular area (headland or island, Gulf- or bay-side) within the action area. Based on survey data depicted in Table 10 (page 41), numbers of piping plovers over-wintering within the action area can range anywhere from one to 51 birds scattered along the Caminada headland (i.e., Fourchon Beach, Bay Champagne, Elmer's Island) and from one to six birds scattered along the remnants of Shell Island; those estimates do not include migrating piping plovers. We expect direct short-term effects in the form of: (1) disturbance due to human presence and equipment noise during onshore pipeline construction activities, sediment placement, dune/beach construction, marsh creation, and vegetative planting; and (2) a temporary loss of food base within the intertidal zone on both the Gulf- and bay-sides of the project footprint on the Caminada headland and Shell Island reach for up to 2 years following completion of sediment placement until the benthic community re-colonizes the project areas. Within the Caminada headland portion of the project, 278 acres is included within critical habitat Unit LA-5. No designated critical habitat occurs within the Shell Island reach. West Belle Pass and East Timbalier Island located west of the Caminada headland and Chaland Beach located west of the Shell Island reach would not be included within any portions of the action area; all of those areas outside of the action area would provide available habitat during project construction. However, a CWPPRA restoration project has been planned for the West Belle Pass headland. Construction funding was allocated in late 2009, and construction is proposed to begin in the fall or winter of 2011. If it remains on schedule through its construction, the restoration of the West Belle Pass headland should be completed and fully available to piping plovers prior to the initiation of the BBBSR project

Distribution

The Corps proposes project construction activities on the Gulf- and protected-sides of the 13.18-mile-long Caminada headland within Lafourche and Jefferson Parishes and the 5.24-mile-long Shell Island reach in Plaquemines Parish. We expect direct effects to wintering piping plovers along existing sand beaches, spits, and flats, mud flats, shell beaches, oyster reefs, and washover areas associated with the Gulf shoreline of the headland and the entire Shell Island reach as a result of human activity and ground disturbance in those areas. Similar temporary disturbance would occur again during a renourishment cycle on the Gulf-side of Shell Island only. Renourishment for the Caminada headland would occur as a result of the replenished sub-tidal feeder bar located just offshore of the headland at its nodal point near the mouth of Bayou Moreau (Figure 2), which would not require any onshore activities during each replenishment of the feeder bar.

Timing

Construction of the TSP will overlap with multiple piping plover wintering/migrating seasons (mid-July to late April) and with construction of several other barrier headland and island restoration projects along the Louisiana coast.

Nature of the adverse effect

The effects to piping plovers may be direct, indirect, and short-term. Activities that impact or alter the use of optimal habitat or increase disturbance to the species may directly decrease the survival and recovery potential of the piping plover by limiting the ability of birds to rest and replenish their fat reserves for spring migration. We expect direct, short-term impacts from human disturbance during project construction to both the bird and its habitat. We anticipate a temporary (i.e., up to 2 years post-construction) decrease in benthic prey species within all existing piping plover foraging habitat within the project footprint as a result of sand and marsh material placement and loss of natural wrack. Following one or two growing seasons, the dune portion of the project may become densely vegetated and would no longer be suitable roosting habitat for piping plovers until a storm event creates over-wash fans. Until the benthic community recovers and new over-wash fans are created, a temporary decrease in prey items and roosting habitat may result in a decrease in the survival of birds on migrating or wintering grounds due to lack of optimal habitat. That situation can contribute to decreased survival rates and may indirectly result in decreased productivity on the breeding grounds. Such effects may temporarily result in increased vulnerability to any of the three piping plover breeding populations.

The effects to 278 acres of critical habitat in Unit LA-5 result from activities that impact or alter the PCEs (disturbance to the species) which may decrease the survival and recovery potential of the piping plover. Such effects consist of temporary reductions in the value of the unit from disturbance to foraging and roosting piping plovers due to human activity during construction, temporary removal of wrack, and a temporary decrease in benthic prey species due to sand placement along the Gulf shoreline. In addition, existing over-wash areas would be covered by placement of new material until natural coastal processes (e.g., daily tidal events, storm events, etc.) are allowed to re-work the additional sediment to create new over-wash areas on Caminada and new sand and mud flats on Shell Island. That acreage (i.e., 278 acres) is approximately 1.1 percent and 4.8 percent of the total acreage of wintering habitat in Louisiana and Unit LA-5, respectively.

Duration

For the TSP initial construction would be completed in approximately 2 to 3 years, with additional time (see project details on pages 3 through 8 for exact timelines) for vegetative planting following dewatering and settlement of the newly placed material. The activities associated with construction of the marsh creation are a one-time occurrence for each portion of the project. Construction of the dune and beach would initially occur at TY1 for the headland and the island; however, two renourishment events (TY20 and TY40) would occur for Shell Island. Each activity may vary in duration depending on the amount of work needed, weather conditions, and equipment mobilization and maintenance. The Corps anticipates beginning construction on the TSP in April 2013. We do not expect long-term, permanent alteration of the natural coastal processes, and the two renourishment events would result in a pulse effect that would temporarily disturb the Gulf-side of the restored Shell Island while the bay-side of the island would remain untouched after initial construction. The initial addition of sand material on 278 acres of critical habitat Unit LA-5 is expected to decrease the quality of foraging habitat from 6 months up to 2 years until the intertidal benthic fauna recovers to normal population levels and natural wrack returns to the shoreline. The sub-tidal feeder bar along the Caminada headland would be reworked by natural processes and would not be placed directly within piping plover foraging habitat.

Disturbance frequency, intensity, and severity

We anticipate that construction activities would have short-term and temporary effects on piping plover populations. We expect short-term disturbance from construction activities and short-term effects due to sand and marsh material placement. Direct effects to 278 acres of critical habitat Unit LA-5 would include temporary removal of wrack, temporary smothering of intertidal benthic prey species at TY1 on the Gulf shoreline of the Caminada headland, and the creation of a dune that may eventually become densely vegetated until new over-wash fans are created. We anticipate that: (1) piping plovers located within the construction area would move outside of the construction zone due to disturbance; (2) natural wrack would be deposited on the Caminada headland and Shell Island reach beaches following normal tidal events; (3) the intertidal benthic fauna would recover within 6 months to 2 years of each initial disturbance event and the two renourishment events on Shell Island; and (4) the density of dune vegetation will ebb and flow as tidal and storm events naturally affect dune vegetation growth. We do not anticipate any permanent adverse changes to barrier headland and island morphology because initial construction elevations and follow-up renourishment elevations would not prevent island washover during storm events and the created marsh platforms would allow for natural headland and island retreat or “rollover.” There would not be any increased or continual disturbance within critical habitat Unit LA-5 as a result of the BBBSR project. Over the long-term the additional sediment would allow for creation of piping plover habitat on the Caminada headland and Shell Island as natural processes re-work the sediment to create over-wash areas, sand flats, mud flats, and sand spits.

Analysis for the effects of the action

Direct effects

Direct effects are those direct or immediate effects of a project on the species and/or its habitat. Implementation of the proposed action is not likely to directly kill and piping plovers since the birds are highly mobile and can quickly move out of harm’s way. The construction window will extend through several piping plover migration and wintering seasons for the proposed TSP. Heavy machinery and equipment (e.g., ORVs and bulldozers operating on project area beaches and bay-side sand and mud flats, the placement of the dredge pipeline along the beach, and sand and marsh material disposal) may directly affect migrating and wintering piping plovers in the project area by disturbance and disruption of normal activities such as roosting and feeding, and possibly forcing birds to expend valuable energy reserves to seek available habitat elsewhere.

Direct effects to critical habitat Unit LA-5 consist of sand and marsh material placement over 278 acres of existing habitat on the Gulf shoreline of the Caminada headland at TY1 which would result in temporary loss of wrack, temporary loss of washover areas, and burial and suffocation of intertidal benthic prey species. The natural wrack would be restored following normal tidal events. Washover areas would eventually be re-created during storm events. Burial and suffocation of invertebrate intertidal prey species will occur during initial sand and marsh material placement throughout the entire project area and during follow-up renourishment events on Shell Island only (which does not contain any critical habitat). Impacts will affect the project footprint on both the Caminada headland and the remnant islands of the Shell Island reach, as well as some down-drift areas. Timeframes projected for benthic recruitment and re-establishment following sand and marsh material placement are from 6 months up to 2 years. Due to the duration of project construction and depending on actual recovery rates, impacts on the Shell Island portion will occur even if renourishment events occur outside the plover migration and wintering seasons.

Indirect effects

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

Reducing the potential for the formation of optimal habitats (such as over-wash or ephemeral pool formations), long-term increased human disturbance, and construction of new infrastructure are possible indirect effects to designated critical habitat. The piping plover's rapid response (within 6 months) to habitats formed by over-wash areas demonstrates the importance of over-wash created sand and mud flats for wintering and migrating piping plovers. Implementation of the proposed project will temporarily cover existing over-wash habitat within the entire action area. Given time, the intertidal zone along the Caminada headland and Shell Island reach will re-establish and with daily tidal processes and occasional storm events natural over-wash and ephemeral pool habitat would again be created throughout the action area.

The project life and expected future re-nourishment activities do not increase the likelihood of long-term increased human disturbance on Elmer's Island or Shell Island, or that the LDWF or other local entities would initiate construction of new infrastructure on those islands. The LDWF is committed to managing and maintaining Elmer's Island as a public recreation area for enjoying wildlife and fishing, as well as improving shorebird nesting, roosting, and foraging habitats with minimal human disturbance. Similarly, Shell Island's remote location and limited access from the mainland discourages regular use of the island. Because the remaining portions of the Caminada headland (i.e., Fourchon Beach/Bay Champagne) are privately owned, it is unknown whether the increased likelihood of long-term increased human disturbance within those areas would occur due to construction of new infrastructure or upgrading of existing facilities, such as camps or oil and gas infrastructure.

Beneficial effects

Beneficial effects are wholly positive without any adverse effects. We expect the prolonged existence and restoration/creation of foraging and roosting habitat for piping plovers along the Shell Island reach and within critical habitat Unit LA-5 along the Caminada headland as an overall result of the proposed BBBSR project. The Corps has estimated that without the project there would be little or no piping plover critical habitat remaining on the Caminada headland and the remnants of Shell Island would erode below sea level within the 50-year period of analysis. With the project, 880 acres of dune and beach complex would be created along the Caminada headland, and 317 acres of dune and beach complex would be restored along the Shell Island reach (Corps 2011). Much of the existing system is sediment-starved, and the proposed action would introduce sediment into that system that would be reworked and redistributed through natural processes, thus maintaining and/or enhancing the features of critical habitat. The additional sediment (within the sediment-starved Barataria Basin barrier system) would be re-worked by wind and wave action and storm events to allow for natural shoreline nourishment and repair along the Caminada headland and natural island “rollover” on Shell Island, all of which should result in the natural reformation of optimal piping plover habitat in the form of over-wash areas, sand flats, mud flats, and sand spits. The restoration and maintenance of intertidal habitat is important for the restoration of the piping plover population to healthy levels.

Species response to the proposed action

This biological opinion addresses the direct and indirect effects that are anticipated to wintering and migrating piping plovers and designated critical habitat as a result of restoring beach, dune, and marsh on the Caminada headland and the remnants of Shell Island, as well as the temporary disruption of existing plover foraging and roosting habitat for the long-term benefit of maintaining existing barrier headland and island habitat. Although survey data from Table 10 (page 41) indicate that anywhere from 1 to 51 piping plovers could be using any portion of the action area in any given year, it is difficult for the Service to estimate the number of birds migrating through or wintering within the proposed action area because piping plover numbers fluctuate from year to year. Therefore, the Service anticipates that all migrating and wintering piping plovers utilizing the remnants of Shell Island and the Gulf shoreline of the Caminada headland (i.e., a total of 18.42 miles [29.64 km] of shoreline), and up to 278 acres of existing critical habitat will be impacted by: (1) disturbance due to human activity and equipment noise during construction within the action area; and (2) temporary habitat loss within the project footprint along each barrier shoreline for the duration of construction activities (2 to 3 years for each project feature) and up to 2 years post construction for the recovery of intertidal benthic prey species.

The nearest suitable habitats to the Caminada headland into which piping plovers can disperse are located on East Timbalier Island (located between Timbalier Island and the West Belle Pass headland), the West Belle Pass headland (located immediately west of Belle Pass), and Grand Isle (located immediately east of Elmer’s Island and Caminada Pass). The next closest suitable habitat areas to the Caminada headland consist of the Isles Dernieres (critical habitat Unit LA-4) to the west and the Grand Terre Islands (critical habitat Unit LA-5) to the east; both of which are greater than 10 miles away from that portion of the action area. The nearest suitable habitat areas to the Shell Island reach are Chaland Beach (located immediately west of Grand Bayou) and Pelican and Scofield Islands (located immediately east of the Empire jetties). The next closest suitable habitat areas to the Shell Island reach are the Grand Terre Islands to the west, and the mud lumps at mouth of the South Pass of the Mississippi River to the east; both of which are greater than 10 miles away from that portion of the action area. However, all of those areas have been impacted by the Deepwater Horizon oil spill, and foraging and roosting habitat in those areas are recovering from ongoing oil spill cleanup activities and NRDAR surveys and data collection. The duration of disturbance from the oil spill is ongoing for an unknown period of time. In addition, several other coastal restoration projects on the Isles Dernieres, West Belle Pass headland, Scofield Island, and Pelican Island will be constructed before, during, or within 2 years of the construction time frame for the BBBSR project.

The closest non-oiled habitat would be the Atchafalaya River Delta which is located greater than 70 miles west of the action area along the Caminada headland; there is no non-oiled habitat located east of either portion of the BBBSR project. Critical habitat Unit LA-2 consists of the deltaic splay and the dredge disposal islands occurring east and southeast of the main navigation channel of the Atchafalaya River. At this time, there have been no reported impacts to those areas as a result of the Deepwater Horizon oil spill. Table 12 depicts the results of sporadic winter surveys of the Atchafalaya River Delta over the last 19 years.

Table 12. Piping plover numbers from winter surveys within the Atchafalaya River Delta.

Location	1991 IPPC[a] Survey	1996 IPPC Survey	2001 IPPC Survey	2006 IPPC Survey	2006-07 CWS[b] Survey	2007 LDWF[c] Survey	2008 LDWF Survey	2009 LDWF Survey	2010 LDWF Survey
Atchafalaya River Delta	27	0	21	6	NS[d]	NS	27	0	NS

(a) IPPC = International Piping Plover Census; (b) CWS = Canadian Wildlife Service, Maddock 2008; (c) LDWF = Louisiana Department of Wildlife and Fisheries-Natural Heritage Program; (d) NS = Not Surveyed.

Critical habitat within the action area is experiencing ongoing disturbance by oil spill cleanup activities, and such disturbance will continue for an unknown period of time. The proposed action would involve anywhere from 2 to 3 years of disturbance activities for the construction period, plus an additional 2 years of recovery for the intertidal benthic community following TY1. The project would not, however, result in permanent changes to the natural processes that maintain the PCEs of critical habitat. Daily tidal processes and occasional storm events would re-work the additional sediment to recreate over-wash areas, sand and mud flats, and sand spits. Without the additional sediment from the project, critical habitat on the headland would eventually erode below sea level.

Although restoration of the Caminada headland and Shell Island reach would follow on the heels of the Deepwater Horizon oil spill and would result in temporary disturbance within the action area, in time the proposed action would ultimately benefit the piping plover and its critical habitat by restoring diverse barrier headland and island habitats used by the piping plover. The proposed action would also allow for the continued existence and creation of habitat within critical habitat Unit LA-5 throughout the project life.

CUMULATIVE EFFECTS

The proposed project would occur on privately owned and State-owned lands and/or State-owned water bottoms. Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

It is unknown how much influence the proposed project would contribute to increased human disturbance along the privately owned portions of the Caminada headland. However, the remoteness of Shell Island and the LDWF's management of Elmer's Island help to control human disturbance levels within those portions of the action area. Overall recreational use of the Caminada headland (including Elmer's Island) is generally in the form of bird watching and fishing, and because of its remoteness, there is little human disturbance on Shell Island. Any future proposed actions that are within endangered or threatened species habitat will require section 7 or 10 permitting from the Service to be covered under the Act.

Impacts to the action area from the Deepwater Horizon oil spill includes Stage III cleanup actions for weathered oil, tar balls, tar mats, tar patties, oil mousse, oiled wrack, Stage IV monitoring and maintenance activities, ongoing NRDAR surveys and studies, dispersants in the water, and increased human disturbance from those cleanup and monitoring activities. Although the final breadth of the oil spill impacts to the Louisiana Gulf shoreline and shoreline-dependent species remains unknown, section 7 consultation will be completed with the lead Federal agency, the U.S. Coast Guard, at the conclusion of the emergency event.

CONCLUSION

The survival and recovery of all breeding populations of piping plovers are fundamentally dependent on the continued availability of sufficient habitat in their coastal migration and wintering range, where the species spends more than two-thirds of its annual cycle. All piping plover populations are inherently vulnerable to even small declines in their most sensitive vital rates (i.e., survival of adults and fledged juveniles). Mark-recapture analysis of resightings of uniquely banded piping plovers from seven breeding areas by Roche et al. (2010) found that apparent adult survival declined in four populations and increased in none over the life of the studies. Some evidence of correlation in year-to-year fluctuations in annual survival of Great Lakes and eastern Canada populations, both of which winter primarily along the southeastern U.S. Atlantic Coast, suggests that shared over-wintering and/or migration habitats may influence annual variation in survival. Further concurrent mark-resighting analysis of color-banded individuals across piping plover breeding populations has the potential to shed light on threats that affect survival in the migration and wintering range. Progress towards recovery (which is attained primarily through intensive protections to increase productivity on the breeding grounds) would be quickly slowed or reversed by even small sustained decreases in survival rates during migration and wintering.

Implementation of the proposed action is not likely to kill any piping plovers since they are highly mobile and can move out of harm's way. The increased disturbance to normal piping plover foraging/roosting behaviors and suitable habitat would likely result in increased energy expenditure and a potential lack of food supply, which may indirectly affect fitness, fecundity, and over-wintering survival. Such effects to migrating and wintering piping plovers would be sporadic and temporary over the course of the 2-year construction window. After reviewing the current status of the piping plover wintering population of the northern Great Plains, the Great Lakes, and the Atlantic Coast; the environmental baseline for the action area; the effects of the proposed BBBSR project; and cumulative effects, it is the Service's biological opinion that implementation of the BBBSR project, as proposed, is not likely to jeopardize the continued existence of the piping plover. As noted previously, the overall status of the listed species is stable, if not increasing.

Critical Habitat

Critical habitat for this species has been designated within the project area and the action area. The project has been designed to mimic natural barrier headland habitat and, in the long-term, would aid natural processes in creating and maintaining the PCEs of critical habitat on the headland by providing sediment within the sediment-starved barrier headland system. The amount of critical habitat in Unit LA-5 directly affected from the project is approximately 278 acres of sparsely and non-vegetated barrier headland shoreline habitat. The project area would be temporarily disturbed during construction activities which would impede piping plovers attempting to roost and forage in the area during the migration and wintering months that coincide with construction. Temporary disturbance to 278 acres of Unit LA-5 equates to 1.1 percent of designated critical habitat in Louisiana and 0.16 percent of all designated critical habitat throughout the Southeast (i.e., North Carolina to Texas). Because the effects to critical habitat would be temporary in nature and the overall project would be beneficial in the long-term, it is the Service's biological opinion that implementation of the BBBSR project is not likely to destroy or adversely modify designated critical habitat in Unit LA-5.

INCIDENTAL TAKE STATEMENT

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

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

AMOUNT OR EXTENT OF TAKE ANTICIPATED

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

1. Wintering bird survey data indicate that anywhere from one to 51 piping plovers could be within the action area at any point in time. The number of birds within the action area for the duration of project construction and intertidal benthic recovery is difficult to detect because wintering piping plover numbers within the action area vary from year to year, and migrating piping plover numbers vary between both fall and spring migrations and year to year.
2. Harassment to the level of harm may only be apparent on the breeding grounds the following year as a result of reduced fitness or fecundity, or as lack of over-wintering survival.
3. Over-wintering survival would be difficult to detect because it is difficult to detect birds that do not survive migration back to the breeding grounds.

However, the following level of take of this species can be expected by disturbance to affected shoreline miles because disturbance to suitable habitat within the action area would affect the ability of piping plovers to find foraging and roosting habitat throughout the migrating and wintering periods for the duration of project construction and intertidal benthic recovery. The Service anticipates that directly and indirectly all piping plovers using the affected 18.42 miles (of which 278 acres is designated critical habitat) of Gulf shoreline along both the Caminada headland and Shell Island reaches could be taken in the form of harm and harassment as a result of the proposed action.

The level (i.e., all piping plovers using the 18.42 miles of Gulf shoreline) of take of this species can be anticipated by the proposed activities because:

1. Piping plovers are known to winter in and migrate through the action area.
2. The placement of sand is expected to temporarily affect (e.g., in the form of increased human disturbance during construction, temporary loss of benthic prey, and temporary loss of wrack) 18.42 miles of Gulf shoreline over multiple migrating and wintering seasons until construction is complete and until the benthic fauna recover.
3. Temporarily increased levels of human disturbance are expected for the duration of construction activities which would make the 18.42 miles of Gulf shoreline less desirable habitat for piping plovers and may cause increased energy expenditure as birds move away from construction activities.
4. A temporary reduction of food base will occur due to sand placement which would affect the piping plover's ability to forage and store enough fat reserves for migration back to the breeding grounds for multiple wintering seasons. Such an effect could result in reduced fitness or fecundity.

The Service has reviewed the biological information and other information relevant to this action. The take is expected in the form of harm and harassment because of: (1) temporarily decreased fitness and survivorship of wintering piping plovers; (2) temporarily decreased fitness and survivorship of piping plovers attempting to migrate to breeding grounds, due to temporary loss of and disturbance to foraging and roosting habitat; and (3) an indirect temporary reduction of fecundity on the breeding grounds due to the temporary decrease in fitness and survivorship of wintering piping plovers. Incidental take covers take of the species within the action area. If the Corps expands the action outside of the action area then consultation must be reinitiated.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the piping plover species or destruction or adverse modification of its critical habitat. Incidental take of piping plovers utilizing the affected 18.42 miles of barrier headland and island habitat is anticipated to occur during project construction, up to 2 years following construction until the intertidal benthic community recovers, and sporadically for up to 3 years following construction for vegetative plantings.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize take on non-breeding piping plovers during implementation of the proposed BBBSR project within the action area.

1. The Corps should carefully mark and stake the boundaries of the project footprint on both the Caminada headland and Shell Island and ensure that those markers are maintained for the duration of project construction activities. Should the project extend outside of those boundary markers, then the level (i.e., all piping plovers using the 18.42 miles of Gulf shoreline) of incidental take for this project would be exceeded and the Corps should reinitiate section 7 consultation with the Service as soon as possible.
2. A baseline piping plover survey should be conducted within the migrating and wintering season immediately prior to initial construction in order to determine the piping plover's preferred habitat use within the action area. Such information could then be used as an aid to determine whether specific project actions require slight modifications in order to minimize the effects of the take for future migrating and wintering seasons. For example, initial bird surveys may aid in locating and marking appropriate ingress and egress routes for ORVs and other work-related equipment, as well as equipment staging areas, in order to reduce disturbance to foraging and roosting birds to the maximum extent practicable.
3. A simple diversity and abundance survey of the intertidal benthic prey species community should be conducted within the migrating and wintering season immediately prior to initial construction (preferably at the same time as the plover distribution surveys) in order to establish a baseline of benthic prey species diversity and abundance. Again, such information could then be used as an aid to determine whether specific project actions require slight modifications in order to minimize the effects of the take for future migrating and wintering seasons. For example, initial surveys could locate areas of abundant benthic prey where birds may tend to congregate for foraging, and those areas could be flagged for avoidance by regular personnel traffic to reduce disturbance to foraging plovers.
4. Piping plover monitoring surveys should be conducted during the migrating and wintering seasons throughout initial project construction and three consecutive years following completion of initial construction in order to determine whether ingress and egress routes are working or whether they need to be adjusted.
5. To determine length of time needed for recovery of suitable foraging habitat for migrating and wintering plovers, monitoring surveys of the intertidal benthic prey species community should be conducted each year following completion of initial construction for three consecutive years. Such information could then be used as an aid to determine whether specific project actions require slight modifications in order to minimize the effects of the take for future project renourishment and/or maintenance events.
6. At least six months prior to mobilization, the Service should be notified in writing when renourishment events (i.e., renourishment of the subtidal feeder bar and of Shell Island) will occur within the action area so that the Corps and the Service can coordinate and exchange updated information to ensure that reinitiation of consultation is not necessary.

7. A comprehensive report describing the actions taken to implement the RPMs and terms and conditions associated with this incidental take statement shall be submitted to the Service by June 30 of the year following completion of all required surveys.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps shall execute the following terms and conditions, which implement the RPMs described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

Marking Project Boundaries

1. The Corps should carefully survey and mark the boundaries of the project footprint on the Caminada headland and Shell Island.
2. Boundary markers should be semi-permanent such that they should be maintained throughout construction activities and should persist until all construction-related activities are completed.
3. The Service's Louisiana Ecological Services Office (337/291-3108) should be notified immediately if any work or project-related actions exceed the boundary markers so that reinitiation of section 7 consultation can proceed as quickly and efficiently as possible to avoid delay in the project schedule.

Monitoring Requirements

1. <u>Requirements for piping plover surveys</u>
   a) A survey schedule (with dates) is listed in Appendix D and the recommendation is for at least 3 survey dates per month; this schedule should be followed as closely as possible. The Service recognizes that given the remoteness of the project area and the potential for inclement weather conditions during the piping plover wintering season, three survey dates per month may be difficult to achieve in Louisiana. If conditions require a deviation from the recommended survey schedule, such information should be carefully documented, including an explanation why any deviation from the recommended schedule was deemed necessary.
   b) Piping plover identification, especially when in non-breeding plumage, can be difficult. Qualified professionals with shorebird/habitat survey experience must conduct the required survey work. Piping plover monitors must be capable of detecting and recording locations of roosting and foraging plovers, and documenting observations in legible, complete field notes. Aptitude for monitoring includes keen powers of observation, familiarity with avian biology and behavior, experience observing birds or other wildlife for sustained periods, tolerance for adverse weather, experience in data collection and management, and patience.
   c) Binoculars, a global positioning system (GPS) unit, a 10-60x spotting scope with a tripod, and the Service datasheet (Appendix D) must be used to conduct the surveys.
   d) Negative (i.e., no plovers seen) and positive survey data shall be recorded and reported.
   e) Piping plover locations shall be recorded with a GPS unit set to record in decimal degrees in universal transverse mercator (UTM) North American Datum 1983 (NAD83).
   f) Habitat, landscape, and substrate features used by piping plovers when seen shall be recorded. Such features are outlined on the Service data sheet in Appendix D.
   g) Behavior of piping plovers (e.g., foraging, roosting, preening, bathing, flying, aggression, walking) shall be documented on the Service data sheet in Appendix D.
   h) Color-bands seen on piping plovers shall also be carefully documented, and should also be reported according to the information found at the following websites. Information regarding

color-band observations can be found at: http://www.fishwild.vt.edu/piping_plover/Protocols_final_draft.pdf, http://www.waterbirds.umn.edu/Piping_Plovers/piping2.htm, and http://www.fws.gov/northeast/pipingplover/pdf/BahamasBandReporting2010.pdf.

2. Requirements for surveying benthic prey species
   a) A qualified professional with sediment/macroinvertebrate sampling experience must conduct the benthic prey species surveys.
   b) A baseline macroinvertebrate survey will be conducted at the same time of the initial piping plover survey during the migrating/wintering season immediately prior to construction. Additional surveys will be conducted during the migrating/wintering season each year post-construction for three consecutive years to determine benthic prey species recovery. Such surveys should be conducted at the same time as the plover surveys.
   c) Sampling will be conducted using a basic before and after control and impact design method. Sampling will be coordinated with piping plover foraging observations based on low tide surveys.
   d) In addition to recording benthic species abundance and diversity, a qualitative measure of sediment characteristics (sand, shell, mud) should also be recorded.
   e) A detailed sampling methodology should be developed in coordination with the Service prior to initiating surveys.

Reporting Requirements

1. Incorporate all data collected into an appropriate database, preferably one for piping plovers and one for benthic prey species.
2. Annual update reports should be provided to the Service by June 30 of each calendar year once construction begins. Annual update reports should include data sheets, maps, a copy of the database, and the progress and initial findings of piping plover and benthic community surveys, as well as any problematic issues that may hinder future survey efforts.
3. If the Corps foresees any problematic issues that would require a change in the recommended survey schedule due to work conditions or project delays, the Corps should immediately notify the Service so that we can resolve/correct any such issues.
4. A final comprehensive report should be provided to the Service by June 30 following the third year of surveys. That final report should include an analysis of all data results from the piping plover and benthic community surveys.
5. At least six months prior to mobilization, the Corps should notify the Service in writing prior to each proposed renourishment event. That notification should include whether there are any changes in the proposed amount of renourishment per island or changes in anticipated project footprints.

Upon locating a dead or injured piping plover that may have been harmed or destroyed as a direct or indirect result of the proposed project, the Corps and/or contractor shall be responsible for notifying the Service's Lafayette, Louisiana, Field Office (337/291-3100) and the LDWF's Natural Heritage Program (225/765-2821). Care shall be taken in handling an injured piping plover to ensure effective treatment or disposition and in handling dead specimens to preserve biological materials in the best possible state for later analysis.

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

Migratory Bird Treaty Act (MBTA)

The MBTA implements various treaties and conventions between the U.S., Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the provisions of the MBTA it is unlawful "by any means or manner to pursue, hunt, take, capture or kill any migratory bird except as permitted by regulations issued by the Fish and Wildlife Service. The term "take" is not defined in the MBTA, but the Service has defined it by regulation to mean to pursue, hunt, shoot, wound, kill, trap, capture or collect any migratory bird, or any part, nest or egg or any migratory bird covered by the conventions or to attempt those activities.

In order to comply with the MBTA and potential for this project to impact nesting shorebirds, the Corps should follow the Service and LDWF's guidelines (Appendix E) to protect against impacts to nesting shorebirds during implementation of this project.

The Fish and Wildlife Service will not refer the incidental take of piping plovers for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-712), if such take is in compliance with the terms and conditions specified here.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. The Corps should consider retro-fitting all sand fencing poles with pointy tops or caps to reduce avian predation.

2. We encourage the Corps to take a proactive approach in coordinating with the Service regarding programmatic-level section 7 consultations for implementation of landscape-scale coastal protection and restoration programs in Louisiana. Programmatic-level planning and consultation may further reduce and minimize cumulative effects to listed species (e.g., piping plover, pallid sturgeon, West Indian manatee, sea turtles) resulting from implementation of multiple types of coastal protection and restoration projects, including, but not limited to those projects associated with the LCA Study, CWPPRA, and hurricane protection actions.

3. We encourage the Corps to continue to coordinate with the Service during the pre-planning phases of future coastal protection and restoration projects (including any sand placement projects) within piping plover designated critical habitat.

4. We encourage the Corps to participate in and/or fund a benthic study (or studies) along coastal Louisiana, west of the Mississippi River. Information is needed regarding the effects of sand placement and dredging projects on benthic prey species and their potential recovery time following such actions. That information would benefit our knowledge regarding piping plover

foraging biology and aid in future section 7 consultation during project planning for future coastal restoration actions.

In order for the Service to be kept informed of actions that minimize or avoid adverse effects or that benefit listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes consultation on the proposed action. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take (i.e., the 18.42 miles of Gulf shoreline described herein) is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take shall cease pending reinitiation.

The above findings and recommendations constitute the report of the Department of the Interior. If you have any questions about this final biological opinion, please contact Ms. Brigette Firmin of this office at 337/291-3108.

Sincerely,

David A. Walther
Acting Supervisor
Louisiana Ecological Services Office

cc: FWS, Atlanta, GA (Attn: Ken Graham)
FWS, Panama City, FL (Attn: Patty Kelly)
LDWF, Baton Rouge, LA
LDWF, Natural Heritage Program, Baton Rouge, LA

LITERATURE CITED

Adams, T. 2009. Electronic mail dated 10 February 2009 from Trish Adams, USFWS, Vero Beach, Florida, Field Office to Patricia Kelly, USFWS, Panama City, Florida Office regarding USFWS-issued permit conditions for raccoon eradication to Indian River County staff in Florida as part of a coastal Habitat Conservation Plan.

American Bird Conservancy. 2007. Pesticide Profile – Fenthion. Accessed on 27 February 2009 at http://www.abcbirds.org/abcprograms/policy/pesticides/Profiles/fenthion.html.

Amirault, D.L., F. Shaffer, K. Baker, A. Boyne, A. Calvert, J. McKnight, and P. Thomas. 2005. Preliminary results of a five year banding study in Eastern Canada – support for expanding conservation efforts to non-breeding sites? Unpublished Canadian Wildlife Service report.

Amirault-Langlais, D.L., P.W. Thomas, and J. McKnight. 2007. Oiled piping plovers (*Charadrius melodus melodus*) in eastern Canada. Waterbirds 30(2):271-274.

Amos, A. 2009. Telephone conversation on 3 April 2009 between Tony Amos, University of Texas Marine Science Institute, and Robyn Cobb, USFWS Corpus Christi, Texas Field Office regarding injured and oiled piping plovers on the central Texas coast.

Arvin, J. 2008. A survey of upper Texas coast critical habitats for migratory and wintering piping plover and associated resident “sand plovers”. Gulf Coast Bird Observatory’s interim report to Texas Parks and Wildlife Department. Grant No. TX E-95-R.

Arvin, J.C. 2009. Hurricane shifts plover populations. Gulf Coast Bird Observatory’s Gulf Crossings. Vol. 13, No.1. Page 5.

Barber Beach Cleaning Equipment. 2009. Information accessed from website at http://www.hbarber.com/cleaners/beach_cleaning_equipment.aspx

Bent, A.C. 1929. Life histories of North American Shorebirds. U.S. Natural Museum Bulletin 146:236-246.

Boesch, D. F. 1982. Proceedings of the conference on coastal erosion and wetland modification in Louisiana: causes, consequences, and options. U.S. Fish and Wildlife Service, Biological Services Program, Washington, D.C. FWS/OBS-82/59. 256 pp.

Brault, S. 2007. Population viability analysis for the New England population of the piping plover (*Charadrius melodus*). Report 5.3.2-4. Prepared for Cape Wind Associates, L.L.C., Boston, Massachusetts.

Burger, J. 1991. Foraging behavior and the effect of human disturbance on the piping plover (*Charadrius melodus*). Journal of Coastal Research 7:39-52.

Burger, J. 1994. The effect of human disturbance on foraging behavior and habitat use in piping plover (*Charadrius melodus*). Estuaries 17:695-701.

Burger, J. 1997. Effects of oiling on feeding behavior of sanderlings (*Calidris alba*) and semipalmated plovers (*Charadrius semipalmatus*) in New Jersey. Condor 99:290-298.

Burton, N.H.K., P.R. Evans, and M.A. Robinson. 1996. Effects on shorebirds numbers of disturbance, the loss of a roost site and its replacement by an artificial island at Hartlepool, Cleveland. Biological Conservation 77:193-201.

Cairns, W.E., and I. McLaren. 1980. Status of the piping plover on the east coast of North America. American Birds 34:206-208.

Calvert, A.M., D.L. Amirault, F. Shaffer, R. Elliot, A. Hanson, J. McKnight, and P.D. Taylor. 2006. Population assessment of an endangered shorebird: The piping plover (*Charadrius melodus melodus*) in eastern Canada. Avian Conservation and Ecology 1(3):4, http://www.ace-eco.org/vol1/iss3/art4.

Camfield, F.E. and C.M. Holmes. 1995. Monitoring completed coastal projects. Journal of Performance of Constructed Facilities 9:169-171.

Catlin, D.H., J.D. Fraser, M. Stantial, J.H. Felio, K. Gierdes, and S. Karpanty. 2011. Operations report – Virginia Tech Chandeleur piping plover survey. Unpublished report prepared for U.S. Fish and Wildlife Service under Permit TE19418A-0. 2pp.

Chapman, B.R. 1984. Seasonal abundance and habitat-use patterns of coastal bird populations on Padre and Mustang Island barrier beaches (following the Ixtoc I Oil Spill). Report prepared for U.S. Fish and Wildlife Service under Contract No. 14-16-0009-80-062.

Clark, Ralph R. 1993. Beach Conditions in Florida: a statewide inventory and identification of the beach erosion problem areas in Florida, in Florida Department of Environmental Protection. 5th Edition, December 1993. Beaches and Shores Technical and Design Memorandum 89-1.

Climate Change Science Program (CCSP). 2008. Weather and climate extremes in a changing climate. Regions of focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. Department of Commerce, NOAA's National Climatic Data Center, Washington, D.C.

Climate Change Science Program (CCSP). 2009. Coastal sensitivity to sea-level rise: A focus on the Mid-Atlantic Region. A report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. J.G. Titus, coordinating lead author. Environmental Protection Agency, Washington, D.C.

Cobb, R. 2009. Electronic mail dated 10 February 2009 from Robyn Cobb, USFWS, Corpus Christi, Texas, Field Office to Patricia Kelly, USFWS, Panama City, Florida, Field Office regarding predator control programs used for waterbird islands in Texas.

Cohen, J. 2009. Electronic mail dated 15 and 16 January 2009 from Jonathan Cohen, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, to Anne Hecht, USFWS, Northeast Regional Office.

Cohen, J. B., J. D. Fraser, and D. H. Catlin. 2006. Survival and site fidelity of piping plovers on Long Island, New York. Journal of Field Ornithology 77:409-417.

Cohen, J.B., S.M. Karpanty, D.H. Catlin, J.D. Fraser, and R.A. Fischer. 2008a. Winter ecology of piping plovers at Oregon Inlet, North Carolina. Waterbirds 31:472-479.

Cohen, J. B., E. H. Wunker, and J. D. Fraser. 2008b. Substrate and vegetation selection by nesting piping plovers (*Charadrius melodus*) in New York. Wilson Journal of Ornithology 120:404-407.

Connor, P.F.Jr., S.P. Penland, A.D. Beall, M.A. Kulp, S. Fearnley, S.J. Williams, and A.H. Sallenger, Jr. 2004. Long-term shoreline change history of Louisiana's gulf shoreline: 1800's to 2002. Pontchartrain Institute for Environmental Sciences, PIES_CRL Technical Report Series 04001.

Coutu, S.D., J.D. Fraser, J.L. McConnaughy, and J.P. Loegering. 1990. Piping plover distribution and reproductive success on Cape Hatteras National Seashore. Unpublished report to the National Park Service.

Cross, R.R. 1990. Monitoring, management and research of the piping plover at Chincoteague National Wildlife Refuge. Unpublished report. Virginia Department of Game and Inland Fisheries, Richmond, Virginia.

Cross, R.R. 1996. Breeding ecology, success, and population management of the piping plover at Chincoteague National Wildlife Refuge, Virginia. M.S. Thesis. College of William and Mary, Virginia.

Cuthbert, F.J. and E.A. Roche. 2006. Piping plover breeding biology and management in the Great Lakes, 2006. Report submitted to the US Fish and Wildlife Service, East Lansing, Michigan.

Cuthbert, F.J. and E.A. Roche. 2007. Estimation and evaluation of demographic parameters for recovery of the endangered Great Lakes piping plover population. Unpublished report submitted to the US Fish and Wildlife Service, East Lansing, Michigan.

Defeo, O., A. McLachlan, D.S. Schoeman, T.A. Schlacher, J. Dugan, A. Jones, M. Lastra, and F. Scapini. 2009. Threats to Sandy Beach Ecosystems: A Review. Estuarine, Coastal and Shelf Science 81(2009):1-12.

Douglas, B.C., Kearney, M., and S. Leatherman. 2001. Sea-level rise: History and consequences. New York, New York: Academic Press, Inc.

Drake, K.R. 1999a. Movements, habitat use, and survival of wintering piping plovers. M.S. Thesis. Texas A&M University-Kingsville, Kingsville, TX. 82 pp.

Drake, K. L. 1999b. Time allocation and roosting habitat in sympatrically wintering piping and snowy plovers. M. S. Thesis. Texas A&M University-Kingsville, Kingsville, TX. 59 pp.

Drake, K.R., J.E. Thompson, K.L. Drake, and C. Zonick. 2001. Movements, habitat use, and survival of non-breeding Piping Plovers. Condor 103(2):259-267.

Dugan, J.E., D.M. Hubbard, M.D. McCrary, and M.O. Pierson. 2003. The response of macrofauna communities and shorebirds to macrophyte wrack subsidies on exposed sandy beaches of southern California. Estuarine, Coastal and Shelf Science 58:25-40.

Dugan and Hubbard. 2006. Ecological responses to coastal armoring on exposed sandy beaches. Journal of the American Shore and Beach Preservation Association. Winter Volume 74, No. 1.

Ecological Associates, Inc. 2009. Report to Martin County, "Piping plover surveys-St. Lucie Inlet Area". Jensen Beach, Florida. 7 pp and appendices.

Elias-Gerken, S.P. 1994. Piping plover habitat suitability on central Long Island, New York barrier islands. M.S. Thesis. Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Elliott, L.F. and T. Teas. 1996. Effects of human disturbance on threatened wintering shorebirds. In fulfillment of Texas Grant number E-1-8. Project 53. 10 pp.

Elliott-Smith, E., S.M. Haig, and B.M. Powers. 2009. Data from the 2006 International Piping Plover Census: U.S. Geological Survey Data Series 426. 332 p.

Emanuel, K. 2005. Increasing destructiveness of tropical cyclones over the past 30 years. Nature, Volume 436(4):686-688.

Environmental Protection Agency (EPA). 2009. Coastal Zones and sea level rise. Accessed on 29 January 2009 at http://www.epa.gov/climatechange/effects/coastal/index/html.

Farley, R. 2009. Phone conversation on 11 February 2009 between Robert Farley, Planning and Landscape Architecture, Post, Buckley, Schuh, and Jernigan, Inc. and Patricia Kelly, Service, Panama City, Florida, Field Office regarding status of beach vitex on northwest Florida beaches.

Ferland, C.L., and S.M. Haig. 2002. 2001 International piping plover census. U.S. Geological Survey, forest and Rangeland Ecosystem Science Center. Corvallis, Oregon.

Florida Department of Environmental Protection (FDEP). 2008. Critically eroded beaches in Florida. Bureau of Beaches and Coastal Systems. 77 pp.

Galbraith, H., R. Jones, R. Park, J. Clough, S. Herrod-Julius, B. Harrington, and G. Page. 2002. Global climate changes and sea level rise: Potential loss of intertidal habitat for shorebirds. Waterbirds 25:173-183.

Gibbs, J.P. 1986. Feeding ecology of nesting piping plovers in Maine. Unpublished report to Maine Chapter, The Nature Conservancy, Topsham, Maine.

Gibson, M., C.W. Nathan, A.K. Killingsworth, C. Shankles, E. Coleman, S. Bridge, H. Juedes, W. Bone, and R. Shiplett. 2009. Observations and implications of the 2007 amalgamation of Sand-Pelican Island to Dauphin Island, Alabama. Geological Society of America. Paper No. 20-10, Southeastern Section - 58th Annual Meeting. Volume 41, No.1, p. 52.

Gilbertson, M., T. Kubiak, J. Ludwig, and G. Fox. 1991. Great Lakes embryo mortality, edema, and deformities syndrome (GLEMEDS) in colonial fish-eating birds: Similarity to chick-edema disease. Journal of Toxicology and Environmental Health 33:455-520.

Godfrey, P.J., S.P. Leatherman, and P.A. Buckley. 1978. Impact of off-road vehicles on coastal ecosystems. Pages 581-599 *in* Coastal Zone 1978 Symposium on Technical, Environmental Socioeconomic and Regulatory Aspects of Coastal Zone Management. Volume II, San Francisco, California.

Godfrey, P.J., S.P. Leatherman, and P.A. Buckley. 1980. ORVs and barrier beach degradation. Parks 5:2, 5-11.

Goldin, M.R. 1993. Piping Plover (Charadrius melodus) management, reproductive ecology, and chick behavior at Goosewing and Briggs Beaches, Little Compton, Rhode Island, 1993. The Nature Conservancy, Providence, Rhode Island.

Goldin, M.R., C. Griffin, and S. Melvin. 1990. Reproductive and foraging ecology, human disturbance, and management of piping plovers at Breezy Point, Gateway National Recreational Area, New York, 1989. Progress report for U.S. Fish and Wildlife Service, Newton Corner, Massachusetts.

Goossen, J.P, D.L. Amirault, J. Arndt, R. Bjorge, S. Boates, J. Brazil, S. Brechtel, R. Chiasson, G.N. Corbett, R. Curley, M. Elderkin, S.P. Flemming, W. Harris, L. Heyens, D. Hjertaas, M. Huot, B. Johnson, R. Jones, W. Koonz, P. Laporte, D. McAskill, R.I.G. Morrison, S. Richard, F. Shaffer, C. Stewart, L. Swanson and E. Wiltse. 2002. National Recovery Plan for the Piping Plover (*Charadrius melodus*). National Recovery Plan No. 22. Recovery of Nationally Endangered Wildlife. Canadian Wildlife Service, Ottawa, Canada. 47 pp.

Goss-Custard, J.D., R.T. Clarke, S.E.A. le V. dit Durell, R.W.G. Caldow, and B.J. Ens. 1996. Population consequences of winter habitat loss in migratory shorebird. II. Model predictions. Journal of Applied Ecology 32:337-351.

Gratto-Trevor, C., D. Amirault-Langlais, D. Catlin, F. Cuthbert, J. Fraser, S. Maddock, E. Roche, and F. Shaffer. 2009. Winter distribution of four different piping plover breeding populations. Report to U.S. Fish and Wildlife Service. 11 pp.

Greene, K. 2002. Beach nourishment: a review of the biological and physical impacts. Atlantic States Marine Fisheries Commission. ASMFC Habitat Management Series #7. 78 pp.

Griffin, C.R. and S.M. Melvin. 1984. Research plan on management, habitat selection, and population dynamics of piping plovers on outer Cape Cod, Massachusetts. University of Massachusetts. Research proposal submitted to U.S. Fish and Wildlife Service, Newton Corner, Massachusetts.

Haig, S.M. 1992. Piping Plover *in* The Birds of North America, No. 2 (A. Poole, P. Stettenheim, & F. Gill, eds). Philadelphia: The academy of Natural Sciences; Washington DC: The American Ornithologists' Union. 17 pp.

Haig, S.M., and E. Elliott-Smith. 2004. Piping Plover *in* The Birds of North America Online (A. Poole, eds.). Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/BNA/account/Piping_Plover.

Haig, S.M., and L.W. Oring. 1985. The distribution and status of the piping plover throughout the annual cycle. Journal of Field Ornithology 56:334-345.

Haig, S.M., and L.W. Oring. 1987. The piping plover. Audubon Wildlife Report. Pp. 509-519.

Haig, S.M., C.L. Ferland, F.J. Cuthbert, J. Dingledine, J.P. Goossen, A. Hecht, and N. McPhillips. 2005. A complete species census and evidence for regional declines in piping plovers. Journal of Wildlife Management. 69(1): 160-173.

Hake, M. 1993. 1993 summary of piping plover management program at Gateway NRA Breezy Point district. Unpublished report. Gateway National Recreational Area, Long Island, New York.

Hall, H. 2009. Electronic mail dated 17 July 2009 from Howard Hall, USFWS Raleigh, North Carolina, Field Office to Patricia Kelly, USFWS, Panama City, Florida, Field Office regarding estimates on beach nourishment coverage in NC.

Harrington, B.R. 2008. Coastal inlets as strategic habitat for shorebirds in the southeastern United States. DOER Technical Notes Collection. ERDC TN-DOER-E25. Vicksburg, MS: U.S. Army Engineer Research and Development Center. http://el.erdc.usace.army.mil/dots/doer.

Hayes, M.O., and J. Michel. 2008. A coast for all seasons: A naturalist's guide to the coast of South Carolina. Pandion Books, Columbia, South Carolina. 285 pp.

Hecht, A., and S. M. Melvin. 2009. Expenditures and effort associated with recovery of breeding Atlantic Coast piping plovers**.** Journal of Wildlife Management 73(7):1099-1107.

Helmers, D.L. 1992. Shorebird management manual. Western Hemisphere Shorebird Reserve. Network, Manomet, Massachusetts, USA.

Hoffman, D.J., C.P. Rice, and T.J. Kubiak. 1996. PCBs and dioxins in birds. Chapter 7, pp.165-207, *in* W.N. Beyer, G.H. Heinz, and A.W. Redmon-Norwood, eds. Environmental contaminants in wildlife: Interpreting tissue concentrations. CRC Press, Inc., New York, New York.

Hoopes, E.M. 1993. Relationships between human recreation and piping plover foraging ecology and chick survival. M.S. Thesis. University of Massachusetts, Amherst, Massachusetts.

Hoopes, E.M., C.R. Griffin, and S.M. Melvin. 1992. Relationships between human recreation and piping plover foraging ecology and chick survival. Unpublished report. University of Massachusetts, Amherst, Massachusetts.

Hopkinson, C.S., A.E. Lugo, M. Alber, A.P. Covich, and S.J. Van Bloem. 2008. Forecasting effects of sea-level rise and windstorms on coastal and inland ecosystems. Frontiers in Ecology and Environment 6:255-263.

Hubbard, D.M., and J.E. Dugan. 2003. Shorebird use of an exposed sandy beach in southern California. Estuarine Coastal Shelf Science 58, 41-54.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate change 2007: Synthesis report, summary for policymakers. IPCC Plenary XXVII. Valencia, Spain, 12-17 November 2007.

Johnson, C.M. and G.A. Baldassarre. 1988. Aspects of the wintering ecology of piping plovers in coastal Alabama. Wilson Bulletin 100:214-233.

Lafferty, K.D. 2001a. Birds at a Southern California beach: Seasonality, habitat use and disturbance by human activity. Biodiversity and Conservation 10:1949-1962.

Lafferty, K.D. 2001b. Disturbance to wintering western snowy plovers. Biological Conservation 101:315-325.

Lamont, M.M., H.F. Percival, L.G. Pearlstine, S.V. Colwell, W.M. Kitchens, and R.R. Carthy. 1997. The Cape San Blas ecological study. U.S. Geological Survey -Biological Resources Division. Florida Cooperative Fish and Wildlife Research Unit, Technical Report No. 57.

Larson, M.A., M.R. Ryan, and R.K. Murphy. 2002. Population viability of piping plovers: Effects of predator exclusion. Journal of Wildlife Management 66:361-371.

LeBlanc, D. 2009. Electronic mail dated 29 January 2009 from Darren LeBlanc, Service, Daphne, Alabama, Ecological Services Office to Patricia Kelly, Service, Panama City, Florida, Field Office regarding habitat changes along Alabama coast from hurricanes.

LeDee, O.E. 2008. Canaries on the coastline: Estimating survival and evaluating the relationship between nonbreeding shorebirds, coastal development, and beach management policy. Ph.D. Dissertation, University of Minnesota, Twin Cities.

LeDee, O.E., K.C. Nelson, and F.J. Cuthbert. 2010. The challenge of threatened and endangered species management in coastal areas. Coastal Management 38:337-353.

Lee, C. 2009. Electronic mail dated 6 February 2009 from Clare Lee, USFWS Corpus Christi, Texas Field Office to Robyn Cobb, USFWS Corpus Christi, Texas Field Office regarding oil spills, area committees, contingency plans and the contents of containers washing up on Texas' beaches.

Loegering, J.P. 1992. Piping plover breeding biology, foraging ecology and behavior on Assateague Island National Seashore, Maryland. M.S. Thesis. Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Lott, C.A., P.A. Durkee, W.A. Gierhart, and P.P. Kelly. 2007 in review. Florida coastal engineering and bird conservation geographic information system (GIS) manual. U.S. Army Corps of Engineers, Dredging Operations and Environmental Research Program, Engineer Research and Development Center, Technical Report.

Lott, C.A., C.S. Ewell Jr., and K.L. Volanky. 2009. Habitat associations of shoreline-dependent birds in barrier island ecosystems during fall migration in Lee County, Florida. Prepared for U.S. Army Corps of Engineers, Engineer Research and Development Center, Technical Report. 103 pp.

Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority. 1999. Coast 2050: toward a sustainable coastal Louisiana, the appendices. Appendix E - region 3 supplemental information. Louisiana Department of Natural Resources. Baton Rouge, LA. 173 pp.

MacIvor, L.H. 1990. Population dynamics, breeding ecology, and management of piping plovers on outer Cape Cod, Massachusetts. M.S. Thesis. University of Massachusetts, Amherst, Massachusetts.

Maddock, S. B. 2008. Wintering piping plover surveys 2006-2007, East Grand Terre, LA to Boca Chica, TX, December 20, 2006 – January 10, 2007, final report. Unpublished report prepared for the Canadian Wildlife Service, Environment Canada, Edmonton, Alberta. iv + 66 pp.

Maddock, S., M. Bimbi, and W. Golder. 2009. South Carolina shorebird project, draft 2006 – 2008 piping plover summary report. Audubon North Carolina and U.S. Fish and Wildlife Service, Charleston, South Carolina. 135 pp.

Massachusetts Audubon. 2003-2009. Buzzard's Bay oil spill: What lies beneath? Accessed on 26 February 2009 at http://www.massaudubon.org/news/newsarchive.php?id=63&type=news.

McBride, R.A., S. Penland, M. Hiland, S.J. Williams, K.A. Westphal, B. Jaffe, and A.H. Sallenger, Jr. 1992. Analysis of barrier shoreline change in Louisiana from 1853 to 1989 *in* Williams, S.J., S. Penland, and A.H. Sallenger (eds), Atlas of Barrier Island Changes in Louisiana from 1853 to 1989. Miscellaneous Investigations Series 1-2150-A, U.S. Geological Survey, pp 36-97.

McConnaughey, J.L., J.D. Fraser, S.D. Coutu, and J.P. Loegering. 1990. Piping plover distribution and reproductive success on Cape Lookout National Seashore. Unpublished report to National Park Service.

Melvin, S.M., C.R. Griffin, and L.H. MacIvor. 1991. Recovery strategies for piping plovers in Managed coastal landscapes. Coastal Management 19: 21-34.

Melvin, S.M., and J.P. Gibbs. 1994. Viability analysis for the Atlantic Coast Population of piping plovers. Unpublished report to the U.S. Fish and Wildlife Service, Sudbury, Massachusetts.

Melvin, S.M., and J.P. Gibbs. 1996. Viability analysis for the Atlantic Coast population of piping plovers. Pp. 175-186 *in* Piping plover (*Charadrius melodus*), Atlantic Coast population, revised recovery plan. U.S. Fish and Wildlife Service, Hadley, Massachusetts.

Morrier, A., and R. McNeil. 1991. Time-activity budget of Wilson's and semipalmated plovers in a tropical environment. Wilson Bulletin 103:598-620.

Morton, R., G. Tiling, and N. Ferina. 2003. Causes of hot-spot wetland loss in the Mississippi delta plain. Environmental Geosciences 10:71-80.

National Park Service (NPS). 2007. Cape Hatteras National Seashore 2007 annual piping plover (*Charadrius melodus*) report. Cape Hatteras National Seashore, Manteo, North Carolina.

Neal, W.J., O.H. Pilkey, J.T. Kelley. 2007. Atlantic Coast Beaches: a guide to ripples, dunes, and other natural features of the seashore. Mountain Press Publishing Company, Missoula, Montana. 250 pp.

Nicholas, M. 2005. Electronic mail dated 8 March 2005 from Mark Nicholas, Gulf Islands National Seashore, Gulf Breeze, Florida to Patricia Kelly, Service, Panama City, Florida Field Office providing documentation of Great Lakes piping plover sightings post-hurricane.

Nicholls, J.L. 1989. Distribution and other ecological aspects of piping plovers (*Charadrius melodus*) wintering along the Atlantic and Gulf Coasts. M.S. Thesis. Auburn University, Auburn, Alabama.

Nicholls, J.L. and G.A. Baldassarre. 1990a. Habitat selection and interspecific associations of piping plovers along the Atlantic and Gulf Coasts of the United States. M.S. Thesis. Auburn University, Auburn, Alabama.

Nicholls, J.L. and G.A. Baldassarre. 1990b. Habitat associations of piping plover wintering in the United States.

Noel, B.L., C.R. Chandler, and B. Winn. 2005. Report on migrating and wintering Piping Plover activity on Little St. Simons Island, Georgia in 2003-2004 and 2004-2005. Report to U.S. Fish and Wildlife Service.

Noel, B.L., C.R. Chandler, and B. Winn. 2007. Seasonal abundance of nonbreeding piping plovers on a Georgia barrier island. Journal of Field Ornithology 78:420-427.

Noel, B. L., and C. R. Chandler. 2008. Spatial distribution and site fidelity of non-breeding piping plovers on the Georgia coast. Waterbirds 31:241-251.

Nordstrom, K.F. N.L. Jackson, A.H.F. Klein, D.J. Sherman, and P.A. Hesp. 2006. Offshore aeolian transport across a low fore dune on a developed barrier island. Journal of Coastal Research. Volume 22., No. 5:1260-1267.

Nudds, R.L. and D.M. Bryant. 2000. The energetic cost of short flight in birds. Journal of Experimental Biology 203:1561-1572.

Operational Science Advisory Team (OSAT-2). 2011. Summary report for fate and effects of remnant oil remaining in the beach environment. Gulf Coast Incident Management Team for the Deepwater Horizon MC252 oil spill. 37pp.

Palmer, R.S. 1967. Piping plover *in* Stout, G.D. (editor). The shorebirds of North America. Viking Press, New York. 270 pp.

Penland, S., and K. Ramsey. 1990. Relative sea level rise in Louisiana and the Gulf of Mexico: 1908-1988. Journal of Coastal Resources 6:323-342.

Perkins, S. 2008. “South Beach PIPLs”, 29 September 2008, electronic correspondence (30 September 2008) NEFO *see 4/27 email from Susi.*

Peterson, C.H., D.H.M. Hickerson, and G.G. Johnson. 2000. Short-term consequences of nourishment and bulldozing on the dominant large invertebrates of a sandy beach. Journal of Coastal Research 16(2):368-378.

Peterson, C.H., M.J. Bishop, G.A. Johnson, L.M. D'Anna, and L.M. Manning. 2006. Exploiting beach filling as an unaffordable experiment: benthic intertidal impacts propagating upwards to shorebirds. Journal of Experimental Marine Biology and Ecology 338:205-221.

Pfister, C., B.A. Harrington, and M. Lavine. 1992. The impact of human disturbance on shorebirds at a migration staging area. Biological Conservation 60:115-126.

Pinkston, J. 2004. Observations of wintering piping plovers using Gulf of Mexico barrier beaches along the Central Texas coast. Year One research summary report to the Service's Corpus Christi, Texas, Field Office. July 2004. One page plus maps and tables.

Plissner, J.H., and S.M. Haig. 1997. 1996 International Piping Plover Census. Report to U.S. Geological Survey, Biological Resources Division, Forest and Rangeland Ecosystem Science Center, Corvallis, Oregon.

Plissner, J.H. and S.M. Haig. 2000. Viability of piping plover *Charadrius melodus* metapopulations. Biological Conservation 92:163-173.

Pompei, V. D., and F. J. Cuthbert. 2004. Spring and fall distribution of piping plovers in North America: implications for migration stopover conservation. Report the U.S. Army Corps of Engineers. University of Minnesota, St. Paul.

Rabon, D. 2009. Electronic mail dated 10-11 February 2009 from David Rabon, Service, Raleigh, North Carolina, Field Office to Patricia Kelly, Service, Panama City, Florida Field Office on regarding NPS lands and individual state parks in North Carolina that participate in predator control programs.

Rahmstorf, S., A. Cazenave, J.U. Church, J.E. Hansen, R.F. Keeling, D.E. Parker, and R.C.J. Somerville. 2007. Recent climate observations compared to projections. Science 316:709.

Rakocinski, C.F., R.W. Heard, S.E. LeCroy, J.A. McLelland, and T. Simons. 1996. Responses by macrobenthic assemblages to extensive beach restoration at Perdido Key, Florida. Journal of Coastal Research 12(1):326-353.

Rand, G.M., and S.R. Petrocelli. 1985. Fundamentals of aquatic toxicology. Hemisphere Publishing Corporation, Washington, D.C.

Rattner, B.A., and B.K. Ackerson. 2008. Potential environmental contaminant risks to avian species at important bird areas in the northeastern United States. Integrated Environmental Assessment and Management 4(3):344-357.

Roche, E.A., J.B. Cohen, D.H. Catlin, D.L. Amirault, F.J. Cuthbert, C.L. Gratto-Trevor, J., Felio, and J.D. Fraser. 2010. Range-wide estimation of apparent survival in the piping plover. Journal of Wildlife Management 74:1784-1791.

Ryan, M.R., B.G. Root, and P.M. Mayer. 1993. Status of piping plover in the Great Plains of North America: A demographic simulation model. Conservation Biology 7:581-585.

Sallenger, A.H., Jr., C.W. Wright, P. Howd, K. Doran, and K. Guy. 2009. Chapter B. Extreme coastal changes on the Chandeleur Islands, Louisiana, during and after Hurricane Katrina, *in* Lavoie, D., ed., Sand resources, regional geology, and coastal processes of the Chandeleur Islands coastal system—an evaluation of the Breton National Wildlife Refuge: U.S. Geological Survey Scientific Investigations Report 2009–5252, p. 27–36.

Scavia, D., J.C. Field, D.F. Boesch, R.W. Buddemeier, V. Burkett, D.R. Cayan, M. Fogarty, M.A. Harwell, R.W. Howarth, C. Mason, D.J. Reed, T.C. Royer, A.H. Sallenger, and J.G. Titus. 2002. Climate change impacts on U.S. coastal and marine ecosystems. Estuaries 25:149-164.

Schmitt, M.A. and A. C. Haines. 2003. Proceeding of the 2003 Georgia Water Resources Conference, April 23-24, 2003, at the University of Georgia.

Smith, B.S. 2007. 2006-2007 Nonbreeding shorebird survey, Franklin and Wakulla Counties, Florida. Final report to the Service in fulfillment of Grant #40181-7-J008. Apalachicola Riverkeeper, Apalachicola, Florida. 32 pp.

Staine, K.J., and J. Burger. 1994. Nocturnal foraging behavior of breeding piping plovers (*Charadrius melodus*) in New Jersey. Auk 111:579-587.

Stucker, J.H. and F.J. Cuthbert. 2004. Piping plover breeding biology and management in the Great Lakes, 2004. Report submitted to the US Fish and Wildlife Service, East Lansing, Michigan.

Stucker, J.H., and F.J. Cuthbert. 2006. Distribution of non-breeding Great Lakes piping plovers along Atlantic and Gulf of Mexico coastlines: 10 years of band resightings. Final Report to U.S. Fish and Wildlife Service.

Stucker, J.H., F.J. Cuthbert and C.D. Haffner. 2003. Piping plover breeding biology and management in the Great Lakes, 2003. Report submitted to the U.S. Fish and Wildlife Service, East Lansing, Michigan.

Suiter, D. 2009. Electronic mail dated 2 February 2009 from Dale Suiter, Service, Raleigh, North Carolina Field Office to Patricia Kelly, Service, Panama City, Florida Field Office on February 2, 2009 regarding status of beach vitex and control measures along the North Carolina, South Carolina, and Georgia coast.

Tarr, J.G., and P.W. Tarr. 1987. Seasonal abundance and the distribution of coastal birds on the northern Skeleton Coast, South West Africa/Nimibia. Madoqua 15, 63-72.

Thomas, K., R.G. Kvitek, and C. Bretz. 2002. Effects of human activity on the foraging behavior of sanderlings (*Calidris alba*). Biological Conservation 109:67-71.

Titus, J.G., and C. Richman. 2001. Maps of lands vulnerable to sea level rise: Modeled elevations along the U.S. Atlantic and Gulf coasts. Climatic Research 18:205-228.

Tremblay, T.A., J.S. Vincent, and T.R. Calnan. 2008. Status and trends of inland wetland and aquatic habitats in the Corpus Christi area. Final report under CBBEP Contract No. 0722 submitted to Coastal Bend Bays and Estuaries Program, Texas General Land Office, and National Oceanic and Atmospheric Administration.

U.S. Army Corps of Engineers (Corps). 2004. Louisiana Coastal Area – Ecosystem Restoration Study, Final Report. U.S. Army Corps of Engineers, New Orleans District. 506 pp.

U.S. Army Corps of Engineers. 2006. Coastal Engineering Manual, EM 1110-2-1100, Part V.

U.S. Army Corps of Engineers. 2009a. April 24, 2009, Biological assessment of the proposed Louisiana Coastal Area – Barataria Basin Barrier Shoreline Restoration project. U.S. Army Corps of Engineers, New Orleans District. 41 pp plus appendices.

U.S. Army Corps of Engineers. 2009b. 2008 Annual Report; Biological Opinion on the Operation of the Missouri River Main Stem System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System. U.S. Army Corps of Engineers, Omaha District, Kansas City District.

U.S. Army Corps of Engineers. 2010. August 9, 2010, Biological Assessment of the proposed Louisiana Coastal Area – Barataria Basin Barrier Shoreline Restoration project. U.S. Army Corps of Engineers, New Orleans District. 88 pp plus appendices.

U.S. Army Corps of Engineers. 2011. June 3, 2011, Biological Assessment of the proposed Louisiana Coastal Area – Barataria Basin Barrier Shoreline Restoration project. U.S. Army Corps of Engineers, New Orleans District. 88 pp plus appendices.

U.S. Fish and Wildlife Service. 1985. Determination of endangered and threatened status for the piping plover. Federal Register 50:50726-50734.

U.S. Fish and Wildlife Service. 1988. Recovery plan for piping plovers (*Charadrius melodus*) of the Great Lakes and Northern Great Plains. U.S. Fish and Wildlife Service, South Dakota, and Twin Cities, Minnesota.

U.S. Fish and Wildlife Service. 1994. Revised Draft - Recovery plan for piping plovers - Breeding on the Great Lakes and Northern Great Plains. U.S. Fish and Wildlife Service, Twin Cities, Minnesota. 99 pp.

U.S. Fish and Wildlife Service. 1996. Piping plover (*Charadrius melodus*), Atlantic Coast population, revised recovery plan. Hadley, Massachusetts.

U.S. Fish and Wildlife Service. 2001a. Final determination of critical habitat for the Great Lakes breeding population of the piping plover. Federal Register 66:22938-22969.

U.S. Fish and Wildlife Service. 2001b. Final determination of critical habitat for wintering piping plovers. Federal Register 66:36037-36086.

U.S. Fish and Wildlife Service. 2002. Final designation of critical habitat for the Northern Great Plains breeding population of the piping plover. Federal Register 67:57637-57717.

U.S. Fish and Wildlife Service. 2003. Recovery plan for the Great Lakes piping plover (*Charadrius melodus*). U.S. Fish and Wildlife Service, Fort Snelling, Minnesota.

U.S. Fish and Wildlife Service. 2009a. Revised designation of critical habitat for the wintering population of the piping plover (*Charadrius melodus*) in Texas. Federal Register 74:23476-23524.

U.S. Fish and Wildlife Service. 2009b. Piping plover (*Charadrius melodus*) 5 year review: summary and evaluation. U.S. Fish and Wildlife Service, Hadley, Massachusetts. 214 pp.

U.S. Fish and Wildlife Service. 2011. Abundance and productivity estimates: Atlantic Coast piping plover population, 1986-2009. Sudbury, Massachusetts. 4 pp.

U.S. Fish and Wildlife Service and Town of Kiawah Island. 2006. Unpublished data.

Unified Area Command. 2010. October 6, 2010, weekly update for the Deepwater Horizon MC252 oil spill. www.RestoreTheGulf.gov.

Webster, P., G. Holland, J. Curry, and H. Chang. 2005. Changes in tropical cyclone number, duration, and intensity in a warming environment. Science 309:1844-1846.

Wemmer, L.C., U. Ozesmi, and F.J. Cuthbert. 2001. A habitat-based population model for the Great Lakes population of the piping plover (*Charadrius melodus*). Biological Conservation 99:169-181.

Westbrock, M., E.A. Roche, F.J. Cuthbert and J.H. Stucker. 2005. Piping plover breeding biology and management in the Great Lakes, 2005. Report submitted to the US Fish and Wildlife Service, East Lansing, MI.

Westbrooks, R.G., and J. Madsen. 2006. Federal regulatory weed risk assessment beach vitex (*Vitex rotundifolia* L.f.) assessment summary. USGS Biological Research Division, Whiteville, North Carolina, and Mississippi State University, GeoResources Institute. 5pp.

Wheeler, N.R. 1979. Effects of off-road vehicles on the infauna of Hatches Harbor, Cape Cod National Seashore. Unpublished report from the Environmental Institute, University of Massachusetts, Amherst, Massachusetts. UM-NPSCRU Report No. 28. [Also submitted as a M.S. Thesis entitled "Off-road vehicle (ORV) effects on representative infauna and a comparison of predator-induced mortality by *Polinices duplicatus* and ORV activity on *Mya arenaria* at Hatches Harbor, Provincetown, Massachusetts" to the University of Massachusetts, Amherst, Massachusetts.]

Wilcox, L. 1939. Notes on the life history of the piping plover. Birds of Long Island 1: 3-13.

Wilcox, L. 1959. A twenty year banding study of the piping plover. Auk 76: 129-152.

Wilkinson, P.M., and M. Spinks. 1994. Winter distribution and habitat utilization of piping plovers in South Carolina. Chat 58:33-37.

Williams, S.J., S. Penland, and A.H. Sallenger, Jr., editors. 1992. Louisiana Barrier Island Erosion Study: Atlas of shoreline changes in Louisiana from 1853 to 1989. Prepared by the U.S. Geological Survey in cooperation with the Louisiana Geological Survey. 103p.

Williams, T. 2001. Out of control. Audubon Magazine October 2001. Accessed on 26 February 2009, at http://www.audubonmagazine.org/incite/incite0109.html.

Winstead, N. 2008. Letter dated 8 October 2008 from Nick Winstead, Mississippi Department of Wildlife, Fisheries and Parks, Museum of Natural Science to Patty Kelly, Service, Panama City, Florida Field Office regarding habitat changes in Mississippi from hurricanes and estimates of shoreline miles of mainland and barrier islands.

Zivojnovich, M. 1987. Habitat selection, movements and numbers of piping plovers wintering in coastal Alabama. Alabama Department of Conservation and Natural Resources. Project Number W-44-12. 16 pp.

Zonick, C. 1997. The use of Texas barrier island washover pass habitat by piping plovers and other coastal waterbirds. National Audubon Society. A Report to the Texas Parks and Wildlife Department and the U.S. Fish and Wildlife Service. 19 pp.

Zonick, C.A. 2000. The winter ecology of the piping plover (*Charadrius melodus*) along the Texas Gulf Coast. Ph.D. dissertation. University of Missouri, Columbia, Missouri.

Zonick, C. and M. Ryan. 1995. The ecology and conservation of piping plovers (*Charadrius melodus*) wintering along the Texas Gulf Coast. Department of Fisheries and Wildlife, University of Missouri, Columbia, Missouri. 49pp.

Zonick, C., K. Drake, L. Elliott, and J. Thompson. 1998. The effects of dredged material on the ecology of the piping plover and the snowy plover. Report submitted to the U.S. Army Corps of Engineers.

APPENDIX A

Standard Conditions for In-water Work in the Presence of Manatees

Guidelines for Activities in Proximity to Manatees and Their Habitat

A. All personnel associated with the project should be informed of the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. Such personnel instruction should also include a discussion of the civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973.

B. All contract and/or construction personnel are responsible for observing water-related activities for the presence of manatee(s).

C. Temporary signs should be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., work area), and at least one sign should be placed where it is visible to the vessel operator.

D. Siltation barriers, if used, should be made of material in which manatees could not become entangled, and should be properly secured and regularly monitored. Barriers should not impede manatee movement.

E. If a manatee is sighted within 100 yards of the active work zone, special operating conditions should be implemented, including: no operation of moving equipment within 50 feet of a manatee; all vessels should operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, should be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area on its own accord, special operating conditions are no longer necessary, but careful observations would be resumed.

F. Any manatee sighting should be immediately reported to the U.S. Fish and Wildlife Service's (Service) Lafayette, Louisiana, Field Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries (LDWF), Natural Heritage Program (225/765-2821).

APPENDIX B

Protective Measures for Dredging Operations in the Presence of Sturgeon

Guidelines for Dredging Operations in the Proximity to Sturgeon

A. All dredged material disposed of in the river should be discharged at the surface, with the use of a baffle plate.

B. The cutterhead should remain completely buried in the bottom material during dredging operations.

C. If pumping water through the cutterhead is necessary to dislodge material, or to clean the pumps or cutterhead, etc., the pumping rate should be reduced to the lowest rate possible until the cutterhead is at mid-depth, where the pumping rate can then be increased. During dredging, the pumping rates should be reduced to the slowest speed feasible while the cutterhead is descending to the channel bottom.

APPENDIX C

FIGURES

Figure 1. The proposed action would be located along the barrier shoreline of the Barataria Basin in Lafourche and Plaquemines Parishes, Louisiana (http://www.lca.gov/Projects/4/Default.aspx).

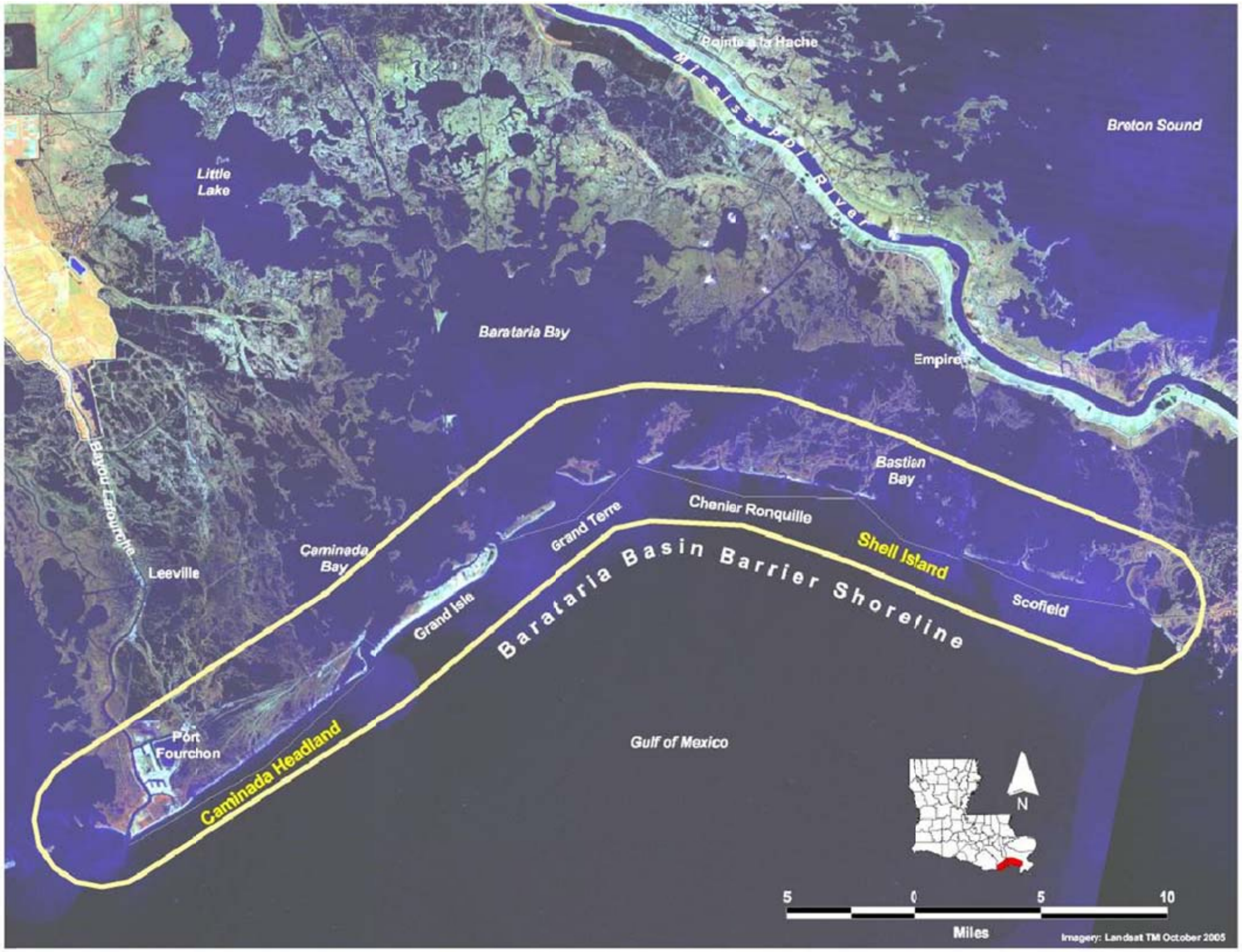


Figure 2. Caminada Headland Alternative 5 – Preferred Dune with Expanded Marsh and Subtidal Feeder Bar (Corps 2011).

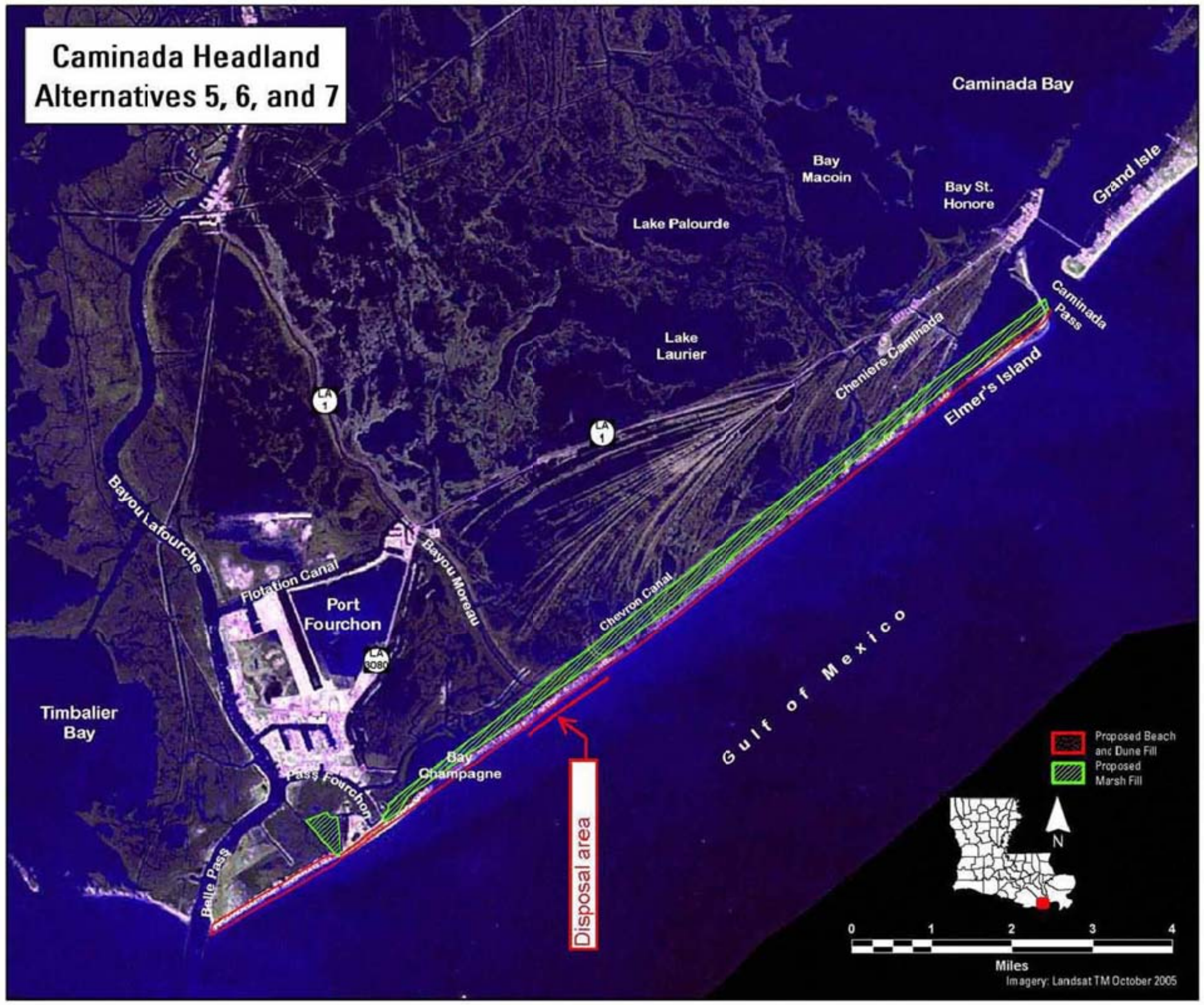


Figure 3. Shell Island Alternative 5 – One Island with Two Renourishments (Corps 2011).

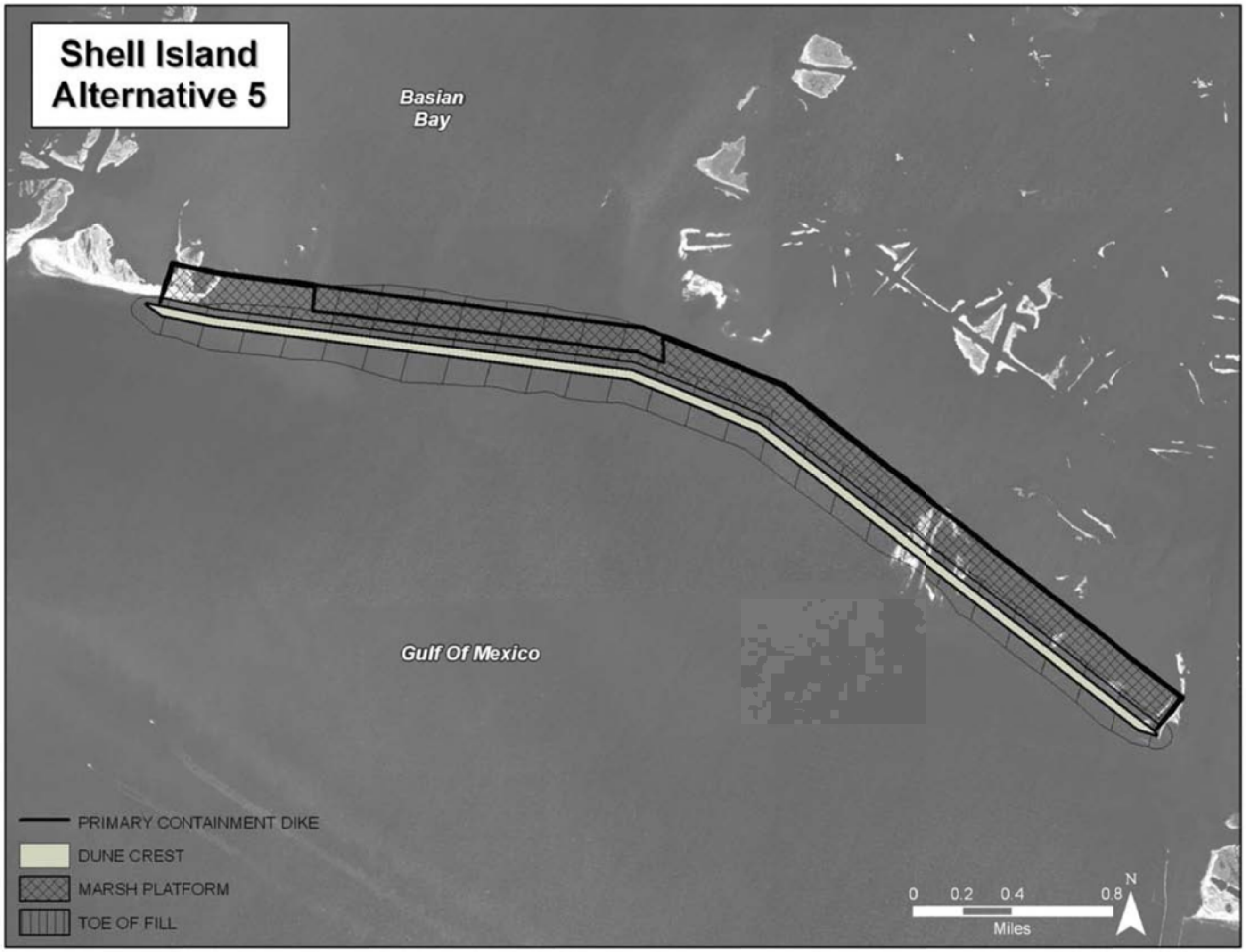


Figure 4. The estimated sediment budget for the Caminada Headland barrier shoreline system (Corps 2010).

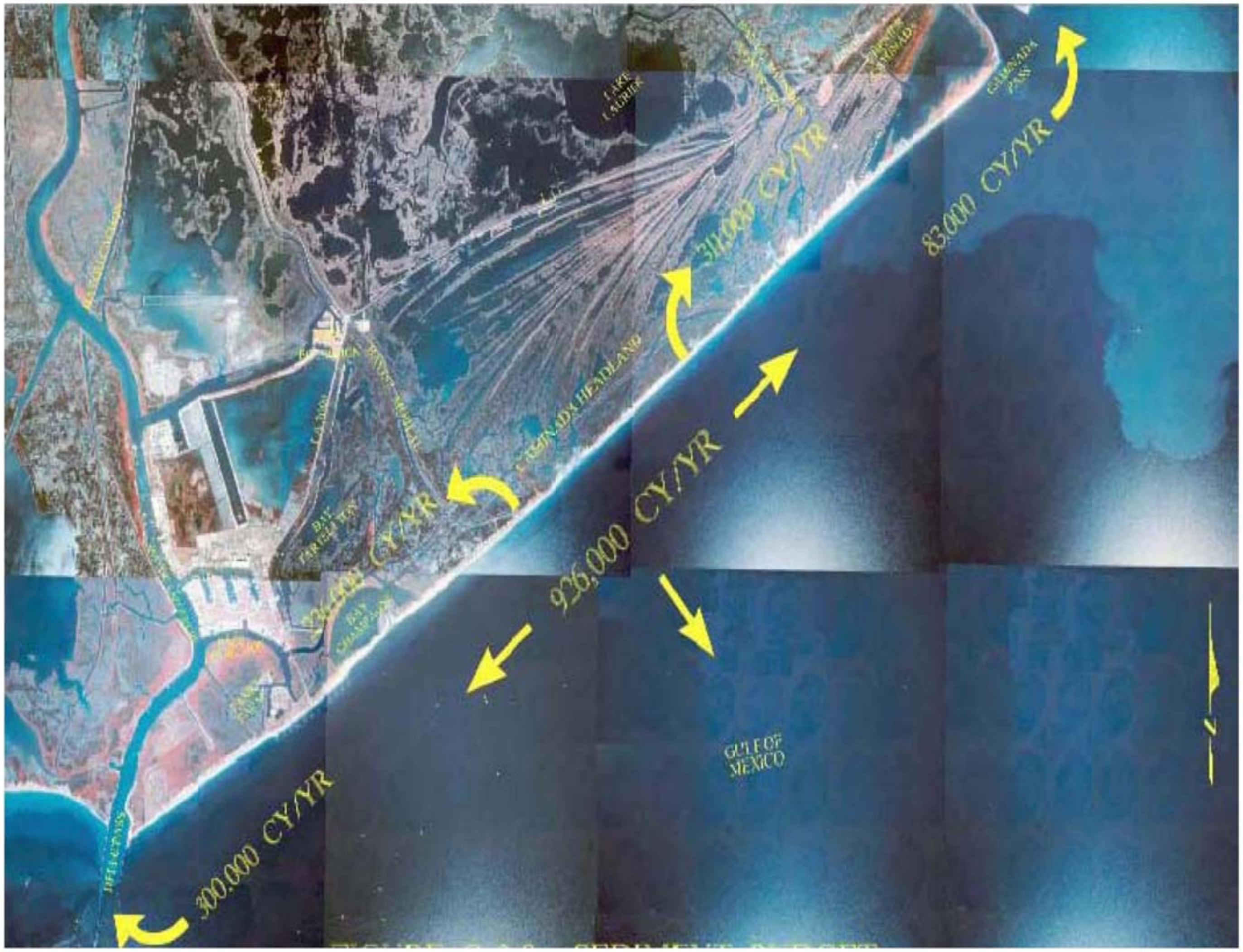


Figure 5. Distribution and range of piping plovers (base map from Haig and Elliott-Smith 2004). Conceptual presentation of subspecies and distinct population segments (DPS) ranges are not intended to convey precise boundaries.

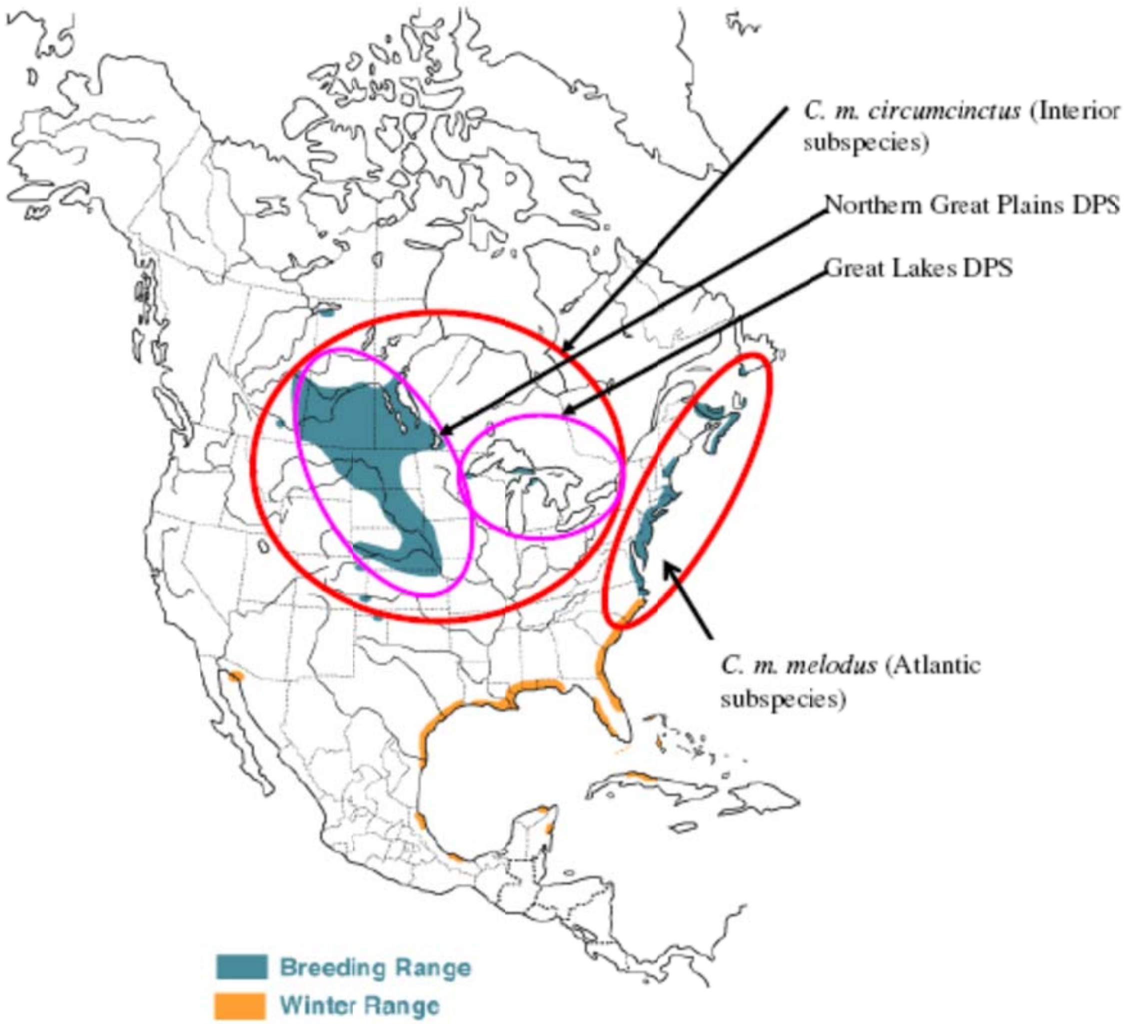
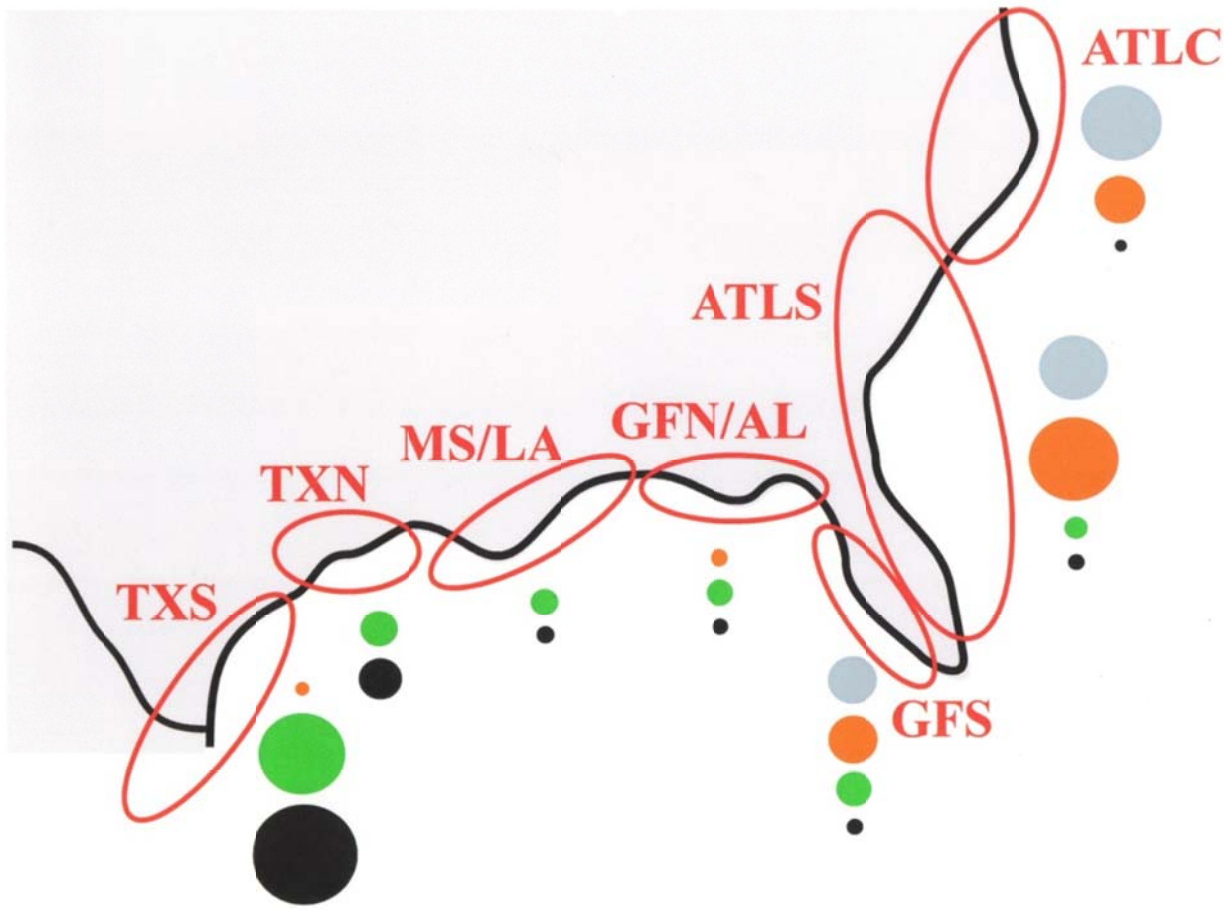


Figure 6. Breeding population distribution* in the wintering/migration range (from Gratto-Trevor et al. 2009, reproduced by permission).



*Regions: ATLC=Atlantic (eastern) Canada; ATLS=Atlantic U.S.; GFS=Gulf Coast of southern Florida; GFN=Gulf Coast of north Florida; AL=Alabama; MS/LA=Mississippi and Louisiana; TXN=northern Texas; and TXS=southern Texas. For each breeding population, circles represent the percentage of individuals reported wintering along the eastern coast of the U.S. from the central Atlantic to southern Texas/Mexico up to December 2008. Each individual was counted only once. Grey circles represent Eastern Canada birds, orange circles for U.S. Great Lakes, green circles for the U.S. Great Plains, and black circles for Prairie Canada. The relative size of the circle represents the percentage from a specific breeding area seen in that winter region. Total number of individuals observed on the wintering grounds was 46 for Eastern Canada, 150 for the U.S. Great Lakes, 169 for the U.S. Great Plains, and 356 for Prairie Canada.

APPENDIX D

Non-breeding Piping Plover Survey Guidelines

U.S. Fish and Wildlife Service
Ecological Services Office
Lafayette, Louisiana

Louisiana Piping Plover Non-Breeding Season Survey Guidelines

The purpose of these guidelines is to assess and/or monitor piping plover use of coastal restoration features related to the Barataria Basin Barrier Shoreline Restoration Project. Survey locations should include the coastal restoration features plus adjacent suitable shorebird habitat (i.e., intertidal beaches, mud flats, sand flats, algal flats, wash-over passes, and associated dunes and flats above annual high tide). Monitoring should be conducted July 15 through May 15 to follow the International Shorebird Survey (ISS) census dates listed below. The ISS schedule usually results in three surveys per month. If this is not feasible, try to do at least two surveys per month on the ISS census dates. Surveys should be conducted on ISS dates plus or minus two days. For example, a survey scheduled for the 15th could be conducted on any day between the 13th through the 17th of that month.

Spring Migration	Fall Migration	Winter
February 25	July 15	October 15
March 5	July 25	October 25
March 25	August 5	November 5
April 5	August 15	November 15
April 15	August 25	November 25
April 25	September 5	December 5
May 5	September 15	December 15
May 15	September 25	December 25
	October 5	January 5
		January 15
		January 25
		February 5
		February 15

To the extent possible, surveys should be conducted when birds are foraging. The best time is at low tide, but surveys can also be conducted on a falling or rising tide provided that the foraging areas are not completely covered. During high tide, birds will be roosting. Although piping plovers often roost near foraging areas, the birds will be more difficult to locate. Avoid conducting surveys during poor weather conditions (e.g., high winds, rain).

Methods

In most cases surveys will be conducted by foot. All terrain vehicles (ATVs) may be used to expedite the transport of observers over long stretches of liner routes (“leapfrogging” teams down a beach in 0.5 to 1 mile increments), but all bird counting will be conducted while walking. **[Driving on vegetated areas shall not be permitted. Any ATV use should be coordinated with the Louisiana Department of Wildlife and Fisheries’ Isles Dernieres Wildlife Refuge management staff.]** Birds on exposed mudflats that may be inaccessible by foot should be counted from boats. Each survey crew should use their best professional judgment on the most efficient way to conduct the survey and should document in detail if any deviations to these guidelines are deemed necessary.

Observers should work in teams of two to four people, depending on the width of the beach and beach/tidal interface. Wide coastal beaches will require a greater number of observers in order to assure that birds are not missed on the back (aft) side of the dune. Observers working on beaches that contain moderate to high dunes should climb them every 0.5 to 1 mile and look for wash-over flats and pools that may not be visible from the beach. Coastal islands will be surveyed on both the Gulf and bay sides (this may require multiple teams of observers in order to finish the surveys in a timely manner).

Piping plover locations will be recorded with global positioning system (GPS) units. GPS locations will be recorded in universal transverse mercator (UTM) map datum NAD 83 CONUS. Each survey team should carry aerial photography of the survey route so that new breaks (cuts) in the beach or island can be noted on the survey maps. Habitat data will also be collected and will include foraging substrate, portion of the beach used and side of the island on which the birds are found (see attached data sheet). These habitat criteria have been adapted from the 2006 International Winter Piping Plover Census organized by the U.S. Geological Survey. Behavioral data (e.g., foraging, roosting, preening, bathing, flying, aggression, walking) of piping plovers when seen should also be documented.

Negative data is as important as positive data. Indicate when surveys have been done and no birds were observed. Although piping plovers are the target species, any additional observations of other species would help the U.S. Fish and Wildlife Service to identify shorebird concentration areas and management needs.

U.S. Fish and Wildlife Service
Ecological Services Office
Lafayette, Louisiana

Louisiana Piping Plover Survey Form

(Note: Most criteria adopted from the 2006 Wintering Piping Plover Census Form)

A. Total # Piping Plovers Observed: ____

B. Location Description (Name): ____

1. Parish: ____
2. UTM location NAD 83 CONUS (center):
   Northing_____________________________ Easting____________________________
3. Land Ownership:
   ___Federal ___State ___Municipal ___Private ___County ___Tribal

C. Date of survey:_________________ Time survey conducted: __________to __________

D. Weather Conditions:

1. Tide stage(s): ___Low ___Mid ___High (___Rising / ___Falling)
2. General weather: ___Sunny ___Partly cloudy ___Overcast ___Rain ___Fog
   ___Other (describe):____
3. Approximate temperature: ________Celsius / Fahrenheit (circle one)
4. Wind speed: _____miles/hr Wind direction:_________

E. Description of Habitat Surveyed (check as many as apply). The Code designation will be used in Section F table below:

- **Body of Water Type**:
  ____I. Ocean ____II. Protected bay, harbor, cove, lagoon ____III. Gulf of Mexico
  ____IV. Ocean Inlet ____V. Other (describe)__________________________________

- **Shoreline Type**:
  ____A. Mainland ____B. Barrier Island ____C. Spoil Island ____D. Bar
  ____E. Other Island ____F. Washover area ____G. Other (describe)______________

- **Specific Description**:
  ____1. Sand beach ____2. Sand spit ____3. Sand flat ____4. Sand bar
  ____5. Salt flat ____6. Gravel shore ____7. Oyster reef ____8. Mudflat
  ____9. Vegetation (algal) mat ____10. Vegetated shoreline
  ____11. Other (describe)____

- **Location Description** (criteria for islands only):
  ____ i. Gulf-side of island ____ii. Bay-side of island
  ____a. Tidal interface ____b. Fore dune ____c. Top of dune ____d. Aft dune

F. Numbers, behaviors, habitat types, and GPS location(s) of piping plovers observed (mark on map if possible).

Number of Plovers Observed	**Behavior Displayed** *(e.g., foraging, roosting, preening, walking, flying, aggression, etc.)*	**Habitat Type where Plovers were found** *(use designations from Section E above, e.g.,* IIC8ii, IIIB9ia*)*	**UTM location NAD 83 CONUS**	
			Northing	*Easting*

G. Mode(s) of transportation:
____Foot ____Car/Truck ____ATV ____Boat ____Airboat ____Other___________

H. Habitat (shoreline) covered: _______miles (please calculate using aerial photograph's scale)

I. Observers: ____
____
____

J. Additional comments or notes:____
____
____
____

K. Additional species encountered (for flying flocks lump as peeps and estimate number). Species of special interest are listed below; please add any additional species.

OTHER SPECIES	**TOTAL#**	**OTHER SPECIES**	**TOTAL#**
Reddish Egret			
Marbled Godwit			
Red Knot			
Western Sandpiper			
Stilt Sandpiper			
Short-billed Dowitcher			
Snowy Plover			
Wilson's Plover			
Long-billed Curlew			
American Oystercatcher			

APPENDIX E

Louisiana Guidelines for Minimizing Disturbance to Colonial Nesting Birds

Louisiana Guidelines for Minimizing Disturbance to Colonial Nesting Birds

Nesting colonies may be present that are not currently listed in the database maintained by the Louisiana Department of Wildlife and Fisheries (LDWF). That database is updated primarily by monitoring the colony sites that were previously surveyed during the 1980s. Until a new, comprehensive coast-wide survey is conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season. In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season.

To minimize disturbance to colonial nesting birds, the following restrictions on activity should be observed:

1. For colonies containing nesting brown pelicans, all activity occurring within 2,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 15 through March 31). Nesting periods vary considerably among Louisiana's brown pelican colonies, however, so it is possible that this activity window could be altered based upon the dynamics of the individual colony. The Louisiana Department of Wildlife and Fisheries' Fur and Refuge Division should be contacted to obtain the most current information about the nesting chronology of individual brown pelican colonies. Brown pelicans are known to nest on barrier islands and other coastal islands in St. Bernard, Plaquemines, Jefferson, Lafourche, and Terrebonne Parishes, and on Rabbit Island in lower Calcasieu Lake, in Cameron Parish.

2. For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present).

3. For colonies containing nesting gulls, terns, and/or black skimmers, all activity occurring within 650 feet of a rookery should be restricted to the non-nesting period (i.e., September 16 through April 1, exact dates may vary within this window depending on species present).

Below is a table explaining the nesting chronology of species that are known to nest in Louisiana. The table is an excerpt from page 31 of:

Martin, R.P., and G.D. Lester. 1990. The Atlas and Census of Wading Bird and Seabird Nesting Colonies of Louisiana: 1990. Louisiana Department of Wildlife and Fisheries – Louisiana Natural Heritage Program. Special Publication No. 3 for the U.S. Department of Interior – Fish and Wildlife Service. Contract No. 14-16-0004-89-963.

Table 8. Nesting chronology for colonial-nesting waterbirds in Louisiana with suggested activity windows.[a]

Species	Incubation Season	Incubation Period (days)	Days to Fledging	Activity[b] Window
Brown Pelican	1 Nov to 15 Jun	28-30	74-76	1 Aug to 31 Oct
Olivaceous Cormorant	15 Mar to 15 Apr	23-26	35-42	1 Jul to 1 Mar
American Anhinga	15 Mar to 15 Apr	25-28	?	1 Jul to 1 Mar
Great Blue Heron	1 Mar to 30 Apr	25-29	58-62	1 Aug to 15 Feb
Great Egret	1 Mar to 31 May	23-24	40-44	1 Aug to 15 Feb
Snowy Egret	16 Mar to 15 Jun	17-19	20-25	1 Aug to 1 Mar
Little Blue Heron	16 Mar to 15 Jun	22-24	28-32	1 Aug to 1 Mar
Tricolored Heron	16 Mar to 15 Jun	20-22	?	1 Aug to 1 Mar
Reddish Egret	16 Mar to 15 Jun	23-26	?	1 Aug to 1 Mar
Cattle Egret	16 Apr to 30 Jun	21-24	35-40	1 Sep to 1 Apr
Green-backed Heron	1 Apr to 30 Jun	19-21	16-17	1 Sep to 15 Mar
Black-crowned Night-Heron	16 Mar to 15 Jun	24-26	40-42	1 Sep to 1 Mar
Yellow-crowned Night-Heron	1 Apr to 15 Jun	?	?	1 Sep to 15 Mar
White Ibis	16 Apr to 30 Jun	21-23	35-42	1 Sep to 1 Apr
Glossy/White-faced Ibis	16 Apr to 30 Jun	21-23	42-49	1 Sep to 1 Apr
Roseate Spoonbill	16 Apr to 15 Jun	23-24	49-56	1 Aug to 1 Apr
Laughing Gull	16 Apr to 15 Jun	23-25	35-45	1 Aug to 1 Apr
Gull-billed Tern	16 May to 15 Jul	22-23	28-35	16 Sep to 1 May
Caspian Tern	1 May to 15 Jul	26-28	36-48	16 Sep to 15 Apr
Royal Tern	1 May to 15 Jul	28-31	36-48	16 Sep to 15 Apr
Sandwich Tern	1 May to 15 Jul	23-25	22-33	16 Sep to 15 Apr
Common Tern	1 May to 15 Jul	21-25	23-27	16 Sep to 15 Apr
Forster's Tern	1 Apr to 31 May	25-29	23-27	1 Aug to 15 Mar
Least Tern	1 May to 15 Jul	20-25	19-23	16 Sep to 15 Apr
Sooty Tern	16 May to 15 Jul	22-23	30-35	16 Sep to 15 Apr
Black Skimmer	16 May to 15 Jul	22-23	30-35	16 Sep to 1 May

[a] Data are compiled from Bent (1921), Bent (1926), Palmer (1962), Harrison (1975), Portnoy (1977) and Terres (1980).

[b] Suggested project initiation and completion dates to minimize disturbance to nesting birds.

The U.S. Fish and Wildlife Service (Service) realizes that the proposed barrier headland and island restoration work most likely would be constructed during one or more colonial waterbird nesting seasons because construction would extend over 2 or more years. In order to minimize disturbance to nesting gulls, terns, and/or black skimmers, the Service would like to coordinate with the Corps to develop a migratory bird abatement plan. Please contact Ms. Patti Holland (337/291-3121) of the Louisiana Ecological Services Office for further information and coordination associated with the development of a migratory bird abatement plan.

NEGOTIATED NONCOMPETITIVE LEASE
BETWEEN
THE BUREAU OF OCEAN ENERGY MANAGEMENT
OF THE DEPARTMENT OF THE INTERIOR
AND THE
STATE OF LOUISIANA
COASTAL PROTECTION AND RESTORATION AUTHORITY

REGARDING THE USE OF OUTER CONTINENTAL SHELF SAND RESOURCES FOR CAMINADA HEADLAND SHORELINE RESTORATION PROJECT INCREMENT 2, LOUISIANA

BOEM Negotiated Agreement No. OCS-G 35161

Title I. Explanatory Recitals

A. The United States Department of the Interior (DOI), acting through the Bureau of Ocean Energy Management (BOEM; or collectively with DOI, as the "Lessor"), enters into this Negotiated Noncompetitive Lease (Lease) with the State of Louisiana, acting through the Coastal Protection and Restoration Authority (CPRA; or collectively with the State, as the "Lessee"), providing for the use of up to 6.1 million cubic yards of Outer Continental Shelf sand resources ("OCS sand resources") to construct the Caminada Headland Shoreline Restoration Project ("the Project"), under the authority of Section 8(k)(2) of the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. § 1337(k)(2)).

B. The term "OCS sand resources" means the sediment deposits found on or below the surface of the seabed on the Outer Continental Shelf (OCS), as defined in Section 2(a) of the OCSLA (43 U.S.C. § 1331(a)).

C. Prior to the notice-to-proceed with construction, the CPRA will procure lands, easements, and rights-of-way (collectively, "Land Rights") as necessary from upland landowners, other property rights holders, and other persons and entities of appropriate scope and duration to facilitate the Project.

Title II. Purpose and Authority

A. This Lease authorizes the CPRA to use OCS sand resources from the approved borrow area located in South Pelto Area Blocks 13 and 14 as designated in Table 1 and on the attached map and design profiles (Attachments 1 and 2), in accordance with the terms of this Lease and the permits issued by the United States Army Corps of Engineers (COE; Permit No. MVN-2012-02134) and Louisiana Department of Natural Resources (LADNR; Permit No. P20121150). After removal of the OCS sand resources from the OCS and placement of those resources as specified in this Lease, BOEM has no jurisdiction over those sand resources unless they return to the OCS.

Table 1.
Louisiana State Plane, South Zone Coordinates
(NAD 83) Delineating Borrow Area

Point	Easting (ft)	Northing (ft)
1	3,506,021.70	150,564.99
2	3,506,940.29	148,759.10
3	3,510,526.96	150,583.53

4	3,511,219.93	148,848.02
5	3,515,585.39	151,068.59
6	3,512,256.30	152,767.04
7	3,510,432.63	152,033.50
8	3,507,116.75	152,376.14

B. BOEM, under the authority delegated by the Secretary of the Interior, is authorized, pursuant to Section 8(k)(2) of the OCSLA (43 U.S.C. § 1337(k)(2)), to enter into this Lease concerning the potential use of OCS sand resources. BOEM has determined that the Project meets the requirements of Section 8(k)(2)(A)(i) of the OCSLA. Therefore, in accordance with Section 8(k)(2) and subject to the terms and conditions as contained herein, BOEM hereby authorizes the use of OCS sand resources from the borrow sites identified in Table 1 and Attachment 1 for the construction of the Project. The Parties acknowledge that under the terms of Section 8(k)(2)(B), BOEM will not assess any fee against the CPRA for the use of the OCS sand resources described herein.

   Nothing in this Lease is intended to abrogate or diminish the Secretary of the Interior's authority under the OCSLA to oversee and regulate the removal of OCS sand resources.

   The CPRA, which is undertaking this project, enters into this Lease in compliance with the requirements of Section 8(k)(2)(A)(i) of the OCSLA.

C. Nothing in this Lease is intended to impede or hinder the CPRA's ability to complete the Project or abrogate or diminish either COE's or BOEM's authority or responsibilities under applicable law, including but not limited to National Environmental Policy Act (NEPA), Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Marine Mammal Protection Act (MMPA), National Historic Preservation Act (NHPA), or the Coastal Zone Management Act (CZMA).

Title III. <u>Project Description</u>

The Caminada Headland is experiencing some of the highest shoreline retreat rates in the Nation, and attendant barrier headland and island erosion has resulted in decreased geomorphic and hydrodynamic functions including protecting interior wetlands from storm wave attack, regulating estuarine conditions, and providing storm surge reduction inland. The purpose of the Project is to protect and preserve the integrity of the barrier headland shoreline of the Caminada Headland from the Bay Champagne shoreline east to Caminada Pass and provide for restoration of hydrology, ecosystem processes, and habitats for the restored coastal segment. Restoration of the headland shoreline will protect and sustain significant and unique foraging and nesting areas for threatened and endangered species, and reduce wave energy and saltwater intrusion from the Gulf of Mexico into back-barrier environments, including beach ridges, marshes, and bays. Restoration of the headland barrier shoreline also provides a sediment source to sustain barrier beaches along the headland and downdrift barrier islands flanking the headland. The earlier Caminada Increment 1 project involved dredging of approximately 5.1 million cubic yards of sand from the South Pelto borrow area to create approximately 31,000 linear feet of shoreline on the Caminada Headland from Belle Pass eastward to Bayou Moreau. The proposed extension, i.e., Increment 2, involves dredging approximately 6.1 million cubic yards of sand from the South Pelto borrow area to create approximately 38,500 linear feet of shoreline (~448 acres [181 hectares] of beach and dune habitat) on the Caminada Headland from the Bay Champagne Shoreline eastward to Caminada Pass.

Title IV. Provisions

A. BOEM authorizes the use of OCS sand resources, up to 6.1 million cubic yards, from the South Pelto Blocks 13 and 14 borrow site. The CPRA or its contractor(s) shall extract, transport, and place such OCS sand resources from the borrow site in accordance with the terms and conditions set forth below and in accordance with the LADNR and COE Permits. Except as provided above, the Parties agree that all other aspects of the Project's execution and completion remain as described in the final design report and the Plan (see Stipulation No. 1).

B. This Lease applies only to the extraction, transportation, and placement of OCS sand resources described above. The Lease shall terminate or expire upon (1) the CPRA sending written notice to the Regional Supervisor, BOEM, Office of Environment, 1201 Elmwood Park Blvd., New Orleans, LA 70123, that the CPRA has received sufficient OCS sand resources to complete the Project, up to 6.1 million cubic yards; (2) the expiration, termination, or revocation of the COE permit MVN-2012-02134, unless COE issues a new or superseding permit within seven (7) days; or (3) four (4) years from the date this Lease is executed, whichever occurs first. Upon request by the CPRA, the Parties may agree to extend the terms of this Lease as necessary to provide the CPRA and its contractors(s) with additional time to complete the Project, subject to applicable law. The Parties acknowledge that there may be a need for future OCS sand resources for periodic maintenance, augmentation, or construction purposes. BOEM and the CPRA may enter into subsequent agreements, for the use of OCS sand resources for the Project, consistent with each Party's responsibilities under applicable law.

C. BOEM and the CPRA recognize that planning and coordination among the two Parties will ensure that responsibilities under the OCSLA and other applicable Federal laws are carried out and accommodated in an efficient and timely manner so that the project schedule will not be unnecessarily delayed or compromised. All Parties recognize that BOEM, as a Bureau in DOI, has certain responsibilities for the orderly, timely, and efficient recovery of OCS minerals using the best available and safest technology while ensuring environmental stewardship and compliance. To these ends, and with respect to the Project, BOEM and the CPRA agree to the following stipulations:

Stipulation No. 1—Plans and Performance Requirements

The CPRA will provide BOEM with a copy of the Project's "Construction Solicitation and Specifications Plan" (herein referred to as the "Plan") prior to solicitation and construction. No activity or operation authorized by the Lease at the borrow area shall be carried out until BOEM has had an opportunity to review the Plan, thus ensuring that each activity or operation is conducted in a manner that is in compliance with the provisions and requirements of the Lease. BOEM recommends that the CPRA include the Lease as a reference document in the advertised Plan. The CPRA will ensure that all operations at the borrow area are conducted in accordance with the final approved Plan and all terms and conditions in this Lease, as well as all applicable statutes, regulations, orders, guidelines, and directives.

The dredging method for removing sand from the borrow area will be consistent with those methods identified in the Project proposal analyzed in supporting NEPA documents, authorizing documents, and all associated State and Federal permits. The CPRA will allow BOEM to review and comment on modifications to the Plan that may affect the project area, including the use of submerged or floated pipelines to directly convey sediment from the borrow area to the placement site. Said comments shall be delivered in a timely fashion in order to not unnecessarily delay the CPRA's schedule and construction contract.

If dredging and/or conveyance methods are not wholly consistent with those evaluated in relevant NEPA documents and environmental and cultural resource consultations, and authorized by COE and LADNR permits, additional environmental review may be necessary. If the additional NEPA, consultations, or permit modifications would impact or otherwise require modification of the provisions of the Lease, an amendment may be required.

Prior to the commencement of construction, the CPRA shall provide a summary of the construction schedule. The CPRA, at the reasonable request of BOEM or the Bureau of Safety and Environmental Enforcement (BSEE), shall allow access, to the site of any operation subject to safety regulations, to any authorized Federal inspector and shall provide BOEM or BSEE any documents and records that are pertinent to occupational or public health, safety, or environmental protection as may be requested.

Stipulation No. 2—Environmental Responsibilities and Environmental Compliance

BOEM must ensure that the project complies with applicable environmental laws, including but not limited to ESA, MSFCMA, NHPA, and CZMA.

The Lessee will implement recommended conservation measures and Terms and Conditions as specified in COE Permit No. MVN-2012-02134 and LADNR Permit No. P20121150, including implementation of all applicable monitoring and conditions, such as water quality monitoring, marine turtle conditions, shorebird monitoring, marine mammal special conditions, nearshore biological monitoring, the sediment quality control/quality assurance plan, and the physical monitoring plan. Additionally, the CPRA will instruct its contractor(s) to implement the mitigation terms, conditions, and measures required by the U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), LADNR, COE, and BOEM pursuant to applicable Federal and State laws and regulations. The required mitigation terms, conditions, and measures are reflected in the applicable Biological Opinions, including all Reasonable and Prudent Measures, Terms and Conditions and Conservation Recommendations identified therein. Construction shall not commence until the preconstruction requirements have been completed. Copies of all relevant correspondence, monitoring, and reporting shall be provided to BOEM within fourteen (14) days of issuance at dredgeinfo@boem.gov (including but not limited to observer and dredging reports).

Stipulation No. 3—Endangered and Threatened Species under National Oceanic and Atmospheric Administration, National Marine Fisheries Service's Protected Resources Division Jurisdiction

In its September 2005 Biological Opinion (2005 Biological Opinion) titled, *Hopper and Hydraulic Cutterhead Dredging Associated with Sand Mining for Coastal Restoration Projects Along the Coast of Louisiana Using Sand from Ship Shoal in the Gulf of Mexico Central Planning Area, South Pelto Blocks 12, 13, and 19 and Ship Shoal Block 88* (Attachment 3), NMFS's Southeast Regional Office Protected Resources Division (PRD) authorized an annual incidental take level from hopper dredging for all projects using Ship Shoal sand covered under the 2005 Biological Opinion. Note that these take allowances are not specific to the Caminada Headland restoration project and are spread across multiple planned projects that intend to use hopper dredges at Ship Shoal. On April 8, 2013, NMFS issued a letter to BOEM indicating that the 2005 Biological Opinion continues to adequately address the issues associated with threatened and endangered species under NMFS jurisdiction (2013 NMFS Letter; Attachment 4).

In keeping with the ESA and the obligations and recommendations identified in the 2005 Biological Opinion and the 2013 NMFS letter, the Lessee shall implement the following terms and conditions to minimize the impacts on listed species from dredging within the borrow area authorized under the terms of this Lease and to document take of listed species, should any occur. The following summary of terms and conditions in the 2005 Biological Opinion, which are incorporated by reference as terms and conditions of this Lease, are provided for the Lessee's reference and to identify where the Lessee is charged with implementing obligations that in the 2005 Biological Opinion were placed on BOEM. To the extent the summary or this Lease otherwise differ from or conflict with the 2005 Biological Opinion, the 2005 Biological Opinion governs.

During excavation of material within the borrow area covered under this Lease, the Lessee will ensure that the following measures are followed to minimize incidental takes:

1. O*bservers*: The CPRA will arrange for NMFS-approved endangered species observers (ESO) to be aboard the hopper dredges to monitor the hopper spoil, screening, and dragheads for sea turtles and their remains. One observer (50 percent coverage) will be utilized for visually inspecting incoming dredge spoils for turtle

remains. One observer will be aboard each hopper dredge. The observer will notify NMFS's Protected Resources Division immediately by phone at (727) 824-5312 or by fax at (727) 824-5309 and BOEM at dredgeinfo@boem.gov if the dredge takes a sea turtle.

2. *Screening*: One hundred percent inflow screening of dredged material is required and 100 percent overflow screening is recommended. If conditions prevent 100 percent inflow screening, inflow screening may be reduced gradually, as further detailed in the following paragraph, but 100 percent overflow screening is then required. The NMFS's Protected Resources Division must be consulted prior to the reductions in screening and an explanation must be included in the dredging report.

   a. *Screen Size*: The hopper's inflow screens will have 4-inch by 4-inch screening. If the CPRA, in consultation with observers and the draghead operator, determines that the draghead is clogging and reducing production substantially, the screens may be modified sequentially: mesh size may be increased to 6-inch by 6-inch, then 9-inch by 9-inch, then 12-inch by 12-inch openings. Clogging should be greatly reduced with these flexible options; however, further clogging may compel removal of the screening altogether, in which case effective 100 percent overflow screening is mandatory. The CPRA will notify NMFS's Protected Resources Division and BOEM beforehand if inflow screening is going to be reduced or eliminated, and provide details of how effective overflow screening will be achieved.

   b. *Need for Flexible, Graduated Screens*: Flexible, graduated-screens will be employed unless NMFS's Protected Resources Division is notified and approves another type of screen consistent with this Paragraph.

3. *Dredging Pumps*: Standard operating procedure is that dredging pumps will be disengaged by the operator when the dragheads are not firmly on the bottom to prevent impingement or entrainment of sea turtles within the water column. This precaution is especially important during the cleanup phase of dredging operations when the draghead frequently comes off the bottom and could suck in turtles resting in the shallow depressions between the high spots the draghead is trimming off.

4. *Sea Turtle Deflecting Draghead*: Rigid deflector dragheads must be used at all times on all hopper dredges mining sand at the borrow areas.

5. *Dredge Take Reporting*: Observer reports of incidental take by hopper dredges must be faxed to NMFS's Southeast Regional Office, Protected Resources Division at (727) 824-5517 by the onboard endangered species observer within 24 hours of any observed sea turtle take. A copy of the report submitted to NMFS and notification of the incidental take must be emailed to dredgeinfo@boem.gov within 24 hours of any observed sea turtle take. A report summarizing the results of the hopper dredging and detailing any documented sea turtle takes must be submitted to NMFS's Protected Resources Division and BOEM within 30 working days of completion of the dredging project. The report will contain information on project location (specific area dredged), start-up and completion dates, cubic yards of material dredged, problems encountered, incidental takes and sightings of protected species, mitigative actions taken (if relocation trawling, the number and species of turtles relocated), screening type (inflow, overflow) utilized, daily water temperatures, name of dredge, names of endangered species' observers, percent observer coverage, and any other information the CPRA deems relevant.

6. S*ea Turtle Strandings*: The CPRA Project Manager or designated representative will notify the Sea Turtle Stranding and Salvage Network (STSSN) State representative

(contact information available at http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp) of the start-up and completion of hopper dredging operations and ask to be notified of any sea turtle strandings in the project area that, in the estimation of STSSN personnel, bear signs of potential draghead impingement or entrainment. Information on any such strandings will be reported in writing within 30 days of project end to the NMFS Southeast Regional Office, Protected Resources Division. Because the deaths of these turtles, if hopper dredge or bed-leveler dredge-related, have already been accounted for in NMFS's jeopardy analysis and because of different possible explanations for and subjectivity in the interpretation of potential causes of strandings, these strandings will not be counted against BOEM's take limit.

7. *Reporting - Strandings*: The CPRA will provide to NMFS's Southeast Regional Office, PRD and BOEM a final report in writing within 30 days of project end detailing incidents, with photographs when available, of stranded sea turtles that bear indications of draghead impingement or entrainment. This reporting requirement may be included in the project completion report required in Term and Condition No. 5 (Dredge Take Reporting) above.

8. *Relocation Trawling*: The 24-hour relocation trawling will be conducted subject to the following conditions:

   a. Relocation trawling (a minimum of 12 hours/day) will be conducted for the 3 days (72 hours) immediately prior to commencement of hopper dredging operations to reduce the abundance of sea turtles in the project area. If no turtle is captured during this time period, then additional relocation trawling will not be required unless takes occur during dredging.

   b. If a sea turtle is taken by a relocation trawler during the 72-hour pre-dredging period, relocation trawling must be conducted for a minimum of 7 consecutive days following the take.

   c. If no turtle is taken during relocation trawling and hopper dredging for 7 consecutive days, then relocation trawling may be discontinued. However, if a sea turtle is subsequently taken during hopper dredging, then relocation trawling will be immediately re-implemented for a minimum of 7 consecutive days; however, dredging may continue.

9. *Relocation Trawling Take Limits*: The 2005 Biological Opinion covering this action authorizes the biennial take of 76 sea turtles (of loggerhead, green, Kemp's ridley, or combination of) and a limit of 152 sea turtles (of loggerhead, green, Kemp's ridley, or combination of) for all dredging projects covered under the 2005 Biological Opinion, including but not limited to the Project identified in this Lease. In order to reduce the abundance of sea turtles during the 72 hours immediately preceding the start of hopper dredging and during hopper dredging, all relocation trawling conducted by or contracted by the CPRA is subject to the following conditions:

   a. *Trawl Time*: Trawl tow-time duration will not exceed 42 minutes (doors in - doors out) and trawl speeds must not exceed 3.5 knots.

   b. *Handling During Trawling*: Sea turtles captured pursuant to relocation trawling will be handled in a manner designed to ensure their safety and viability, and will be released over the side of the vessel, away from the propeller, and only after ensuring that the vessel's propeller is in the neutral, or disengaged, position (i.e., not rotating). Resuscitation guidelines are attached (Appendix V of the 2005 Biological Opinion).

c. *Captured Turtle Holding Conditions*: Captured turtles will be kept moist and shaded, whenever possible, until they are released.

d. *Weight and Size Measurements*: All turtles will be measured (standard carapace measurements including body depth), tagged, and weighed when safely possible, prior to release. Any external tags must be noted and the data recorded into the observers' log. Only NMFS-approved observers or observer candidates in training under the direct supervision of an NMFS-approved observer may conduct the tagging/measuring/weighing/tissue sampling operations.

e. *Take and Release Time during Trawling*: Turtles will be kept no longer than 12 hours prior to release and must be released not less than 3 nautical miles (3.5 miles; 5.6 kilometers) from the dredge site. If two or more released turtles are later recaptured, subsequent turtle captures must be released not less than 5 nautical miles (5.8 miles; 9.3 kilometers) away. If it can be done safely, turtles may be transferred onto another vessel for transport to the release area to enable the relocation trawler to keep sweeping the dredge site without interruption.

f. *Injuries and Incidental Take Limits*: Any protected species injured or killed during or as a consequence of relocation trawling will count toward the incidental take limit. Minor skin abrasions resulting from trawl capture are considered non-injurious. Injured sea turtles must be immediately transported to the nearest sea turtle rehabilitation facility.

g. *Flipper Tagging*: All sea turtles captured by relocation trawling will be flipper-tagged prior to release with external tags, which will be obtained prior to the project from the University of Florida's Archie Carr Center for Sea Turtle Research http://accstr.ufl.edu/cmttp.html by contacting Alan Bolten, Archie Carr Center for Sea Turtle Research, University of Florida, PO Box 118525, Gainesville, Florida 32611, (352) 392-5194, abolten@ufl.edu. The NMFS Biological Opinion serves as the permitting authority for any NMFS-approved endangered species observer aboard these relocation trawlers to flipper-tag with external tags (e.g., Inconel tags) captured sea turtles. Columbus crabs or other organisms living on external sea turtle surfaces may also be sampled and removed under this authority.

h. *PIT-Tag Scanning*: All sea turtles captured by relocation trawling (or dredges) will be thoroughly scanned for the presence of PIT tags prior to release using a scanner powerful enough to read dual frequencies (125 and 134 kHz) and to read tags deeply embedded deep in muscle tissue (e.g., manufactured by Biomark or Avid). If scans show that a turtle has been previously PIT tagged it will nevertheless be externally flipper tagged. The data collected (PIT tag scan data and external tagging data) will be submitted to NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, FL 33149. All data collected must be submitted in electronic format within 60 working days to Lisa.Belskis@noaa.gov.

i. *Cooperative Marine Turtle Tagging Program (CMTTP)*: External flipper tag and PIT tag data generated and collected by relocation trawlers must also be submitted to the CMTTP on the appropriate CMTTP form at the University of Florida's Archie Carr Center for Sea Turtle Research.

j. *Tissue Sampling*: All live or dead sea turtles captured by relocation trawling or dredging will be tissue-sampled prior to release, according to the protocols described in Appendix III or Appendix IV of the 2005 Biological Opinion. Tissue samples must be sent within 60 days of capture to NOAA, National

Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, FL 33149. All data collected must be submitted in electronic format within 60 working days to Lisa.Belskis@noaa.gov. The 2005 Biological Opinion serves as the permitting authority for any NMFS-approved endangered species observers aboard relocation trawlers or hopper dredges to tissue-sample live- or dead-captured sea turtles without the need for an ESA Section 10 permit.

k. *Cost Sharing of Genetic Analysis*: The CPRA will pay for collection, shipping, and analysis by NMFS scientists of up to 32 tissue samples taken during BOEM-authorized hopper dredging operations in the Gulf of Mexico. The cost of analysis is currently estimated by NMFS to be about $100-$150 per sample, or $3,200-$4,800. The CPRA funds will be provided to Dr. Peter Dutton of NMFS's Southwest Fisheries Center within 6 months of completion of the project.

l. *PIT Tagging*: The PIT tagging is not required or authorized for, and may not be conducted by, ESOs who do not have (1) ESA Section 10 permits authorizing said activity and (2) prior training or experience in said activity; however, if the ESO has received prior training in PIT tagging procedures and is also authorized to conduct said activity by an ESA Section 10 permit, then the ESO must PIT tag the animal prior to release (in addition to the standard external flipper tagging). PIT tagging must then be performed in accordance with the protocol detailed at NMFS's Southeast Science Center's webpage at http://www.sefsc.noaa.gov/seaturtlefisheriesobservers.jsp. The PIT tags used must be sterile, individually wrapped tags to prevent disease transmission. The PIT tags will be 125 kHz, glassen capsulated tags — the smallest ones made. Note: If scanning reveals a PIT tag and it was not difficult to find, then do not insert another PIT tag; simply record the tag number and location, and the frequency, if known. If for some reason the tag is difficult to detect (e.g., tag is embedded deep in muscle or is a 400-mHz tag), then insert one in the other shoulder.

m. *Other Sampling Procedures*: All other tagging and external or internal sampling procedures (e.g., PIT tagging, bloodletting, laparoscopies, anal and gastric lavages, mounting satellite or radio transmitters, etc.) performed on live sea turtles are not permitted under the 2005 Biological Opinion unless the observer holds a valid sea turtle research permit (obtained pursuant to Section 10 of the ESA from NMFS's Office of Protected Resources, Permits Division) authorizing the activity, either as the permit holder or as the designated agent of the permit holder.

n. *Handling Fibropapillomatose Turtles*: When handling sea turtles infected with fibropapilloma tumors, observers must either (1) clean all equipment that comes in contact with the turtle (tagging equipment, tape measures, etc.) with a mild bleach solution between the processing of each turtle or (2) maintain a separate set of sampling equipment for handling animals displaying fibropapilloma tumors or lesions.

10. *Training - Personnel on Hopper Dredges*: The CPRA must ensure that all contracted personnel involved in operating hopper dredges receive thorough training on measures of dredge operation that will minimize takes of sea turtles. Documentation of this training must be provided to BOEM prior to commencement of hopper dredging on the OCS. Operating procedures will be consistent with those that have been used successfully by COE during hopper dredging in other regions of the coastal United States, and that have proven effective in reducing turtle/dredge interactions. Therefore, the CPRA will consult and coordinate with appropriate

experts in the matter of hopper dredge operation training, and in the installation, adjustment, and monitoring of the rigid deflector draghead assembly. Prior to the commencement of hopper dredging, a BOEM-approved Inspector will inspect specific sea turtle protection requirements and a report will be provided to BOEM for approval prior to the commencement of dredging activities. The list of inspections the Inspector will perform is identified on a sea turtle inspection checklist entitled "COE Sea Turtle Inspection Checklist for Hopper Dredges" that can be found at http://el.erdc.usace.army.mil/seaturtles/index.cfm. All identified deficiencies must be corrected prior to the commencement of hopper dredging activities.

11. *Dredge Lighting*: From May 1 through October 31, sea turtle nesting and emergence season, all lighting aboard hopper dredges and hopper dredge pumpout barges operating within 3 nautical miles (3.5 miles; 5.6 kilometers) of sea turtle nesting beaches will be limited to the minimal lighting necessary to comply with U.S. Coast Guard (USCG) and/or Occupational Safety and Health Administration requirements. All nonessential lighting on the dredge and pump-out barge will be minimized through reduction, shielding, lowering, and appropriate placement of lights to minimize illumination of the water to reduce potential disorientation effects on female sea turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward from their natal beaches.

Consistent with the 2005 Biological Opinion, which is a programmatic biological opinion, the Lessee acknowledges and agrees that, even where it is otherwise in compliance with the terms and conditions of this Lease and other required authorizations, incidental take of sea turtles or other endangered species by the Lessee or its authorized contractors, within federal waters, may require suspension of the Lease by BOEM and reinitiation of consultation with NMFS. The amount and severity of incidental take that will trigger suspension, and the need for any such suspension or reinitiated consultation, will be determined by BOEM in its sole discretion, in consideration of the 2005 Biological Opinion and pursuant to all applicable laws and regulations, including, but not limited to, the ESA. Depending on the results of an assessment of the take or any reinitiated consultation, BOEM expressly reserves the right to lift the suspension, revoke and terminate the Lease, negotiate with the Lessee an amendment to the existing Lease or enter into a new lease with additional terms and conditions to protect threatened or endangered species. BOEM shall provide prompt written notice to Lessee of any such suspension of this Lease or reinitiation of consultation with NMFS, as described herein. The Lessee acknowledges and agrees on behalf of itself, its agents, contractors, and other representatives, that it shall not assert any claims, legal actions in equity for damages, adjustments, or other entitlements that it may have against BOEM which arise out of BOEM's actions taken in accordance with this Section, the 2005 Biological Opinion, and any applicable laws and regulations, including, but not limited to, the ESA.

Stipulation No. 4—Pre-Construction Notification of Activity in or Near the Borrow Area

The CPRA will invite BOEM to attend a pre-construction meeting that describes the CPRA's and/or its agents' plan and schedule to construct the Project.

The CPRA will also notify BOEM at dredgeinfo@boem.gov of the commencement and termination of operations at the borrow area by the close of business, next business day after the CPRA receives such notification from its contractor(s) for the Project.

Stipulation No. 5—Dredge Positioning

During all phases of the Project, the CPRA will ensure that the dredge and any bottom-disturbing equipment is outfitted with an onboard global positioning system (GPS) capable of maintaining and recording location within a horizontal accuracy range of no more than plus or minus 3 meters (10 feet). The GPS must be installed as close to the cutterhead or draghead as practicable or use appropriate instrumentation to accurately represent the position of the cutterhead or draghead. Whenever dredging operations are underway, the location of the dredge will be continuously monitored and its position within the borrow area will be recorded in real time, in North American Datum of 1983 (NAD83), at intervals not to exceed 2 minutes. During dredging operations, the CPRA will immediately notify BOEM at dredgeinfo@boem.gov if dredging occurs outside of the approved borrow area.

Anchoring, spudding, or other bottom-disturbing activities on the OCS are not authorized outside of the approved borrow area with the exception of cutterhead dredge swing anchors within the anchor area zone as shown on the map in Attachment 1.

The CPRA will provide BOEM all dredge positioning and production data acquired during the Project using procedures agreed upon in writing by BOEM and the CPRA prior to dredging. These data will be submitted to BOEM at dredgeinfo@boem.gov on a biweekly basis. These biweekly dredge reports will also include a summary of dredge excavator (draghead(s) and/or cutter head) track lines, outlining any deviations from the original Plan. A color-coded plot of the excavator locations will be submitted, showing any horizontal or vertical dredge violations. A plot will also be used show dredge status as described in Stipulation No. 7 below. Map(s) will be provided in Adobe PDF format. A complete dataset (dredge position) will be submitted within 45 days of completion of the Project. If available, the CPRA will also submit Automatic Identification System (AIS) data for vessels qualifying under the International Maritime Organization's (IMO) International Convention for the Safety of Life at Sea.

Stipulation No. 6—Dredge Operation

Dredging will be performed so that the hopper dredge excavates material to an overall cut depth not to exceed that approved in the Project borrow design plan (Attachments 1 and 2).

Stipulation No. 7—Submittal of Production and Volume Information

The CPRA, in cooperation with the dredge operator, will submit to BOEM on a biweekly basis a summary of the dredge track lines, outlining any deviations from the original Plan. A color-coded plot of the cutterhead and/or drag heads will be submitted, showing any horizontal or vertical dredge violations. The dredge track lines must show dredge status: hoteling, dredging (pump on/off), transiting, or unloading. This map will be provided in Adobe PDF format.

The CPRA will provide at least a biweekly update of the construction progress, including estimated volumetric production rates (both cumulative and for the reporting period) to BOEM. The biweekly deliverables will be provided electronically to BOEM at dredgeinfo@boem.gov. The Project completion report, as described below, will also include production and volume information, including Daily Operational Reports.

Stipulation No. 8—Local Notice to Mariners

The CPRA will require its contractor(s) for the Project to place a notice in the USCG Local Notice to Mariners regarding the timeframe and location of dredging and construction operations in advance of commencement of dredging.

Stipulation No. 9—Marine Pollution Control and Contingency Plan

The CPRA will require its contractor(s) and subcontractor(s) to prepare for and take all necessary precautions to prevent discharges of oil and releases of waste and hazardous materials that may impair water quality. In the event of a discharge, notification and response will be in accordance with applicable requirements of 40 C.F.R. Part 300. All dredging and support operations must be compliant with USCG regulations and the U.S. Environmental Protection Agency's Vessel General Permit, as applicable. The CPRA will notify BOEM of any occurrences and remedial actions and provide copies of reports of the incident and resultant actions at dredgeinfo@boem.gov.

Stipulation No. 10—Encounter of Ordnance

If any ordnance is encountered while conducting dredging activities, the CPRA will report the discovery within 24 hours to the Regional Supervisor, Office of Environment, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region at (504) 736-2759 and dredgeinfo@boem.gov.

Stipulation No. 11—Bathymetric Surveys

The CPRA will provide BOEM with pre- and post-dredging bathymetric surveys of the borrow area. The pre-dredging survey will be conducted within 60 days prior to dredging. The post-dredging survey will be conducted within 30 days after the completion of dredging. Additional bathymetric surveys are recommended one (1) and three (3) years after the completion of dredging. Hydrographic surveys will be performed in accordance with COE's Hydrographic Surveying Manual EM 1110-2-1003 unless specified otherwise. One hundred percent coverage using interferometric swath or multibeam bathymetry data is preferred over single-beam data. All bathymetric data will be roll, pitch, heave, and tide corrected using best practices. Survey lines of the specific dredge area will be established at intervals necessary to provide 100 percent coverage or a minimum of 60-meter (197-feet) line spacing for single-beam. Three equidistant cross-tie lines will be established parallel to the same baseline. All survey lines will extend at least 100 meters (328 feet) beyond the edge of the dredge areas. All data will be collected in such a manner that post-dredging bathymetry surveys are compatible with the pre-dredging bathymetric survey data to enable the latter to be subtracted from the former to calculate the volume of sand removed, the shape of the excavation, and the nature of post-dredging bathymetric change. Pre-dredge bathymetric survey transects will be reoccupied during the post-dredging surveys. Surveys will be conducted using kinematic GPS referenced to GPS base station occupying an established (NAVD 88 vertical control) monument within 15 kilometers (9 miles) of the survey area, a National Geodetic Survey real-time network, or referenced to a water-level gauge deployed within the vicinity of the project area, unless alternative methods are approved by BOEM. Pre- and post-dredging surveys will be referenced to the same water-level gauge, tide gauge, real-time network and/or benchmark, etc. An uncertainty or error analysis will be conducted on the bathymetric dataset based on calculated differences of measured elevations (depths) at all transect crossings (also note that other best practices typically employed to identify potential error or quantify uncertainty, such as daily bar-checks, will be conducted and documented). A methods and uncertainty analysis report, field notes, and metadata must be submitted to BOEM with the processed bathymetric data products.

Copies of processed pre-dredging and post-dredging hydrographic data will be submitted to BOEM via dredgeinfo@boem.gov within 30 days after each survey is completed. Pre-dredging bathymetric survey results and attendant products must be provided to BOEM for approval, and BOEM must review and deem them acceptable prior to commencement of dredging activity. If data accuracy, coverage, quality, etc. for either pre or post dredging surveys are not sufficient to provide for accurate comparisons between the pre-dredge and post-dredge surveys (e.g. do not meet specifications and standards discussed or referenced above), BOEM may require that a new survey (at pre-dredge and/or post-dredge phase) be conducted. The delivery format for data submission is an ASCII file containing x, y, z data. The horizontal data will be provided in the North American Datum of 1983 (NAD83) Louisiana State Plane south, U.S. survey feet. Vertical data will be provided in the North American Vertical Datum of 1988 (NAVD 88), U.S. survey feet unless otherwise specified. An 8.5 x 11″ plan view plot of the pre- and post-construction data will be provided showing the individual survey points, as well as contour lines at appropriate elevation intervals. These plots will be provided in Adobe PDF format. Survey metadata will also be provided.

Stipulation No. 12—Oil and Gas Infrastructure

Oil and gas infrastructure are present in the immediate vicinity of the borrow area. The BOEM has provided CPRA with information delineating the locations of oil and gas pipelines, based on the survey documentation provided to BSEE by pipeline operators. Magnetometer surveys conducted in 2011 by CPRA provide more recent information delineating the locations of oil and gas pipelines in the area. The CPRA or their contractor(s) will conduct a pre-dredging magnetometer survey within 60 days prior to mobilization of dredge equipment to the OCS. This survey can be conducted simultaneously with the pre-dredge bathymetry survey and must be submitted to BOEM. BOEM must concur that the survey data do not indicate the presence of any infrastructure or hazards prior to commencement of bottom disturbing activities.

CPRA will notify the Chevron Pipe Line Company, Shell Pipeline Company, and any other current BSEE Pipelines right of way (ROW) permit holder(s) within the Project area at least four (4) weeks prior to the commencement of dredging operations, so that the ROW permit holder(s) may take precautions to mark its pipeline segment if the ROW permit holder(s) choose to do so. Documentation and outcome of communication between Chevron Pipe Line Company, Shell Pipeline Company (and any other current ROW permit holders) and the CPRA must be provided to the Regional Supervisor, Office of Environment, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, 1201 Elmwood Park Blvd., New Orleans, LA 70123 and to dredgeinfo@boem.gov before the commencement of dredging. It is incumbent upon CPRA to request a current list of all oil and gas infrastructure, including but not limited to ROW permit holders, from BOEM at the above contact in order to comply with this stipulation.

During all dredging operations, the CPRA will require its contractor to observe a minimum setback distance of 1,000 feet (305 meters) from existing pipelines and all other oil and gas related infrastructure. No bottom disturbing activity (including anchoring and spudding) or dredging may occur within this setback distance. CPRA will immediately notify Regional Supervisor, Office of Environment, BOEM Gulf of Mexico Region, at (504) 736-2759 and dredgeinfo@boem.gov, if any oil and gas infrastructure on the OCS is disturbed during the course of the Project.

The BOEM reserves the right to require additional pre-dredging shallow hazards surveys to locate the position of existing pipelines and other seabed infrastructure in the wake of a severe storm event or availability of new information suggesting there may be hazards in the area.

Stipulation No. 13—Archaeological Resources

Onshore Prehistoric or Historic Resources

If the CPRA discovers any previously unknown historic or archeological remains while accomplishing activities related to the Project onshore, then the CPRA will notify BOEM and COE of any finding. The CPRA will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places. All Parties will follow NHPA Section 106 guidelines to determine and implement future actions that may include data recovery or resource avoidance.

Offshore Prehistoric or Historic Resources

An archeological and hazard survey was conducted at the borrow area and these data were used to conduct an assessment of the potential for both historic and prehistoric resources within the borrow area. The survey results and interpretations did not result in identification of any potential cultural resources within the borrow area. In the event that the dredge operators discover any archaeological resource while conducting dredging operations in Ship Shoal or in the vicinity of pump-out operations, the CPRA must require that dredge and/or pump-out operations be halted immediately within 305 meters (1,000 feet) of the area of discovery. The CPRA must then immediately report the discovery to the Regional Supervisor, Office of Environment, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region at (504) 736-2759. If investigations determine that the resource is significant, the Parties will together determine how best to protect it.

Stipulation No. 14—Responsibilities

As between the Lessor and the Lessee, the Lessee assumes all responsibility for the Project, activities authorized under this Lease, and the determination of the suitability of OCS sand resources for these purposes. Neither DOI nor BOEM warrant that the OCS sand resources used in this Project are suitable for the purpose for which they are intended by the Lessee. DOI and BOEM disclaim any and all responsibility for the physical and financial activities undertaken by the Lessee in pursuit of the Project.

Stipulation No. 15—Project Completion Report

A project completion report will be submitted by the CPRA to BOEM within 120 days following completion of the activities authorized under this Lease. This report and supporting materials must be sent to the Regional Supervisor, Office of Environment, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, 1201 Elmwood Park Blvd., New Orleans, LA 70123 and to dredgeinfo@boem.gov. The report must contain, at a minimum, the following information:

- the names and titles of the project managers overseeing the effort (for the CPRA, the engineering firm (if applicable), and the contractor), including contact information (telephone numbers, mailing addresses, and email addresses);
- the location and description of the project, including the final total volume of material extracted from the borrow area and the volume of material actually placed on the beach or shoreline (including a description of the volume calculation method used to determine these volumes);
- ASCII files containing the x, y, z and time stamp of the cutterhead or drag arm locations;
- a narrative describing the final, as-built features, boundaries, and acreage, including the restored beach width and length;
- a table, an example of which is illustrated below, showing the various key project cost elements;

Project Cost Element	Cost Incurred as of Construction Completion ($)
Construction	
Engineering and Design	
Inspections/Contract Administration	
Total	

- a table, an example of which is illustrated below, showing the various items of work construction, final quantities, and monetary amounts;

Item No.	Item	Estimated Quantity	Final Quantity
1	Mobilization and Demobilization		
2	Beach Fill		
3	Any beach or offshore hard structure placed or removed		

- a listing of construction and construction oversight information, including the prime and subcontractor(s), contract costs, etc.;
- a list of all major equipment used to construct the project;
- a narrative discussing the construction sequences and activities, and, if applicable, any problems encountered and solutions;
- a list and description of any construction change orders issued, if applicable;
- a list and description of any safety-related issues or accidents reported during the life of the project;
- a narrative and any appropriate tables describing any environmental or compliance surveys or efforts associated with the project and costs associated with these surveys or efforts;
- a table listing significant construction dates beginning with bid opening and ending with final acceptance of the project by the CPRA;
- digital appendices containing the as-built drawings, beach-fill cross-sections, and survey data; and
- any additional pertinent comments.

Stipulation No. 16—Point of Contact, Environmental and Reporting Compliance

The CPRA will designate, in advance of construction, a single CPRA point of contact responsible for facilitation of compliance with all lease requirements. The contact information will be provided to BOEM at dredgeinfo@boem.gov at least 30 days in advance of mobilization of dredging and construction equipment to the OCS.

Stipulation No. 17—Sharing of Information

Consistent with the purposes stipulated by the Parties in this Lease, and to the extent allowed by law, policy, and regulation, the CPRA and BOEM agree to: (1) share all information needed for or generated from the Project, including the sharing of implementation and other applicable schedules; (2) provide such information to the requesting agency as expeditiously as possible; and (3) work to ensure that all required completion report information is received. BOEM reserves the right to share all information provided by the State of Louisiana or CPRA pursuant to this Lease with BSEE, for the purposes outlined in Secretarial Order 3299, which granted BSEE enforcement functions for activities involving the removal of OCS sand resources from the OCS.

Stipulation No. 18—Resolution of Disputes

The Parties agree to make every attempt to settle any disputes regarding this Lease at the lowest operational level. In the case of: (1) a substantial disagreement between BOEM and the CPRA with respect to any aspect of BOEM's authorization of the use of OCS sand resources in accordance with the terms and conditions as specified or (2) any alleged breach by a Party of the terms and conditions as specified herein, the undersigned will designate a senior management official in their respective agencies to state the area(s) of disagreement or alleged breach in writing and present such statement to the other Party for consideration. If resolution is not reached within 60 days, the undersigned will request the active participation of the Executive Director of the CPRA and the Regional Supervisor, Office of Environment, BOEM Gulf of Mexico OCS Region.

Stipulation No. 19—Notices

Except as otherwise provided herein, all notices relating to this Lease or activities authorized hereunder by or among the Parties must be provided to the following addresses:

To BOEM:
Regional Supervisor
Office of Environment
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, LA 70123

All electronic notifications, submissions, and deliverables to BOEM should be sent to dredgeinfo@boem.gov.

To the CPRA:
Brad Miller, CPRA Project Manager
450 Laurel Street, Suite 1200
Baton Rouge, Louisiana 70801
Brad.miller@la.gov

Stipulation No. 20—Miscellaneous

This Lease does not affect any preexisting or independent relationships or obligations among DOI and the State of Louisiana, including any other relationships or obligations between BOEM and the CPRA, or any other units of such Departments. No Party shall assign any interest in this Lease and shall not transfer any interest in same (whether by assignment or novation), without the prior written consent of the other Party. Nothing herein is intended or may be deemed to create or confer any right, action, or benefit in, to, or on the part of any person not a Party to this Lease except for those rights which are conferred by law.

All rights in the South Pelto Blocks 13 and 14 borrow area not expressly granted to the CPRA by the OCSLA or this Lease are hereby reserved to BOEM. BOEM reserves the right to authorize other uses in the borrow area that will not unreasonably interfere with activities authorized under this Lease. BOEM will allow the CPRA to review and comment on any proposed authorizations for the use of OCS sand resources in the borrow area while this Lease is in effect.

Nothing herein is intended to conflict with current state or federal laws, rules, or regulations. If the terms of this Lease are inconsistent with the existing applicable laws, rules, or regulations of any of the Parties entering into this Lease, then those portions of this agreement that are determined to be inconsistent will be invalid, but the remaining terms and conditions not affected by the inconsistency will remain in full force and effect. At the first opportunity for review of the Lease, all necessary changes will be accomplished either by an amendment to this Lease or by entering into a new Lease, whichever is deemed expedient to the interest of the Parties. Any changes and/or amendments to this Lease shall be effective only upon mutual written consent of the Parties.

This agreement may be executed in two (2) or more counterparts, each of which will be deemed an original. The signatures to this agreement may be executed on separate pages, and when attached to this agreement, will constitute one complete document.

[*The remainder of this page was intentionally left blank. Signature Page to follow.*]

**NEGOTIATED NONCOMPETITIVE LEASE
BETWEEN
THE BUREAU OF OCEAN ENERGY MANAGEMENT
OF THE DEPARTMENT OF THE INTERIOR
AND THE
STATE OF LOUISIANA
COASTAL PROTECTION AND RESTORATION AUTHORITY**

**REGARDING THE USE OF OUTER CONTINENTAL SHELF
SAND RESOURCES FOR CAMINADA HEADLAND SHORELINE
RESTORATION PROJECT INCREMENT 2, LOUISIANA**

BOEM Negotiated Agreement No. OCS-G 35161

Signatory Page 1 of 2

for

Kyle Graham
Executive Director
Coastal Protection and Restoration Authority
State of Louisiana

Date: March 13, 2014

Joseph A. Christopher
Regional Supervisor, Office of Environment
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

Date: ____________________

NEGOTIATED NONCOMPETITIVE LEASE
BETWEEN
THE BUREAU OF OCEAN ENERGY MANAGEMENT
OF THE DEPARTMENT OF THE INTERIOR
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COASTAL PROTECTION AND RESTORATION AUTHORITY

REGARDING THE USE OF OUTER CONTINENTAL SHELF SAND RESOURCES FOR CAMINADA HEADLAND SHORELINE RESTORATION PROJECT INCREMENT 2, LOUISIANA

BOEM Negotiated Agreement No. OCS-G 35161

Signatory Page 2 of 2

____
Kyle Graham
Executive Director
Coastal Protection and Restoration Authority
State of Louisiana

Date: __________________________

Joseph A. Christopher
Regional Supervisor, Office of Environment
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

Date: 3/13/2014

ATTACHMENT 1

Borrow Area Plan View

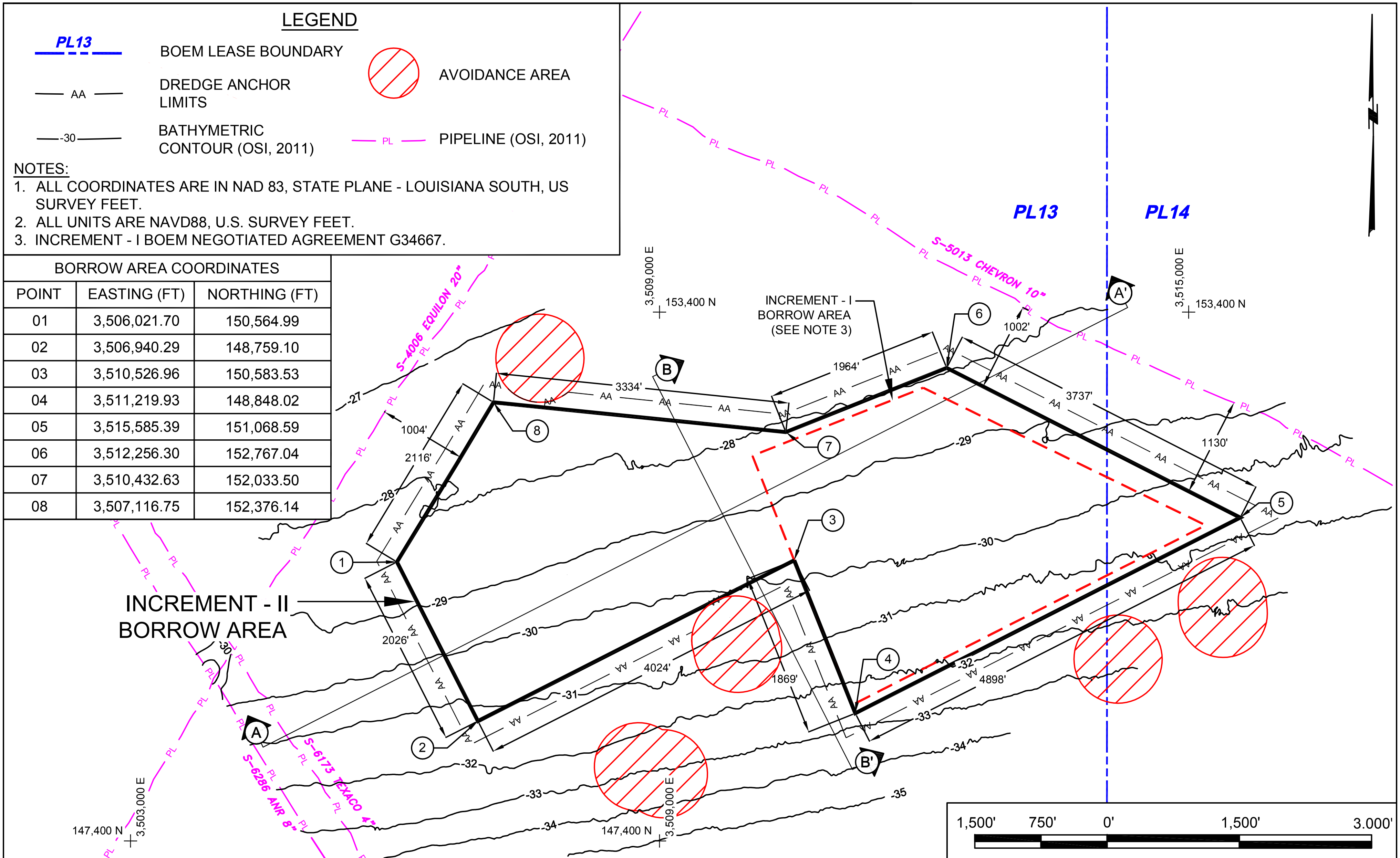
LEGEND

PL13	BOEM LEASE BOUNDARY
— AA —	DREDGE ANCHOR LIMITS
—-30—	BATHYMETRIC CONTOUR (OSI, 2011)
	AVOIDANCE AREA
— PL —	PIPELINE (OSI, 2011)

NOTES:
1. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, US SURVEY FEET.
2. ALL UNITS ARE NAVD88, U.S. SURVEY FEET.
3. INCREMENT - I BOEM NEGOTIATED AGREEMENT G34667.

BORROW AREA COORDINATES

POINT	EASTING (FT)	NORTHING (FT)
01	3,506,021.70	150,564.99
02	3,506,940.29	148,759.10
03	3,510,526.96	150,583.53
04	3,511,219.93	148,848.02
05	3,515,585.39	151,068.59
06	3,512,256.30	152,767.04
07	3,510,432.63	152,033.50
08	3,507,116.75	152,376.14

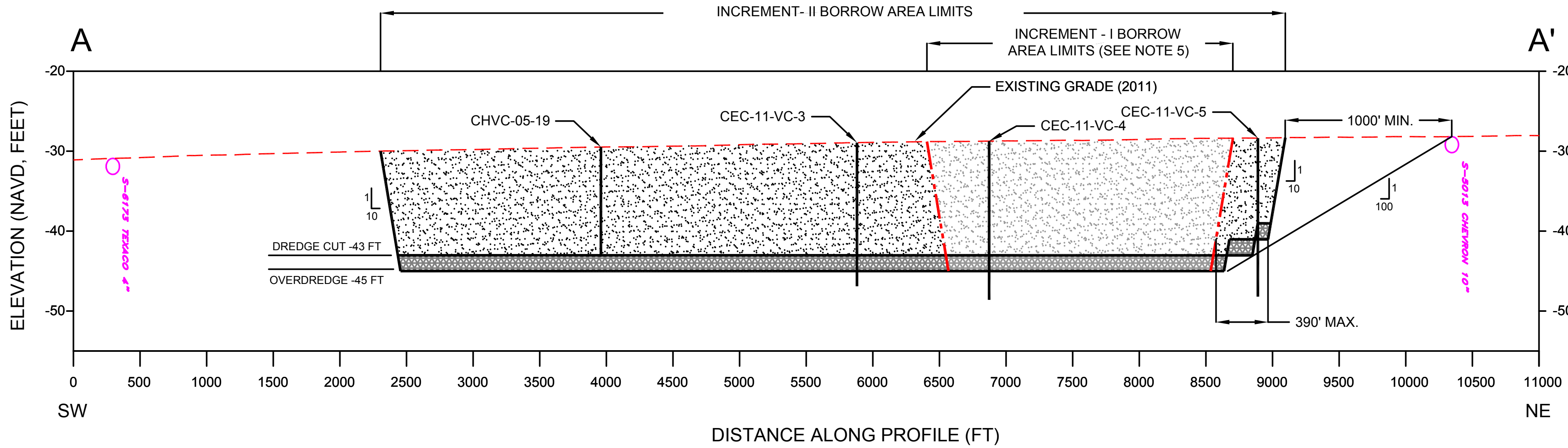


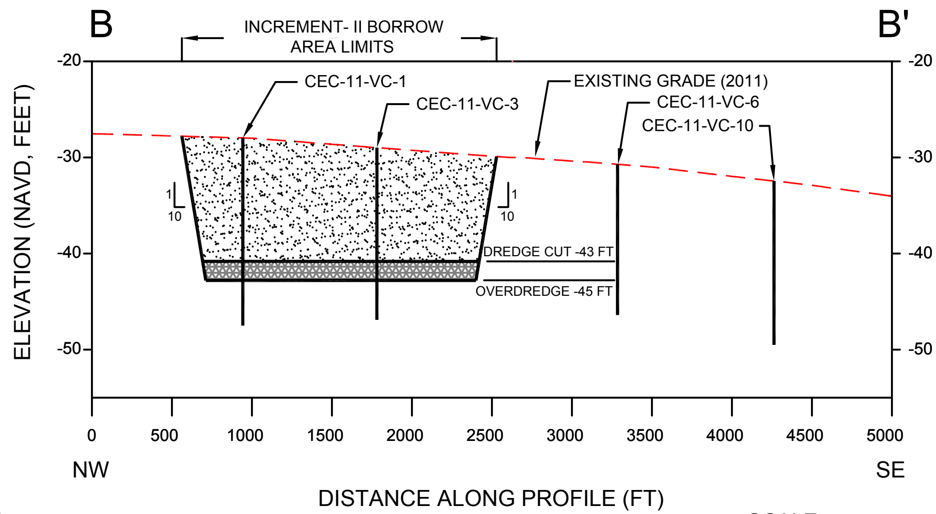
COASTAL ENGINEERING CONSULTANTS, INC

NRDA CAMINADA HEADLAND BEACH AND DUNE RESTORATION (BA-143) INCREMENT - II

INCREMENT - II
SOUTH PELTO BORROW AREA
DESIGN PLAN VIEW

ATTACHMENT 2
Borrow Area Design Sections





NOTES:
1. PIPELINE DATA FROM OSI, 2011.
2. BATHYMETRIC SURVEY CONDUCTED BY OSI, 2011.
3. ELEVATIONS HEREON ARE REFERENCED TO NORTH AMERICAN VERITCAL DATUM 1988 (NAVD)
4. VIBRACORE DATA OBTAINED FROM CPE, 2005 AND OSI, 2011.
5. INCREMENT - I BOEM NEGOTIATED AGREEMENT G34667.

SCALE
H: 1" = 1200'
V: 1" = 20'

LEGEND:
- DREDGE CUT
- OVERDREDGE TOLERANCE

COASTAL ENGINEERING CONSULTANTS, INC

NRDA CAMINADA HEADLAND BEACH AND DUNE RESTORATION (BA-143)
INCREMENT - II

INCREMENT - II
SOUTH PELTO BORROW AREA
TYPICAL DESIGN SECTIONS

ATTACHMENT 3

National Marine Fisheries Service September 19, 2005 Biological Opinion No. F/SER/2003/01247

Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency: Minerals Management Service

Activity: Hopper and Hydraulic Cutterhead Dredging Associated with Sand Mining for Coastal Restoration Projects Along the Coast of Louisiana Using Sand from Ship Shoal in the Gulf of Mexico Central Planning Area, South Pelto Blocks 12, 13, and 19, and Ship Shoal Block 88.

Consultation Number F/SER/2003/01247

Consulting Agency: National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida

Approved by: ____

Roy E. Crabtree, Ph.D., Regional Administrator
NMFS, Southeast Regional Office
St. Petersburg, Florida

Date Issued: ____

Contents

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq*.), requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When the action of a federal agency may affect a protected species, that agency is required to consult with the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), or the U.S. Fish and Wildlife Service (FWS), depending upon the protected species that may be affected.

This document represents NOAA's NMFS biological opinion (opinion) based on our review of the proposed granting of non-competitive leases by the Minerals Management Service (MMS) of the U.S. Department of the Interior for offshore sand mining from sand sources in federal waters of Ship Shoal in the Gulf of Mexico Central Planning Area, South Pelto Blocks 12, 13, and 19, and Ship Shoal Block 88, for barrier island beach restoration and levee construction activities in the U.S. Gulf of Mexico off Louisiana, using hopper dredges and hydraulic cutterhead pipeline dredges. The opinion analyzes potential hopper dredging and hydraulic cutterhead pipeline dredging, and sand emplacement effects for flood levee construction and barrier island restoration on green sea turtles *(Chelonia mydas*), loggerhead sea turtles (*Caretta caretta*), and Kemp's ridley sea turtles *(Lepidochelys kempii*) in accordance with section 7 of the ESA.

Formal consultations are required when action agencies determine that a proposed action "may affect" listed species or designated critical habitat. Formal consultations on most listed marine species are conducted between the action agency and NMFS. Consultations are concluded after NMFS' issuance of an opinion that identifies whether a proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify critical habitat. The opinion also states the amount or extent of incidental taking that may occur. Non-discretionary measures ("reasonable and prudent measures" - RPMs) to reduce the likelihood of takes are developed, and conservation recommendations are made. Notably, there are no reasonable and prudent measures associated with critical habitat, only reasonable and prudent alternatives that must avoid destruction or adverse modification.

This opinion is based on the Ship Shoal Multi-Project Biological Assessment (BA) and Environmental Assessment (EA) submitted by MMS in September 2003, incorporated herein by reference; the NMFS' November 19, 2003, Regional Biological Opinion (RBO) to the U.S. Army Corps of Engineers' (COE) combined Gulf of Mexico districts on hopper dredging of navigation channels and sand mining sites in the Gulf of Mexico, incorporated herein by reference (F/SER/2000/01287); the November 2003 Biological Assessment (BA) for the Barataria Barrier Shoreline Complex Restoration Project produced by NMFS' Habitat Conservation Division, incorporated herein by reference; the February 19, 2004, biological opinion to the NMFS' Habitat Conservation Division for hopper dredging associated with sand mining for the Pelican Island segment of the Barataria Barrier Shoreline Complex Restoration Project, incorporated herein by reference (F/SER/2003/01071); and other sources of information on the effects of hopper dredging on listed species under NMFS' purview, including information on COE Gulf of Mexico and South Atlantic beach nourishment projects involving the use of hopper dredges and annual take reports, dredge observer reports, dredging project completion reports, and annual dredging project summary reports of COE Gulf of Mexico dredging projects.

1.0 Consultation History

- A letter requesting formal consultation on the proposed action, enclosed BA and EA were received on September 23, 2003, from MMS, Washington, D.C.

- Various e-mail communications between April-November 2004, between Protected Resources Division (PRD) and MMS staff.

- Numerous phone conversations between June 2004-June 2005, between PRD and MMS staff.

- A phone conversation in June 2004, between PRD and MMS staff; where MMS staff revealed that the proposed action and area was changed.

- A phone conversation on November 3, 2004, between PRD and MMS staff; where MMS staff revealed that the proposed action area had changed. MMS informed PRD staff that the New Cut project, under the original letter requesting consultation had been dropped. On November 29, 2004, NMFS received a letter from MMS confirming this modification to the proposed action.

2.0 Description of the Action Area and Proposed Action

Background

The action agency's stated need for the Multi-Project proposed action is to arrest and reduce the rate of the persistent and alarming loss of coastal landmass along southern Louisiana and the Mississippi and Atchafalaya delta complex and to protect vital coastal infrastructure from the tidal surge that accompanies tropical storms. Land loss has occurred from a combination of subsidence and sea-level rise. These conditions have been aggravated by changes in the river's flow parameters and sediment load distribution that have occurred as a result of decades-long construction of upstream navigation and flood-control systems. Disruption of over-bank flooding/distributary formation in the deltas themselves has been a major cause of coastal land loss.

Louisiana's coastal land loss problem, which continues at a rate of more than 30 mi^2 (19,200 ac or 7,770 ha) per year, has been extensively studied and well documented in the scientific literature. The Isles Dernieres barrier island chain is considered one of the most rapidly deteriorating barrier shorelines in the United States. This barrier island chain is losing its structural functions for the coastal/estuarine ecosystem; primarily among these is the chain's storm wave buffering capacity and the protection it provides human populations, cities and towns, oil and gas infrastructure, inland bays, estuaries, and wetlands. Breakup of the island chain has resulted from both major storm actions and the loss of nourishing sediment from the natural system as a result of human alterations. As an example to illustrate the severity of coastal landloss in Louisiana, Figure 2 shows the amount of landloss within the Isle Dernieres chain between 1887 and 1996.

The Isles Dernieres and Timbalier barrier island chains form the outer line of defense for Timbalier and Terrebonne Bays. These island chains play a critical role in reducing storm surge and wave energy on back-barrier shorelines which helps protect inland areas from further erosion and flooding. The bays are huge estuaries (where fresh and saltwater mix) that sustain most of Louisiana's important commercial and recreational fisheries. Without a robust barrier island system these coastal fisheries may collapse (Penland et al., 1981).

The Isles Dernieres and Timbalier barrier island chains are experiencing a landward migration and landloss as a result of both natural and man-induced processes. Many of these islands are expected to be lost in the very near future if no restoration is completed. The entire Isles Dernieres chain, a critical component of the Louisiana barrier island system offshore central Louisiana, is projected to be lost by 2010 if no mitigating actions are taken. A study by the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) task force recommended returning Isles Dernieres and the Timbalier Islands to 1992 pre-Hurricane Andrew conditions, which means restoring island widths to about 1,230 ft (375 m) and beach and dune heights of 8-9 ft (3 m) above sea level.

Proposed Action Area

The action area (defined in 50 CFR 402.02 as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action") for this project includes several areas. Ship Shoal is the primary borrow area for this MMS multi project (Figure 1). Ship Shoal is a submerged topographic feature located offshore the central coast of Louisiana, approximately 50 km long and 5-12 km in width with relief of up to 3.6 m. The eastern tip of Ship Shoal lies approximately 10 NM south-southwest of Isle Dernieres in the Gulf of Mexico. The water depths at the site range form 7-9 m on the eastern side of the Shoal to approximately 3 m over the western reaches.

Ship Shoal is the largest submerged shoal off Louisiana and exhibits a landward-oriented asymmetry that slopes westward. The change in shoal-crest asymmetry and orientation westward is concurrent with the decrease in water depth over the shoal crest and the increase in shoal relief. Byrnes and Patnaik (1991) and Penland et al. (1986) stated that the landward-oriented asymmetry suggests migration of the shoal to the north-northwest onto a bathymetric protuberance. The protuberance is roughly defined by the 6 m (20-ft) isobath and extends into Caillou Bay and Point Au Fer. Seaward of Ship Shoal, the inner continental shelf forms a platform structure approximately 15-20 km (9.3-12.4 mi) wide between the 18- and 20 m (60- and 66-ft) isobaths. About 25 km (15.5 mi) seaward of the shoal at the edge of the platform, another shore-parallel shoal occurs. This shoal is about 35 km (21.7 ft) long and 5-7 km (3.1-4.3 mi) wide with relief of 1-2 m (3.2-6.5 ft) and water depths of 12-15 m (39.3-49.2 ft) above the crest. The platform and outer shoal define the inner shelf seaward of Ship Shoal. The east-to-west trends of increasing shoal crest slopes reflect the influence of the nearshore protuberance extending out of Caillou Bay.

Results obtained from sediment analyses indicate that very significant similarities exist among the properties of Ship Shoal and the adjacent Isles Dernieres. Based on the results of those analyses, Ship Shoal sand is considered ideal material for use in beach nourishment projects along the Isles Dernieres, as well as Bayou Lafourche (MMS 2003). MMS estimates that the volumes of sand comprising the Ship Shoal structure are 1.2 billion cubic meters ranging from very fine to medium sand; an additional 123 million cubic meters of sand is estimated to be contained as distributary channel fill deposits under the Shoal.

Given the geology of Ship Shoal, virtually any block on the Shoal proper could provide sand for Louisiana shoreline restoration projects. However, only blocks with suitable quantities of sand resources in closes proximity of the intended project should be utilized, providing that dredging operations can be safely conducted while avoiding any oil and gas-related structures which might be present in and around

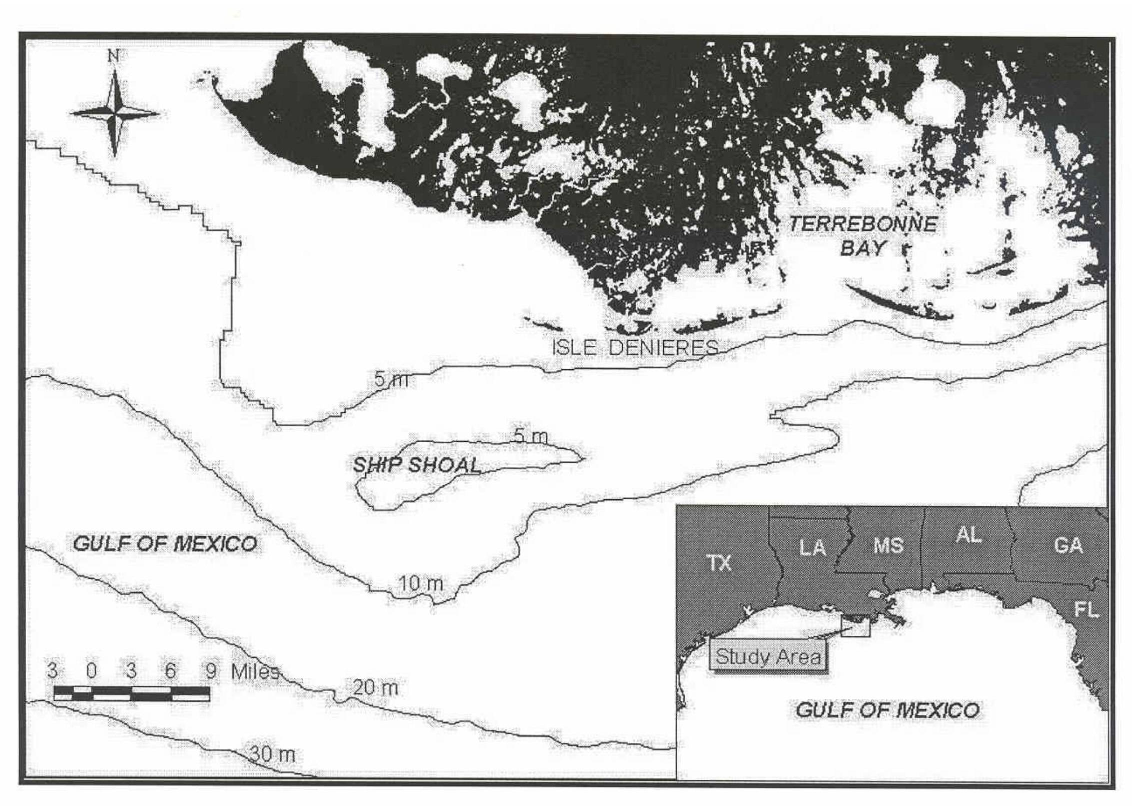


Figure 1. Location of Ship Shoal, offshore Louisiana.

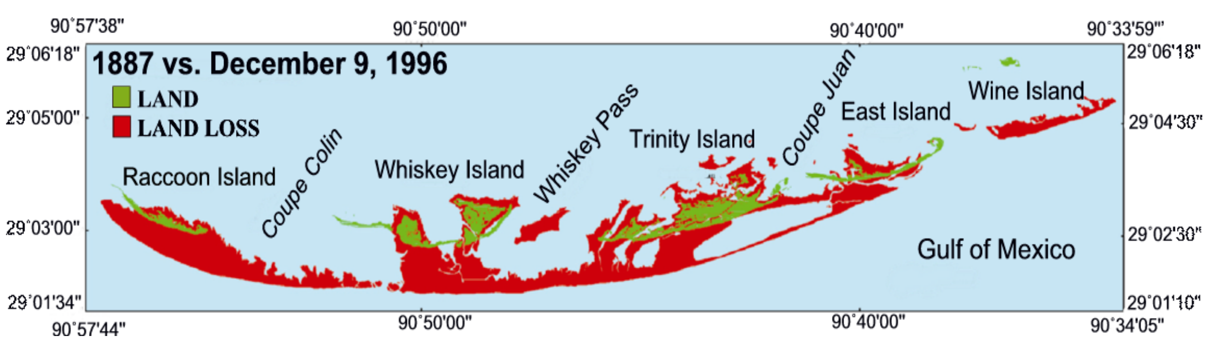


Figure 2. Land map showing cumulative landloss in the Isle Dernieres barrier island arc between 1887 and 1996 (Penland et al., in press).

the potential borrow site. The plethora of such structures (pipelines, platforms, wellheads, etc.) precludes the use of a significant portion of Ship Shoal. Based on these factors, several likely targets have been identified as suitable for use as borrow areas.

Ship Shoal Block 88 is considered one of the prime targets for use because as a borrow site it is located on the leading edge of the Shoal where the sand sequence is thickest and there is virtually no oil and gas-related infrastructure present. This block could provide an extremely large quantity of sand for the majority of the Isles Dernieres area. For restoration and other projects that are located on the eastern portion of the Isles Dernieres and Terrebonne Basin and within the Barataria Basin, blocks located on the far eastern portion of the Shoal might be more suitable. South Pelto Blocks 12, 13, and 19 are likely candidates for use; the only complicating factor is the existence of pipelines and other structures that must be avoided.

In addition to the Ship Shoal borrow area, the action area includes the following restoration areas: whiskey island and an area called Morganza. Whiskey Island is a barrier island in the Isles Dernieres chain in south Terrebonne Parish. The island is located 18 miles SW from Cocodrie, Louisiana, in Terrebonne Parish. The island is bounded by Raccoon Island to the west, Wine Island to the east, Lake Pelto to the northeast, Caillou Bay to the northwest, and the Gulf of Mexico to the south (Figure 2).

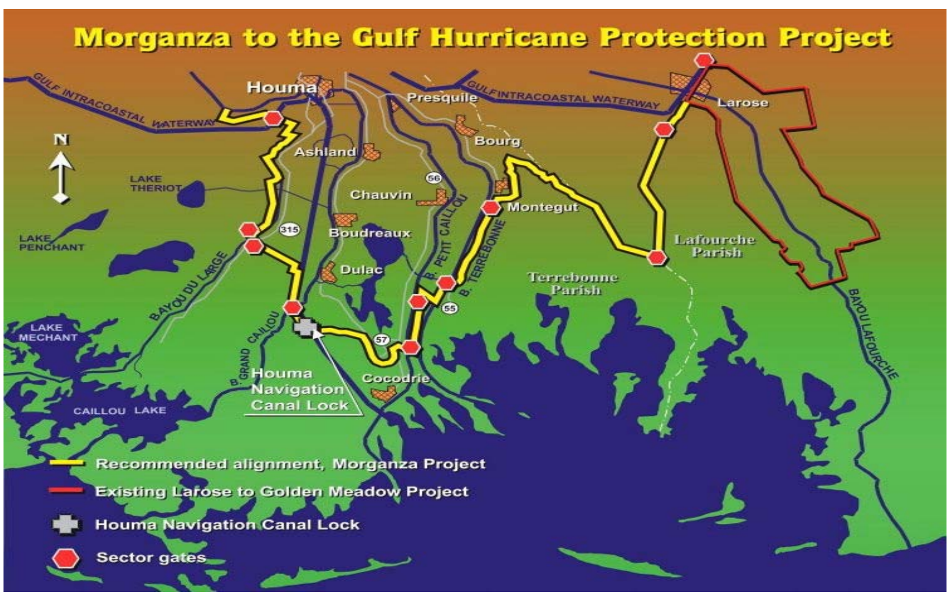


Figure 3. Location of the Morganza to the Gulf Hurricane Protection Project.

The Morganza project area is located approximately 60 miles southwest of New Orleans, Louisiana, and includes portions of Terrebonne and Lafourche Parishes. The area is bounded on the west by Bayou Du Large and State Highway 311; on the east by Bayou Lafourche with the east and west boundaries forming an apex at Thibodaux, Louisiana; and on the south by the Gulf of Mexico (Figure 3). The majority of the action area for this project is inland or terrestrial. The project for the most part builds on natural ridges, roadbeds, or existing levees that have been built for other purposes such as forced drainage or marsh management.

The action area includes secondary borrow areas. The proposed borrow areas for the Multi-Project are polygons defined on the crest of Ship Shoal. These polygons encompass parts of 4 OCS blocks in two protraction areas and are shown in Figure 4. One polygon includes Ship Shoal Block 88, and the other polygon includes South Pelto Blocks 12, 13, and 19. The Ship Shoal polygon encompasses an area of 10.17 mi^2 (6,512 ac), and the South Pelto polygon encompasses an area of 10.36 mi^2 (6,630 ac). Geological and geophysical studies of Ship Shoal have determined that the shoal's sand is an ideal source of material to place on the rapidly eroding Louisiana barrier islands (Figure 4).

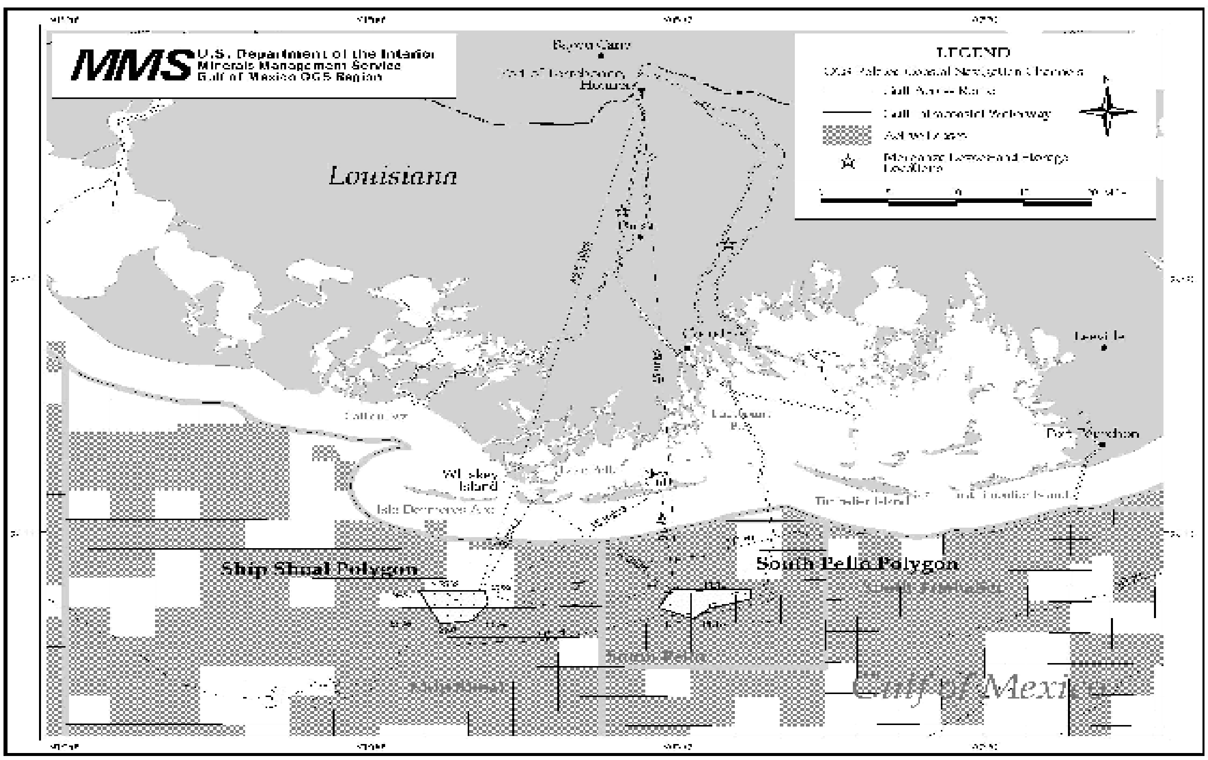


Figure 4. Index map showing (1) sand borrow polygons in the Ship Shoal and South Pelto areas and OCS block numbers, (2) distances from the polygons to the beach nourishment projects at New Cut and Whiskey Island, (3) temporary sand storage areas for the Morganza levee, and (4) distances from the polygons to the shore base at the Port of Terrebonne in Houma, Louisiana (currently leased OCS blocks are shaded).

Proposed Action

According to the MMS's Biological Assessment (BA), the overall proposed action is anticipated to use approximately 14.5 million yd^3 of Outer Continental Shelf (OCS) sand. The MMS will be using either a trailing suction hopper dredge or cutterhead suction dredge. The proposed action includes a total of two projects: the dredging of OCS sand for one barrier island restoration project and the construction of a flood levee project. If the project was conducted without any delays, the MMS estimates it would take approximately between 35-54 months to complete both projects; however, dredging will not be conducted on a continuous basis. Dredging is expected to occur during the months of April through September (120-180 days/year). Based on the ability for MMS to dredge 25,000 yd^3/day and to dredge between 120-180 days/year, the actual dredging is expected to range between 3.2-4.5 years if dredging was conducted continuously without any delays; however, the project may span over a 10-12 year period since the project is primarily contingent upon funding and the project will not be conducted continuously.

A hopper dredge uses a suction draghead to retrieve the sand from the sea bottom and load it into the dredge's hold (hopper) while decanting the slurry water overboard. When the hopper is full, the dredge would come off station at the borrow site and moor to a temporary buoy to offload the sand as a slurry. The buoy would be anchored a distance offshore of the beach—far enough to allow the dredge vessel to attach to the mooring buoy. A 203-inch diameter (515 cm) slurry pipe would be temporarily anchored on the seabed to bring sand slurry to the restoration area. Sand would be placed directly on the shoreline or established in feeder berms in the nearshore area. The discharged sand would be configured into position by bulldozers and graders. Sand fencing and vegetative plantings will be included in the design specifications where appropriate.

A hydraulic, cutter-suction dredge pumps and excavates material as a fluidized mass (slurry) through a pipeline deployed on the seabed, for placement and discharge onto the beach. The cutter-suction dredge is the most widely used dredge in the industry. It is equipped with a rotating cutter that surrounds the intake end of the suction pipe. The cutterhead suction dredge simultaneously excavates and pumps sand ashore through a pipeline previously laid on the seabed from the borrow area to the beach.

One restoration and beach nourishment project is proposed for Whisky Island of the Isles Dernieres barrier island arc. One noncompetitive lease is intended for the LDNR or Terrebonne Parish for 2.5 million yd^3 of OCS sand for the beach nourishment project at Whiskey Island. The proposed borrow area for Whiskey Island is Ship Shoal Block 88. The Whiskey Island project is expected to replenish about 364 acres of beach and dune platform. The Whiskey Island project is schedule to begin in 2005. The proposed borrow area for the 72 miles of flood-control levee flood levee system at Morganza is South Pelto Block 12 or 19 and Ship Shoal Block 88. The Morganza to Gulf project is scheduled to begin in 2005. Each project involves continuous sand dredging and emplacement during April-September (120-180 days) using either a deep-draft hopper dredge or a cutter suction dredge. The estimated project <u>dredging</u> time for Whiskey Island is 4 months and the estimated time for the Morganza to Gulf project is 24 months.

<u>Whiskey Island Project Overview</u>

The project is located on Whiskey Island, a barrier island in the Isles Dernieres chain in south Terrebonne Parish. The island is located 18 miles southwest of Cocodrie, Louisiana, in Terrebonne Parish. It is bounded by Raccoon Island to the west, Wine Island to the east, Lake Pelto to the northeast, Caillou Bay to the northwest, and the Gulf of Mexico to the south. The Whiskey West Flank project will extend Whiskey Island westward in order to provide a continuous protective barrier for back bays and inland marshes by reducing wave effects and ultimately reducing land loss. Whiskey Island from 1978 to 1988 endured an average loss of 31.1 acres per year. The project's objectives include: (1) restoring the integrity of the west flank of Whiskey Island to retain its structural function; (2) adding new offshore sediment into the west flank; and (3) restoring roughly 387 acres of barrier island habitat into the island's western flank. Based on the ability for MMS to dredge 25,000 yd^3/day and to dredge between 120-180 days/year, the total dredging duration is expected to range between 3-4 months (90-120 days). The estimated quantity of sand to be dredged is 2-2.5 million cubic yards. The Ship Shoal 88 borrow site will be utilized for this project.

<u>Hurricane Protection Project (Morganza to the Gulf) Overview</u>
The largest project under this MMS mulit-project is the Morganza (Hurricane protection) project. One noncompetitive lease is intended for the COE for approximately 12 million yd^3 of OCS sand for the Morganza levee project. The proposed borrow area for the Morganza levee project is South Pelto Block 13. This project is proposed to begin in early 2005 and may occur over a period of 10-12 years. The project involves sand removal using a hopper dredge. Dredging is anticipated to occur during April through September (120-180 days/year). Based on the ability for MMS to dredge 25,000 yd^3/day and to dredge between 120-180 days/year, the total dredging duration is expected to range between 24-36 months; however, the total project duration is expected to last between 10 and 12 years considering dredging is dependent upon funding and weather. When the dredge's hopper is full, the dredge will come off station at the borrow site and moor at the location of one or the other of two temporary sand storage sites located in Terrebonne Parish, one at the intersection of Falgout Canal and the Houma Navigation Canal, and the other at the intersection of Bush Canal and Bayou Petite Grand Caillou near the Houma Navigation Channel Canal, which are all located on land. From there the sand would be barged and trucked to the levee construction site as needed.

Seventy-two miles of levee will be constructed as part of the Morganza to the Gulf Project. The proposed work is located in coastal Louisiana approximately 60 miles southwest of New Orleans, and includes portions of Terrebonne and Lafourche Parishes. Louisiana Highway 311 and Bayou du Large form the western study boundary and Bayou Lafourche forms the eastern boundary from Thibodaux southeast toward the Gulf of Mexico. The study area encompasses approximately 1,700 square miles. The purpose of the project is to protect development and the remaining fragile marsh from hurricane storm surge. The area is significantly affected by tides emanating from the Gulf of Mexico. Deterioration of coastal marshes as a result of saltwater intrusion, land subsidence, and the lack of interchanges from the various systems have increased storm surge inundation. The plan would <u>improve</u> existing levees and construct new levees along a 72-mile alignment south of Houma. The hurricane protection varies in elevation from +15.0 ft NGVD to +9.0 ft. NGVD. Also required for flood protection would be the construction of nine 56-foot wide sector gate structures in various waterways, one 125-foot floodgate in the Gulf Intracoastal Waterway (GIWW) near Bayou Lafourche and two 125-foot floodgates adjacent to one another in the GIWW near Houma. Another significant feature of the plan is the 200-ft wide x 1200-ft long multipurpose lock structure in the HNC. At twelve locations along the levee alignment, a series of environmental water control structures consisting of 6-foot by 6-foot concrete box culverts would be constructed through the earthen levees to provide tidal ebb and flow. Discharge pipes for six existing pump stations would also be modified during construction, but no new pump stations would be required. The alignment for the most part builds on natural ridges, roadbeds, or existing levees that have been built for other purposes such as forced drainage or marsh management.

Of the estimated 72 miles of levee proposed in the current alignment, approximately 15 miles would cross part of the estuaries that are currently open to estuarine exchange and 57 miles of levee will build on existing levees located inland away from the coastline and in the terrestrial environment. The 15 miles of marine environment affected consists of shallow coastal marsh communities that are important to mostly juvenile fishes and birds. The mean depth in this area is currently 1 ft. The proposed project includes numerous environmental water control structures in the levees to allow hydrologic exchange through the protection levees. Existing wetlands on the 'inside' would still be tidal wetlands. Also, in many cases additional structures, such as roads, have been added to the proposed project plans to allow tidal exchange through existing barriers. Thus, the COE believes the construction of the levee itself would cause very little new impact on estuarine hydrology and for the most part would follow existing hydrologic barriers. The New Orleans District COE is now planning and developing conceptual designs for a sand base for most, if not all, of the 72 miles of levees.

Sand Characterization Tests Using Hopper Dredges

Because sand characterization tests are typically associated with sand mining projects, NMFS considers these tests as a part of the overall proposed action; thus, these tests are evaluated under this opinion. In association with the proposed projects, MMS plans on conducting various sand characterization studies within the Ship Shoal action area. These tests typically involve only limited hours of hopper dredging at potential offshore borrow sites to determine the grain size and sediment characteristics of the sand at the borrow site. Sand characterization studies will be executed by the use of hopper dredges because of safety concerns and the distance from shore. These studies are usually carried out in deep areas away from hard bottom, which is habitat for various protected species. NMFS believes there is only limited potential for interactions with listed species at these featureless sand mining sites because of: 1) the relatively flat, smooth, featureless sandy bottom characteristics of these sites which lack structure to attract sea turtles, 2) the relative distance from coastal estuarine environments that may serve as developmental and foraging habitat, 3) the relative distance from hardgrounds which could serve as foraging habitat, 4) the known high efficiency of sea turtle deflector dragheads at excluding sea turtles, when operated on flat, sandy bottoms, as documented by previous COE studies, and 5) the short duration of the sand characterization tests (less than ½ day).

Mitigation Measures Proposed by MMS that will be Incorporated into the Proposed Action

The MMS proposes to implement, as part of the agency's proposed action, a number of activities to avoid or minimize harm to protected species that may be affected by the proposed action (MMS BA pp. 40-41) and thus are considered in this opinion as part of the proposed action. These activities include the following: relocation trawling, the use of sea turtle observers, flood lights, artificial lighting, turtle deflector device, turtle reports, and the use of time intervals between dredging. NMFS considers mitigation measures, described below, to be an essential component of the proposed action analyzed in this opinion that must be carried out in addition to the reasonable and prudent measures (RPMs) outlined in the terms and conditions of the Incidental Take Statement (ITS) of this opinion. Because some of the activities involve directed take of sea turtles designed to minimize the impact of the proposed action, these activities are more appropriately characterized as RPMs. Accordingly, these measures are included as non-discretionary terms of the ITS, but their effects, since they do involve take, are analyzed in Section 5.0.

Relocation Trawling
Relocation trawling is a procedure whereby a contracted trawl vessel attempts to capture and relocate sea turtles located in the path of the dredge, and thus minimize the numbers killed or seriously injured by entrainment in the hopper dredge suction dragheads.

Sea Turtle Observers
Sea turtle observers will visually monitor the dredge areas repeatedly prior to the commencement of dredging and during the dredging for the presence of sea turtles. Observers will monitor the hopper spoil,

screening, and hopper dredge draghead for sea turtles and their remains.. Hopper dredges operating in areas of high concern for sea turtles, such as inshore South Atlantic or inshore channel areas throughout the Gulf of Mexico are required as terms and conditions under various opinions issued to the COE to utilize sea turtle observers to monitor all hopper-dredging operations. Hopper dredges operat 24 hours a day; thus, two observers are utilized. Each observer alternates monitoring the operations for 12-hours. Because hopper dredges will be operating in offshore sand areas away from sea turtle foraging, nesting, or high abundance areas, only one observer will be utilized for visually monitoring the hopper dredging operations. With only one observer, only 50 percent of the incoming dredge material can be monitored for protected species remains. NMFS believes the risk to sea turtles by this project is significantly lower in comparison to other projects that have been conducted in or near foraging, nesting, or high abundance areas; hence, 50 percent observer coverage is justified.

Flood Lights

Flood lights will be installed to allow observers to safely observe and monitor the baskets or screens.

Artificial Lighting

When night work is performed, all on-beach lighting associated with the projects will be limited to the immediate area of active construction. Such lighting must consist of shielded, low pressure, sodium vapor lights to minimize illumination of the nesting beach and nearshore waters. Red filters will be placed over vehicle headlights (i.e., bulldozers, front-end loaders). Lighting on offshore equipment will be similarly minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination of the water, while meeting U.S. Coast Guard, and Occupational Health and Safety Administration requirements. Shielded, low pressure, sodium vapor lights are highly recommended for lights on offshore equipment that cannot be eliminated. The beach will be inspected for turtle activity every hour during the night, and construction within the vicinity of a nest halted if any turtle nesting activity is observed in the construction zone. Construction may resume after the nest has been relocated. The MMS understands that because sea turtles nest on land, responsibility for their conservation is shared between the NMFS and the USFWS. According to USFWS personnel, the ESA-Section 7 and 10 consultation process between MMS and the USFWS has not been initiated at this time (B. Firmin, personal communication, November 23, 2004); however, MMS is in the initial phases of drafting a consultation request with the USFWS (W. Waskes, personal communication, November 23, 2004).

Turtle Deflector Device

Should a hopper dredge be used, the dredge will be equipped with a rigid sea turtle deflector attached to the draghead. The dredge will be operated in such a manner in which to reduce interactions with sea turtles (e.g., reduce pump engine RPMs when the draghead is not on the surface of the sediment). Inflow screening baskets (4-inch mesh) will be installed to monitor the intake and overflow of the dredge for sea turtle remains.

Turtle Reports

A final report summarizing the results of the dredging and any takes of listed species will be submitted to NMFS within 30 working days of the completion of each year as well as a summary report to be submitted on completion of each project.

Intervals Between Dredging

Sufficient time must be allotted between each dredging cycle for approved observers to inspect and thoroughly clean the baskets and screens for sea turtle and/or turtle parts and document findings.

Between each dredging cycle, the approved observer will also examine and clean the dragheads and document findings.

Summary

In summary, the MMS anticipates to oversee two projects that will consist of dredging a total of approximately 14-14.5 million cubic yards of sand. The projects will utilize sand from 4 blocks in the Ship Shoal area and the total projected dredging time is approximately 28 months, beginning in 2005 and occurring over several years. Dredging duration is dependent on many factors including funding, contracting, equipment, and weather. Dredging will only occur during the months of April through September (120-180 days) and will not be continuous through out the year. Dredging will be conducted with one hopper dredge in operation at one time, but two may be used simultaneously (for and only for) the Hurricane Protection Project.

3.0 Status of Listed Species and Critical Habitat

Much of the information for this section, as well as additional detailed information relating to the species' biology, habitat requirements, threats, and recovery objectives, can be found in the recovery plan for each species (see "References Cited" section). The following listed species under the jurisdiction of NMFS occur in the Gulf of Mexico:

Table1. Listed Species which occur in the Gulf of Mexico and Action Area.

Endangered	
Green sea turtle[1]	*Chelonia mydas*
Leatherback sea turtle	*Dermochelys coriacea*
Hawksbill sea turtle	*Eretmochelys imbricata*
Kemp's ridley sea turtle	*Lepidochelys kempii*
Sperm whale	*Physeter macrocephalus*
Humpback whale	*Megaptera novaeangliae*
Fin whale	*Balaenoptera physalus*
Blue whale	*Balaenoptera musculus*
Sei whale	*Balaenoptera borealis*
Northern right whale	*Eubalaena glacialis*
Smalltooth sawfish	*Pristis pectinata*

[1]Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. waters.

Threatened	
Loggerhead sea turtle	*Caretta caretta*
Gulf sturgeon	*Acipenser oxyrinchus desotoi*
Critical Habitat	
Within the Gulf of Mexico, critical habitat has only been designated for the Gulf sturgeon.	

Species Not Likely to Be Affected
Leatherback sea turtles (*Dermochelys coriacea*) are generally found in deep, pelagic, offshore waters though these turtles occasionally may come into shallow waters to feed on aggregations of jellyfish. Leatherbacks are unlikely to be found associated with relatively nearshore, shallow borrow areas such as Ship Shoal and thus are unlikely to be impacted by hopper dredging activity or relocation trawling associated with the proposed action. Since relocation trawling commenced in the 1980s, there has only been one reported instance of a take of a leatherback sea turtle in association with a hopper dredging operation, and that take occurred in the trawl net of a turtle relocation trawler sweeping in front of the path of the dredge. The take occurred in a shipping channel approximately 1.5 miles offshore of Aransas Pass, Texas (T. Bargo, pers. comm. to E. Hawk, April 28, 2003) and the turtle was released unharmed. There has never been a reported take of a leatherback by a hopper dredge. Most leatherback turtles are as large or larger than the "large", industry-standard California-type hopper dredge draghead. Therefore, leatherback sea turtles will not be considered further in this opinion based on the improbability of their presence nearshore and their non-benthic feeding habits. These characteristics combine to produce a very low likelihood of hopper dredge entrainment.

Hawksbill sea turtles (*Eretmochelys imbricata*) are the most tropical marine turtles, ranging from approximately 30°N to 30°S. These turtles are closely associated with coral reefs and other hard-bottom habitats, but are also found in other habitats including inlets, bays, and coastal lagoons (NMFS and USFWS 1993). Hawksbill sea turtle life history consists of a pelagic stage that lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm in straight carapace length (Meylan 1988, Meylan and Donnelly 1999), followed by residency in developmental habitats (foraging areas where immatures reside and grow) in coastal waters, which may include inlets, bays, seagrass areas, and coastal lagoons in addition to coral reefs and hardbottom habitats. Adult foraging habitat, which may or may not overlap with developmental habitat, is typically coral reefs, although other hard-bottom communities and occasionally mangrove-fringed bays may be occupied. Hawksbills show fidelity to their foraging areas over periods of time as great as several years (van Dam and Díez 1998). The Hawksbill sea turtle diet is highly specialized and consists primarily of sponges (Meylan 1988), although other food items, notably corallimorphs and zooanthids, have been documented to be important in some areas of the Caribbean (van Dam and Díez 1997, Mayor et al. 1998, León and Díez 2000). Texas is the only continental state where hawksbills are sighted with any regularity and most of these sightings involve post-hatchlings and juveniles believed to originate from nesting beaches in Mexico. One hawksbill was reported from a gillnet catch in Cameron Parish, Louisiana, in the 1986 survey of Louisiana coastal waters by NMFS (Fuller et al. 1987). This information supports the general belief that hawksbill sea turtles are scarce in Louisiana waters. The Louisiana sea turtle stranding network data reported only one hawksbill stranding from 1990 through 1994 and five hawksbill strandings from 1995 through 2000 in Louisiana. NMFS believes that hawksbills are unlikely to be present, although their potential presence at nearby (< 10 miles) potential developmental habitat (e.g., shallow, estuarine waters behind Isles

Dernieres) cannot be ruled out. Similarly, hawksbills may be attracted to sponges growing on support caissons and piles associated with offshore oil and gas platforms at Ship Shoal; however, borrow areas are chosen to avoid these platforms and their associated pipelines. Also, despite over ten years of observer-monitored hopper dredging projects in the Gulf of Mexico off Texas, Louisiana, Mississippi, and Florida, no hawksbills have ever been reported as taken or observed. Therefore, NMFS believes that it is unlikely that hawksbill sea turtles will be present in the action area, or adversely affected by hopper dredging since the likelihood of their entrainment is very low. The chances of the proposed action affecting them are discountable; thus, this species will not be discussed further in this opinion.

The U.S. population of smalltooth sawfish *(Pristis pectinata)* was listed as endangered under the ESA on April 1, 2003 (68 FR 15674). Presently, smalltooth sawfish critical habitat has not been designated. Historically, smalltooth sawfish commonly occurred in the shallow waters of the Gulf of Mexico and along the eastern seaboard as far north as North Carolina. The current distribution is believed to be centered near the extreme southern portion of peninsular Florida (i.e., Everglades National Park including Florida Bay). Recent sawfish records are limited to Georgia (n=1), Florida, and Texas. Notably, the Texas sighting was not verified and may have been either the endangered smalltooth sawfish or the similar largetooth sawfish (*P. perotteti*); records of both are rare throughout the western Gulf of Mexico. There are no known sawfish breeding or juvenile habitats adjacent to, or associated with, the project area. Based upon consultation with an experienced hopper dredge industry observer provider (C. Slay, Coastwise Consulting, pers. comm. August 18, 2003), and a review of the available scientific literature, NMFS has determined that there has never been a reported take of a smalltooth sawfish by a hopper dredge, and such take is unlikely to occur because of smalltooth sawfishes' affinity for shallow, estuarine systems. Therefore, NMFS believes smalltooth sawfish are rare in the action area, the likelihood of their entrainment is very low, and the chances of the proposed action affecting them are discountable. This species will not be discussed further in this opinion.

NMFS and the U.S. Fish and Wildlife Service (USFWS) manage the threatened Gulf sturgeon (*Acipenser oxyrinchus desotoi*) jointly. Gulf sturgeon are anadromous fishes; adults spawn in freshwater then migrate to feed and grow in estuarine/marine habitats. Historically, Gulf sturgeon occurred from the Mississippi River to Tampa Bay. Its present range extends from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida. Sporadic occurrences have been recorded as far west as the Rio Grande between Texas and Mexico, and as far east and south as Florida Bay (Wooley and Crateau 1985, Reynolds 1993). Because the proposed project area is west of the Mississippi River, NMFS believes that the chance of a Gulf sturgeon being affected by the proposed action is discountable. Therefore, NMFS concludes that Gulf sturgeon are not likely to be adversely affected by this project. This species will not be discussed further in this opinion.

Sperm whales (*Physeter macrocephalus*) are found year-round in the Gulf of Mexico but rarely occur within inshore waters. Other endangered whales, including the blue whale (*Balaenoptera musculus*), sei whale (*B. borealis*), fin whale (*B. physalus*), humpback whale (*Megaptera novaeangliae*), and the northern right whale (*Eubalaena glacialis*) have been observed occasionally in the Gulf of Mexico. It is believed individuals observed have likely been inexperienced juveniles straying from the normal range of these stocks, or occasional transients (in April 2004, a right whale mother and calf were spotted several miles off of Panama City Beach, Florida). NMFS believes there are no resident stocks of right or humpback whales in the Gulf of Mexico. Blue, fin, and sei whales are deepwater species found offshore which are unlikely to be found near hopper dredging sites. There has never been a report of a whale taken by a hopper dredge. Therefore, based on the improbability of their presence, feeding habits, and very low likelihood of hopper dredge interaction, the above-mentioned cetaceans will not be discussed further in this pinion. There is no designated critical habitat for any protected species in or near the action area; therefore, effects to critical habitat are not evaluated in this opinion.

Species Likely to Be Affected

Of the above-listed threatened and endangered species of sea turtles, whales, sawfish, and sturgeon potentially present in the action area, NMFS believes only loggerhead, green, and Kemp's ridley sea turtles are vulnerable to being taken as a result of the proposed hopper dredge operations associated with barrier island restoration in Louisiana. Presently, it is believed that hydraulic cutterhead dredges are unlikely to kill or injure sea turtles, because it is believed that the cutterhead encounters a smaller area of seafloor per unit time, allowing more time for turtles to escape (Palmero, 1990). Descriptions follow for each of these species.

A. Species descriptions

<u>Loggerhead Sea Turtle</u>

The loggerhead sea turtle was listed as a threatened species on July 28, 1978. This species inhabits the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian oceans, and within the continental United States it nests from Louisiana to Virginia. The major nesting areas include coastal islands of Georgia, South Carolina, and North Carolina, and the Atlantic and Gulf coasts of Florida, with the bulk of the nesting occurring on the Atlantic coast of Florida. Developmental habitat for small juveniles is the pelagic waters of the North Atlantic and the Mediterranean Sea (NMFS and USFWS 1991b).

Life history

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. There are five western Atlantic subpopulations, divided geographically as follows: (1) a northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29^{o}N; (2) a south Florida nesting subpopulation, occurring from 29^{o}N on the east coast to Sarasota on the west coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990 and TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS SEFSC 2001). The fidelity of nesting females to their nesting beach is the reason these subpopulations can be differentiated from one another. This nest beach fidelity will prevent recolonization of nesting beaches with turtles from other subpopulations.

Mating takes place in late March early June, and eggs are laid throughout the summer, with a mean clutch size of 100-126 eggs in the southeastern United States. Individual females nest multiple times during a nesting season, with a mean of 4.1 nests/individual (Murphy and Hopkins 1984). Nesting migrations for an individual female loggerhead are usually on an interval of 2-3 years, but can vary from 1-7 years (Dodd 1988). Generally, loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years or more. Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length they begin to live in coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico. These benthic immature loggerheads have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern Mexico.

Previous literature estimated age at maturity of 21-35 years (Frazer and Ehrhart 1985; Frazer et al. 1994) with the benthic immature stage lasting at least 10-25 years. However, new data from tag returns, strandings, and nesting surveys (NMFS SEFSC 2001) estimates age of maturity ranging from 20-38 years and benthic immature stage lasting from 14-32 years.

While the list of food items eaten by loggerheads is lengthy and includes invertebrates from eight phyla (Dodd 1988), it is clear that subadult and adult loggerheads are, first and foremost, predators of benthic invertebrates such as gastropod and pelecypod molluscs and decapod crustaceans. Larger turtles also take coelenterates and cephalopod molluscs, but these invertebrates are especially favored by loggerheads in the pelagic stage (NMFS and USFWS 1991b).

Population dynamics and status

A number of stock assessments (TEWG 1998, TEWG 2000, and NMFS SEFSC 2001) have examined the stock status of loggerheads in the waters of the United States, but have been unable to develop any reliable estimates of absolute population size. Based on nesting data, of the five western Atlantic subpopulations, the south Florida nesting subpopulation and the northern nesting subpopulation are the most abundant (TEWG 2000 and NMFS SEFSC 2001). The Turtle Expert Working Group's (TEWG) (2000) assessment of the status of these two better-studied populations concluded that the south Florida subpopulation is increasing, while no trend is evident (maybe stable but possibly declining) for the northern subpopulation. However, more recent analysis, including nesting data through 2003, indicate that there is no discernable trend in the south Florida nesting subpopulation (Witherington pers. comm.). Another consideration adding to the importance and vulnerability of the northern subpopulation is that NMFS' scientists estimate that the northern subpopulation produces 65 percent males (NMFS SEFSC 2001).

The latest and most extensive stock assessment (NMFS SEFSC 2001) was successful in assembling the best available information on loggerhead turtle life history and developing population models that can be used to predict the response of the loggerhead populations to changes in their mortality and survival. The new turtle excluder device rule (68 FR 8456, February 21, 2003) requiring larger openings is expected to reduce trawl related loggerhead mortality by 94 percent (Epperly et al. 2002). Based on the loggerhead population models derived by NMFS SEFSC (2001), this change in the mortality rate is expected to move the northern nesting population from stable to increasing.

The southeastern U.S. nesting aggregation is second in size only to the nesting aggregation on islands in the Arabian Sea off Oman (Ross 1979, Ehrhart 1989, NMFS and USFWS 1991b). The southeastern U.S. nesting aggregation is especially important because the status of the Oman colony has not been evaluated recently. The Oman colony is located in an area of the world where it is highly vulnerable to disruptive events such as political upheavals, wars, catastrophic oil spills, and lack of strong protections (Meylan et al. 1995).

Ongoing threats to the western Atlantic populations include incidental takes from dredging; commercial trawling, longline fisheries, and gillnet fisheries; loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and disease.

In the Pacific Ocean, loggerhead sea turtles are represented by a northwestern Pacific nesting aggregation (located in Japan) a smaller southwestern nesting aggregation that occurs in eastern Australia (Great Barrier Reef and Queensland) and New Caledonia (NMFS SEFSC, 2001). There are no reported loggerhead nesting sites in the eastern or central Pacific Ocean basin.

In general, during the last 50 years, loggerhead nesting populations in Japan have declined 50-90%. (N. Kamezaki, Sea Turtle Association of Japan, pers. comm., August, 2001). Recent genetic analyses on female loggerheads nesting in Japan suggest that this "subpopulation" is comprised of genetically distinct nesting colonies (Hatase et al., 2002) with precise natal homing of individual females. As a result, Hatase, et al. (2002) indicate that loss of one of these colonies would decrease the genetic diversity of Japanese loggerheads; recolonization of the site would not be expected on an ecological time scale.

In Australia, long-term census data has been collected at some rookeries since the late 1960s and early 1970s, and nearly all the data show marked declines in nesting populations since the mid-1980s (Limpus and Limpus 2003).

Green Sea Turtle

Federal listing of the green sea turtle occurred on July 28, 1978, with all populations listed as threatened except for the Florida and Pacific coast of Mexico breeding populations, which are endangered. The complete nesting range of the green turtle within the NMFS' Southeast Region includes sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands between Texas and North Carolina and the U.S. Virgin Islands (U.S.V.I.) and Puerto Rico (NMFS and USFWS 1991a). Principal U.S. nesting areas for green turtles are in eastern Florida, predominantly Brevard through Broward counties (Ehrhart and Witherington 1992). Green turtle nesting also occurs regularly on St. Croix, U.S.V.I., and on Vieques, Culebra, Mona, and the main island of Puerto Rico (Mackay and Rebholz 1996).

Life history

Green sea turtle mating occurs in the waters off the nesting beaches. Each female deposits 1-7 clutches (usually 2-3) during the breeding season at 12-14 day intervals. Mean clutch size is highly variable among populations, but averages 110-115 eggs/nest. Females usually have 2-4 or more years between breeding seasons, while males may mate every year (Balazs 1983). After hatching, green sea turtles go through a post-hatchling pelagic stage where they are associated with drift lines of algae and other debris.

Green turtle foraging areas in the southeastern United States include any coastal shallow waters having macroalgae or sea grasses near mainland coastlines, islands, reefs, or shelves, and any open-ocean surface waters, especially where advection from wind and currents concentrates pelagic organisms (Hirth 1997, NMFS and USFWS 1991a). Principal benthic foraging areas in the southeastern United States include Aransas Bay, Matagorda Bay, Laguna Madre, and the Gulf inlets of Texas (Doughty 1984, Hildebrand 1982, Shaver 1994), the Gulf of Mexico off Florida from Yankeetown to Tarpon Springs (Caldwell and Carr 1957, Carr 1984), Florida Bay and the Florida Keys (Schroeder and Foley 1995), the Indian River Lagoon System, Florida (Ehrhart 1983), and the Atlantic Ocean off Florida from Brevard through Broward counties (Wershoven and Wershoven 1992, Guseman and Ehrhart 1992). Adults of both sexes are presumed to migrate between nesting and foraging habitats along corridors adjacent to coastlines and reefs. Age at sexual maturity is estimated to be between 20-50 years (Balazs 1982, Frazer and Ehrhart 1985).

Green sea turtles are primarily herbivorous, feeding on algae and sea grasses, but also occasionally consume jellyfish and sponges. The post-hatchling, pelagic-stage individuals are assumed to be omnivorous, but few data are available.

Population dynamics and status

The vast majority of green turtle nesting within the southeastern United States occurs in Florida (Meylan et al. 1995, Johnson and Ehrhart 1994). Marine turtle populations have been monitored on Florida nesting beaches for nearly four decades. Currently, the Florida Wildlife Commission (FWC) coordinates the collection of nesting survey data on 180 survey areas comprising 1,300 km of nesting beach. Thirty-three of these beaches, chosen to represent the state geographically, participate in FWC's Index Nesting Beach Survey Program by following a standardized methodology for data collection that allows for statistically valid trend evaluation. It is unclear how greatly green turtle nesting in the whole of Florida has been reduced from historical levels (Dodd 1981). However, based on 1989-2002 nesting information, green turtle nesting in Florida has been increasing (Florida Marine Research Institute Statewide Nesting 2002, Database). Total nest counts and trends at index[2] beach sites during the past decade suggest that green turtles that nest within the southeastern United States are increasing.

There are no reliable estimates of the number of immature green turtles that come to forage in coastal areas of the southeastern United States. However, information on incidental captures of immature green turtles at the St. Lucie Power Plant (average 215 green turtle captures per year since 1977) in St. Lucie County, Florida (on the Atlantic coast), indicates that the annual number of immature green turtles captured has increased significantly in the past 26 years (FPL 2002). It is not known whether or not this increase is indicative of local or Florida east coast populations.

It is likely that immature green turtles foraging in the southeastern United States come from multiple genetic stocks; therefore, the status of immature green turtles in the southeastern United States might also be assessed from trends at all of the main regional nesting beaches, principally Florida, Yucatán, and Tortuguero. Trends at Florida beaches are presented above. Trends in nesting at Yucatán beaches cannot be assessed because of a lack of consistent beach surveys over time. Trends at Tortuguero, Costa Rica (ca. 20,000-50,000 nests/year), show a significant increase in nesting during the period 1971-1996 (Bjorndal et al. 1999). Therefore, it seems reasonable that there is an increase in immature green turtles inhabiting coastal areas of the southeastern U.S.; however, the magnitude of this increase is unknown.

The primary cause of past declines and extirpations of green turtle assemblages has been the over exploitation of green turtles for food and other products. Although intentional take of green turtles and their eggs is not extensive within the southeastern U.S., green turtles that nest and forage in the region may spend large portions of their life history outside the region and outside U.S. jurisdiction, where exploitation is still a threat. There are still significant and ongoing threats to green turtles from human-related causes in the U.S. These threats include beach armoring, erosion control, artificial lighting, beach disturbance (e.g., driving on the beach), pollution, foraging habitat loss as a result of direct destruction by dredging, siltation, boat damage, other human activities, and fishing gear. There is also the increasing threat from occurrences of green turtle fibropapillomatosis disease. Presently, this disease is

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[2]Indexed beaches are those where survey effort to monitor annual nesting has been standardized and is constant from year- to -year and therefore nesting trends may be determined with statistical confidence; at non-indexed beaches, survey effort may, and often does, vary from year- to- year.

cosmopolitan and has been found to affect large numbers of animals in some areas, including Hawaii and Florida (Herbst 1994, Jacobson 1990, Jacobson et al. 1991).

Kemp's Ridley Sea Turtle

The Kemp's ridley was listed as endangered on December 2, 1970. Internationally, the Kemp's ridley is considered the most endangered sea turtle (Zwinenberg 1977, Groombridge 1982, TEWG 2000). Kemp's ridleys nest primarily at Rancho Nuevo, a stretch of beach in Mexico, Tamaulipas State. The species occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean. Occasional individuals reach European waters (Brongersma 1972). Adults of this species are usually confined to the Gulf of Mexico, although adult-sized individuals sometimes are found on the east coast of the United States.

Life history

Females return to their nesting beach approximately every two years (TEWG 1998). Nesting occurs from April into July and is essentially limited to the beaches of the western Gulf of Mexico, near Rancho Nuevo in southern Tamaulipas, Mexico. The mean clutch size for Kemp's ridleys is 100 eggs/nest, with an average of 2.5 nests/female/season.

Benthic immature Kemp's ridleys have been found along the east coast of the United States and in the Gulf of Mexico. In the Atlantic, benthic immature turtles travel northward as the water warms to feed in productive, coastal waters (Georgia through New England), migrating southward with the onset of winter (Lutcavage and Musick 1985, Henwood and Ogren 1987, Ogren 1989). In the Gulf, studies suggest that benthic immature Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud 1995). Little is known of the movements of the post-hatching stage (pelagic stage) within the Gulf. Studies have shown the post-hatchling pelagic stage varies from 1-4 or more years, and the benthic immature stage lasts 7-9 years (Schmid and Witzell 1997). The TEWG (1998) estimates age at maturity from 7-15 years.

Kemp's ridleys stomach contents sampled from the lower Texas coast consisted of mainly nearshore crabs and mollusks, as well as fish, shrimp, and other foods considered to be shrimp fishery discards (Shaver 1991). Pelagic stage Kemp's ridleys presumably feed on the available sargassum and associated infauna or other epipelagic species found in the Gulf of Mexico.

Population dynamics and status

Of the seven extant species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the adult female populations nest on the Rancho Nuevo beaches (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the mid-1980s nesting numbers were below 1,000 (with a low of 702 nests in 1985). However, recent observations of increased nesting (with 6,277 nests recorded in 2000) suggest that the decline in the Kemp's ridley population has decreased and the population may be increasing (USFWS 2000).

A period of steady increase in benthic immature Kemp's ridleys has been occurring since 1990 and appears to be due to increased hatchling production and an apparent increase in survival rates of immature turtles beginning in 1990. NMFS believes the increased survivorship of immature turtles may be due in part to the introduction of turtle excluder devices (TEDs) in the United States and Mexican shrimping fleets. As demonstrated by nesting increases at the main nesting sites in Mexico, adult Kemp's ridley numbers have grown. The population model used by TEWG (2000) projected that Kemp's ridleys could reach the intermediate recovery goal identified in the Recovery Plan of 10,000 nesters by the year 2015.

The largest contributor to the decline of the Kemp's ridley was commercial and local exploitation, especially poaching of nests at the Rancho Nuevo site, as well as incidental capture by shrimp trawl fisheries. However, the advent of TED regulations for trawlers and protections for the nesting beaches has allowed the species to begin to rebound. Many threats to the future of the species remain, including interactions with fishery gear, marine pollution, foraging habitat destruction, illegal poaching of nests, and potential threats to the nesting beaches from such sources as global climate change, development, and tourism pressures.

4.0 Environmental Baseline

This section is an analysis of the effects of past and present ongoing human and natural factors leading to the current status of the species and their habitat within the action area. The environmental baseline is a "snapshot" of a species' health at a specified point in time and includes state, tribal, local, and private actions already affecting the species or that will occur contemporaneously with the consultation in progress. Unrelated federal actions affecting the same species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are federal and other actions within the action area that may benefit listed species or critical habitat.

Status of the Species Within the Action Area

The environmental baseline for this opinion includes the effects of several activities that influence the survival and recovery of threatened and endangered species in the action area. As noted above, sea turtles found in the action area may migrate widely throughout the Atlantic, Gulf of Mexico, and Caribbean Sea. Therefore, individuals found in the action area can potentially be affected by activities anywhere else within this wide range. The most thorough account of permitted and non-permitted activities, including research activities that are not harmful to the turtles, in the entire U.S. Atlantic, Gulf of Mexico, and Caribbean can be found in Appendix 2 of the NOAA Technical Memorandum NMFS-SEFSC-455, Stock Assessments of Loggerhead and Leatherback Sea Turtles and an Assessment of the Impact of the Pelagic Longline Fishery on the Loggerhead and Leatherback Sea Turtles of the Western North Atlantic (NMFS SEFSC 2001). The information in that appendix is the best representation of activities occurring throughout the North Atlantic Ocean, Gulf of Mexico, and Caribbean which can be expected to impact sea turtle populations, and includes activities on which we have consulted as well as other actions. The most significant activities affecting sea turtles in the Atlantic are fisheries and conservation activities directed at fisheries. Other environmental impacts to turtles may arise from vessel operations, discharges, dredging, military activities, oil and gas development activities, industrial cooling water intake, aquaculture, recreational fishing, coastal development, directed take, and marine debris.

Satellite telemetry work funded by the COE and conducted by NMFS' Galveston Laboratory, demonstrates the nearshore occurrence of Kemp's ridleys near northern Gulf channels. Results from this study show that Kemp's ridleys remained within 10 nmi of shore for greater than 95 percent of the observed time, with 90 percent of the observed locations within 5 nmi (M. Renaud, NMFS' Galveston Laboratory, pers. comm.). Kemp's ridleys movements in and out of northern Gulf waters correlated with water temperatures.

Sea turtle seasonal abundance utilizing nearshore waters of the northwest Gulf of Mexico varies with species and location. Green turtles within subtropical habitats of the Laguna Madre are the region's only year-round inshore turtle occupant. Other species, especially the Kemp's ridley, are transient users of the coastal zone that venture toward tidal passes and into bays during May-August when food sources and other environmental factors are favorable. The May-August period has yielded over 80 percent of the sea turtles captures (n=516) recorded by Texas A&M researchers (Landry et al. 1997) in northwestern Gulf of Mexico passes. Based on strandings, reported incidental captures, observer data (Gulf and South Atlantic Foundation, and NMFS), aerial surveys (SETS, Pascagoula Oil Platform Association data, Gulf of Mexico red drum surveys of 1987, 1995, and 1999, CETAP, SEAS92 and SECAS95, MATS95, GulfCet I, GulfCet II, and GoMex surveys), and telemetry tracks, data shows that loggerheads are distributed ubiquitously in the Gulf area, generally occurring in all areas, inshore and offshore (NMFS' unpublished data, December 2002: Environmental Assessment/Regulatory Impact Review of Technical Changes to the Turtle Excluder Device (TED) Regulations to Enhance Turtle Protection in the Southeastern United States).

Presence of loggerhead turtles in the action area

During Gulf of Mexico aerial surveys, the majority (97 percent) of loggerheads were seen off the east and west coasts of Florida (Fritts 1983). Most were observed around midday near the surface, possibly related to surface basking behavior (Nelson 1986). Although loggerheads were seen off the coast of Louisiana and Texas, these turtles were 50 times more abundant in Florida than in the western Gulf. The majority of the sightings were in the summer (Fritts et al. 1983). There is indication that some loggerheads in this area may migrate west along shallow coastal waters, as indicated by telemetry data from an individual tagged in the Mississippi Delta moving to Corpus Christi (Solt 1981).

Loggerhead turtle strandings have been reported in Louisiana from Cameron (Fuller 1986) as well as Holly Beach in August and Isles Dernieres in July (SEAN 1980). A tagged loggerhead was recaptured near Grand Isle at Belle Pass (Lund 1974). More recently, Louisiana Sea Turtle Stranding and Salvage Network (LA-STSSN) personnel registered 45 loggerheads stranded on Louisiana beaches from 1990 through 1994. This represented 12 percent of the total number of sea turtles stranded, second only to the Kemp=s ridley. Results obtained from the period 1995 to 2000 showed that a greater number of loggerheads were stranded (145) and made up a greater percentage of the overall sea turtle strandings (21 percent).

Studies exploring loggerhead strandings on the lower Texas coast (south of Matagorda Island) have indicated that stranded individuals were feeding in nearshore waters shortly before their death (Plotkin et al. 1993). Recent capture and telemetry studies of sea turtle movements along the northern Gulf of Mexico showed usage of the nearshore areas near jetties and channels. Kemp=s ridleys were captured most frequently, with loggerheads captured with the second highest frequency in Texas and Louisiana waters.

Loggerhead eggs were collected from Grand Isle, Louisiana, 50 years ago (Hildebrand 1981). Ogren (1977) reported a historical reproductive assemblage of sea turtles that nested seasonally on remote barrier island beaches of eastern Louisiana, Mississippi, and Alabama. This included Bird, Breton, and Chandeleur islands in Louisiana. Since then, the only loggerhead turtle nesting sites observed in Louisiana were on the Chandeleur Islands. Because of storm processes, the Chandeleur Islands no longer contain high beach and dune surfaces. Beach structure is suitable for nesting, however, surveys by USFWS and the southeast Louisiana Refuge personnel have found no loggerhead nests in the area to date.

It is believed that loss or degradation of suitable nesting habitat may be the most important factor affecting the nesting population in Louisiana (Ogren 1977). Overall loss of nesting beaches, hatchling disorientation from artificial light, drowning in fishing and shrimping trawls, marine pollution, and ingestion of plastics and Styrofoam have led to the decline of loggerheads.

Presence of green turtles in the action area

Sightings of green turtles by fishermen in Louisiana have occurred Gulf-ward of Isles Dernieres and Timbalier Islands in spring, summer, and fall. Sightings have been reported from the northwest areas of Terrebonne Bay in summer and off Belle Pass in fall (Fuller 1986). A green turtle also has been reported from the Chandeleur Islands (Viosca 1961). A green turtle was found in June on Grand Terre near Fort Livingston (SEAN 1980). No green turtles were observed during an aerial survey in Louisiana or Texas in 1979, possibly due to low abundance and identification problems. Green turtle stranding records, and turtle fishing records from Louisiana and Texas combined, are one-third that reported from Florida (Fritts et al. 1983). The LA-STSSN registered ten green turtles stranded on Louisiana beaches from 1990 through 1994. This represented 2.7 percent of the sea turtles stranded. Between 1995 and 2000, seven green sea turtles were registered as stranded, representing less than one percent of the total turtle strandings in Louisiana.

Presence of Kemp's ridley turtles in the action area

Inshore areas of the Gulf of Mexico appear to be important habitats for the Kemp=s ridley. Members of this genus are characteristically found in waters of low salinity, high turbidity, high organic content, and where shrimp are usually abundant (Zwinenberg 1977, Hughes 1972). Adults tagged at Rancho Nuevo were recaptured off coastal Louisiana and in Vermilion Bay, and animals have been reported from Vermilion Parish to Terrebonne Parish (Pritchard and Márquez 1973; Chavez 1969; Keiser 1976; Zwinenberg 1977; Dobie et al. 1961). Ridleys are commonly captured by shrimpers off the Texas coast and in heavily trawled areas of the Louisiana and Alabama coast (Pritchard and Márquez 1973; Carr 1980). The Kemp=s ridley has been labeled the "Louisiana turtle" by Hildebrand (1981) and is thought to be the most abundant turtle off the Louisiana coast (Viosca 1961; Gunter 1981). The LA-STSSN registered 373 sea turtles stranded on Louisiana beaches from 1990 through 1994: of these, 268 were Kemp's ridleys, and 41 were unidentified (Koike 1995). The highly productive white shrimp and portunid crab beds of Louisiana, from Marsh Island to the Mississippi Delta, are thought to be the major feeding grounds for sub-adult and adult ridleys (Hildebrand 1981). It is believed that the current patterns in the Gulf of Mexico may aid in the transport of individuals, where small turtles would enter the clockwise loop current of the western Gulf of Mexico, carrying individuals north and east along Texas, Louisiana, and other northern Gulf areas (Pritchard and Márquez 1973; Hildebrand 1981). Findings of ongoing research conducted by NMFS scientists support the likelihood that the nearshore waters of Texas and Louisiana provide important developmental habitat for young loggerheads and Kemp=s ridley sea turtles. Ogren (1988) suggests that the Gulf Coast from Port Aransas, Texas, through Cedar Key, Florida, represents the primary habitat for subadult ridleys in the northern Gulf of Mexico. NMFS' Galveston Lab staff has tracked one hundred and thirty turtles since 1980, including 91 ridleys tracked since September 1988. Analysis of the tracking suggests that subadult Kemp=s ridleys occupy warm, shallow, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida Coast. Juvenile ridleys are usually found in waters of 30 feet or less, and all ridleys are generally found in water depths less than 60 feet.

Overall sea turtle presence in the action area

From 1990 through 1994, the LA-STSSN has documented 373 sea turtles stranded along Louisiana beaches (Koike 1995). From 1995 through 2001, the LA-STSSN has documented 742 strandings along Louisiana beaches. According to Koike (1995), approximately 60 percent were Kemp's ridley, followed by loggerhead, unknowns, green, and Hawksbill (Figure 5).

The utilization of the project area by sea turtles has been previously researched. As part of the platform removal process, under ESA section 7 consultation, MMS was required to observe and document sea turtles
within Ship Shoal and South Pelto Blocks from 1988 through 2002. During the months of June through February, MMS observers recorded a total of 112 turtles. Of these sighted turtles, 48 percent were loggerhead and 36 percent were unable to be identified**.** Kemp's ridleys represented 9 percent followed by leatherback and green sea turtles representing the remainder. Although sightings and stranding evidence indicates sea turtles within the action area, and strandings evidence is not uniform, the majority of strandings did occur along the western end of Louisiana and the Texas state line, outside the action area.

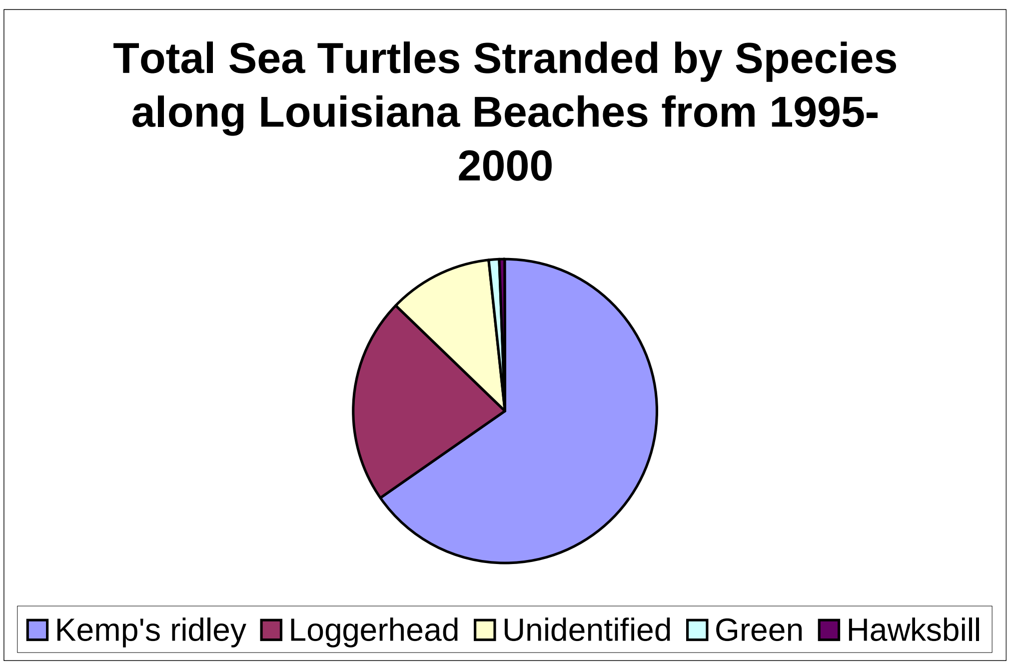


Figure 5. Total sea turtles stranded along Louisiana beaches

4.1 Federal Actions

In recent years, NMFS has undertaken several ESA section 7 consultations to evaluate the effects of federally-permitted fisheries and other federal actions on threatened and endangered species. Each of those consultations sought to develop ways of reducing the probability of adverse effects of the action on sea turtles and/or cetaceans. Similarly, recovery actions NMFS has undertaken under the ESA and the MMPA are addressing the problem of sea turtle and cetacean incidental takes in the fishing and shipping industries and other activities such as COE-dredging operations. The summary below of anticipated sources of incidental take of sea turtles from federal action includes only those which have undergone formal section 7 consultation.

Fisheries
Adverse effects on threatened and endangered species from several types of fishing gear occur in the action area. Efforts to reduce the adverse effects of commercial fisheries are addressed through the ESA section 7 process. NMFS has consulted on potential sea turtle takes by fishermen on several federally-permitted public piers in Florida. Also, gillnet, longline, trawl gear, and pot fisheries have all been documented as interacting with sea turtles. For all of these fisheries for which there is a federal fishery management plan (FMP) or for which any federal action is taken to manage that fishery, impacts have been evaluated under ESA section 7. Formal consultations have been conducted on the following fisheries which NMFS has determined are likely to adversely affect threatened and endangered species: American lobster, calico scallop trawl, monkfish, dogfish, Southeast shrimp trawl, Northeast multispecies, dolphin/wahoo, sargassum, Atlantic pelagic swordfish and tuna, shark, and summer flounder/scup/black sea bass fisheries.

The *Atlantic Bluefish fishery* may pose a risk to protected marine mammals, but is most likely to interact with sea turtles (primarily Kemp's ridley and loggerheads) given the time and locations where the fishery occurs. Gillnets are the primary gear used to commercially land bluefish. Turtles can become entangled in the gillnet buoy lines or in the net panels.

Section 7 consultation was completed on the *Atlantic Herring* FMP on September 17, 1999, and concluded that the federal herring fishery may adversely affect loggerhead, leatherback, Kemp's ridley, and green sea turtles as a result of capture in gear used in the fishery. NMFS currently authorizes the use of trawl, purse seine, and gillnet gear in the commercial herring fishery (64 FR 4030). There is no direct evidence of takes of ESA-listed species in the herring fishery from the NMFS sea sampling program. However, observer coverage of this fishery has been minimal. Sea turtles have been captured in comparable gear used in other fisheries that occur in the same area as the herring fishery. Because much of the herring fishery occurs in state waters, the fishery is managed in these waters under the guidance of the Atlantic States Marine Fisheries Commission (ASMFC). The ASMFC plan, implemented through regulations promulgated by member states, is expected to benefit sea turtles by reducing effort in the herring fishery.

The *Atlantic Mackerel/Squid/Atlantic Butterfish fishery* is known to take sea turtles. Several types of gillnet gear may be used in the mackerel/squid/butterfish fishery. Other gear types that may be used in this fishery include midwater and bottom trawl gear, pelagic longline/hook-and-line/handline, pot/trap, dredge, poundnet, and bandit gear. Entanglements or entrapments of sea turtles have been recorded in one or more of these gear types.

NMFS previously believed that the *Atlantic Sea Scallop fishery* was unlikely to take sea turtles given differences in depth and temperature preferences for sea turtles and the optimal areas where the fishery occurs. After the reopening of a closed area in the mid-Atlantic, and the accumulation of more extensive observer effort, NMFS initiated formal section 7 consultation to reevaluate the potential affects by this fishery on threatened and endangered species. Based on the information for the opinion, NMFS concluded that operation of the fishery may adversely affect loggerhead, Kemp's ridley, green, and leatherback sea turtles as a result of capture in scallop dredge and/or trawl gear. Consultation was reinitiated in 2003 following receipt of additional information on the capture of sea turtles in scallop dredge gear and a new ITS was provided for sea turtles. NMFS is currently drafting an opinion evaluating the affects of this fishery on protected species.

The *Dolphin/Wahoo fishery* FMP was approved in December 2003. NMFS conducted a formal section 7 consultation to consider the effects of implementation on sea turtles. The biological opinion concluded that loggerhead, leatherback, hawksbill, green, and Kemp's ridley sea turtles may be adversely affected by operation of the fishery. However, the proposed action was not expected to jeopardize the continued existence of any of these species; thus, an ITS was developed.

The federal *Monkfish fishery* occurs in all waters under federal jurisdiction from Maine to the North Carolina/South Carolina border. The current commercial fishery operates primarily in the deeper waters of the Gulf of Maine, Georges Bank, southern New England, and in the Mid-Atlantic. The monkfish fishery uses several gear types that may entangle sea turtles, including gillnet and trawl gear. NMFS reinitiated consultation on the Monkfish FMP on May 4, 2000, in part, to reevaluate the effects of the monkfish gillnet fishery on sea turtles. Based on the opinion, a new ITS was provided for the take of sea turtles in the fishery as a result of capture in monkfish gillnet and trawl gear. Consultation was subsequently reinitiated in 2002 and 2003 to consider, first, the one year delay in reducing Days-at-Sea (DAS) to zero (which would have effectively eliminated directed monkfish fishing effort) and then elimination of the DAS reduction altogether. A new ITS was provided for sea turtles in each case. Reducing DAS to zero would have likely been of benefit to sea turtles by eliminating directed gillnet and trawl effort in the fishery. In March 2002, NMFS published new restrictions for the use of gillnets with larger than 8 inch (20.3 cm) stretched mesh, in federal waters (3-200 nautical miles) off of North Carolina and Virginia. These restrictions were published in an Interim Final Rule under the authority of the Endangered Species Act (67 FR 13098) and were implemented to reduce the impact of the monkfish and other large-mesh gillnet fisheries on endangered and threatened species of sea turtles in areas where they are known to concentrate. Following review of public comments submitted on the Interim Final Rule, NMFS published a Final Rule on December 3, 2002, that establishes the restrictions on an annual basis. These measures are in addition to Harbor Porpoise Take Reduction Plan measures in place that prohibit the use of large-mesh gillnets in southern Mid-Atlantic waters (territorial and federal waters from Delaware through North Carolina out to 72E 30'W longitude) from February 15-March 15, annually. Operation of the gillnet sector of the monkfish fishery is further modified by management measures implemented under the Atlantic Large Whale Take Reduction Plan (ALWTRP).

Multiple gear types are used in the *Northeast Multispecies fishery*. However, the gear type of greatest concern to turtles is sink gillnet gear that can entangle sea turtles (*i.e.*, in buoy lines and/or net panels). The northeast multispecies sink gillnet fishery has historically occurred from the periphery of the Gulf of Maine to Rhode Island in water as deep as 60 fathoms. In recent years, more of the effort in the fishery has occurred in offshore waters and into the Mid-Atlantic. Participation in this fishery has declined because extensive groundfish conservation measures have been implemented; the latest of these occurring under Amendment 13 to the Multispecies FMP. As a result of Amendment 13 measures, fishing effort is expected to be reduced.

The *Red crab fishery* is a pot/trap fishery that occurs in deep waters along the continental slope. There have been no recorded takes of ESA-listed species in the red crab fishery. However, given the type of gear used in the fishery, takes of loggerhead and leatherback sea turtles may be possible where gear overlaps with the distribution of ESA-listed species. Thus, an ITS has been provided.

Traditionally, the main gear types used in the *Skate fishery* include mobile otter trawls, gillnet gear, hook and line, and scallop dredges, although bottom trawling is by far the most common gear type, accounting for 94.5 percent of skate landings. Gillnet gear is the next most common gear type, accounting for 3.5 percent of skate landings. The Northeast skate complex is comprised of seven different skate species. The seven species of skate are distributed along the coast of the northeast U.S. from the tide line to depths exceeding 700m (383 fathoms). There have been no recorded takes of ESA-listed species in the skate fishery. However, given that sea turtles interactions with trawl and gillnet gear have been observed in other fisheries, sea turtle takes in gear used in the skate fishery may be possible where the gear and sea turtle distribution overlap. Section 7 consultation on the new Skate FMP was completed July 24, 2003, and concluded that implementation of the Skate FMP may adversely affect ESA-listed sea turtles as a result of interactions with (capture in) gillnet and trawl gear. Thus, an ITS was provided.

The primary gear types for the *Spiny dogfish fishery* are sink gillnets, otter trawls, bottom longline, and driftnet gear. Spiny dogfish are landed in every state from Maine to North Carolina, throughout a broad area with the distribution of landings varying by area and season. During the fall and winter months, spiny dogfish are captured principally in Mid-Atlantic waters from New Jersey to North Carolina. During the spring and summer months, spiny dogfish are landed mainly in northern waters from NY to ME. Sea turtles can be incidentally captured in all gear sectors of this fishery. NMFS reinitiated consultation on the Spiny Dogfish FMP on May 4, 2000, to reevaluate, in part, the effects of the spiny dogfish gillnet fishery on sea turtles. A new ITS has been provided for the take of sea turtles in the fishery.

The FMP for spiny dogfish called for a 30 percent reduction in quota allocation levels for 2000 and a 90 percent reduction in 2001. Although there have been delays in implementing the plan, quota allocations are expected to be substantially reduced over the 4½ year rebuilding schedule which should result in a substantial decrease in effort directed at spiny dogfish. The reduction in effort should be of benefit to protected species by reducing the number of gear interactions that occur.

The *Southeast shrimp trawl fishery* affects more sea turtles than all other activities combined (NRC 1990). On December 2, 2002, NMFS completed the opinion for shrimp trawling in the southeastern United States under proposed revisions to the TED regulations (68 FR 8456, February 21, 2003). This opinion determined that the shrimp trawl fishery under the revised TED regulations would not jeopardize the continued existence of any sea turtle species. This determination was based, in part, on the opinion's analysis that shows the revised TED regulations are expected to reduce shrimp trawl related mortality by 94 percent for loggerheads and 97 percent for leatherbacks.

The *Summer Flounder, Scup and Black Sea Bass fisheries* are known to interact with sea turtles.
Summer flounder, scup and black sea bass are managed under one FMP since these species occupy similar habitat and are often caught at the same time. They are present in offshore waters throughout the winter and migrate and occupy inshore waters throughout the summer. The primary gear types used in the summer flounder, scup and black sea bass fisheries are mobile trawl gear, pots and traps, gillnets, pound nets, and handlines. Significant measures have been developed to reduce the take of sea turtles in

summer flounder trawls and trawls that meet the definition of a summer flounder trawl (which would include fisheries for other species like scup and black sea bass) by requiring the use TEDs throughout the year for trawl nets fished from the North Carolina/South Carolina border to Oregon Inlet, North Carolina and seasonally (March 16-January 14) for trawl vessels fishing between Oregon Inlet, North Carolina and Cape Charles, Virginia. Developmental work is also ongoing for a TED that will work in the flynets used in the summer flounder fisheries. Gillnet, pot gear and staked trap sectors may also entangle whales and sea turtles. As a result of new information not considered in previous consultations, NMFS has reinitiated section 7 consultation on this FMP to consider the effects of the fisheries on sea turtles.

The North Carolina inshore fall *southern flounder gillnet fishery* was identified as a source of large numbers of sea turtle mortalities in 1999 and 2000, especially loggerhead sea turtles. In 2001, NMFS issued an ESA section 10 permit to North Carolina with mitigation measures for the southern flounder fishery. Subsequently, the sea turtle mortalities in these fisheries were drastically reduced. The reduction of sea turtle mortalities in these fisheries reduces the negative effects these fisheries have on the environmental baseline.

The management unit for the *Tilefish* FMP is all golden tilefish under U.S. jurisdiction in the Atlantic Ocean north of the Virginia/North Carolina border. Tilefish have some unique habitat characteristics, and are found in a warm water band (8-18º C) approximately 250 to 1200 feet deep on the outer continental shelf and upper slope of the U.S. Atlantic coast. Because of their restricted habitat and low biomass, the tilefish fishery in recent years has occurred in a relatively small area in the Mid-Atlantic Bight, south of New England and west of New Jersey. Section 7 consultation was completed on this newly regulated fishery in March 2001. An ITS is provided for loggerhead and leatherback sea turtles.

On June 14, 2001, NMFS issued a jeopardy opinion for the Highly Migratory Species (HMS) fisheries off the eastern United States. The HMS opinion found continued prosecution of the pelagic longline fishery in the manner described in the HMS FMP was likely to jeopardize the existence of loggerhead and leatherback sea turtles. This jeopardy determination was made by analyzing the effects of the fishery on sea turtles in conjunction with the environmental baseline and cumulative effects (for loggerheads this determination was based on the effects on the northern nesting population). The environmental baseline section of the HMS opinion is incorporated herein by reference and can be found at the following NMFS Web site:

http://www.nmfs.noaa.gov/prot_res/readingrm/ESAsec7/HMS060801final.pdf

In response to the 2001 jeopardy opinion, NMFS implemented a reasonable and prudent alternative (RPA) in the HMS fishery, which would allow the continuation of the pelagic longline fishery without jeopardizing the continued existence of loggerhead and leatherback sea turtles. The provisions of this RPA included the closure of the Grand Banks region off the northeastern United States and gear restrictions that were predicted to reduce the bycatch of loggerheads by as much as 76 percent and of leatherbacks by as much as 65 percent compared to previously existing conditions. NMFS also implemented a major research project to develop measures aimed at further reducing longline bycatch. The implementation of this RPA reduced the negative effects that the HMS fishery has on the environmental baseline.

Due to exceedance of the ITS in the 2001 opinion, in late 2003 NMFS Office of Sustainable Fisheries' requested reinitiation of section 7 consultation for the Atlantic pelagic longline fishery. On June 1, 2004, NMFS issued a jeopardy opinion for the HMS Atlantic pelagic longline fishery. The HMS opinion found continued prosecution of the pelagic longline fishery in the manner described in the HMS FMP was likely to jeopardize the existence of leatherback sea turtles. The opinion identified RPAs to minimize the impacts to leatherback sea turtles. NMFS' HMS Division has developed management alternatives to address and meet the RPAs and terms and conditions issued under the June 1, 2004 opinion in a final rule promulgated on July 6, 2004 (69 FR 40734). In summary, these regulations prohibit the use of J style fishing hooks for the entire fishery and implements the requirement to only use circle hooks in the fishery, along with increased observer coverage and monitoring and research to verify assumptions regarding the benefits of circle hooks, as well as to ensure that the ITS is not exceeded.

The environmental baseline for the June 14, 2001, HMS opinion also considered the impacts from the North Carolina offshore spring monkfish gillnet fishery and the inshore fall southern flounder gillnet fishery, both of which were responsible for large numbers of sea turtle mortalities in 1999 and 2000, especially loggerhead sea turtles. However, during the 2001, season NMFS implemented an observer program that observed 100 percent of the effort in the monkfish fishery, and then in 2002 a rule was enacted creating a seasonal monkfish gillnet closure along the Atlantic coast, based upon sea surface temperature data and turtle migration patterns. On November 10, 2004 (69 FR 65127) NMFS published a proposed rule to amend current, seasonal restrictions on large mesh gillnet fisheries operating in the mid-Atlantic region to reduce the incidental take of sea turtles in North Carolina and Virginia. In summary, NMFS is proposing to modify the existing seasonal closures to include state waters, seaward of the COLREGS lines and to amend the previous rule to include gillnets with a stretch mesh of 7-inches or greater, instead of the current limitation of greater than 8-inches stretched mesh. In 2001, NMFS also issued an ESA section 10 permit to North Carolina with mitigative measures for the southern flounder fishery. Sea turtle mortalities in these fisheries have been reduced. NMFS believes the reduction of turtle mortalities in these fisheries reduces the negative effects these fisheries have on the environmental baseline.

The effects of the *Gulf of Mexico Reef Fish fishery* on endangered and threatened species were considered a part of an April 28, 1989, opinion, which analyzed the effects of all commercial fishing activities in the Southeast Region. The opinion concluded that commercial fishing activities in the Southeast Region were not likely to jeopardize the continued existence of any threatened or endangered species. The incidental take of 10 Kemp's ridley, green, hawksbill, or leatherback sea turtles; 100 loggerhead; and 100 shortnose sturgeon was allocated to each fishery identified in the ITS. The reef fish bottom longline and hook-and-line components of the GOM reef fish fishery were identified as a fishery in the ITS. The amount of incidental take was later reduced in a July 5, 1989, opinion to only 10 documented Kemp's ridley, green, hawksbill, or leatherback sea turtles; 100 loggerhead sea turtles; and 100 shortnose sturgeon for all commercial fishing activities conducted in the Atlantic Ocean and the GOM fisheries combined. On August 25, 2004, NMFS F/SER2 requested initiation of section 7 consultation on a draft version of Amendment 23 to the Reef Fish FMP. Based on the effects of the action as a result of Amendment 23, the opinion concluded that take was likely. However, the opinion determined that the continued operation of the Gulf of Mexico Reef Fish fishery was not likely to jeopardize the continued existence of any ESA-listed species. The opinion authorized total takes over three-year periods, beginning in August of 2004.

The *Coastal Migratory Pelagic Resources fishery* is a primarily a hook-and-line fishery that occurs in the south Atlantic, but the fishery is also prosecuted in the Gulf of Mexico. Previous opinions concluded that the fishery was not expected to adversely impact ESA-listed species; however, a new consultation has been initiated because of new information regarding the status of listed species and the effects actions have on the environmental baseline information and because a new species has recently been listed, the smalltooth sawfish. A biological opinion is expected to be completed within the next couple of months. At this time, NMFS has concluded through a ESA-Section 7(d) analysis that the proposed actions in Amendment 15 are not expected to alter the manner in which the fishery is conducted; thus, the proposed action is not likely to jeopardize the continued existence of any listed species since the major gear threat to protected species, gillnets, will not be active and part of the proposed action.

Vessel Operations
Potential adverse effects from federal vessel operations in the action area and throughout the range of sea turtles include operations of the Navy (USN) and Coast Guard (USCG), the Environmental Protection Agency, the National Oceanic and Atmospheric Administration (NOAA), and the COE. NMFS has conducted formal consultations with the USCG, the USN, and NOAA on their vessel operations. Through the section 7 process, where applicable, NMFS has, and will continue to, establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. At the present time, however, they present the potential for some level of interaction. Private vessels participate in high speed marine events concentrated in the southeastern United States and are a threat to sea turtles and marine mammals. The magnitude of these marine events is not currently known. NMFS and the USCG (which permits these events) are in early consultation on these events, but a thorough analysis of impacts has not been completed.

Military Activities
In addition to vessel operations, other military activities including training exercises and ordnance detonation also affect sea turtles. Consultations on individual activities have been completed, but no formal consultation on overall USCG or USN activities in any region has been completed at this time. Formal consultation is presently ongoing with the USAF on their use of the Eglin Gulf Test and Training Range in the northeastern Gulf of Mexico, to conduct military exercises involving live-firing (air-to-surface gunnery missions).

Dredging
Federally funded and permitted projects to construct and maintain navigation channels have also been identified as a source of turtle mortality. Hopper dredges move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles, presumably as the drag arm of the moving dredge overtakes the slower moving turtle. RBOs for hopper dredging conducted by the COE have been completed for southeastern Atlantic waters (North Carolina through Florida) and Gulf of Mexico waters. Consultation on a new regional opinion for the COE's Gulf of Mexico hopper dredging of navigational channels and sand mining sites in the Gulf of Mexico was completed in November 2003, and NMFS plans to consult on a new regional opinion for the COE's south Atlantic waters. On February 19, 2004, NMFS completed a formal consultation for hopper dredging associated with sand mining for Pelican Island segment of the Barataria Barrier Shoreline Complex Restoration Project. The ITS for the Pelican Island opinion consists of one documented Kemp's ridley, green turtle, or loggerhead take; and one additional take by injury or mortality of a Kemp's ridley, green turtle, or loggerhead turtle is anticipated to occur but to go undetected.

Oil and Gas Exploitation
The COE and the MMS issue permits for oil and gas exploration, well development, production, and abandonment/rig removal activities that also may adversely affect turtles. Both these agencies have consulted with NMFS on these activities which include the use of seismic arrays for oil and gas exploration in the Gulf of Mexico, the impacts of which have been addressed in opinions for individual and multi-lease sales. Impacts are expected to result from vessel strikes, noise, marine debris, and the use of explosives to remove oil and gas structures.

Electrical Generating Plants

Another action with federal oversight (by the Federal Energy Regulatory Commission (FERC) or the Nuclear Regulatory Agency) that has impacts on sea turtles is the operation of electrical generating plants. Sea turtles entering coastal or inshore areas have been affected by entrainment in the cooling-water systems of electrical generating plants. Biological opinions have already been written for a number of electrical generating plants, and others are currently undergoing ESA section 7 consultation.

4.2 State or Private Actions

Vessel Traffic

Commercial traffic and recreational pursuits can adversely affect sea turtles through propeller and boat strikes. Private vessels participate in high-speed marine events concentrated in the southeastern United States and are a particular threat to sea turtles. Currently, the magnitude of these marine events is not known. Initial consultation between NMFS and the USCG has begun; however, a thorough analysis has not been completed. The Sea Turtle Stranding and Salvage Network (STSSN) also reports many records of vessel interaction (propeller injury) with sea turtles off coastal states such as New Jersey and Florida, where there are high levels of vessel traffic.

State Fisheries

Various fishing methods used in state fisheries, including trawling, pot fisheries, fly nets, and gillnets are known to incidentally take listed species, but information on these fisheries is sparse (NMFS 2001a). Although few of these state regulated fisheries are currently authorized to incidentally take listed species, several state agencies have approached NMFS to discuss applications for a section 10(a)(1)(B) incidental take permit. Since NMFS' issuance of a section 10(a)(1)(B) permit requires formal consultation under section 7 of the ESA, the effects of these activities are considered in section 7 consultation. Any fisheries that come under a section 10(a)(1)(B) permit in the future will likewise be subject to section 7 consultation. Although the past and current effects of these fisheries on listed species are currently not determinable, NMFS believes that ongoing state fishing activities may be responsible for seasonally high levels of observed strandings of sea turtles on both the Atlantic and Gulf of Mexico coasts. Most of the state data is based on extremely low observer coverage or sea turtles were not part of data collection; thus, this data provides insight into gear interactions that may occur but is not indicative of the magnitude of the overall problem. In addition to the lack of interaction data, there is another issue that complicates the analysis of impacts to sea turtles from these fisheries. Certain gear types may have high levels of sea turtle takes, but very low rates of serious injury or mortality. For example, the hook and line takes rarely result in death, but trawls and gillnets frequently do. Leatherbacks seem to be susceptible to a more restricted list of fisheries, while the hard shelled turtles, particularly loggerheads, seem to appear in data on almost all of the state fisheries.

Early in 1997, the commonwealth of Massachusetts implemented restrictions on lobster pot gear in the state water portion of the Cape Cod Bay critical habitat during the January 1 - May 15 period to reduce the impact of the fishery on right whales. Massachusetts has also implemented winter/spring gillnet restrictions similar to those in the ALWTRP and the MSA for the purpose of right whale and/or harbor porpoise conservation. Lobster pots are fished in areas outside of Massachusetts where sea turtles and the depleted stock of bottlenose dolphin are present, and entanglement has been documented for both species.

The North Carolina Observer program documented 33 flynet trips from November through April of 1991-1994 and recorded no sea turtles interactions for 218 hours of trawl effort. However, a NMFS- observed vessel targeting summer flounder with an otter trawl (27 tows) equipped with a TED and targeting weakfish and Atlantic croaker with a flynet (nine tows) which was not equipped with a TED caught one loggerhead in 27 TED-equipped tows and seven loggerheads in nine flynet tows without TEDs. Further, the same vessel using the flynet on a previous trip took 12 loggerheads in 11 out of 13 observed tows targeting Atlantic croaker. NMFS is testing designs for TEDs that may be required in the flynet fishery in the future.

Other bottom trawl fisheries that are suspected of incidentally capturing sea turtles are the horseshoe crab fishery in Delaware (Spotila et al. 1998) and the whelk trawl fishery in South Carolina (S. Murphy, pers. comm. to J. Braun-Mcneill, November 27, 2000) and Georgia (M. Dodd, pers. comm. to J. Braun-McNeill, December 21, 2000). In South Carolina, the whelk trawling season opens in late winter and early spring when offshore bottom waters are > 55ºF. One criterion for closure of this fishery is water temperature: whelk trawling closes for the season and does not reopen throughout the state until six days after water temperatures first reach 64ºF in the Fort Johnson boat slip. Based on the South Carolina Department of Natural Resources' Office of Fisheries Management data, approximately six days will usually lapse before water temperatures reach 68ºF, the temperature at which sea turtles move into state waters (D. Cupka, pers. comm.). From 1996-1997, observers onboard whelk trawlers in Georgia reported a total of three Kemp's ridley, two green, and two loggerhead sea turtles captured in 28 tows for a CPUE of 0.3097 turtles/100ft net hour. As of December 2000, TEDS are required in Georgia state waters when trawling for whelk. There has also been one report of a loggerhead captured in a Florida flynet (W. Teas, pers. comm.).

A detailed summary of the gillnet fisheries currently operating along the mid- and southeast U.S. Atlantic coastline, that are known to incidentally capture loggerheads, can be found in the TEWG reports (1998, 2000). Nearshore gillnetting is prohibited by state regulations in state waters of South Carolina, Georgia, Florida, Louisiana, and Texas, but gillnetting in other states' waters and in federal waters does occur. Of particular concern are the nearshore and inshore gillnet fisheries of the mid-Atlantic operating in Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina state waters and/or federal waters. Incidental captures in these gillnet fisheries (both lethal and non-lethal) of loggerhead, leatherback, green and Kemp's ridley sea turtles have been reported (W. Teas, pers. comm., J. Braun-McNeill pers. comm.). In addition, illegal gillnet incidental captures have been reported in South Carolina, Florida, Louisiana and Texas (NMFS 2001a).

Georgia and South Carolina prohibit gillnets expect for the shad fishery, which will be eliminated in December 2004. The NMFS SEFSC observed the South Carolina shad fishery for one season (McFee et al. 1996). No takes of protected species were observed in this fishery. Florida and Texas have banned the use of gillnet gear in state waters. Louisiana, Mississippi and Alabama have also placed restrictions on gillnet fisheries within state waters such that very little commercial gillnetting takes place in southeast waters, with the exception of North Carolina. Gillnetting activities in North Carolina associated with the southern flounder fishery had been implicated in large numbers of sea turtle mortalities. The Pamlico Sound portion of that fishery was closed and has subsequently been reopened under a section 10(a)(1)(B) permit.

Pound nets are a passive, stationary gear that are known to incidentally capture loggerhead sea turtles in Massachusetts (R. Prescott pers. comm.), Rhode Island, New Jersey, Maryland (W. Teas pers. comm.), New York (Morreale and Standora 1998), Virginia (Bellmund et al. 1987) and North Carolina (Epperly et al. 2000). Pound nets are not a significant source of mortality for loggerheads in New York (Morreale and Standora 1998) and North Carolina (Epperly et al. 2000); nonetheless, these nets have been implicated in the stranding deaths of loggerheads in the Chesapeake Bay from mid-May through early June (Bellmund et al. 1987). The turtles were reported entangled in the large mesh (>8 inches) pound net leads (NMFS 2001a).

Incidental captures of loggerheads in fish traps set in Massachusetts, Rhode Island, New York, and Florida have been reported (W. Teas, pers. comm.). Another potential anthropogenic impact to loggerheads and other sea turtles are fish traps in North Carolina and Delaware ; although, no incidental captures have been documented (Anon 1995). Lobster pot fisheries are prosecuted in Massachusetts (Prescott 1988), Rhode Island (Anon 1995), Connecticut (Anon 1995) and New York (S. Sadove, pers. comm.). Although they are more likely to entangle leatherback sea turtles, lobster pots set in New York are also known to entangle loggerhead sea turtles. Currently, no incidental capture data exist for the other states. Long haul seines and channel nets in North Carolina are known to incidentally capture loggerhead and other sea turtles in the sounds and other inshore waters (J. Braun-McNeill, pers. comm.), but no lethal takes have been reported (NMFS 2001a).

Observations of state recreational fisheries have shown that loggerhead, leatherback, and green sea turtles are known to bite baited hooks, and loggerheads frequently ingest the hooks. Hooked turtles have been reported to NMFS by the public fishing from boats, piers, and beach, banks, and jetties and from commercial fishermen fishing for reef fish and for sharks with both single rigs and bottom longlines (NMFS 2001). Detailed summaries of the known impacts of hook and line incidental captures to loggerhead sea turtles can be found in the TEWG reports (1998, 2000).

Coastal Development
Beachfront development, lighting and beach erosion control all are ongoing activities along the Gulf and Atlantic coasts. These activities potentially reduce or degrade sea turtle nesting habitats or interfere with hatchling movement to sea. Nocturnal human activities along nesting beaches may also discourage sea turtles from nesting sites. The extent to which these activities reduce sea turtle nesting and hatchling production is unknown. However, more and more coastal counties are adopting stringent protective measures to protect hatchling sea turtles from the disorienting effects of beach lighting.

Other Sources of Impacts

International
NMFS estimates that thousands of sea turtles of all species are incidentally caught and a proportion of them killed incidentally or intentionally annually by international activities. The impact of international fisheries is a significant factor in the baseline inhibiting sea turtle recovery. For sea turtle species in the Atlantic, international activities, particularly fisheries, are significant factors impacting populations. The U.S. and 26 other nations participate in longline fishing throughout the western North Atlantic Ocean and the relative proportion of total hooks fished by the U.S. fleet is small compared to the cumulative total hooks fished by foreign fleets. As with U.S. fleets, sea turtles are incidentally captured in foreign fleets (NMFS SEFSC 2001). Pelagic juvenile loggerhead takes in U.S. and international longline fisheries as a whole are large and, although the mortality rate cannot be quantified, NMFS SEFSC (2001) concludes that it could alter population trends. Takes in international gillnet fisheries are also known to be prevalent. Additional information on the impacts of international fisheries is found in NMFS SEFSC (2001).

Significant anthropogenic impacts threaten nesting populations of all species in areas outside of the U.S. These impacts include poaching of eggs, immatures and adults as well as beach development problems. There are other more indirect factors; for a complete list refer to NMFS SEFSC (2001).

Marine Pollution
A number of activities that may indirectly affect listed species in the action area of this consultation include discharges from wastewater systems, dredging, ocean dumping and disposal, aquaculture, recreational fishing, and anthropogenic marine debris. The impacts from these activities are difficult to measure, but conservation actions are being implemented to monitor or study impacts from these sources. Through the section 7 process, close coordination is occurring on both dredging and disposal sites to develop monitoring programs and ensure that vessel operators do not contribute to vessel-related impacts.

Sources of pollutants in Atlantic and Gulf coastal regions include atmospheric loading of pollutants such as PCBs, storm water runoff from coastal towns, cities and villages, runoff into rivers emptying into the bays, groundwater and other discharges, and river input and runoff. Nutrient loading from land-based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems. The effects on larger embayments are unknown. Although pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo et al. 1986), the impacts of many other anthropogenic toxins have not been investigated.

Disease
A little understood disease is posing a new threat to loggerhead sea turtles. Between the period of September 2000 to January 2001, 45 debilitated and 95 dead loggerhead turtles have been found in south Florida between Indian River and Charlotte Counties, elevating stranding data for this period to more than 3 times the previous 10-year average (Foley, pers. comm., 2000). It has been estimated that these numbers may represent only 10 to 20 percent of the turtles that have been affected by this disease because many dead or dying turtles likely never wash ashore. If the agent responsible for debilitating these turtles re-emerges in Florida, the scope of this die-off may increase substantially. Further, if the agent is infectious, nesting females could spread the disease throughout the range of the adult loggerhead population. Symptoms of the unknown disease include extreme lethargy and pneumonia. Of those found alive, even with extensive care, many of them have died and none have fully recovered. The cause of the disease has yet to be determined but it is believed that potential causes may include bacteria, virus, or exposure to some toxin.

Acoustic impacts
NMFS and the USN have been working cooperatively to establish a policy for monitoring and managing acoustic impacts from anthropogenic sound sources in the marine environment. Acoustic impacts to sea turtles can include temporary or permanent injury, habitat exclusion, habituation, and disruption of other normal behavior patterns.

4.3 Conservation and Recovery Actions Shaping the Environmental Baseline

NMFS has implemented a series of regulations aimed at reducing the potential for incidental mortality of sea turtles in commercial fisheries. In particular, NMFS has required the use of TEDs in southeastern U.S. shrimp trawls since 1989 and in summer flounder trawls in the mid-Atlantic area (south of Cape Charles, Virginia) since 1992. It has been estimated that TEDs are 97 percent efficient at excluding (releasing alive) turtles caught in such trawls. These regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), floatation, and more widespread use. Recent analyses by Epperly and Teas (2002) indicate that the minimum requirements for the escape opening dimensions were too small, and that as many as 47 percent of the loggerheads stranding annually along the Atlantic Seaboard and Gulf of Mexico were too large to fit through existing openings. Thus, NMFS recently published a final rule to require larger escape openings in TEDs used in the southeastern shrimp trawl fishery (68 FR 8456;

February 21, 2003). Based upon the analyses by Epperly et al. (2002), leatherback and loggerhead sea turtles interactions are expected to be reduced up to 97 percent and 94 percent (over the reduction expected with the old TEDs), respectively, in mortality from shrimp trawling.

In 1993 (with a final rule implemented in 1995), NMFS established a Leatherback Conservation Zone which restricted shrimp trawl activities from the coast of Cape Canaveral, Florida, to the North Carolina/Virginia border. This provided for short-term closures when high concentrations of normally pelagic leatherbacks are recorded in near coastal waters where the shrimp fleet operates. This measure was necessary because, due to their size, adult leatherbacks were larger than the escape openings of most NMFS-approved TEDs. With the implementation of the new TED rule requiring larger opening sizes on all TEDs, the reactive emergency closures within the Leatherback Conservation Zone are no longer necessary. Presently, NMFS is also working to develop a TED that can be effectively be used in a type of trawl known as a fly net. Fly nets are sometimes used in the mid-Atlantic and northeastern fisheries to target sciaenids and bluefish. A prototype design has been developed, and limited testing has been conducted since December 2002.

In 1999, NMFS closed part of Pamlico Sound to gillnet fishermen targeting southern flounder, which is a state fishery, after the strandings of relatively large numbers of loggerhead and Kemp's ridley sea turtles on inshore beaches. NMFS also closed the waters north of Cape Hatteras to 38E N., including the mouth of the Chesapeake Bay, to large (> 6 inch stretched) mesh gillnets for 30 days in mid-May 2000 due to the large numbers of loggerhead strandings in North Carolina, and will continue to implement such proactive measures as necessary. Analyses conducted by Bass et al. (1999) on genetic samples collected from sea turtles stranding on U.S. Atlantic and Gulf of Mexico shores suggested that a large proportion of these stranded loggerheads may be from the northern subpopulation. The northern subpopulation accounted for 25-28 percent of the animals that stranded off the Carolinas, and 46 percent of the animals sampled that stranded in the northernmost area sampled, Virginia (TEWG 2000). On October 27, 2000, the North Carolina Division of Marine Fisheries (NCDMF) closed waters in the southeastern portion of the Pamlico Sound as a result of elevated takes by the commercial large-mesh flounder gillnet fishery. The fishery was closed when anticipated incidental take levels were met for green turtles. The NCDMF estimated that there were 50 loggerheads captured at the time of closure and that 44 of those had been drowned (NMFS SEFSC 2001, Part 1). The fishery has subsequently been reopened under a section 10(a)(1)(B) permit.

NMFS has been active in public outreach efforts to educate fishermen regarding sea turtle handling and resuscitation techniques. NMFS recently conducted a number of workshops with longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NMFS intends to continue these outreach efforts and hopes to reach all fishermen participating in the pelagic longline fishery over the next one to two years. An extensive network of Sea Turtle Stranding and Salvage Network participants along the Atlantic and Gulf of Mexico not only collect data on dead sea turtles, but also rescue and rehabilitate any live stranded turtles.

Loggerheads, greens, and Kemp's ridleys are known to bite a baited hook, frequently ingesting the hook. Hooked turtles have been reported by the public fishing from boats, piers, beaches, banks, and jetties. Necropsies have revealed hooks internally, which often were the cause of death. An investigation of injuries and mortalities related to fish hook ingestion is underway at the NMFS Laboratory, Galveston, Texas, and NMFS currently is exploring adding questions about encounters with sea turtles to intercept interviews of recreational fishermen conducted by the Texas Parks and Wildlife Department under the auspices of the Marine Recreational Fishery Statistics Surveys conducted throughout the Gulf of Mexico and along the Atlantic Coast. NMFS is also considering surveying recreational fishermen aboard headboats throughout the southeast U.S. Atlantic and the Gulf of Mexico to quantify their encounters with sea turtles (TEWG 2000). Detailed summaries of the impact of hook and line incidental captures on loggerhead sea turtles can be found in the TEWG reports (1998, 2000). NMFS continues to explore mitigation measures in the commercial fishing industry, such as the NED experiment, in order to continue to reduce the impacts of fishing on sea turtle populations. NMFS aims to develop technology and fishing practices, which may be promoted internationally.

Loss or degradation of suitable nesting habitat may be the most important factor affecting the nesting population in Louisiana (Ogren 1977). Loggerhead eggs were collected from Grand Isle, Louisiana, 50 years ago (Hildebrand 1981). Ogren (1977) reported a historical reproductive assemblage of sea turtles, which nested seasonally on remote barrier beaches of eastern Louisiana, Mississippi, and Alabama. This included Bird, Breton, and Chandeleur Islands in Louisiana. Since then, the only loggerhead turtle nesting sites observed in Louisiana were on the Chandeleur Islands. Because of storm processes, Chandeleur Island no longer contains high beach dune and dune surfaces, although beach structure is suitable for nesting. Surveys by USFWS and the Southeast Louisiana Refuge personnel have found no loggerhead nests in the area to date (MMS BA, p. 31). Loss or degradation of suitable nesting habitat may be the most important factor affecting the nesting population in Louisiana (Ogren 1977). It is expected that barrier island creation and restoration activities, such as the projects proposed in this opinion, and the Barataria Bay, Pelican Island restoration project currently underway, funded by NMFS' Habitat Conservation Division, and similar restoration projects will over time lead to the development of more permanent, stable barrier island beaches which may be conducive to increased sea turtle nesting.

5.0 Effects of the Action

In this opinion, NMFS evaluates the effects of dredging a total of approximately 14.5 million yd^3 of OCS sand over a 36-54 month period. The proposed action includes two distinct projects: dredging OCS sand for one barrier island restoration project (Whiskey Island) and to provide foundation material for a flood levee construction project (Morganza to the Gulf). Hopper dredges and hydraulic cutterhead pipeline dredges will be used for dredging Ship Shoal sand. NMFS believes that the Morganza to the Gulf of Mexico hurricane protection project is unlikely to have any adverse affects on sea turtles since the majority of the project action area, 57 miles, is inland (terrestrial environment) and follows existing levees along mostly freshwater canals. The remaining 15 miles of the project area is in a marine brackish environment, but mostly composed of marsh grasses where the water depth is approximately 1 foot. The Morganza to the Gulf of Mexico project does not block any nesting or potential nesting areas for sea turtles. Sea turtles nest offshore approximately 20-30 miles away from this particular project area and in areas that are a sandy beach or island community and not a coastal marsh brackish community. Consequently, this opinion evaluates the potential effects of dredging associated with the Whiskey Island restoration project as well as the potential impacts associated with the Morganza to Gulf project. In addition, this opinion evaluates the sand characterization tests associated with the above projects. Although the sand characterization tests will occur in the same area, NMFS believes there is only limited potential for interactions with listed species at these featureless sand mining sites because of: 1) the relatively flat, smooth, featureless sandy bottom characteristics of these sites which lack structure to attract sea turtles, 2) the relative distance from coastal estuarine environments that may serve as developmental and foraging habitat, 3) the relative distance from hardgrounds which could serve as foraging habitat, 4) the known high efficiency of sea turtle deflector dragheads at excluding sea turtles, when operated on flat, sandy bottoms, as documented by previous COE studies, and 5) the short duration of the sand characterization tests (less than ½ day). The effects of sand characterization tests on sea turtles will not be discussed further in this opinion. The MMS understands that because sea turtles nest on land, responsibility for their conservation is shared between the NMFS and the USFWS. According to USFWS personnel, the ESA-Section 7 and 10 consultation process between MMS and the USFWS has not been initiated at this time (B. Firmin, personal communication, November 23, 2004); however, MMS is in the initial phases of drafting a consultation request with the USFWS (W. Waskes, personal communication, November 23, 2004). MMS has completed ESA section 7 consultation with the USFWS for the Morganza to Gulf project. The USFWS concluded that there were no likely adverse affects to sea turtles as a result of the proposed action.

To evaluate the overall effects of the action, NMFS considered the direct and indirect effects of the proposed action on sea turtles.

Direct Effects

Dredging Effects on Sea Turtles

The primary direct effect of the proposed action is hopper-dredging activities on sea turtles. Hydraulic cutterhead pipeline dredges have never been implicated in turtle takes, presumably because the slow-moving cutterhead is readily discerned and easily avoided by these species. Additionally, numerous previous opinions issued by NMFS to the COE since 1991 in both the South Atlantic and Gulf of Mexico COE districts, hydraulic cutterhead pipeline dredge use has been determined to be unlikely to adversely affect any listed species under NMFS' purview; therefore, hydraulic cutterhead dredges will not be considered further in this opinion. This opinion will only consider hopper-dredging effects on listed species potentially present during the Ship Shoal proposed action.[3]

In the Southeast, sea turtle impacts from hopper dredging operations have been observed and documented since 1980. The endangered species observer program was established in 1980 and a sea turtle/dredging task force was established in 1981 (DOER 1998). The COE cites issues related to potential entrainment of aquatic organisms as reasons underlying environmental dredging windows at 49 percent of its Districts (18 districts), and of these environmental windows, 32 percent are related to threatened and/or endangered species (DOER 1998). According to Dickerson et al. (1995), between 1980-1990 there have been 175 sea turtles observed entrained (0.91 turtles/100,000 cubic yards) in dredging operations in the southeastern U.S. channels. Results from this study indicated entrainment rates ranged from 0.052 turtles/100,000 cubic yards for Brunswick Harbor, Georgia, to 1.68 turtles/100,000 cubic yards for Canaveral Harbor, Florida. During 1980-1994, the highest rate of all observed entrainments occurred in Canaveral Harbor, Florida with 1.73 turtles/100,000 cubic yards, or 80 percent (128 dead and 11 live/injured) of the total documented entrainments. The second highest rate of observed entrainment occurred in Fernandina

[3]Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore sand mining areas, move relatively rapidly and can entrain and kill sea turtles, presumably as the drag arm of the moving dredge overtakes the slower moving turtle. In contrast to hopper dredges, pipeline dredges are relatively stationary, and therefore act on only small areas at any given time. In the 1980s, observer coverage was required by NMFS at pipeline outflows during several dredging projects deploying pipeline dredges along the Atlantic coast. No turtles or turtle parts were observed in the outflow areas. Additionally, the COE's South Atlantic Division (SAD) office in Atlanta, Georgia, charged with overseeing the work of the individual COE Ddistricts along the Eastern Seaboard from North Carolina through Florida, provided documentation of hundreds of hours of informal observation by COE inspectors during which no takes of listed species were observed. Additional monitoring by other agency personnel, conservation organizations, and the general public has never resulted in reports of turtle takes by pipeline dredges (NMFS 1991a).

Harbor, St. Marys River, which resulted in 0.4 turtles/100,000 cubic yards or 19 percent (29 dead, 2 alive/injured) of the total documented entrainments.

There have been an additional 105 sea turtles observed entrained in dredging operations in the Southeast during 1990-1997 (DOER 1998). In 1991, there were a total of 34 sea turtles observed entrained in Georgia waters. The entrainment rate for Brunswick Harbor, Georgia was 1.39 turtles/100,000 cubic yards and 1.55 turtles/100,000 cubic yards for Savannah Harbor, Georgia. In 1997, the highest spring rate of observed entrainment occurred during dredging operations in Morehead City Harbor, North Carolina, which resulted in six loggerhead turtle takes. In summary, the authors of this study suggest that entrainments are correlated with sea turtle abundance; hence, seasonal dredging windows are important for minimizing the impacts of hopper dredging operations on sea turtle populations in areas of high sea turtle abundance or potential abundance. A 1991 jeopardy opinion to the COE's South Atlantic Division on hopper dredging of southeastern U.S. channels first identified a seasonal window, or "hopper dredging window", as the time between December 1 and March 31.

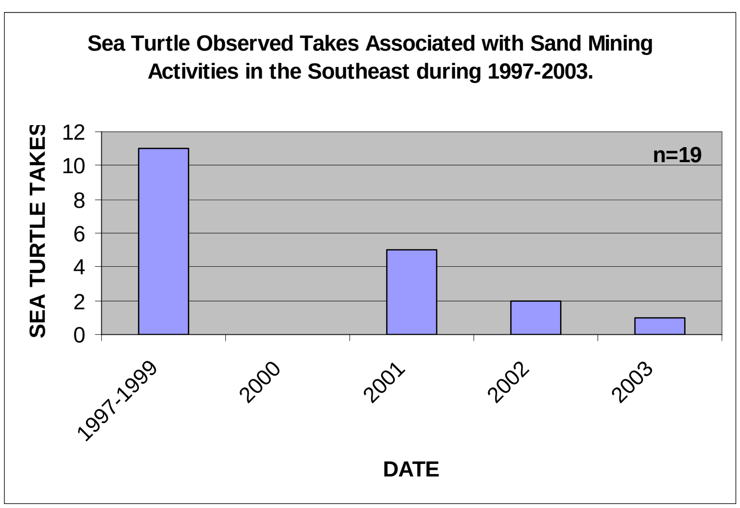
From the information available, dredging effects on sea turtles appears to be correlated with areas of high sea turtle occurrence. In contrast to the East Coast, Gulf of Mexico sea turtle takes by hopper dredges are lower. In the western Gulf of Mexico from February 1995 through 2005, a total of 49 lethal takes was documented (22 loggerheads, 17 greens, and 10 Kemp's ridleys) by Galveston District in hopper maintenance dredging activities. In the northern Gulf of Mexico from May 1995 through 2005, a total of 56 sea turtles (44 loggerheads, 8 Kemp's ridleys, 1 green, and 3 unidentified) have been reported by the New Orleans District as lethally taken by hopper dredges during maintenance dredging. Fifty-two of the takes (93 percent) reported by the New Orleans District occurred in the Mississippi River-Gulf Outlet (MR-GO) dredging area with four takes occurring in the Calcasieu Channel. Based on take records since 1985, the period with the highest number of takes occurred during September 24,2004 through February 16, 2005 in the MR-GO with 14 takes and 81 animals relocated through relocation trawling. Since 1980, there have been a total of 247 sea turtle takes by the Jacksonville District, but only 8 turtle takes have been documented by this District in Gulf of Mexico projects (7 in Tampa Bay and 1 in Charlotte Harbor). For the COE-Mobile District there have only been two documented takes, but it should be noted that the District did not require observers or screening on its hopper dredges until late-summer 2002.

As a result of the water pressure force, or because the animals are crushed and killed by the suction draghead but not entrained, NMFS believes that documented takes by onboard marine endangered species observers represent only partial estimates of total takes and that some turtles may pass through inflow screening devices undetected by observers. NMFS estimates that unseen (thus, undocumented) takes represent approximately 50 percent of total documented takes and has evaluated the effects of the action including the expected undocumented takes.

A biological opinion issued in September 1995 on the use of hopper dredges for maintenance dredging activities in the COE New Orleans District, including the MR-GO, tributaries, bayous, and New Orleans District navigational channels concluded that hopper dredging in the northern Gulf of Mexico was likely to adversely affect sea turtles; nevertheless, the opinion concluded that it was unlikely to jeopardize the continued existence of sea turtle populations. The authorized level of incidental take has not been reached for any species since the opinion was issued. Nevertheless, in 2005, the New Orleans District has taken 14 loggerhead sea turtles. This District has only been authorized to take 15 loggerhead sea turtles.

The November 19, 2003, RBO is the current Gulf-wide opinion authorizing sea turtle and Gulf sturgeon takes in association with COE hopper dredging activities in the Gulf of Mexico, principally maintenance dredging of navigation channels. In that RBO, NMFS anticipates that for the entire Gulf of Mexico from the U.S.-Mexico border to Key West, not including Key West, endangered species observers aboard COE hopper dredging operations, and state STSSN personnel indirectly monitoring bed-leveler type dredging, will document the take yearly, by injury or mortality, of a maximum of approximately 40 loggerhead turtles, 20 Kemp's ridley turtles, 14 green turtles, 4 hawksbill turtles, and 4 Gulf sturgeon, and a maximum of 300 turtles and 8 Gulf sturgeon taken non-injuriously by relocation trawling. These estimates are based on factors such as documented average and maximum yearly takes during previous years, variability in sea turtle abundance and distribution, annual maintenance dredging schedules, anticipated increases in beach nourishment projects, and anticipated takes established in previous opinions. To be conservative and account for listed species which may be taken but not documented, NMFS believes that an equal number of sturgeon and turtles are killed by being crushed by the deflector dragheads but are not entrained, and thus are not documented. It is important to note that the ITS is also developed on the basis that fragments and some entrainments may not be detected or missed by hopper dredge endangered species observers during periods when hopper dredge endangered species observers are not required or are not present. The RBO estimates that a maximum of 80 loggerhead turtles, 40 Kemp’s ridleys, 28 green turtles, 8 hawksbill turtles, and 8 Gulf sturgeon may be killed or injured annually in COE Gulf of Mexico hopper dredging operations. The RBO estimates that 0-2 turtles and 0-1 Gulf sturgeon will be killed or injured annually pursuant to annual relocation trawling in the Gulf of Mexico.

The Barataria Barrier Shoreline Complex Restoration Project biological opinion recently issued to NMFS’ Habitat Conservation Division was the first opinion issued for Gulf of Mexico sand mining activities. For that action, consisting of approximately 100 days of hopper dredging for a project lasting approximately six months with a target start/finish time between April and October 2004 or 2005, NMFS anticipated the total documented incidental take, by injury or mortality, of one Kemp's ridley, green turtle, or loggerhead turtle; and one additional take by injury or mortality of a Kemp's ridley, green turtle, or loggerhead turtle is anticipated to occur but go undetected. This take level of two turtles represents the total take anticipated or authorized for all sand mining by hopper dredges in association with the Barataria sand mining action. In addition, the total anticipated non-injurious take by relocation trawling that is authorized under the Barataria biological opinion’s ITS is expected to consist of not more than 25 sea



Source: MMS EA (2004)

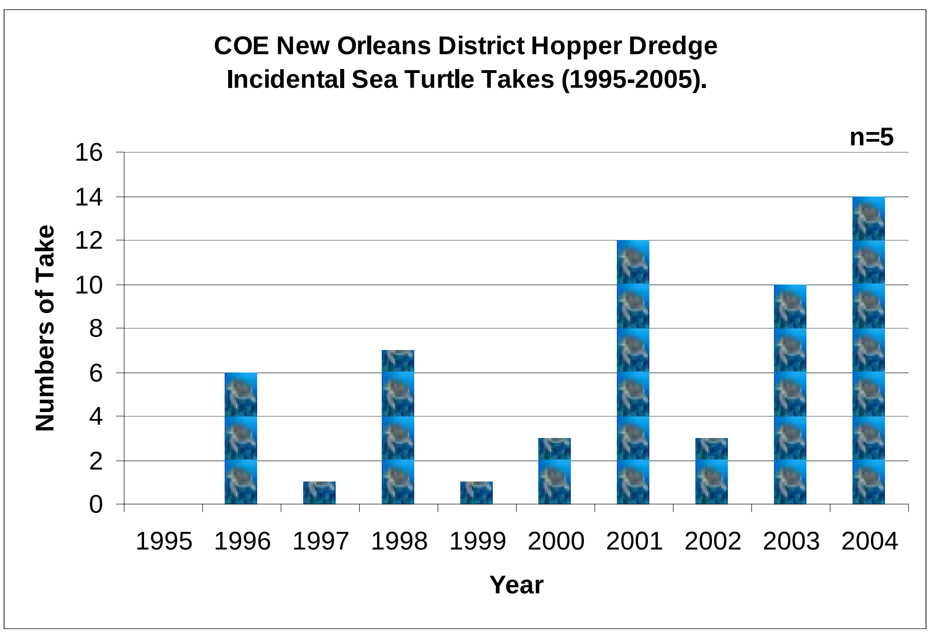
turtles, of any combination of the species. NMFS anticipates that no turtles will be injured or killed during relocation trawling associated with the Barataria Barrier Shoreline Complex Restoration Project. Based on the previous opinions, the possibility of sea turtle take by hopper dredging associated with the proposed action is not discountable. NMFS believes based upon years of data from observers aboard hopper dredges conducting channel maintenance operations in the Gulf of Mexico as well as from sea turtle distribution data that the proposed action is likely to take one or more sea turtles. However, sand mining sites (blocks) within the Ship Shoal action area are to some extent selected by the action agency based on the sites' lack of, or safe distance from, hard bottoms or other man-made features which in addition to attracting sea turtles may damage the dragheads, reduce production, and may also not provide sand with characteristics suitable for beach restoration efforts. Ship Shoal sand will also be preferentially dredged from blocks where oil and gas development infrastructure is minimal, e.g., Ship Shoal Block 88 (MMS BA, p. 5). While Block 88 will be preferentially dredged, other blocks on the far eastern portion of the Shoal (e.g., South Pelto Blocks 12, 13, and 19) may be more suitable for restoration projects and other projects on the eastern portions of the Isles Dernieres and Terrebonne Basin, despite the complicating factor of numerous pipelines and other structures, which must be avoided. Despite the apparent absence of hard bottoms nearby, NMFS believes that sea turtles may occasionally be found on the bottom at Ship Shoal, or possibly attracted to oil and gas-related structures such as oil platforms, wellheads, etc. Shrimp trawlers in the Gulf of Mexico routinely avoid hard bottoms to avoid tearing up their nets yet they also routinely capture sea turtles in their trawl nets.

In contrast to sea turtle takes affiliated with hopper dredging in channels associated with hard bottom communities, such as southeast Atlantic hopper dredging activities, sea turtle takes associated with the use of hopper dredges in sand mining activities, and specifically in the Gulf of Mexico, have been historically much lower, particularly for those activities conducted in offshore waters. According to the MMS' EA (2004), which analyzed the effects of the action on the environment, submitted to NMFS for review, 11 loggerhead sea turtles have been observed taken from 1997 to 1999 at sand mining sites off Myrtle Beach, South Carolina, and a total of 19 sea turtles takes, in the Southeast, have been associated with sand mining activities. On March 31, 2001, and February 19, 2002, one loggerhead sea turtle was observed taken at the Canaveral Shoals sand mining site in offshore waters. In North Carolina, two Kemp's ridleys and two loggerheads were observed taken in a single day at the Bogue Banks Restoration Project borrow site on December 21, 2001, apparently attracted to remains of an artificial tire reef, and another Kemp's ridley was taken on April 11, 2002. On March 19, 2003, a loggerhead sea turtle was observed taken during sand mining for the Bogue Banks Restoration Project (a relocation trawler moved five turtles out of the area between March 13-28). The MMS report concludes that there have been no other instances of observed takes at sand mining sites in the Gulf of Mexico. However, these activities have been limited, it is not known if observers have been present, and other instances of take may have not been reported to NMFS.

NMFS anticipates sea turtle take associated with the proposed action, although the possibility is deemed low in comparison to either channel dredging or inshore sand mining activities. NMFS believes Ship Shoal sand's proximity to nearshore estuarine areas and oil and gas-related infrastructure, which may contain foraging habitat for sea turtles, may serve as attractants to sea turtles; thus, turtles may be susceptible to take by entrainment.

Analysis for the Effects of the Action (Direct)

NMFS has reviewed previous dredging projects that have occurred in the Gulf of Mexico as well as stranding information that indicates that sea turtle aggregations are found in the vicinity of Gulf of Mexico navigation channels and are present in nearshore Gulf coastal waters year-round. Because of the year-round presence of sea turtles in coastal waters and potential presence at sand mining sites, NMFS cannot discount that dredging at Ship Shoal with hopper dredges may entrain sea turtles. If entrainments occur they can be expected to result in death of the individuals overtaken by the suction draghead. Since 1995, based on documented records reported to NMFS, there have been a total of 56 incidental sea turtles takes by hopper dredges in the COE New Orleans District (NOD), which is the closest COE district to the action area (Figure 7). The year with the largest number of incidental sea turtles takes by hopper dredges operating in the NOD was 2004 (n=14) followed by 2001 (n=11). Of the total incidental sea turtle takes by hopper dredges in the COE NOD, there have been 44 loggerhead (80%), 8 Kemp's ridley (14%), 3 unknown (5%), and 1 green (2 percent) sea turtle takes (Figure 8). The overall mean number of incidental sea turtles takes by hopper dredges operating in the NOD during 1995-2005 was 5.1-sea turtles/year. During 1995-2005, the mean number of incidental sea turtles takes by hopper dredges operating in the NOD was 4 loggerhead per year, 0.7 Kemp's ridley per year, 0.3 unknown, and .09 green sea turtles per year. Although the documented take is from the closest COE district to the action area and is from hopper dredge operations, NMFS established the allocation of estimated or anticipated take by species using this ratio data, but believes actual estimated take may be lower primarily due to the location of the action. Nevertheless, this is the most current information available for hopper dredge takes associated with inshore waters which are believed to be higher than for offshore sandy bare areas where this proposed



activity will occur.

Figure 7

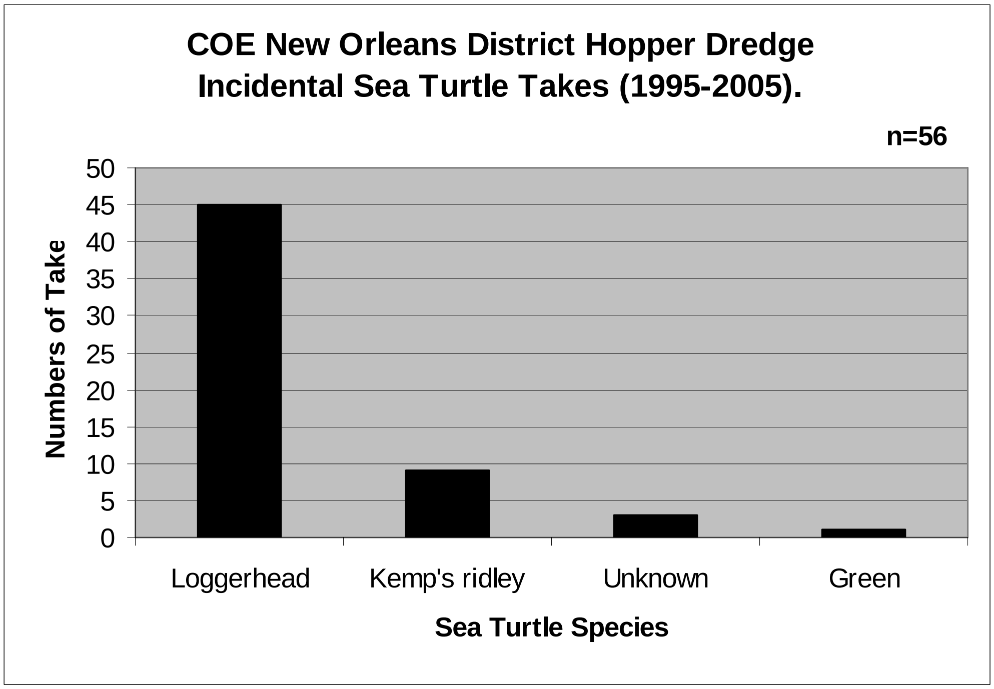


Figure 8

NMFS anticipates no sea turtle takes from any of the hydraulic cutterhead pipeline dredging associated with the mining of Ship Shoal sand.

NMFS bases the estimated anticipated take level on the following data:

1. Previous sea turtle takes associated with hopper dredging by the COE in the Gulf of Mexico;

2. The level of take anticipated in previous hopper dredging opinions to federal agencies;

3. Sea turtle distribution and abundance in the Gulf of Mexico; and

4. The type and magnitude of operational measures (including relocation trawling) employed by the action agency during this project.

As a result of NMFS' previous experience with the COE, NMFS anticipates the MMS has the ability to: dredge 25,000 yd^3/day (5,000 yd^3/load, 5 loads/day), dredge between 120-180 days/year, and to dredge between 3-4.5 million yd^3 of sand per year at any one location. Typically, dredging takes place during the months of April through September (120-180 days) and usually not during the winter, when hopper dredges have a more difficult time operating because of storms. The estimated sea turtle take level for this project was developed using this previous dredging experience information, the overall total documented historically take levels by sea turtle species (number of sea turtle takes/yard of dredged sand) from the New Orleans District (1995-2005), and the NMFS Pelican Island project (Barataria Barrier Island opinion) since we believe this proposed action is similar to the Pelican Island project in terms of location, timing, and listed species present, even though the total dredging quantities are substantially different. NMFS estimates the total sea take associated with hopper dredging for this project to be 14 sea turtles (10 loggerhead, two Kemp's ridley, and two green) per two years and no more than a total of 23 sea turtles (17 loggerhead, three Kemp's ridley, and three green) for the entire project, which consists of both the Whiskey Island and the Morganza to the Gulf project. NMFS anticipates the actual direct documented take to be less than estimated take; since only 50 percent of the takes will be observed and it is estimated that 50 percent of the takes will be missed by hopper dredge observers. This information is based on previous hopper dredge activities that use two observers (100 percent), two (12-hour shifts), to monitor and document take. The estimated take level of 14 sea turtles biennially and 23 sea turtles for the entire project represents the total take anticipated including the additional take (50%) that is anticipated to occur but to go undetected by observers. As discussed above, the total take associated with hopper dredging for the proposed action was estimated by using the Barataria Barrier Island opinion which concluded the estimated take to be 2 sea turtles/2.5 million yd^3/year, the anticipated MMS annual hopper dredging activity, and the mean annual estimated take and the allocated percentage by turtle species, while accounting for some variability in yearly take level. Hence, this biennial approach incorporates some flexibility in the anticipated annual estimated take without comprising any sea turtle conservation efforts within the scope of this proposed action.

Indirect Effects

NMFS also considers the following indirect effects on sea turtles as a result of the use of hopper dredges for the proposed action:

Disorientation Effects of Hopper Dredge and Pumpout Barge Deck Lighting

The beach nourishment projects are expected to begin in the spring of 2005 and continue until the fall or completion, coinciding with sea turtle nesting and the period of greatest sea turtle activity; thus, NMFS believes that female sea turtles approaching nesting beaches and neonates (i.e., hatchlings) emerging from nests and exiting their natal beaches, may be adversely affected by bright offshore lights from hopper dredges or hopper dredge pumpout barges operating in the nearshore (0-3 nmi) environment. Females approaching the beach to nest may be deterred from nesting by bright lights in the nearshore environment. Additionally, hatchlings emerging from their nests may be attracted away from the shortest path to the water and instead crawl or swim toward the bright lights of a nearshore hopper dredge or anchored pumpout barge (instead of crawling or swimming seaward toward the open horizon), thus increasing their exposure time to predation. NMFS recently received a report (M. Nicholas pers. comm. to E. Hawk, September 29, 2003) from a National Park Service biologist at Gulf Islands National Seashore) who relocated a clutch of 97 Perdido Key hatchlings on September 28, 2003. The biologist felt that the hatchlings were in danger of being attracted to a nearby operating, brightly lit hopper dredge which was dredging ½ to 1 mile offshore in Pensacola Entrance Channel. NMFS considers it prudent that hopper dredges and hopper dredge pumpout barges operating within three NM of sea turtle nesting beaches during sea turtle nesting and sea turtle hatchling emergence season (May 1-October 31, yearly), take measures to shield essential deck lighting and reduce or extinguish non-essential deck lighting to the maximum extent possible consistent with vessel personnel safety and U.S. Coast Guard navigation requirements. NMFS believes shielding the lighting may reduce potential disorientation effects, reduce potential diminished or aborted nesting, and reduce potential increased hatchling mortality from increased exposure to predators. This is consistent with U.S. Fish and Wildlife Service biological opinion requirements and Florida Wildlife Commission requirements for beach nourishment projects where nesting sea turtles may be present, and was jointly developed by these agencies, Florida Department of Environmental Protection, and the U.S. Army Corps of Engineers, Jacksonville District (Robbin Trindell, pers. comm. to Eric Hawk, September 30, 2003). NMFS believes that female sea turtles approaching nesting beaches and hatchlings emerging from nests and exiting their natal beaches may be adversely affected by bright offshore lights from hopper dredges or hopper dredge pumpout barges operating in the nearshore (0-3 NM) environment. NMFS does not expect any lighting-related adverse effects to sea turtles or sea turtle hatchlings from the proposed action, however, as the nearest known nesting beach is on the Chandeleur Islands, over 100 miles distant from the action area.

Sedimentation Effects

Sedimentation is often associated with hopper dredging. Efforts to reduce potential sedimentation damage to habitats adjacent to sand mining sites were incorporated into the 1995 SAD RBO, which recommended "water column sediment load deposition rates of no more than 200 mg/cm^2/day, averaged over a 7-day period, to protect coral reefs and hard bottom communities..." dredging causes sedimentation by suspending particles into the water column which decreases water clarity. Sediments suspended in the water column may inhibit bottom communities from filtering the needed nutrients and possibly affect sea turtle food sources. Thus, to reduce the possibility of listed species takes during sand mining activities and damaging possible food sources for sea turtles, the terms and conditions of this opinion will require that hopper dredges operating at offshore sand mining sites maintain a minimum distance of 400 feet from hardgrounds since these areas may attract sea turtles.

Effects of Relocation Trawling (Capture, Tag, and Release) in Association with Hopper Dredging

Since 1986, relocation trawling has been successfully used as a conservation tool for temporarily displacing Kemp's ridley, loggerhead, leatherback, and green sea turtles from channels and nearshore mining areas in the Atlantic and Gulf of Mexico during periods when hopper dredging was imminent or ongoing. NMFS believes relocation trawling may prevent and minimize sea turtle takes by hopper dredges, even though some turtles captured during relocation trawling operations return to the dredge site and are subsequently recaptured. Sea turtle relocation studies by Standora et al. (1993) at Canaveral Channel relocated 34 turtles to six release sites of varying distances north and south of the channel. Ten turtles returned from southern release sites, and seven from northern sites, indicating that there was no significant difference between directions. Return times observed suggested that there was a direct correlation between relocation distance and likelihood of return or length of return time to the channel when sea turtles were relocated to the south. No correlation was observed between the northern release sites and the time or likelihood of return. The study found that relocation of turtles to the site 70 km (43 miles) south of the channel would result in a return time of over 30 days.

One private company contracted to conduct relocation trawling, captured, tagged, and relocated 69 turtles in a 7-day period at Canaveral Channel in October 2002, with no recaptures; turtles were relocated a minimum of 3-4 miles away (Trish Bargo, REMSA, June 2, 2003 pers. comm. to Eric Hawk). Twenty-four hour per day relocation trawling conducted by REMSA at Aransas Pass Entrance Channel (Corpus Christi Ship Channel) from April 15, 2003 to July 7, 2003, relocated 71 turtles. Turtles were relocated 1.5-5 miles from the dredge site, with three recaptures (Trish Bargo, July 24, 2003 pers. comm. to Eric Hawk). One turtle was released on June 14, 2003, approximately 1.5 miles from the dredge site, and was recaptured four days later. Another turtle was released on June 9, 2003, approximately three miles from the dredge site and was recaptured nine days later. Subsequent releases occurred five miles away. Of these 68 subsequent capture/releases, one turtle released on June 22, 2003 was recaptured 13 days later (REMSA Final Report, Sea Turtle Relocation Trawling, Aransas Pass, Texas, April-July 2003).

Prior to 1997, most relocation trawling in association with hopper dredging was performed by the COE under a NMFS ESA section 10 incidental take/research permit. Since then, however, private companies have primarily conducted relocation trawling. From 1999-2002, Coastwise Consulting, Inc., conducted over 132 days of relocation trawling at Morehead City, North Carolina; Charleston, South Carolina; and Kings Bay, Georgia (e-mail, C. Slay to E. Hawk, October 25, 2002). During the course of this work, at least 43 loggerheads, ten Kemp's ridleys, and one green turtle were successfully captured, tagged, and released. No dead or injured turtles were encountered and no captured turtles were recaptured during this work. Since around 1998, Coastwise Consulting has captured, tagged, and released approximately 80-90 turtles, with no evidence of injury or mortality (Pers. comm., C. Slay to E. Hawk, December 6, 2002). On the Atlantic coast, REMSA has also successfully tagged and relocated over 140 turtles in the last several years, most notably, 69 turtles (55 loggerheads and 14 greens) in a 7-day period at Canaveral Channel in October 2002, with no significant injuries. Other sea turtle relocation contractors (R. Metzger in 2001; C. Oravetz in 2002) have also successfully and non-injuriously trawl-captured and released sea turtles out of the path of oncoming hopper dredges. More recently in the Gulf of Mexico, REMSA captured, tagged, and relocated 71 turtles at Aransas Pass with no apparent long-term ill effects to the turtles. Three injured turtles captured were subsequently transported to University of Texas Marine Science Institute rehabilitation facilities for treatment (two had old, non-trawl related injuries or wounds; the third turtle may have sustained an injury to its flipper, apparently from the door chain of the trawl, during capture). Three of the 71 captures were recaptures–released around 1.5, three, and five miles, respectively, from the dredge site–and exhibited no evidence that their capture, tag, release, and subsequent recapture, was in any way detrimental.

Stressor hormones may rise as a result of the capture and handling of sea turtles during tagging procedures, which may cause some discomfort. Based on past observations obtained during similar research-trawling for turtles, these effects are expected to dissipate within a day (Stabenau and Vietti 1991). Cumulative adverse effects of recapture are not expected because turtle recaptures are rare, and recaptures that do occur typically happen several days to weeks after initial capture;.

Rarely, even properly conducted relocation trawling can result in accidental sea turtle deaths. Henwood (pers. comm. to E. Hawk, December 6, 2002) noted that several trawl-captured loggerhead sea turtles died on various occasions during handling on deck during winter trawling in Canaveral Channel in the early 1980s, after short (approximately 30-minute) tow times. However, Henwood also noted that a significant number of the loggerheads captured at Canaveral during winter months appeared to be physically stressed and in "bad shape" compared to loggerheads captured in the summer months from the same site, which appeared much healthier and robust. Stressed turtles, unhealthy turtles, or turtles exposed to repeated forced submergences are more likely to be injured or killed during relocation trawling than healthy turtles.

In November 2002, during relocation trawling conducted in York Spit, Virginia, a Kemp's ridley sea turtle was likely struck by one of the heavy trawl doors or it may have been struck and killed by another vessel shortly before trawl net capture. The hopper dredge was not working in the area at the time (pers. comms. and e-mails, P. Bargo to E. Hawk, December 6 and 9, 2002).

NMFS typically limits tow times for relocation trawling to 42 minutes or less measured from the time the trawl doors enter the water when setting the net to the time the trawl doors exit the water during haulback ("doors in - doors out"). The National Research Council report "Decline of the Sea Turtles: Causes and Prevention" (NRC 1990) suggested that limiting tow durations to 40 minutes in summer and 60 minutes in winter would yield sea turtle survival rates that approximate those required for the approval of new TED designs, i.e., 97%. The NRC report also concluded that mortality of turtles caught in shrimp trawls increases noticeably for tow times greater than 60 minutes. Current NMFS' TED regulations allow, under very specific circumstances, for shrimp fishermen with no mechanical-advantage trawl retrieval devices on board, to be exempt from federal TED requirements if they limit tow times to 55 minutes during April through October and 75 minutes from November through March. The presumption is that these tow time limits will result in turtle survivability comparable to having TEDs installed.

The Gulf and South Atlantic Fisheries Development Foundation's August 31, 1998, "Alternatives to TEDs: Final Report," presents data on 641 South Atlantic shallow tows (only one tow was in water over 15 fathoms [27.4 m]), all conducted under restricted tow times (55 minutes during April through October and 75 minutes from November through March), and 584 Gulf of Mexico nearshore tows conducted under the same tow time restrictions. Offshore effort in the Gulf of Mexico consisted of 581 non-time-restricted tows which averaged 7.8 hours per tow. All totaled, 323 turtle observations were documented: 293 in the nearshore South Atlantic efforts, and 30 in the Gulf efforts (24 nearshore and six offshore). Of the 293 South Atlantic turtles (219 loggerhead, 68 Kemp' ridley, five green, and one leatherback), only 274 were used in the analyses (201 loggerhead, 67 Kemp's ridley, five green, and one leatherback) because 12 escaped from the nets after being seen and seven were caught in flynets. Of the 274 South Atlantic turtles captured using restricted tow times, only five loggerheads and one Kemp's ridley died because of the interaction. For the Gulf efforts, 26 turtles (eight loggerhead, 16 Kemp's ridley, two green) were captured, resulting in three mortalities (one loggerhead inshore, one loggerhead and one green offshore). Excluding all six offshore tows and both offshore mortalities (because of the prolonged, non-restricted tow times), we are left with 1,225 time-restricted tows (584 + 641) resulting in 298 trawl-captured turtles (274 + 24) resulting in seven mortalities, i.e., 2.3% of the interactions resulted in death.

Relocation trawling is frequently required by NMFS as a reasonable and prudent measure during the conduct of hopper dredging operations by federal action agencies, notably, the COE. Even though relocation trawling involves directed take of turtles, it constitutes a legitimate RPM because it reduces the level of almost certain lethal and injurious take of sea turtles by hopper dredges. The purpose of the relocation trawling, included as part of the Ship Shoal proposed action by MMS, is to allow the turtles captured non-injuriously by trawl to be relocated out of the path of the dredge and to reduce lethal or injurious take of sea turtles by the dredge. The "Consultation Handbook for Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act" (U.S. Fish and Wildlife Service and National Marine Fisheries Service, March 1998) expressly authorizes such directed take as an RPM (see pages 4-53 to 4-54). Therefore, NMFS will in this section evaluate the expected level of turtle take through relocation trawling, so that this level can be evaluated to determine whether the proposed action including this non-discretionary RPM will jeopardize the continued existence of the species.

Since 1980 to the present, contract trawlers in association with Gulf of Mexico hopper dredging projects have relocated approximately 210 sea turtles. Although 2002 was the first year the Galveston District conducted relocation trawling in association with some of its hopper dredging projects, the District now requires mandatory 24-hr/day relocation trawling in association with all dredging projects within the District (Rob. Hauch, pers. comm. to E. Hawk, July 22, 2003).

Analysis for the Effects of the Action (Indirect)

In contrast to the direct effects of the action on sea turtles, the indirect effects associated with relocation trawling are not considered to be as harmful to sea turtles, but still need to be analyzed and considered under this opinion. Relocation trawling may result in sea turtle takes, but given the low estimated injury or mortality rate associated with short-duration of the tow times (15 to 30 minutes per tow; not more than 42 minutes) and required safe-handling procedures, these takes are not expected to be injurious or lethal.

Since 1980, based on documented records reported to NMFS, there have been a total of 90 relocation sea turtles takes by relocation trawlers in the COE New Orleans District (NOD), which is the closest COE district to the action area. Although the documented relocation take is from the closest COE district to the action area, NMFS established the allocation of estimated or anticipated take by species using species ratio data, but believes actual estimated take by relocation trawler within the action area may be lower, because the majority of the relocation takes are associated with channel dredging projects and not sand mining projects, where turtles are less likely to be found.

Based on NMFS' past experience with the COE, NMFS anticipates MMS has the ability to dredge, on average, 25,000 yd^3/day (5,000 yd^3/load, 5 loads/day), between 120-180 days/year, and to dredge 3-4.5 million yd^3 of sand per year at any one location. Typically, dredging takes place during the months of April through September and not usually during the winter, when hopper dredges have a more difficult time operating because of storms. NMFS believes this proposed action is similar to the previous action analyzed by NMFS for Pelican Island in terms of location, timing, and listed species present, even though the total dredging quantities are substantially different.

NMFS developed the relocation trawling take based on project duration, project location, and past experience with summertime relocation trawling by the COE in the northern Gulf of Mexico (e.g., in FY03, Shoreline Consulting captured 12 turtles at Aransas Pass; REMSA captured 71 turtles in Aransas Pass, relocation trawling at Brownsville Entrance Channel captured at least 5 more, and relocation trawling at the MR-GO captured 7 in 2½ weeks, for a FY03 total of 85 turtles). More recently, relocation trawling in the MR-GO in winter 2004-2005 captured 81 turtles. Further, the section on indirect effects of the action for this opinion is based on the previous opinion to NMFS HCD for the Pelican Island segment of the Barataria Barrier Shoreline Complex Restoration Project, which estimated 25 sea turtle takes by relocation trawler for 100 days of dredging and for 3.6 million cubic yards of material.

Using the available information on relocation trawling take in the NOD and summertime relocation trawling by the COE in the northern Gulf of Mexico, the past experience with the COE and anticipated MMS dredging, as well as the Barataria Barrier Island opinion which estimated take to be 25 sea turtles/2.5 million yd^3/year, NMFS estimates total non-lethal, non-injurious take associated with relocation trawling for the proposed action to be no more than 76 sea turtles (46 loggerhead, 20 Kemp's ridley, or 10 green) per two years or no more than a total of 152 sea turtles (91 loggerhead, 38 Kemp's ridley, or 23 green) for the duration of the proposed action, which consists of Whiskey Island and the Morganza to the Gulf projects. As previous indicated, the duration of the proposed action will span several years depending on weather, equipment, and funding limitations, but actual dredging is based on 120-180 days/year for a total of 35-54 months (3-4.5 years) of dredging time, if dredging was continuous without any delays. Relocation trawling associated with this project is a combined estimate of anticipated turtle take by trawls in the 0-3 days prior to project start-up, and anticipated take by relocation trawling during the estimated 120-180 days of hopper dredging per year (April-September) for the duration of the proposed activity. Relocation trawling may result in sea turtle takes, but given the low estimated injury or mortality rate associated with short-duration relocation trawling, these takes are not expected to be injurious or lethal. To further prevent the possibility of any additional sea turtle mortality over the course of the proposed action by hopper dredge, we calculated our estimated sea turtle take by relocation trawling more conservatively than for the estimated take by hopper dredge. Because we believe relocation trawling is not as harmful to sea turtles as hopper dredges are, we based our estimated relocation take on a four-year project time period rather than a five-year time period even though there is no clear time period for the proposed action, only a range period. Using this method, we can be sure that the proposed action is less likely to exceed the authorized directed take, by hopper dredge under the incidental take statement since we are authorizing the take by relocation trawling to be lower than expected.

In summary, NMFS believes that properly conducted and supervised relocation trawling (i.e., observing trawl speed and tow-time limits, and taking adequate precautions to release captured animals) and tagging is unlikely to result in adverse effects to sea turtles. Overall, NMFS believes that sea turtle trawling and relocation efforts will result in considerably less than 0.5% mortality of captured turtles, and any such unexpected mortality would primarily be due to the turtles being previously stressed or diseased or if struck by trawl doors or accidents on deck. However, hopper dredge entrainments invariably result in injury, and are almost always fatal. In the present opinion, NMFS requires relocation trawling and tagging as methods of reducing sea turtle entrainment in hopper dredges and to document the effects of relocation trawling, according to criteria defined in the ITS.

Effects and desirability of tagging relocated animals:
Tagging prior to release will help NMFS to understand more about sea turtle movements, age, and growth, as well as to help identity these animals after they are released. Further, if the turtles are recaptured, it will enable improvements in relocation trawling design to further reduce the effect of the take. External and internal flipper tagging (e.g., with Inconel and PIT tags) are not considered harmful procedures by the sea turtle research community. Sea turtle tagging is routinely done by thousands of volunteers in the United States and abroad and can be safely accomplished with minimal training. NMFS has no evidence to suggest that flipper tagging has resulted in mortality or serious injury to a trawl-captured sea turtle. NMFS believes such an occurrence would be extremely unlikely because the technique of applying a flipper tag is minimally traumatic and relatively non-invasive; also, these tags are attached using sterile techniques. Important life history and migratory behavior data may be obtained from turtles captured and subsequently relocated. Limited sea turtle life history information is available; consequently, the tagging (and scanning for pre-existing tags) of sea turtles prior to release is important.

Fresh Takes vs. Decomposed Takes
The incidental level of sea turtle take is anticipated to consist of “fresh dead” animals. However, NMFS realizes that dredging may encounter an additional unquantifiable number of “previously dead” sea turtles, or turtle parts. While decomposed animals taken in federal operations are considered to be takes (the possession of a listed species is considered a take), NMFS recognizes that decomposed sea turtles, whose deaths were not necessarily related to the dredging activity, may be entrained by the dredge. Reviews of observer records reveal that entrainment of old turtle bones during hopper dredging operations does occasionally occur. Hence, takes of decomposed listed species will be evaluated on a case-by-case basis by NMFS and these takes, depending upon the circumstances, may or may not be ascribed to the ongoing dredging operation and may or may not be counted towards the anticipated take level. NMFS relies heavily on the unbiased onboard-endangered species observer reports and other sources of information (such as commercial fisheries operating in the area) when determining listed species take. Provided that NMFS concurs with the action agency’s determination regarding the stage of decomposition, condition of the specimen, and ultimately the likely cause of mortality, the take may or may not be attributed to the incidental take level for a project. Similarly, sometimes parts of one dismembered turtle are taken in separate loads, sometimes several days apart; if the parts are a good “match” and appear to be from the same animal, NMFS will likely determine that only a single turtle was taken. NMFS will evaluate these situations carefully in consultation with the action agency and

Endangered species observer personnel before reaching a determination on whether or not to count these as takes.

Effects of Dredged Material Placement on Sea Turtles (Direct and Indirect Effects)

In addition to the above direct and indirect effects of dredging analyzed for the proposed action, NMFS assessed the potential effects of dredged material placement on sea turtles. NMFS believes deposition of dredged materials on the beach or in the littoral nearshore environment for beach renourishment and creation of island, wetland, marsh, and shallow-water habitats in the Gulf of Mexico by MMS during beach restoration or habitat restoration projects described in the proposed action section of this opinion will not adversely affect sea turtles in the water that are under NMFS' jurisdiction because the sediment will be mostly deposited onto or near the beach. Nearshore habitats for foraging sea turtles are present in sufficient quantities such that removal of relatively small portions of potential foraging habitat will not cause measurable adverse effects on sea turtles. Turtles are highly mobile and should be able to easily avoid a descending sediment plume discharged at the surface. Also, NMFS believes that foraging habitat for sea turtles is not likely to be impacted by dredging operations since foraging grounds are not believed to be a limiting factor in the Gulf of Mexico. The removal of foraging habitat for sea turtles is dependent upon the recovery rate of the benthic communities in the dredged area. The BA submitted by MMS expects benthic recolonization to take between 3-24 months and concludes that the impacts to sea turtle foraging habitats are expected to be temporary; NMFS agrees with the assessment. The Morganza to the Gulf hurricane protection project is located mostly inland away from any potential sea turtle habitat. The Morganza project area that is near the water, adjacent to Morgan City, Louisiana, and southeast of New Iberia, Louisiana, is not suitable sea turtle habitat. Hence, because the project area is mostly inland and the area that will impact the water community is shallow and marshy, NMFS believes this project is not likely to adversely affect potential sea turtle habitat. Overall, NMFS believes sea turtles will move to surrounding foraging areas and therefore the temporary loss of potential foraging areas by the proposed action should not have any measurable adverse effects on sea turtles.

Because sea turtles nest on land but spend the majority of their life cycle in the ocean, responsibility for their conservation is shared between the NMFS and the USFWS. According to USFWS personnel, the ESA Section 7 and 10 consultation processes between MMS and the USFWS are ongoing at this time for the Whiskey Island section of this two-phased project (B. Firmin, personal communication, November 23, 2004). The USFWS has only completed consultation for the Morganza to Gulf project and this section of the consultation concluded that there were no expected adverse affects to sea turtles as a result of the proposed action.

6.0 Cumulative Effects

Cumulative effects are the effects of future state, local, or private activities that are reasonably certain to occur within the action area. Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Within the action area, major future changes are not anticipated in the ongoing human activities described in the environmental baseline. The present, major human uses of the action area are expected to continue at the current levels of intensity in the near future.

Throughout the coastal Gulf of Mexico, the loss of thousand of acres of wetlands is occurring due to natural subsidence and erosion, as well as reduced sediment input from the Mississippi River. Impacts caused by residential, commercial, and agricultural developments appear to be the primary causes of wetland loss in Texas.

Oil spills from tankers transporting foreign oil, as well as the illegal discharge of oil and tar from vessels discharging bilge water, will continue to affect water quality in the Gulf of Mexico. Cumulatively, these sources and natural oil seepage contribute most of the oil discharged into the Gulf of Mexico. Floating tar sampled during the 1970s, when bilge discharge was still legal, concluded that up to 60 percent of the pelagic tars sampled did not originate from northern Gulf of Mexico coast.

Marine debris will likely persist in the action area in spite of national and international treaty prohibitions. In Texas and Florida, approximately half of the stranded turtles examined have ingested marine debris (Plotkin and Amos 1990, Bolten and Bjorndal 1991). Although few individuals are affected, entanglement in marine debris may contribute more frequently to the death of sea turtles.

Coastal runoff and river discharges carry large volumes of petrochemical and other contaminants from agricultural activities, cities, and industries into the Gulf of Mexico. The coastal waters of the Gulf of Mexico have more sites with high contaminant concentrations than other areas of the coastal United States due to the large number of waste discharge point sources. The species of turtles analyzed in this opinion may be exposed to and accumulate these contaminants during their life cycles. A limited number of Gulf sturgeon (n=12) have been analyzed for pesticides and heavy metals (Bateman and Brim 1994). Results demonstrated that each individual fish had concentrations of arsenic, mercury, DDT metabolites, toxaphene, polycyclic aromatic hydrocarbons, and aliphatic hydrocarbons high enough to warrant concern (USFWS et al. 1995). Specific sources were not identified.

Beachfront development, lighting, and beach erosion control all are ongoing activities along the Atlantic and Gulf coasts. These activities potentially reduce or degrade sea turtle nesting habitats or interfere with hatchling movement to sea. Nocturnal human activities along nesting beaches may also discourage sea turtles from nesting sites. The extent to which these activities reduce sea turtle nesting and hatchling production is unknown. However, as conservation awareness spreads, more and more coastal cities and counties are adopting more stringent measures to protect hatchling sea turtles from the disorienting effects of beach lighting.

Because many activities that affect marine habitat involve some degree of federal authorization (e.g., through MMS or COE), NMFS expects ESA section 7 will apply to most major, future actions that could affect designated Gulf sturgeon critical habitat.

State-regulated commercial and recreational fishing activities in Atlantic Ocean and Gulf of Mexico waters currently result in the incidental take of threatened and endangered species. It is expected that states will continue to license/permit large vessel and thrill-craft operations that do not fall under the purview of a federal agency, and issue regulations that will affect fishery activities. Any increase in recreational vessel activity in inshore and offshore waters of the Gulf of Mexico and Atlantic Ocean will likely increase the number of turtles taken by injury or mortality in vessel collisions. Recreational hook-and-line fisheries have been known to lethally take sea turtles. Future cooperation between NMFS and the states on these issues should help decrease take of sea turtles caused by recreational activities. NMFS will continue to work with coastal states to develop and refine ESA section 6 agreements and section 10 permits to enhance programs to quantify and mitigate these takes.

7.0 Jeopardy Analysis: Effect of Action on Likelihood of Survival and Recovery

According to the Final ESA Section 7 consultation handbook (March, 1998), an action must be viewed against the aggregate effects of everything that has led to the species' current status and, for non-federal activities, those factors likely to affect the species in the future when evaluating whether an action is likely to jeopardize the continued existence of a species. Jeopardy analyses must describe how NMFS considered: (1) the status of the species, (2) the environmental baseline, (3) all the effects of the proposed action, and (4) the cumulative effects of other anticipated actions. Based on the regulations implementing the ESA (50 CFR 402.02), jeopardy is defined as engaging in an action which would be expected, directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species, all of which must be considered given the aggregate effects of the action. In Section 5.0, we have outlined how the effect of hopper dredging is anticipated to affect sea turtles, and the extent of those effects in terms of biennial estimated take. The following is an assessment of the sea turtle species' response to the action impact and whether those impacts would appreciably reduce the species' likelihood of surviving and recovering in the wild, thereby jeopardizing the continued existence of the species.

Likelihood of Survival and Recovery
Lethal Take

The Final ESA section 7 consultation handbook (March 1998), describes survival as the species' persistence, as listed or as a recovery unit, beyond the conditions leading to its endangerments, with sufficient resilience to allow recovery from endangerment. Survival is the ability for a species to continue to exist into the future while retaining the potential for recovery.

The first survival and recovery component evaluated was the action's effects on species' reproduction. Species' reproduction may be impaired by several factors including, but not limited to the following: the take of mature breeding females, impacts to nesting grounds, impacts to mating or courtship behavior, impacts to environmental conditions (water temperature, tide/current conditions, water quality, or moon phase), and impacts to juvenile or hatchling survival rates. As described in Section 5.0, the effects of the action, the estimated removal of no more than 14 sea turtles (10 loggerhead, 2 Kemp's ridley and 2 green sea turtles) biennially and no more than 23 (17 loggerhead, 3 Kemp's ridley, 3 green sea turtles) for the duration of the proposed activity would be a reduction in numbers. However, the proposed activity is not expected to specifically take a particular sex or any specific size class. Both adult and juvenile sea turtles may be taken by the proposed action, but it is likely that smaller turtles may be more vulnerable to hopper dredges (Andrew Jackson, Coastwise Consulting, per. comm. to E. Hawk, June 22, 2005). The take of male juveniles may affect survivorship and recruitment rates of the future reproductive population in any given year, and yet not significantly reduce the reproductive potential of the overall population since most female loggerhead, Kemp's ridley, and green sea turtles usually breed with several males during any given breeding season. The mortality of mature breeding females can have an immediate effect on the reproductive rate of the species, although there is no evidence to suggest that hopper dredging will specifically take mature breeding females.

Additionally, based on the most current loggerhead sea turtle population assessment (NMFS SEFSC 2001), researchers believe that the south Florida subpopulation is increasing, and while no trend is evident for the northern subpopulations it is thought to be stable. Since a low of 750 nests in 1985 for Kemp's ridley sea turtles, in the Rancho Nuevo area, the largest known nesting area, it appears the nesting population has steadily been increasing. Total population estimates for the green turtle are also unavailable, but relative abundance data indicates the number of nests has increased on Hutchinson Island, Florida, a known nesting area, over the period 1971-1989. Overall, according to the Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute Index Nesting Beach Survey Database, green sea turtle nesting in Florida has been increasing since 1989. Total nest counts and trends at index beach sites during the past decade suggest the numbers of green sea turtles that nest within the southeastern United States are increasing. Further, trends at Tortuguero, Costa Rica (ca. 20,000-50,000 nests/year) showed a significant increase in nesting during the period 1971-1996 (Bjorndal et al. 1999), and more recent information continues to show increasing nest counts. Therefore, it seems reasonable that there is an increase in immature green sea turtles inhabiting coastal areas of the southeastern United States; however, the magnitude of this increase is unknown.

Further, based on our understanding of relationships between variability in vital rates (for example, age- or stage-specific rates of survival or fecundity) and among different populations, a species' reproductive potential and a species' probability of persistence over time, NMFS believes the population will be able to withstand some level of mortality without appreciably reducing the species' likelihood of survival and recovery in the wild since sea turtle populations overall appear to be currently stable and long-term population trends have not been decreasing. Therefore, NMFS believes the lethal takes are not expected to reduce the species' likelihood of surviving in the wild. The proposed action is not expected to impact loggerhead, Kemp's ridley, or green sea turtle nesting grounds, breeding, or any breeding area since the action area is located offshore Louisiana, which is a considerable distance away from any potential and known mating or breeding areas. Breeding areas are believed to be located in offshore waters adjacent to nesting beaches. Similar to salmonid species, it is believed that sea turtles are "imprinted" with their birth location and return to that specific beach to nest, usually in 2, 3, or 4-year intervals after reaching maturity. Thus, it is highly unlikely that mating sea turtles of any species will be impacted by the proposed action because there are no known nesting grounds within the vicinity of the action area and most turtles do not breed annually. It is believed that if there were any turtles within the action area it is likely they would only be passing through the action area and not specifically migrating in large population numbers to any breeding grounds within the vicinity of action area. The proposed activity is not expected to have any long-term impacts to water quality since dredging effects are usually only temporary and short-term. In the absence of sea turtle absolute population numbers, sex ratio, age, and size-class information that will be affected by the action, NMFS believes that even if all takes were to consist of mature females of each species the relatively small numbers of takes are not expected to appreciably reduce the numbers found in any given age class or the current and overall future reproductive potential. Given all the information, NMFS believes the proposed activity is unlikely to have any effect on the reproductive potential of loggerhead, Kemp's ridley, or green sea turtles.

The second survival and recovery component evaluated was the action's effect on species' numbers. As described in Section 5.0, the effects of the action, the estimated removal of no more than 14 sea turtles (10 loggerhead, 2 Kemp's ridley and 2 green sea turtles) biennially and no more than 23 (17 loggerhead, 3 Kemp's ridley, 3 green sea turtles) for the duration of the proposed activity would be a reduction in numbers. Although any level of take associated with an action theoretically may have a negative effect on the overlying population, the ability of a species to withstand some level of take or mortality (natural or human-caused) is dependent upon the size and population dynamics (growth or decline). In order for a population not to be negatively affected by the action, mortality must not exceed the numbers expected through population growth (births, reproduction or recruitment). Sea turtles are known to have high reproduction potential since they have the ability to lay over 100 eggs per nest and usually lay several nests per season, although sea turtles do not nest every year. Based on the most current population assessments (NMFS SEFSC 2001) for loggerhead, Kemp's ridley, and green sea turtles, which show that their populations are stable or increasing, the anticipated small number of takes as a result of the proposed activity, and the anticipated continuing recovery of these species, NMFS believes the proposed action is unlikely to have any effect on the overall numbers of green, loggerhead, and Kemp's ridley sea turtles.

The third and final survival and recovery component evaluated was the action's effect on species' distribution. Loggerheads are circumglobal, inhabiting continental shelves, bays, estuaries, and lagoons in temperate, subtropical, and tropical waters. In the Atlantic, the loggerhead turtle's range extends from Newfoundland to as far south as Argentina. During the summer, nesting occurs in the lower latitudes. The primary Atlantic nesting sites are along the east coast of Florida, with additional sites in Georgia, the Carolinas, and the Gulf Coast of Florida. In the eastern Pacific, loggerheads are reported as far north as Alaska, and as far south as Chile. Occasional sightings are also reported from the coast of Washington, but most records are of juveniles off the coast of California. Southern Japan is the only known breeding area in the North Pacific. Loggerhead turtles seem to have wide abiotic tolerance range levels occurring in many marine geographical areas. Because of the anticipated small number of takes from a population that is found throughout the majority of the oceans, NMFS believes it is highly unlikely for loggerhead distribution to be impacted or diminished by the proposed action.

Adult Kemp' ridley sea turtles are usually found only in the Gulf of Mexico; one of two sea turtle species with a restricted distribution (the other is the flatback). Juvenile and immature Kemp's ridely sea turtle range between tropical and temperate coastal areas of the northwestern Atlantic Ocean. Occasionally, young turtles reach northern European waters and as far south as the Moroccan coast. In comparison to other sea turtle species, Kemp's ridley sea turtles do have a restricted distribution; however, NMFS believes it is unlikely that the take of two Kemp's ridley sea turtles will curtail distribution.

In the southeastern United States, green turtles are found around the U.S. Virgin Islands, Puerto Rico, and the continental U.S. from Texas to Massachusetts. Important feeding grounds in Florida include Indian River Lagoon, the Florida Keys, Florida Bay, Homosassa, Crystal River and Cedar Key. The primary nesting sites in U.S. Atlantic waters are along the east coast of Florida, with additional sites in the U.S. Virgin Islands and Puerto Rico. Green turtles are found throughout the North Pacific, ranging as far north as Eliza Harbor, Admiralty Island, Alaska, and Ucluelet, British Columbia. In the eastern North Pacific, green turtles have been sighted from Baja California to southern Alaska. In the central Pacific, green turtles can be found at most tropical islands. In U.S. Hawaiian waters, green turtles are found around most of the islands in the Hawaiian Archipelago. The primary nesting site is at French Frigate Shoals. Green turtles are found in the Gulf of Mexico, but are mostly found near hard bottom communities. Accordingly, since the occurrence of green sea turtles is rare within the action area, NMFS believes the take of a small amount (two green turtles) is unlikely to limit the overall distribution of the species.

Species distribution may be influenced by the following factors, but are not limited to: temperature, prey availability, climatic, colonization, dispersal, abiotic factors (limits and optimal conditions), population status, adaptation, genetics (spatial isolation), competition, and predation. NMFS believes none of these factors will be negatively influenced by the action. Overall, populations are lower than historical levels; however, based on the most current information, population levels for loggerhead, Kemp's ridley and green sea turtles (NMFS SEFSC 2001) are stable and actually may be increasing for some sea turtle species. Further, the action will not have any long-term effects on any abiotic (water quality) parameters and no impacts to temperature, prey availability, climatic, colonization, dispersal, abiotic factors (limits and optimal conditions), population status, adaptation, genetics (spatial isolation), competition, or predation are anticipated; thus, the action is not expected to reduce green turtle distribution. Therefore, NMFS believes the take of 14 sea turtles (10 loggerhead, 2 Kemp's ridley, 2 green sea turtles) biennially and up to total of 23 sea turtles (17 loggerhead, 3 Kemp's ridley, 3 green sea turtles) over the life of the proposed activity is unlikely to impact the current or future species' distribution.

Non-lethal Take

NMFS estimates total non-lethal, non-injurious take associated with relocation trawling for the proposed action may result in the capture of no more than 76 sea turtles (46 loggerhead, 20 Kemp's ridley, or 10 green) biennially or no more than a total of 152 sea turtles (91 loggerhead, 38 Kemp's ridley, or 23 green) for the duration of the proposed action, which consists of Whiskey Island and the Morganza to the Gulf project. Relocation trawling may result in sea turtle takes, but these takes are not expected to be injurious or lethal due to the short duration of the tow times (15 to 30 minutes per tow; not more than 42 minutes) and required safe-handling procedures. Therefore, the non-lethal takes are not expected to reduce the species' numbers, reproduction or distribution, and thus will not appreciably reduce the species likelihood of surviving in the wild. Relocation trawling will relocate sea turtles away from the area, but it will not result in any sea turtle distribution changes since relocation will be close (within 3-6 nmi) to the capture area and recapture information indicates that turtles usually remain within the capture area.

Jeopardy Analysis Summary

In summary, we must apply the "jeopardy" standard, which requires us to consider those effects on a species' survival and recovery in the wild and whether the action threatens the continued existence of the species. Specifically, the "jeopardy" standard requires us to identify the probable effect of changes in reproduction, in numbers, and distribution. Therefore, based upon our review of the best available information, including the effects of the proposed action, the status of the species, the environmental baseline, recovery plans, the most current stock assessment, and cumulative effects, NMFS has determined that the MMS's proposed action *is not* likely to appreciably reduce the likelihood of both the survival and preclude the recovery of loggerhead, green, Kemp's ridley sea turtles in the wild by reducing their reproduction, numbers, or distribution in the wild.

8.0 Conclusion

In summary, because of the expected low number of interactions with the species under consideration, NMFS believes that the effects of the proposed MMS's authorized hopper dredging activities are not reasonably expected to jeopardize the continued existence of loggerhead, Kemp's ridley, or green sea turtles in the wild.

9.0 Incidental Take Statement

Section 9 of the ESA and federal regulations issued pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided such taking is in compliance with the terms and conditions of an incidental take statement.

The measures described below are non-discretionary and must be undertaken by MMS so that they become binding conditions of any grant, permit, contract or other authorization issued to Gulf of Mexico hopper dredge or relocation trawl operators for the exemption in section 7(o)(2) to apply. The MMS has a continuing duty to regulate the activity covered by this incidental take statement. If the MMS (1) fails to assume and implement the terms and conditions, or (2) fails to require the hopper dredge or relocation operators to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the authorizing document, the protective coverage of section 7(o)(2) will lapse. In order to monitor the impact of incidental take, the MMS must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR 402.14(i)(3)].

Only incidental take resulting from the agency action, including incidental take caused by activities approved by the agency, that are identified in this statement and that comply with the specified reasonable and prudent measures and terms and conditions are exempt from the take prohibition of section 9(a) of the ESA.

Amount or Extent of Anticipated Take

Take of sea turtles

NMFS has determined that there is an expected impact to sea turtles by the proposed action in the action area as a result of the activities associated with hopper dredging. Therefore, pursuant to section 7(b)(4) of the ESA, NMFS anticipates the total take associated with hopper dredging to be 14 sea turtles (10 loggerhead, 2 Kemp's ridley, 2 green sea turtles) biennially and up to total of 23 sea turtles (17 loggerhead, 3 Kemp's ridley, 3 green sea turtles) for the entire project, which consists of Whiskey Island and the Morganza to the Gulf project. **This anticipated take level of up to 14 sea turtles/every two years and 23 sea turtles for the life of the project represents the total authorized documented (i.e., observed and counted by onboard endangered species observers) take assuming 50 percent observer coverage.**

In addition, NMFS estimates that relocation trawling in association with the proposed action may result in the capture of no more than 76 sea turtles (46 loggerhead, 20 Kemp's ridley, or 10 green) per two years or no more than a total of 152 sea turtles (91 loggerhead, 38 Kemp's ridley, or 23 green) for the duration of the proposed action, which consists of Whiskey Island and the Morganza to the Gulf project. Relocation trawling is required under specific circumstances. This relocation trawling may result in sea turtle takes, but given the low documented injury and mortality rates associated with short-duration relocation trawling, these takes are not expected to be injurious or lethal. NMFS believes that properly conducted and supervised relocation trawling (i.e., observing trawl speed and tow-time limits, and taking adequate precautions to release captured animals) and tagging is unlikely to result in adverse effects to sea turtles. NMFS believes that, overall, sea turtle trawling and relocation efforts will result in considerably less than 0.5% mortality of captured turtles, which could result primarily from the turtles being previously stressed or diseased or if struck by trawl doors or accidents on deck. Nonetheless, hopper dredge entrainments invariably result in injury, and are almost always fatal. In the present opinion, NMFS requires relocation trawling and tagging as methods of reducing sea turtle entrainment in hopper dredges and to document the effects of relocation trawling, according to criteria defined in this ITS.

Effect of the take

This opinion determines that the aforementioned level of anticipated take (lethal or non-lethal) is not likely to appreciably reduce either the survival or recovery of loggerhead, Kemp's ridley, or green, in the wild. Specifically, NMFS does not expect the activities associated with the proposed action, when added to ongoing activities affecting these species in the action area and cumulative effects, to affect these listed species in a way that measurable or significantly reduces the numbers of offspring, numbers, or distribution. The proposed action is therefore not likely to result in jeopardy to any of the above-mentioned species.

10.0 Reasonable and Prudent Measures

Regulations (50 CFR Section 402.02) implementing section 7 of the ESA define reasonable and prudent measures as actions the Director believes necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take. The reasonable and prudent measures that NMFS believes are necessary to minimize the impacts of hopper dredging in the Gulf of Mexico have been discussed with the MMS and include:

- use of intake and overflow screening,
- use of sea turtle deflector dragheads,
- observer and reporting requirements, and
- sea turtle relocation trawling
- sedimentation levels

The following terms and conditions are established to implement these measures, and to document incidental takes. Only incidental takes that occur while these measures are in full implementation are authorized. These restrictions remain valid until completion of the proposed action or until reinitiation and conclusion of any subsequent section 7 consultation.

11.0 Terms and Conditions

1. O*bservers*: The MMS shall arrange for NMFS-approved observers to be aboard the hopper dredges to monitor the hopper spoil, screening, and dragheads for sea turtles and their remains. As previously described in the mitigation measures proposed by MMS and which were incorporated as part of the proposed action, one observer (50 percent coverage) shall be utilized for visually inspecting incoming dredge spoils for turtle remains. One observer shall be aboard each hopper dredge. The observer shall notify NMFS' PRD immediately by phone **(727-824-5312)** or fax **(727-824-5309)** if the dredge takes a sea turtle.

2. *Screening*: One hundred percent inflow screening of dredged material is required and 100 percent overflow screening is recommended. If conditions prevent 100 percent inflow screening, inflow screening may be reduced gradually, as further detailed in the following paragraph, but 100 percent overflow screening is then required. NMFS' PRD must be consulted **prior** to the reductions in screening and an explanation must be included in the dredging report.

    a. Screen Size: The hopper's inflow screens should have 4-inch by 4-inch screening. If the MMS, in consultation with observers and the draghead operator, determines that the draghead is clogging and reducing production substantially, the screens may be modified sequentially: mesh size may be increased to 6-inch by 6-inch, then 9-inch by 9-inch, then 12-inch by 12-inch openings. Clogging should be greatly reduced with these flexible options; however, further clogging may compel removal of the screening altogether, in which case **effective** 100 percent overflow screening is mandatory. The MMS shall notify NMFS' PRD **beforehand** if inflow screening is going to be reduced or eliminated, and provide details of how effective overflow screening will be achieved.

b. Need for Flexible, Graduated Screens: NOAA Fisheries believes that this flexible, graduated-screen option is necessary, since the need to constantly clear the inflow screens will increase the time it takes to complete the project and therefore increase the exposure of sea turtles to the risk of impingement or entrainment. Additionally, there are increased risks to sea turtles in the water column when the inflow is halted to clear screens, since this results in clogged intake pipes, which may have to be lifted from the bottom to discharge the clay by applying suction.

3. *Dredging Pumps*: Standard operating procedure shall be that dredging pumps shall be disengaged by the operator when the dragheads are not firmly on the bottom, to prevent impingement or entrainment of sea turtles within the water column. This precaution is especially important during the cleanup phase of dredging operations when the draghead frequently comes off the bottom and can suck in turtles resting in the shallow depressions between the high spots the draghead is trimming off.

4. *Sea Turtle Deflecting Draghead*: Rigid deflector dragheads must be used at all times on all hopper dredges mining sand at the borrow areas.

5. *Dredge Take Reporting*: Observer reports of incidental take by hopper dredges must be faxed to NMFS' Southeast Regional Office, PRD **(727-824-5517)**, by the onboard endangered species observer within 24 hours of any observed sea turtle take.

   A preliminary report summarizing the results of the hopper dredging and detailing any documented sea turtle takes must be submitted to NMFS' PRD within 30 working days of completion of the dredging project. The report shall contain information on project location (specific area dredged), start-up and completion dates, cubic yards of material dredged, problems encountered, incidental takes and sightings of protected species, mitigative actions taken (if relocation trawling, the number and species of turtles relocated), screening type (inflow, overflow) utilized, daily water temperatures, name of dredge, names of endangered species observers, percent observer coverage, and any other information the MMS deems relevant.

6. *Sea Turtle Strandings*: The MMS Project Manager or designated representative shall notify the Sea Turtle Stranding and Salvage Network (STSSN) state representative (contact information available at: http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp) of the start-up and completion of hopper dredging operations and ask to be notified of any sea turtle strandings in the project area that, in the estimation of STSSN personnel, bear signs of potential draghead impingement or entrainment.

   Information on any such strandings shall be reported in writing within 30 days of project end to NOAA Fisheries' Southeast Regional Office. Because the deaths of these turtles, if hopper dredge or bed-leveler dredge-related, have already been accounted for in

NMFS' jeopardy analysis, and because of different possible explanations for, and subjectivity in the interpretation of potential causes of strandings, these strandings will not be counted against the MMS's take limit.

7. *Reporting - Strandings*: The MMS shall provide to NMFS' Southeast Regional Office, PRD, a final report in writing within 30 days of project end detailing incidents, with photographs when available, of stranded sea turtles that bear indications of draghead impingement or entrainment. This reporting requirement may be included in the project completion report required in Term and Condition No. 5a, above.

8. *Relocation Trawling*: 24-hour relocation trawling shall be conducted subject to the following conditions:

a. Relocation trawling (a minimum of 12 hours/day) shall be conducted for the three days (72 hours) immediately prior to commencement of hopper dredging operations, to reduce the abundance of sea turtles in the project area. If no turtle is captured during this time period, then relocation trawling will not be required unless takes occur during dredging.

b. If a sea turtle is taken by a relocation trawler during the 72-hour pre-dredging period, relocation trawling must be conducted for a minimum of 7 consecutive days following the take.

c. If no turtle is taken during relocation trawling and hopper dredging for 7 consecutive days, then relocation trawling may be discontinued. However, if a sea turtle is subsequently taken during hopper dredging, then relocation trawling will be immediately re-implemented for a minimum of 7 consecutive days; however, dredging may continue

9. *Relocation Trawling Take Limits*: This opinion authorizes the biennial take of 76 sea turtles (of loggerhead, green, Kemp's ridley or combination of) and a limit of 152 sea turtles (of loggerhead, green, Kemp's ridley or combination of) for the project, in association with all relocation trawling conducted by or contracted by the MMS to reduce the abundance of sea turtles during the three days immediately preceding the start of hopper dredging and during hopper dredging, subject to the following conditions:

a. *Trawl Time*: Trawl tow-time duration shall not exceed 42 minutes (doors in - doors out) and trawl speeds shall not exceed 3.5 knots.

b. *Handling During Trawling*: Sea turtles captured pursuant to relocation trawling shall be handled in a manner designed to ensure their safety and viability, and shall be released over the side of the vessel, away from the propeller, and only after ensuring that the vessel's propeller is in the neutral, or disengaged, position (i.e., not rotating). Resuscitation guidelines are attached (Appendix V).

c. *Captured Turtle Holding Conditions*: Captured turtles shall be kept moist, and shaded whenever possible, until they are released.

d. *Weight and Size Measurements*: All turtles shall be measured (standard carapace measurements including body depth) and tagged, and weighed when safely possible, prior to release. Any external tags shall be noted and data recorded into the observers log. Only NMFS-approved observers or observer candidates in training under the direct supervision of a NMFS-approved observer shall conduct the tagging/measuring/weighing/tissue sampling operations.

e. *Take and Release Time During Trawling*: Turtles shall be kept no longer than 12 hours prior to release and shall be released not less than three NM from the dredge site. If two or more released turtles are later recaptured, subsequent turtle captures shall be released not less than five NM away. If it can be done safely, turtles may be transferred onto another vessel for transport to the release area to enable the relocation trawler to keep sweeping the dredge site without interruption.

f. *Injuries and Incidental Take Limits*: Any protected species injured or killed during or as a consequence of relocation trawling shall count toward the incidental take limit. Minor skin abrasions resulting from trawl capture are considered non-injurious. Injured sea turtles shall be immediately transported to the nearest sea turtle rehabilitation facility.

g. *Flipper Tagging*: All sea turtles captured by relocation trawling shall be flipper-tagged prior to release with external tags which shall be obtained prior to the project from the University of Florida's Archie Carr Center for Sea Turtle Research. This opinion serves as the permitting authority for any NMFS-approved endangered species observer aboard these relocation trawlers to flipper-tag with external tags (e.g., Inconel tags) captured sea turtles. Columbus crabs or other organisms living on external sea turtle surfaces may also be sampled and removed under this authority.

h. *PIT-Tag Scanning*: All sea turtles captured by relocation trawling (or dredges) shall be thoroughly scanned for the presence of PIT tags prior to release using a scanner powerful enough to read dual frequencies (125 and 134 kHz) and read tags deeply embedded deep in muscle tissue (e.g., manufactured by Biomark or Avid). Turtles which scans show have been previously PIT tagged shall never-the-less be externally flipper tagged. The data collected (PIT tag scan data and external tagging data) shall be submitted to NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All data collected shall be submitted in electronic format within 60 working days to Lisa.Belskis@noaa.gov.

i. *CMTTP:* External flipper tag and PIT tag data generated and collected by relocation trawlers shall also be submitted to the Cooperative Marine Turtle Tagging Program (CMTTP), on the appropriate CMTTP form, at the University of Florida's Archie Carr Center for Sea Turtle Research.

j. *Tissue Sampling*: All live or dead sea turtles captured by relocation trawling or dredging shall be tissue-sampled prior to release, according to the protocols described in Appendix III or Appendix IV of this opinion. Tissue samples shall be sent within 60 days of capture to: NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All data collected shall be submitted in electronic format within 60 working days to Lisa.Belskis@noaa.gov. This opinion serves as the permitting authority for any NMFS-approved endangered species observers aboard relocation trawlers or hopper dredges to tissue-sample live- or dead-captured sea turtles, without the need for a section 10 permit.

k. *Cost Sharing of Genetic Analysis*: The MMS shall pay for collection, shipping, and analysis by NMFS scientists, of up to 32 tissue samples taken during MMS-authorized hopper dredging operations in the Gulf of Mexico. The cost of analysis is currently estimated by NMFS to be about $100-150 per sample, or $3,200-$4,800. MMS funds shall be provided to NMFS' Southwest Fisheries Center's Dr. Peter Dutton within six months of completion of the project.

l. *PIT Tagging:* PIT tagging is <u>not required or authorized for, and shall not be conducted by,</u> ESOs who do not have 1) section 10 permits authorizing said activity <u>and</u> 2) prior training or experience in said activity; however, if the ESO has received prior training in PIT tagging procedures <u>and is also authorized to conduct said activity by a section 10 permit, then the ESO</u> **<u>must</u>** <u>PIT tag the animal</u> prior to release (in addition to the standard external flipper tagging). PIT tagging must then be performed in accordance with the protocol detailed at NMFS' Southeast Science Center's webpage: http://www.sefsc.noaa.gov/seaturtlefisheriesobservers.jsp. (See Appendix C on SEC's "Fisheries Observers" webpage). PIT tags used must be sterile, individually wrapped tags to prevent disease transmission. PIT tags should be 125 kHz, glass-encapsulated tags _ the smallest ones made. Note: If scanning reveals a PIT tag and it was not difficult to find, then **do not** insert another PIT tag; simply record the tag number and location, and frequency, if known. If for some reason the tag is difficult to detect (e.g., tag is embedded deep in muscle, or is a 400 mHz tag), then insert one in the other shoulder.

m. *Other Sampling Procedures*: All other tagging and external or internal sampling procedures (e.g., PIT tagging, blood letting, laparoscopies, anal and gastric lavages, mounting satellite or radio transmitters, etc.) performed on live sea turtles are **<u>not permitted under this opinion unless</u>** the observer holds a valid sea turtle research permit (obtained pursuant to section 10 of the ESA, from the NMFS' Office of Protected Resources, Permits Division) authorizing the activity, either as the permit holder, or as designated agent of the permit holder.

p. Handling Fibropapillomatose Turtles: When handling sea turtles infected with fibropapilloma tumors, observers must either: 1) clean all equipment that comes in contact with the turtle (tagging equipment, tape measures, etc.) with mild bleach solution, between the processing of each turtle or 2) maintain a separate set of sampling equipment for handling animals displaying fibropapilloma tumors or lesions.

10. *Hardground Buffer Zones*: All dredging in sand mining areas will be designed to ensure that dredging will not occur within a minimum of 400 feet from any significant hardground areas or bottom structures that serve as attractants to sea turtles for foraging or shelter. NMFS considers (for the purposes of this opinion only) a significant hardground in a project area to be one that, over a horizontal distance of 150 feet, has an average elevation above the sand of 1.5 feet or greater, <u>and</u> has algae growing on it.

11. *Training - Personnel on Hopper Dredges*: The MMS must ensure that all contracted personnel involved in operating hopper dredges receive thorough training on measures of dredge operation that will minimize takes of sea turtles. Operating procedures shall be consistent with those that have been used successfully by the U.S. Army Corps of Engineers during hopper dredging in other regions of the coastal United States, and which have proven effective in reducing

turtle/dredge interactions. Therefore, MMS shall consult and coordinate with appropriate experts in the matter of hopper dredge operation training, and installation, adjustment, and monitoring of the rigid deflector draghead assembly.

12. *Dredge Lighting*: From May 1 through October 31, sea turtle nesting and emergence season, all lighting aboard hopper dredges and hopper dredge pumpout barges operating within three NM of sea turtle nesting beaches shall be limited to the minimal lighting necessary to comply with U.S. Coast Guard and/or OSHA requirements. All non-essential lighting on the dredge and pumpout barge shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to minimize illumination of the water to reduce potential disorientation effects on female sea turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward from their natal beaches.

13. *Sedimentation Levels*. In order to reduce potential sedimentation damage to habitats adjacent to sand mining sites hopper dredges operating at offshore sand mining sites shall maintain a minimum distance of 400 feet from hardgrounds since these areas may attract sea turtles.

12.0 Conservation Recommendations

Section 7(a)(1) of the ESA directs federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered or threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or develop information. The following conservation recommendations are made to assist the MMS in contributing to the conservation of sea turtles by further reducing or eliminating adverse impacts that result from hopper dredging.

1. Sodium Vapor Lights on Offshore Equipment: On offshore equipment (i.e., hopper dredges, pumpout barges) shielded low pressure sodium vapor lights are highly recommended for lights that cannot be eliminated.

13.0 Reinitiation of Consultation

This concludes formal consultation on MMS's hopper and hydraulic cutterhead dredging associated with sand mining for coastal restoration projects along the coast of Louisiana using sand from ship shoal in the Gulf of Mexico central planning area, south Pelto blocks 12,13, and 19, and Ship Shoal block 88. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if:

1. the amount or extent of taking specified in the incidental take statement is exceeded (e.g., the total take of any species by hopper dredges is exceeded or a turtle is injuriously or lethally taken by relocation trawling),
2. new information reveals effects of the action that may affect listed species or critical habitat, when designated, in a manner or to an extent not previously considered,
3. the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the opinion, or

4. a new species is listed or critical habitat designated that may be affected by the identified action.

Dredging/Trawling Operations Approaching Take Limits: NMFS requests that MMS initiate discussions with the Southeast Regional Office Protected Resources Division early to identify the potential need for reinitiation of consultation, well in advance of actually exceeding the amount or extent of taking specified in the incidental take statement. NMFS requests notification when:

1. 3 turtles of any combination are taken by a hopper dredge during the project;
2. relocation trawling indicates high abundance of sea turtles (two captures in 24 hours) or significant presence of sea turtles (one or more captures in seven days of trawling),
3. 14 sea turtles (10 loggerhead, 2 Kemp's ridley, or 2 green) biennially have been taken by the hopper dredge; or
4. 76 sea turtles (46 loggerhead, 20 Kemp's ridley, or 10 green) biennially have been taken by relocation trawling.
5. 152 sea turtles (91 loggerhead, 38 Kemp's ridley, or 23 green) over the life of the project have been taken by relocation trawling.

The NMFS Southeast Regional Office will work with the MMS to quickly review such incidents, to discuss the need and advisability of further mitigating measures, and to plan for a reinitiation of consultation if it appears that one of the reinitiation triggers is likely to be met.

Once the need for reinitiation is triggered, the MMS is not necessarily required to suspend dredging or relocation trawling operations pending the conclusion of the reinitiated consultation, so long as the continuation of operations would not violate section 7(a)(2) or 7(d) of the ESA. In that case, the MMS is advised to document its determination that these provisions would not be violated by continuing activities covered by this Opinion during the reinitiation period and to seek NMFS' concurrence with its findings.

14.0 Appendices I - V

Appendix I:

NOVEMBER 19, 2003, REGIONAL BIOLOGICAL OPINION THE U.S. ARMY CORPS OF ENGINEERS, GULF OF MEXICO DISTRICTS, ON HOPPER DREDGING OF NAVIGATION CHANNELS AND SAND MINING SITES IN THE GULF OF MEXICO.

Appendix II:

BIOLOGICAL ASSESSMENT FOR THE BARATARIA BARRIER SHORELINE COMPLEX RESTORATION PROJECT, NOVEMBER 2003: Section 12 - Conservation measures for proposed hopper dredging activities. Pp. 41-48.

Appendix III:PROTOCOL FOR COLLECTING TISSUE FROM DEAD TURTLES FOR GENETIC ANALYSIS

Method for Dead Turtles

<<<IT IS CRITICAL TO USE A NEW SCALPEL BLADE AND GLOVES FOR EACH TURTLE TO AVOID CROSS-CONTAMINATION OF SAMPLES>>>

1. Put on a new pair of latex gloves.
2. Use a new disposable scalpel to cut out an approx. 1 cm (½ in) cube (bigger is NOT better) piece of muscle. Easy access to muscle tissue is in the neck region or on the ventral side where the front flippers "insert" near the plastron. It does not matter what stage of decomposition the carcass is in.
3. Place the muscle sample on a hard uncontaminated surface (plastron will do) and make slices through the sample so the buffer solution will penetrate the tissue.
4. Put the sample into the plastic vial containing saturated NaCl with 20% DMSO *(SEE BELOW)
5. Use the pencil to write the stranding ID number (observer initials, year, month, day, turtle number by day), species, state and carapace length on the waterproof paper label and place it in the vial with the sample. EXAMPLE: For a 35.8 cm curved carapace length green turtle documented by Jane M. Doe on July 15, 2001 in Georgia, the label should read "JMD20010715-01, C. mydas, Georgia, CCL=35.8 cm". If this had been the third turtle Jane Doe responded to on July 15, 2001, it would be JMD20010715-03.
6. Label the outside of the vial with the same information (stranding ID number, species, state and carapace length) using the permanent marker.
7. Place clear scotch tape over the writing on the vial to protect it from being smeared or erased.
8. Wrap parafilm around the cap of the vial by stretching it as you wrap.
9. Place vial within whirlpak and close.
10. Dispose of the scalpel.
11. Note on the stranding form that a part was salvaged, indicating that a genetic sample was taken and specify the location on the turtle where the sample was obtained.
12. Submit the vial with the stranding report to your state coordinator. State coordinators will forward the reports and vials to NMFS for processing and archiving.

*The 20% DMSO buffer in the plastic vials is nontoxic and nonflammable. Handling the buffer without gloves may result in exposure to DMSO. This substance soaks into skin very rapidly and is commonly used to alleviate muscle aches. DMSO will produce a garlic/oyster taste in the mouth along with breath odor. The protocol requires that you WEAR gloves each time you collect a sample and handle the buffer vials.

The vials (both before and after samples are taken) should be stored at room temperature or cooler. If you don't mind the vials in the refrigerator, this will prolong the life of the sample. DO NOT store the vials where they will experience extreme heat (like in your car!) as this could cause the buffer to break down and not preserve the sample properly. Questions: Sea Turtle Program, NOAA/NMFS/SEFSC, 75 Virginia Beach Drive, Miami, FL 33149, 305-361-4207.

THANK YOU FOR COLLECTING SAMPLES FOR SEA TURTLE GENETIC RESEARCH!!
Genetic Sample Kit Materials – DEAD turtles

- latex gloves
- single-use scalpel blades (Fisher Scientific 1-800-766-7000, cat. # 08-927-5A)
- plastic screw-cap vial containing saturated NaCl with 20% DMSO, wrapped in parafilm
- waterproof paper label, ¼” x 4”
- pencil to write on waterproof paper label
- permanent marker to label the plastic vials
- scotch tape to protect writing on the vials
- piece of parafilm to wrap the cap of the vial
- whirl-pak to return/store sample vial

Appendix IV:

PROTOCOL FOR COLLECTING TISSUE FROM LIVE TURTLES FOR GENETIC ANALYSIS

Method for Live Turtles

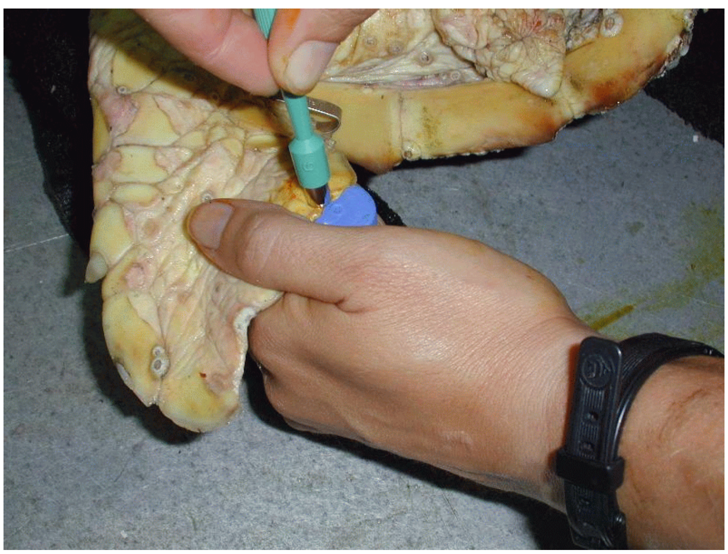
<<<IT IS CRITICAL TO USE A NEW BIOPSY PUNCH AND GLOVES FOR EACH TURTLE TO AVOID CROSS-CONTAMINATION OF SAMPLES>>>

1. Turn the turtle over on its back.
2. Put on a new pair of latex gloves.
3. Swab the entire cap of the sample vial with alcohol.
4. Wipe the ventral and dorsal surfaces of the rear flipper 5-10 cm from the posterior edge with the Betadine/iodine swab.
5. Place the vial under the flipper edge to use the cleaned cap as a hard surface for the punch.
6. Press a new biopsy punch firmly into the flesh as close to the posterior edge as possible and rotate one complete turn. Cut all the way through the flipper to the cap of the vial.
7. Wipe the punched area with Betadine/iodine swab; rarely you may need to apply pressure to stop bleeding.
8. Use a wooden skewer to transfer the sample from the biopsy punch into the plastic vial containing saturated NaCl with 20% DMSO *(SEE BELOW)
9. Use the pencil to write the stranding ID number (observer initials, year, month, day, turtle number by day), species, state and carapace length on the waterproof paper label and place it in the vial with the sample. EXAMPLE: For a 35.8 cm curved carapace length green turtle documented by Jane M. Doe on July 15, 2001 in Georgia, the label should read "JMD20010715-01, C. mydas, Georgia, CCL=35.8 cm". If this had been the third turtle Jane Doe responded to on July 15, 2001, it would be JMD20010715-03.
10. Label the outside of the vial with the same information (stranding ID number, species, state and carapace length) using the permanent marker.
11. Place clear scotch tape over the writing on the vial to protect it from being smeared or erased.
12. Wrap parafilm around the cap of the vial by stretching it as you wrap.
13. Place vial within whirlpak and close.
14. Dispose of the biopsy punch.
15. Note on the stranding form that a part was salvaged, indicating that a genetic sample was taken and specify the location on the turtle where the sample was obtained.
16. Submit the vial with the stranding report to your state coordinator. State coordinators will forward the reports and vials to NMFS for processing and archiving.

*The 20% DMSO buffer in the plastic vials is nontoxic and nonflammable. Handling the buffer without gloves may result in exposure to DMSO. This substance soaks into skin very rapidly and is commonly used to alleviate muscle aches. DMSO will produce a garlic/oyster taste in the mouth along with breath odor. The protocol requires that you WEAR gloves each time you collect a sample and handle the buffer vials.
The vials (both before and after samples are taken) should be stored at room temperature or cooler. If you don't mind the vials in the refrigerator, this will prolong the life of the sample. DO NOT store the vials where they will experience extreme heat (like in your car!) as this could cause the buffer to break down and not preserve the sample properly. Questions: Sea Turtle Program, NOAA/NMFS/SEFSC, 75 Virginia Beach Drive, Miami, Florida, 33149, 305-361-4207.

THANK YOU FOR COLLECTING SAMPLES FOR SEA TURTLE GENETIC RESEARCH!!
Genetic Sample Kit Materials – LIVE turtles

- latex gloves
- alcohol swabs
- Betadine/iodine swabs
- 4-6 mm biopsy punch – sterile, disposable (Moore Medical Supply 1-800-678-8678, part #0052442)
- plastic screw-cap vial containing saturated NaCl with 20% DMSO, wrapped in parafilm
- wooden skewer
- waterproof paper label, ¼” x 4”
- pencil to write on waterproof paper label
- permanent marker to label the plastic vials
- scotch tape to protect writing on the vials
- piece if parafilm to wrap the cap of the vial
- whirl-pak to return/store sample vial



Appendix V: SEA TURTLE HANDLING AND RESUSCITATION GUIDELINES

Any sea turtles taken incidentally during the course of fishing or scientific research activities must be handled with due care to prevent injury to live specimens, observed for activity, and returned to the water according to the following procedures:

A) Sea turtles that are actively moving or determined to be dead (as described in paragraph (B)(4) below) must be released over the stern of the boat. In addition, they must be released only when fishing or scientific collection gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels.

B) Resuscitation must be attempted on sea turtles that are comatose or inactive by:

1. Placing the turtle on its bottom shell (plastron) so that the turtle is right side up and elevating its hindquarters at least 6 inches (15.2 cm) for a period of 4 to 24 hours. The amount of elevation depends on the size of the turtle; greater elevations are needed for larger turtles. Periodically, rock the turtle gently left to right and right to left by holding the outer edge of the shell (carapace) and lifting one side about 3 inches (7.6 cm) then alternate to the other side. Gently touch the eye and pinch the tail (reflex test) periodically to see if there is a response.

2. Sea turtles being resuscitated must be shaded and kept damp or moist but under no circumstance be placed into a container holding water. A water-soaked towel placed over the head, carapace, and flippers is the most effective method in keeping a turtle moist.

3. Sea turtles that revive and become active must be released over the stern of the boat only when fishing or scientific collection gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels. Sea turtles that fail to respond to the reflex test or fail to move within 4 hours (up to 24, if possible) must be returned to the water in the same manner as that for actively moving turtles.

4. A turtle is determined to be dead if the muscles are stiff (rigor mortis) and/or the flesh has begun to rot; otherwise, the turtle is determined to be comatose or inactive and resuscitation attempts are necessary.

Any sea turtle so taken must not be consumed, sold, landed, offloaded, transshipped, or kept below deck.

These guidelines are adapted from 50 CFR § 223.206(d)(1). Failure to follow these procedures is therefore a punishable offense under the Endangered Species Act.

15. 0 BIBLIOGRAPHY

1. Literature Cited - Turtle Species Accounts
2. General References and Other Literature Cited

Literature Cited - Turtle Species Accounts

Audubon, J.J. 1926. The Turtlers. Pp. 194_202 In: Delineations of American Scenery and Character, G.A. Baker and Co., N.Y.

Balazs, G.H. 1982. Growth rates of immature green turtles in the Hawaiian Archipelago, p. 117 - 125. *In* K.A. Bjorndal (ed.), Biology and Conservation of Sea Turtles. Smithsonian Institution Press, Washington, D.C.

Balazs, G.H. 1983. Recovery records of adult green turtles observed or originally tagged at French Frigate Shoals, northwestern Hawaiian Islands. NOAA Tech. Memo. NMFS-SWFC-36.

Balazs, G.H. 1999. Factors to consider in the tagging of sea turtles. In: Research and Management Techniques for the Conservation of Sea Turtles, by K.L. Eckert, K.A. Bjorndal, F.A. Abreu-Grobois, and M. Donnelly (editors). IUCN/SSC Marine Turtle Specialist Group Publication No. 4, 1999.

Bass, A.L., S.P. Epperly, J. Braun, D.W. Owens, and R.M. Patterson. 1998. Natal origin and sex ratios of foraging sea turtles in the Pamlico-Albemarle Estuarine Complex. U.S. Dep. Commer. NOAA Tech. Memo. NMFS-SEFSC-415: 137-138.

Bjorndal, K.A., J.A. Wetherall, A.B. Bolten, and J.A. Mortimer. 1999. Twenty_six years of green turtle nesting at Tortuguero, Costa Rica: an encouraging trend. Conservation Biology 13: 126_134.

Brongersma, L. 1972. European Atlantic Turtles. Zool. Verhand. Leiden, 121: 318 pp.

Caldwell, D.K. and A. Carr. 1957. Status of the sea turtle fishery in Florida. Transactions of the 22nd North American Wildlife Conference, 457-463.

Carr, A.F., M.H. Carr, and A.B. Meylan. 1978. The ecology and migrations of sea turtles, 7. The west Caribbean green turtle colony. Bulletin of the American Museum of Natural History 162: 1-46.

Carr, A. 1984. So Excellent a Fishe. Charles Scribner's Sons, N.Y.

Díez, C.E. 2000. Personal communication to Blair Witherington, FMRI.

Dodd, C.K. 1981. Nesting of the green turtle, *Chelonia mydas* (L.), in Florida: historic review and present trends. Brimleyana 7: 39-54.

Dodd, C.K. 1988. Synopsis of the biological data on the loggerhead sea turtle *Caretta caretta* (Linnaeus 1758). U.S. Fish and Wildlife Service, Biological Report 88 (14).

Doughty, R.W. 1984. Sea turtles in Texas: a forgotten commerce. Southwestern Historical Quarterly 88: 43-70.

Dutton, P.H., B.W. Bowen, D.W. Owens, A. Barragán, and S.K. Davis. 1999. Global phylogeography of the leatherback turtles (*Dermochelys coriacea*). J. Zool. Lond 248:397-409.

Eckert, S.A. and K.L. Eckert, P. Ponganis, and G.L. Kooyman. 1989. Diving and foraging behavior of leatherback sea turtles (*Dermochelys coriacea*). Can. J. Zool. 67:2834-2840.

Eckert, K. L. 1995. Hawksbill sea turtle (*Eretmochelys imbricata*). National Marine Fisheries Service and U.S. Fish and Wildlife Service Status Reviews for Sea Turtles Listed under the Endangered Species Act of 1973. Silver Spring, Maryland: National Marine Fisheries Service, pp. 76-108.

Ehrhart, L.M. 1983. Marine turtles of the Indian River Lagoon System. Florida Sci. 46: 337-346.

Ehrhart, L.M. 1989. Status report of the loggerhead turtle. In Ogren, L., F. Berry, K. Bjorndal, H. Kumpf, R. Mast, G. Medina, H. Reichart, and R. Witham (eds.). Proceedings of the 2nd Western Atlantic Turtle Symposium. NOAA Technical Memorandum NMFS-SEFC-226: 122-139.

Ehrhart, L.M. and B.E. Witherington. 1992. Green turtle. In P. E. Moler (ed.). Rare and Endangered Biota of Florida, Volume III. Amphibians and Reptiles. University Presses of Florida: 90-94.

Epperly, S.P., J. Braun, and A.J. Chester. 1995b. Aerial surveys for sea turtles in North Carolina inshore waters. Fishery Bulletin 93: 254-261.

Ernst, L.H. and R.W. Barbour. 1972. Turtles of the United States. Univ. Kentucky Press, Lexington, Ky.

Florida Marine Research Institute, Florida Dept. of Environmental Protection. 2001. Florida statewide nesting beach survey data. Florida Department of Environmental Protection. Unpublished data.

FPL (Florida Power & Light Co.) St. Lucie Plant. 2000. Annual environmental operating report 1999. Juno Beach, Fla.

Frazer, N.B. and L.M. Ehrhart. 1985. Preliminary growth models for green, *Chelonia mydas*, and loggerhead, *Caretta caretta*, turtles in the wild. Copeia 1985: 73-79.

Frazer, N.B., C.J. Limpus, and J.L. Greene. 1994. Growth and age at maturity of Queensland loggerheads. U.S. Dep. of Commer. NOAA Tech. Mem. NMFS-SEFSC-351:42-45.

Garrison, L. 2003. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2001-2002. U.S. Dep. of Commer. NOAA Tech. Mem. NMFS-SEFSC-515:52p.

Garduño-Andrade, M., Guzmán, V., Miranda, E., Briseño-Dueñas, R., and Abreu, A. 1999. Increases in hawksbill turtle (*Eretmochelys imbricata)* nestings in the Yucatán Peninsula, Mexico (1977-1996): data in support of successful conservation? Chelonian Conservation and Biology 3(2):286-295.

Groombridge, B. 1982. The IUCN Amphibia - Reptilia Red Data Book. Part 1. Testudines, Crocodylia, Rhynchocephalia. Int. Union Conserv. Nature and Nat. Res., 426 pp.

Guseman, J.L. and L.M. Ehrhart. 1992. Ecological geography of Western Atlantic loggerheads and green turtles: evidence from remote tag recoveries. In M. Salmon and J. Wyneken (compilers). Proceedings of the 11th Annual Workshop on Sea Turtle Biology and Conservation, NOAA Technical Memorandum NMFS. NMFS-SEFC-302: 50.

Henwood, T.A. and L.H. Ogren. 1987. Distribution and migrations of immature Kemp's ridley turtles (*Lepidochelys kempii*) and green turtles (*Chelonia mydas*) off Florida, Georgia, and South Carolina. Northeast Gulf Science, 9(2): 153-160.

Herbst, L.H. 1994. Fibropapillomatosis in marine turtles. Annual Review of Fish Diseases 4: 389-425.

Hildebrand, H. 1963. Hallazgo del area de anidación de la tortuga "lora" *Lepidochelys kempii* (Garman), en la costa occidental del Golfo de México (Rept., Chel.). Ciencia Mex., 22(a): 105-112 .

Hildebrand, H. 1982. A historical review of the status of sea turtle populations in the Western Gulf of Mexico. In K.A. Bjorndal (ed.). Biology and Conservation of Sea Turtles. Smithsonian Institution Press, Washington, D.C. 447-453.

Hirth, H.F. 1997. Synopsis of the biological data on the green turtle *Chelonia mydas* (Linnaeus 1758). Biological Report 97(1), Fish and Wildlife Service, U.S. Dept of the Interior. 120 pp.

Hirth, H. 1980. Some aspects of the nesting behavior and reproductive biology of sea turtles. American Zoologist 20:507-523.

Jacobson, E.R. 1990. An update on green turtle fibropapilloma. Marine Turtle Newsletter 49: 7-8.

Jacobson, E.R., S.B. Simpson, Jr., and J.P. Sundberg. 1991. Fibropapillomas in green turtles. In G.H. Balazs, and S.G. Pooley (eds.). Research Plan for Marine Turtle Fibropapilloma, NOAA_TM_NMFS_SWFSC_156: 99_100.

Johnson, S.A., and L.M. Ehrhart. 1994. Nest_site fidelity of the Florida green turtle. In B.A. Schroeder and B.E. Witherington (compilers). Proceedings of the 13th Annual Symposium on Sea Turtle Biology and Conservation, NOAA Technical Memorandum NMFS_SEFSC_341: 83.

Keinath, J.A. 1993. Movements and behavior of wild and head-started sea turtles. Ph.D. Dissertation. College of William and Mary, Gloucester Point, Va., 206 pp.

Lagueux, C.J. 1998. Demography of marine turtles harvested by Miskito Indians of Atlantic Nicaragua. In R. Byles and Y. Fernández (compilers). Proceedings of the 16th Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS_SEFSC_412: 90.

León, Y.M. and C.E. Díez, 2000. Ecology and population biology of hawksbill turtles at a Caribbean feeding ground. Pp. 32-33 *in* Proceedings of the 18th International Sea Turtle Symposium, Abreu-Grobois, F.A., Briseno-Duenas, R. ,Marquez, R., and Sarti, L., Compilers. NOAA Technical Memorandum NMFS-SEFSC-436.

Lutcavage, M. and J.A. Musick. 1985. Aspects of the biology of sea turtles in Virginia. Copeia 1985(2): 449-456.

MacKay, A.L. and J.L. Rebholz. 1996. Sea turtle activity survey on St. Croix, U.S. Virgin Islands (1992_1994). In J.A. Keinath, D.E. Barnard, J.A. Musick, and B.A. Bell (Compilers). Proceedings of the 15th Annual Symposium on Sea Turtle Biology and Conservation. NOAA Tech. Memo. NMFS_SEFSC_387: 178_181.

Magnuson, J.J., K.A. Bjorndal, W.D. DuPaul, G.L. Graham, D.W. Owens, P.C.H. Pritchard, J.I. Richardson, G.E. Saul, and C.W. West. 1990. Decline of the sea turtles: causes and prevention. National Academy Press, Washington, D.C. 274 pp.

Mayor, P., B. Phillips, and Z. Hillis-Starr. 1998. Results of stomach content analysis on the juvenile hawksbill turtles of Buck Island Reef National Monument, U.S.V.I. Pp. 230-232 *in* Proceedings of the 17th Annual Sea Turtle Symposium, S. Epperly and J. Braun, Compilers. NOAA Tech. Memo. NMFS-SEFSC-415.

Meylan, A.B. 1988. Spongivory in hawksbill turtles: a diet of glass. Science 239(393-395).

Meylan, A., B. Schroeder, and A. Mosier. 1995. Sea turtle nesting activity in the State of Florida 1979_1992. Florida Marine Research Publications 52: 1-51.

Meylan, A.B., and M. Donnelly. 1999. Status justification for listing the hawksbill turtle (*Eretmochelys imbricata* as critically endangered on the 1996 IUCN Red List of Threatened Animals. Chelonian Conservation and Biology 3(2): 200-204.

Meylan, A.B. 1999a. The status of the hawksbill turtle (*Eretmochelys imbricata*) in the Caribbean. Region. Chelonian Conservation and Biology 3(2): 177-184.

Meylan, A.B. 1999b. International movements of immature and adult hawksbill turtles (*Eretmochelys imbricata*) in the Caribbean region. Chelonian Conservation and Biology 3(2): 189-194.

Meylan, A.B., in prep. The hawksbill turtle (*Eretmochelys imbricata*). *In* Meylan, P. A,. and G. L. Heinrich, eds. The Biology and Conservation of Florida Turtles. Chelonian Research Monographs.

Morreale, S.J. and E.A. Standora. 1999. Vying for the same resources: potential conflict along migratory corridors. U.S. Dep. Commer. NOAA Tech. Mem. NMFS-SEFSC-415: 69.

Murphy, T.M. and S.R. Hopkins. 1984. Aerial and ground surveys of marine turtle nesting beaches in the Southeast Region. Unpublished report prepared for the National Marine Fisheries Service.

Nietschmann, B. 1982. The cultural context of sea turtle subsistence hunting in the Caribbean and problems caused by commercial exploitation. In K.A. Bjorndal (ed.). Biology and Conservation of Sea Turtles. Smithsonian Institution Press, Washington, D.C. 439-445.

NMFS Southeast Fisheries Science Center. 2001. Stock assessments of loggerhead and leatherback sea turtles and an assessment of the impact of the pelagic longline fishery on the loggerhead and leatherback sea turtles of the Western North Atlantic. U.S. Department of Commerce, National Marine Fisheries Service, Miami, Fla., SEFSC Contribution PRD-00/01-08; Parts I-III and Appendices I-V1.

NMFS and USFWS. 1991a. Recovery Plan for U.S. Population of Atlantic Green Turtle. National Marine Fisheries Service, Washington, D.C.

NMFS and USFWS. 1991b. Recovery Plan for U.S. Population of Loggerhead Turtle. National Marine Fisheries Service, Washington, D.C.

NMFS and USFWS. 1992. Recovery Plan for Leatherback Turtles in the U.S. Caribbean, Atlantic, and Gulf of Mexico. National Marine Fisheries Service, Washington, D.C.

NMFS and USFWS. 1993. Recovery Plan for Hawksbill Turtles in the U.S. Caribbean, Atlantic Ocean, and Gulf of Mexico. National Marine Fisheries Service, St. Petersburg, Fla.

NMFS and USFWS. 1995. Status reviews for sea turtles listed under the Endangered Species Act of 1973. National Marine Fisheries Service, Silver Spring, Md.

Ogren, L.H. 1989. Distribution of juvenile and sub-adult Kemp's ridley sea turtle: Preliminary results from 1984-1987 surveys, pp. 116-123 in: Caillouet, C.W. and A.M. Landry (eds), First Intl. Symp. on Kemp's Ridley Sea Turtle Biol, Conserv. and Management. Texas A&M Univ.Galveston, Tex., Oct. 1-4, 1985, TAMU-SG-89-105.

Parsons, J.J. 1972. The hawksbill turtle and the tortoise shell trade. In: Études de géographie tropicale offertes a Pierre Gourou. Paris: Mouton, pp. 45-60.

Pritchard, P.C.H. 1969. Sea turtles of the Guianas. Bull. Fla. State Mus. 13(2): 1_139.
Renaud, M.L. 1995. Movements and submergence patterns of Kemp's ridley turtles (*Lepidochelys kempii*). Journal of Herpetology 29: 370-374.

Richardson, J.I., Bell, R. and Richardson, T.H. 1999. Population ecology and demographic implications drawn from an 11-year study of nesting hawksbill turtles, *Eretmochelys imbricata*, at Jumby Bay, Long Island, Antigua, West Indies. Chelonian Conservation and Biology 3(2): 244-250.

Ross, J.P. 1979. Historical decline of loggerhead, ridley, and leatherback sea turtles, pp. 189-195. In: Bjorndal, K.A. (editor), Biology and Conservation of Sea Turtles. Smithsonian Institution Press, Washington, D.C.

Schmid, J.R. and W.N. Witzell. 1997. Age and growth of wild Kemp's ridley turtles (*Lepidochelys kempii*): cumulative results of tagging studies in Florida. Chelonian Conserv. Biol. 2: 532 - 537.

Schroeder, B.A., and A.M. Foley. 1995. Population studies of marine turtles in Florida Bay. In J. I. Richardson and T.H. Richardson (compilers). Proceedings of the Twelfth Annual Workshop on Sea Turtle Biology and Conservation, NOAA Technical Memorandum NMFS_SEFSC_361: 117.

Schroeder, B.A., A.M. Foley, B.E. Witherington, and A.E. Mosier. 1998. Ecology of marine turtles in Florida Bay: Population structure, distribution, and occurrence of fibropapilloma. U.S. Dep. Commer. NOAA Tech. Memo. NMFS-SEFSC-415: 265-267.

Schultz, J.P. 1975. Sea turtles nesting in Surinam. Zoologische Verhandelingen (Leiden), Number 143: 172 pp.

Shaver, D.J. 1991. Feeding ecology of wild and head-started Kemp's ridley sea turtles in south Texas waters. Journal of Herpetology. Vol. 23. 1991.

Shaver, D.J. 1994. Relative abundance, temporal patterns, and growth of sea turtles at the Mansfield Channel, Texas. Journal of Herpetology 28: 491_497.

Shoop, C.R. and R.D. Kenney. 1992. Seasonal distributions and abundance of loggerhead and leatherback sea turtles in waters of the northeastern United States. Herpetological Monographs. 6: 43-67.

Smith, G.M. and C.W. Coates. 1938. Fibro-epithelial growths of the skin in large marine turtles, *Chelonia mydas* (Linnaeus). Zoologica 24: 93-98.

Spotila, J.R., A.E. Dunham, A.J. Leslie, A.C. Steyermark, P.T. Plotkin, and F.V. Paladino. 1996. Worldwide population decline of *Dermochelys coriacea*: are leatherback turtles going extinct? Chel. Conserv. Biol. 2(2): 209-222.

Spotila, J.R., R.D. Reina, A.C. Steyermark, P.T. Plotkin and F.V. Paladino. 2000. Pacific leatherback turtles face extinction. Nature 405: 529-530.

TEWG. 1998. An assessment of the Kemp's ridley (*Lepidochelys kempii)* and loggerhead (*Caretta caretta*) sea turtle populations in the western North Atlantic. U.S. Dep. Commer. NOAA Tech. Memo. NMFS-SEFSC-409, 96 pp.

TEWG. 2000. Assessment update for the Kemp's ridley and loggerhead sea turtle populations in the western North Atlantic. U.S. Dep. Commer. NOAA Tech. Mem. NMFS_SEFSC-444, 115 pp.

USFWS and NMFS. 1992. Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*). National Marine Fisheries Service, St. Petersburg, Fla.

van Dam, R. and C. Díez, 1997. Predation by hawksbill turtles on sponges at Mona Island, Puerto Rico. Pp. 1421-1426, Proc. 8th International Coral Reef Symposium, v. 2.

van Dam, R. and C. Díez. 1998. Home range of immature hawksbill turtles (*Eretmochelys imbricata*) at two Caribbean islands. Journal of Experimental Marine Biology and Ecology, 220(1):15-24.

Wershoven, J.L. and R.W. Wershoven. 1992. Juvenile green turtles in their nearshore habitat of Broward County, Florida: a five-year review. In M. Salmon and J. Wyneken (compilers). Proceedings of the 11th Annual Workshop on Sea Turtle Biology and Conservation, NOAA Technical Memorandum NMFS. NMFS-SEFC-302: 121-123.

Witherington, B.E., and L.M. Ehrhart. 1989. Status and reproductive characteristics of green turtles (*Chelonia mydas*) nesting in Florida. In L. Ogren, F. Berry, K. Bjorndal, H. Kumpf, R. Mast, G. Medina, H. Reichart, and R. Witham (eds.). Proceedings of the 2nd Western Atlantic Turtle Symposium, NOAA Technical Memorandum NMFS_SEFC_226: 351_352.

Zug, G.R.. and J.F. Parham. 1996. Age and growth in leatherback turtles, *Dermochelys coriacea* (Testudines: Dermochelyidae): a skeletochronological analysis. Chel. Conserv. Biol. 2(2): 244-249.

Zwinenberg. A.J. 1977. Kemp's ridley, *Lepidochelys kempii* (Garman, 1880), undoubtedly the most endangered marine turtle today (with notes on the current status of *Lepidochelys olivacea*). Bulletin of the Maryland Herpetological Society, 13(3): 170-192.

2. General References and Other Literature Cited

Aguilar, R., J. Mas, and X. Pastor. 1995. Impact of Spanish swordfish longline fisheries on the loggerhead sea turtle *Caretta caretta* population in the western Mediterranean. U.S. Dep. Commer. NOAA Tech. Memo. NMFS_SEFSC_361:1_6.

Aguirre, A.A., Balazs, G., Zimmerman, B. and F.D. Galey. 1994. Organic contaminants and trace metals in the tissues of green turtles (*Chelonia mydas*) affected with fibropapillomas in the Hawaiian Islands. Marine Pollution Bulletin 28:109-114.

Anonymous. 1990. Sources of oil pollution in the oceans. Marine Conservation News 2(3):1-20, Autumn.

Applied Biology, Inc. 1993. Florida Power & Light Company, St. Lucie Unit 2 annual environmental operating report. AB-631. Prepared by Applied Biology, Inc. for Florida Power & Light Co. Juno Beach, Florida, pp. 71.

Babcock, H.L. 1937. The sea turtles of the Bermuda Islands, with a survey of the present state of the turtle fishing industry. Proc. Zool. Soc. Lond. 107: 595_601.

Bagley, D. and L. Ehrhart. 2000. Unpublished data.

Barlow, J. and P.J. Clapham. 1997. A new birth-interval approach to estimating demographic parameters of humpback whales. Ecology 78(2): 535-546.

Bass, A.L. 1999. Genetic analysis of juvenile loggerheads captured at the St. Lucie Power Plant.A report to National Marine Fisheries Service and Quantum Resources, Inc.

Bass, A.L., S-M. Chow, and B.W. Bowen. 1999. Final report for project titled: genetic identities of loggerhead turtles stranded in the Southeast United States. Unpublished report to NMFS, order number 40-AANF809090. Department of Fisheries and Aquatic Sciences, University of Florida, Gainesville, Fla., 11 pp.

Bass, A.L., S.P. Epperly, J. Braun, D.W. Owens, and R.M. Patterson. 1998. Natal origin and sex ratios of foraging sea turtles in the Pamlico-Albemarle Estuarine Complex. U.S. Dep. Commer. NOAA Tech. Memo. NMFS-SEFSC-415:137-138.

Bass, A. L., C. J. Lagueux, and B. W. Bowen. 1998. Mixed stock composition of the Miskitu Cays green turtle fishery based on mtDNA markers. In S. P. Epperly, and J. Braun (Compilers). Proceedings of the Seventeenth Annual Sea Turtle Symposium. NOAA Tech. Memo. NMFS_SEFSC_415:7.

Belardo E., R. Matos, and F. Ortiz. 2000. Annual Report, Sea Turtle Conservation Project on Vieques Island. Department of Natural and Environmental Resources, San Juan, Puerto Rico. Report to U.S. Naval Station Roosevelt Roads.

Belardo, E., R. Matos, and F. Ortiz. 1999. 1998 Annual Report, Sea Turtle Conservation Project on Vieques Island. Department of Natural and Environmental Resources, San Juan, Puerto Rico.. Report to U.S. Naval Station Roosevelt Roads.

Belardo, E., R. Matos, and F.J. Ortiz.. 1998. 1997 Annual Report, Sea Turtle Conservation Project on Vieques Island. Department of Natural and Environmental Resources, San Juan, Puerto Rico. Report to U.S. Naval Station Roosevelt Roads.

Belardo, E., R. Matos, and F.J. Sanez. 1997. 1996 Annual Report, Sea Turtle Conservation Project on Vieques Island. Department of Natural and Environmental Resources. Report to U.S. Naval Station Roosevelt Roads.

Belardo, E., R. Matos, and F.J. Ortiz. 1996. 1995 Annual Report, Sea Turtle Conservation Project on Vieques Island. Department of Natural and Environmental Resources, San Juan, Puerto Rico. Report to U.S. Naval Station Roosevelt Roads.

Belardo, E., R. Matos, and J.F. Sanez. 1995. 1994 Annual Report, Sea Turtle Conservation Project on Vieques Island. Department of Natural and Environmental Resources, San Juan, Puerto Rico. Report to U.S. Naval Station Roosevelt Roads.

Belardo, E., R. Matos, and G. Roman. 1994. 1993 Annual Report, Sea Turtle Conservation Project on Vieques Island. Department of Natural and Environmental Resources, San Juan, Puerto Rico. Report to U.S. Naval Station Roosevelt Roads.

Belardo, E., R. Matos, and G. Roman. 1993. 1992 Annual Report, Sea Turtle Conservation Project on Vieques Island, Final Draft. Department of Natural and Environmental Resources, San Juan, Puerto Rico. Report to U.S. Naval Station Roosevelt Roads.

Bellmund, S., M.T. Masnik, and G. Laroche. 1982. Assessment of the impacts of the St. Lucie Nuclear Plant on threatened or endangered species. U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation. Docket No. 50-398, pp 68.

Best, P.B. 1979. Social organization in sperm whales, *Physeter macrocephalus*. In: H.E. Winn and B.L. Olla (Eds.) Behavior of marine animals, volume 3: cetaceans, p.227-289. Plenum Press, N.Y.

Bishop, C.A., Brown, G.P., Brooks, R.J., Lean, D.R.S., and J.H. Carey. 1994. Organochlorine contaminant concentrations in eggs and their relationship to body size and clutch characteristics of the female common snapping turtle (*Chelydra serpentina*) in Lake Ontario, Canada. Archives of Environmental Contamination and Toxicology 27:82-87.

Bishop, C.A., Brooks, R.J., Carey, J.H., Ng, P., Norstrom, R.J. and D.R.S. Lean. 1991. The case for a cause-effect between environmental contamination and development in eggs of the common snapping turtle (*Chelydra serpentina*) from Ontario, Canada. Journal of Toxicology and Environmental Health 33:521-547.

Bjorndal, K.A., A.B. Bolten, and H.R. Martins. In press. Somatic growth model of juvenile loggerhead sea turtles: duration of the pelagic stage.

Bjorndal, K.A., Bolten, A.B., and C.J. Lagueux. 1994. Ingestion of marine debris by juvenile sea turtles in coastal Florida habitats. Marine Pollution Bulletin, Vol. 28, No. 3, 154-158.

Bjorndal, K.A., A.B. Bolten, J. Gordon, and J.A. Camiñas. 1994a. *Caretta caretta* (loggerhead) growth and pelagic movement. Herp. Rev. 25:23-24.

Bjorndal, K.A., A.B. Meylan, and B.J. Turner. 1983. Sea turtles nesting at Melbourne Beach, Florida. I. Size, growth and reproductive biology. Biological Conservation 26:65-77.

Blaylock, Robert A., J.W. Hain, L.J. Hansen, D.L. Palka, and G.T. Waring. 1995. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments. NOAA Technical Memorandum NMFS-SEFSC-363. July. 211 pp.

Bolten, A.B., K.A. Bjorndal, H.R. Martins, T. F Dellinger, M.J. Biscoito, S.E. Encalada, and B.W. Bowen. 1998. Trans-Atlantic developmental migrations of loggerhead sea turtles demonstrated by mtDNA sequence analysis. Ecological Applications 8:1-7.

Bolten, A.B., K.A. Bjorndal, and H.R. Martins. 1994. Life history model for the loggerhead sea turtle (*Caretta caretta*) populations in the Atlantic: Potential impacts of a longline fishery. U.S. Dep. Commer. NOAA Tech. Memo. NMFS-SWFC-201:48-55.

Bolten, A.B., H.R. Martins, K.A. Bjorndal, and J. Gordon. 1993. Size distribution of pelagic-stage loggerhead sea turtles (*Caretta caretta*) in the waters around the Azores and Madeira. Arquipelago 11A: 49-54.

Bolten, A.B. and K.A. Bjorndal. 1991. Effects of marine debris on juvenile, pelagic sea turtles. Interim Project Report to the National Marine Fisheries Service Marine Entanglement Research Program. 41 pp.

Bowen, B.W., J.C. Avise, J.I. Richardson, A.B. Meylan, D. Margaritoulis, and S.R. Hopkins_Murphy. 1993. Population structure of loggerhead turtles (*Caretta caretta*) in the northwestern Atlantic Ocean and Mediterranean. Sea. Conserv. Biol. 7:834_844.

Bowen, B.W. 1995. Tracking marine turtles with genetic markers. BioSci. 45:528_53.

Brown, C.A., J.A. Cramer, and A. Bertolino. 2000. Estimates of bycatch by the U.S. Atlantic pelagic longline fleet during 1993-1998. Proceedings of the Sixth National Stock Assessment Workshop, March 28-30, 2000. NOAA Tech. Memo. NMFS-NWFSC.

Brown, C. 2000. Fishery Biologist, NMFS-Pelagic Longline Observer Program. Personal communication to Terri Jordan, NMFS, Silver Spring, MD.

Burchfield, P. 1996a. Personal Communication. Gladys Porter Zoo, Brownsville, Texas.

Burchfield, P. 1996b. Report on the Mexico/United States of America Kemp's ridley sea turtle population restoration project at the Rancho Nuevo, Barra Del Tordo, Barra Ostionales, Tepehuajes, La Pesca and Altamira Camps, Tamaulipas, Mexico. U.S. Department of Commerce, National Marine Fisheries Service.

Byles, R.A. 1988. Behavior and ecology of sea turtles from Chesapeake Bay, Virginia. A dissertation presented to the faculty of the School of Marine Science, The College of William and Mary in Virginia, in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

Caldwell, D.K. and D.S. Erdman. 1969. Pacific ridley sea turtle, *Lepidochelys olivacea*, in Puerto Rico. Bull. So. Calif. Acad. Sci. 68: 112.

Cannon, A.C. and J.P. Flanagan. 1996. Trauma and treatment of Kemp's ridley sea turtlews caught on hook-and-line by recreational fishermen. Draft abstract submitted for the 18th Annual Sea Turtle Symposium, Hilton Head, SC. February.

Carocci, F. and J. Majkowski. 1998. Aatlas of tuna and billfish catches. CD-ROM version 1.0. FAO, Rome, Italy.

Carr, A. 1987. New perspectives on the pelagic stage of sea turtle development. Conserv. Biol. 1:103-121.

Carr, A.F. 1954. The passing of the fleet. A. I .B. S. Bull. 4(5):17_19.

Carr, A.F. 1952. Handbook of Turtles. Ithaca, New York: Cornell University Press.

Carr, A.F., M.H. Carr and A.B. Meylan. 1978. The ecology and migrations of sea turtles. 7. The western Caribbean green turtle colony. Bull. Amer. Mus. Nat. Hist. 162(1):1_46.

Carr, A.F. and L. Ogren. 1960. The ecology and migrations of sea turtles. 4. The green turtle in the Caribbean Sea. Bull. Amer. Mus. Nat. Hist. 131(1):1_48.

CeTAP. 1982. A characterization of marine mammals and turtles in the mid- and north-Atlantic areas of the U.S. outer continental shelf, Final Report. U.S. Dept. of Interior, Bureau of Land Management, Contract No. AA551-CT8-48, Washington, D.C. 538 pp.

Chevalier, J. and Girondot, M. 1998. Nesting dynamics of marine turtles in French Guiana during the 1997 nesting season. Bull. Soc. Herp. Fr., 85_86: 5_19.

Clapham, P.J. and J.G. Mead. 1999. *Megaptera novaeangliae*. Mammalian Species. No. 604. 9 pp.

Clark, C.W. 1995. Application of U.S. Navy underwater hydrophone arrays for scientific research on whales. Rep. IWC 45: 210-212.

Clarke, M.R. 1980. Cephalapoda in the diet of sperm whales of the Southern Hemisphere and their bearing on sperm whale biology. Discovery Rep. 37:1-324.

Clarke, M.R. 1962. Stomach contents of a sperm whale caught off Madeira in 1959. Norsk Hvalfangst-tidende 51(5):173-191.

Coe, J.M., Rogers, D.B., Alexander, D.E., Laist, D.W. 1996. Marine Debris Sources, Impacts, and Solutions. National Marine Fisheries Service, ISBN 0-387-94759-0.

Cox, B.A. and Mauermann, R. G. Incidental Catch and Disposition of Sea Turtles by the Brownsville-Port Isabel Gulf Shrimp Fleet. 5 pp.

Cramer, J. and H. Adams. 2000. Large pelagic logbook newsletter: 1998. NOAA Tech. Memo. NMFS-SEFSC-433. 25 pp.

Crouse, D.T. 1999. The consequences of delayed maturity in a human-dominated world. American Fisheries Society Symposium. 23:195-202.

Crouse, D.T., L.B. Crowder, and H. Caswell. 1987. A stage-based population model for loggerhead sea turtles and implications for conservation. Ecol. 68:1412-1423.

Crowder, L.B., D.T. Crouse, S.S. Heppell, and T.H. Martin. 1994. Predicting the impact of turtle excluder devices on loggerhead sea turtle populations. Ecol. Applic. 4:437-445.

Dahlen, M.K., R. Bell, J.I. Richardson, and T.H. Richardson. 2000. Beyond D-0004: Thirty-four years of loggerhead (*Caretta caretta*) research on Little Cumberland Island, Georgia, 1964-1997. Proceedings of the Eighteenth International Sea Turtle Symposium. U.S. Dept. of Commerce, NOAA Technical Memorandum NMFS_SEFSC_436, pp. 60_62.

Dahlgren. 2000. Noise Blast Test Results Aboard USS Cole. Report from Dahlgren Division, Naval Surface Warfare Center to Commander-in Chief, U.S. Atlantic Fleet (N3). 18 July.

Davis, R. 2000. Personal Communication to Kathy Wang, NMFS St. Petersburg, Fla.

Davenport, J. and J. Wrench. 1990. Metal levels in a leatherback turtle. Marine Pollution Bulletin 21:40-41.

Dellinger, T. and H. Encarnacao. 2000. Accidental capture of sea turtles by the fishing fleet based at Madeira Island, Portugal. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SEFSC-443:218.

Department of Defense. 1999. The National Security Need for Vieques. July.

Department of the Navy. 1998. Shock Testing the SEAWOLF submarine. Final Environmental Impact Statement. Department of the Navy with cooperation from the National Marine Fisheries Service.

Dickerson, D.D. and D.A. Nelson. 1989. Recent results on hatchling orientation responses to light wavelengths and intensities. Pages 41-43 *in* Eckert, S.A., K.L. Eckert, and T.H. Richardson (compilers). Proceedings of the 9th Annual Workshop on Sea Turtle Conservation and Biology. NOAA Technical Memorandum NMFS-SEFSC-232.

Dickerson, D.D. and J.E. Clausner. 2003. Draft: Summary of Sea Turtle/Dredging Issues and Recommended Action Tasks Generated by the Improved Draghead Design Meeting, September 4, 2003, Atlanta, Georgia. U.S. Army Corps of Engineers, Engineering Research and Development Center, Vicksburg, Mississippi. 13pp.

Díez, C.E. 2000. Personal communication to Blair Witherington, FMRI.

Díez, C.E. and R.P. van Dam. 2000. Research Report for 1999 with summary of findings 1995 - 1999. Mona and Monito Island Hawksbill Turtle Research Project. Puerto Rico Department of Natural Resources, San Juan, PR (Díez)/Scripps Institute of Oceanography, La Jolla, CA (van Dam)

Doughty, R.W. Sea turtles in Texas: A forgotten commerce. Southwestern Historical Quarterly:43-70.

Eckert, K.L. 1993. Draft Status Review of Sea Turtles Listed Under the Endangered Species Act of 1973. Leatherback Sea Turtle *Dermochelys coriacea*. Prepared for NMFS, Silver Spring, MD.

Ecology and Environment. 1980. Environmental impact statement for the continued use of the Atlantic Fleet Weapons Training Facility, Inner Range (Vieques),Puerto Rico.

Ehrhart, L.M. 1983. Marine turtles of the Indian River lagoon system. Florida Sci. 46(3/4):337_346.

Ehrhart, L.M. 1979. A survey of marine turtle nesting at Kennedy Space Center, Cape Canaveral Air Force Station, North Brevard County, Florida, 1_122. Unpublished report to Division of Marine Resources, St. Petersburg, Florida, Fla. Dept. Nat. Res.

Epperly, S.P. and Braun-McNeill. 2002. The Use of AVHRR Imagery and the Management of Sea Turtle Interactions in the Mid Atlantic Bight. NMFS Southeast Fisheries Science Center. Unpublished.
Ernst, L.H. and R.W. Barbour. 1972. Turtles of the United States. Univ. Kentucky Press, Lexington Kentucky.

Epperly, S.A. 1996. Personal Communication. NMFS Beaufort Laboratory, North Carolina.

Epperly, S.P., J. Braun, and A. Veishlow. 1995. Sea turtles in North Carolina waters. Conserv. Biol. 9:384-394.

Epperly, S.P., J. Braun, A. J. Chester, F.A. Cross, J. . Merriner, and P.A. Tester. 1995. Winter distribution of sea turtles in the vicinity of Cape Hatteras and their interactions with the summer flounder trawl fishery. Bull. Mar. Sci. 56(2):519-540.

Epperly, S.A., Braun, J., Chester, A.J., Cross, F.A., Merriner, J.V., and P.A. Tester. 1994. Beach strandings as an indicator of at-sea mortality of sea turtles. Submitted to Fishery Bulletin. January 10, 1994.

Erdman, D.S., J. Harms, and M.M. Flores. 1973. Cetacean records from the northeastern Caribbean region. Cetology 17. 14 pp.

Expert Working Group (Byles, R, C. Caillouet, D. Crouse, L. Crowder, S. Epperly, W. Gabriel, B. Gallaway, M. Harris, T. Henwood, S. Heppell, R. Marquez-M, S. Murphy, W. Teas, N. Thompson, and B. Witherington) 1996. Kemp's ridley sea turtle (*Lepidochelys kempii*) status report. Submitted to NMFS June 28, 1996.

Expert Working Group (Byles, R, C. Caillouet, D. Crouse, L. Crowder, S. Epperly, W. Gabriel, B. Gallaway, M. Harris, T. Henwood, S. Heppell, R. Marquez-M, S. Murphy, W. Teas, N. Thompson, and B. Witherington) 1996. Status of the loggerhead turtle population (*Caretta caretta*) in the Western North Atlantic. Submitted to NMFS July 1, 1996.

Florida Marine Research Institute. Unpublished Data. Index Nesting Beach Survey Database. St. Petersburg, Fla.

Florida Power & Light Co. 1985. Sea turtle intake entrapment studies. Special Document 4/9/85.

Florida Power & Light Co. 2000. Physical and ecological factors influencing sea turtle entrainment at the St. Lucie Nuclear Plant: 1976-1998.

Florida Power & Light Co. 2000. M. Bressette. Unpublished data.

Foley, A. 2000. Florida Marine Research Institute, St. Petersburg, Fla. Personal communication.

Francisco, A.M., A.L. Bass, K.A. Bjorndal, A.B. Bolten, R. Reardon, M. Lamont, Y. Anderson, J. Foote, and B.W. Bowen. 2000. Stock structure and nesting site fidelity in Florida loggerhead turtles (*Caretta caretta*) resolved with mtDNA sequences. Unpublished Manuscript. Department of Fisheries and Aquatic Sciences, University of Florida, Gainesville, 23pp.

Frazer, N.B. 1992. Sea turtle conservation and halfway technology. Cons. Biol. 6:179-184.

Frazer, N.B., C.J. Limpus, and J.L. Greene. 1994. Gorwth and age at maturity of Queensland loggerheads. U.S. Dep. of Commer. NOAA Tech. Mem. NMFS-SEFSC-351: 42-45.

Frazer, N.B. and L.M. Ehrhart. 1985. Preliminary growth models for green, *Chelonia mydas*, and loggerhead, *Caretta caretta*, turtles in the wild. Copeia 1985:73-79.

Fuller, D.A. and Tappan, A.M. The Occurrence of Sea Turtles in Louisiana Coastal Waters. Coastal Fisheries Institute, Center for Wetland Resources, Louisiana State University. 1986 Sep. 46 pages.

Fulton, J. 1998. Personal Communication. U.S. Department of the Interior, Fish and Wildlife Service, Bon Secour National Wildlife Refuge, AL.

Gambell, R. 1985. Sei whale -- *Balaenoptera borealis*. In: Ridgway, S.H. and R. Harrison, eds. Handbook of marine mammals. Vol. 3: The sirenians and baleen whales. London: Academic Press. Pp. 155-170.

Geo-Marine, Inc. 1996. Land Use Management Plan for U.S. Naval Facilities Vieques, Puerto Rico

Gitschlag, G. 2001. NMFS Laboratory, Galveston, TX. Personal communication (July 24 e-mail) to Eric Hawk, NMFS, St. Petersburg, Fla.

Gitschlag, G. 1998. NMFS Laboratory, Galveston, TX. Personal communication to Kathy Wang, NMFS, St. Petersburg, Fla.

Gitschlag, G., and B.A. Herczeg. 1994. Sea Turtle Observations at Explosive Removals of Energy Structures. Marine Fisheries Review 56(2) pp 1-8.

Hansen, L.J., D.D. Mullin, T.A. Jefferson, and G.P. Scott. 1996. Visual surveys aboard ships and aircraft. Pages 55-132 in R.W.

Hain, J.H.W., M.J. Ratnaswamy, R.D. Kenney, and H.E. Winn. 1992. The fin whale in waters of the northeastern U.S. continental shelf. Rep. IWC 42: 653-669.

Harmer, K.B.E. 1923. Cervical vertebrae of a gigantic blue whale from Panama. Proceed. Zool. Soc. London 1923: 1085-1089.

Hastings, M. 2000. Analyses of sound levels by Mark 45 ship-to-shore guns. Unpublished report, 8 pp. Provided by Richard Copaken, Esq., to NMFS SERO.

Henwood, T.A., W. Stuntz, and N. Thompson. 1992. Evaluation of U.S. Turtle Protective Measures under existing TED regulations, including estimates of shrimp trawler related mortality in the Wider Caribbean. NOAA Tech Memo NMFS-SEFSC-303.

Henwood, T.A. and W. Stuntz. 1987. Analysis of sea turtle captures and mortalities during commercial shrimp trawling. Fishery Bulletin 85(4): 813-817.

Heppell, S.S., D.T. Crouse, L.B. Crowder, S.P. Epperly, and N.B. Frazer. In preparation. Population models for Atlantic loggerheads: past, present and future. In A. Bolten and B. Witherington, eds. Ecology and Conservation of Loggerhead Sea Turtles, Univ. Florida Press (presented at special loggerhead symposium in Orlando, Florida, March 2000).

Hildebrand, H. 1982. A historical review of the status of sea turtle populations in the western Gulf of Mexico, pp. 447-453 in Bjorndal, K., (ed.), Biology and Conservation of Sea Turtles. Proc. World Conf. of Sea Turtle Conserv. Smithsonian Inst. Press. Washington, D.C.

Hildebrand, H.H. Random Notes on Sea Turtles in the Western Gulf of Mexico. Western Gulf of Mexico Sea Turtle Workshop Proceedings, January 13-14, 1983. 1983 Oct:34-41. Note: A copy of the entire Workshop Proceedings is at SP000480.

Hilborn, R. 1998. The economic performance of marine stock enhancement projects. Bulletin of Marine Science, 62(2):661-674.

Hirth, H.F. 1971. Synopsis of biological data on the green turtle *Chelonia mydas* (Linnaeus) 1758. FAO Fisheries Synopsis. 85:1_77.

Hopkins-Murphy, S.R., and T.M. Murphy, Jr. 1988. Status of the loggerhead turtle in South Carolina, p. 35-37. In: B.A. Schroeder (comp.), Proceedings of the Eighth Annual Workshop on Sea Turtle Conservation and Biology. NOAA Tech. Memo. NMFS-SEFSC-214.

Iverson, S., D.M. Allen, and J.B. Higman. 1993. Shrimp capture and culture fisheries of the United States. Imprint of John Wiley & Sons, Inc. New York.

IWC. Committee for Whaling Statistics. 1959-1983. International whaling statistics, volumes 41-91. Comm. Whaling Stat., Oslo, Norway, var. paging.

Jefferson, T.A., S. Leatherwood, and M.A. Webber. 1993. FAO species identification guide. Marine Mammals of the World. Rome: Food and Agriculture Organization.

Johnson, D.R., C. Yeung, and C.A. Brown. 1999. Estimates of marine mammal and marine turtle bycatch by the U.S. Atlantic pelagic longline fleet in 1992_1997. U.S. Dep. Commer. NOAA Tech. Memo. NMFS_SEFSC_418, 70 pp.

Katona, S.K. and J.A. Beard. 1990. Population size, migrations, and feeding aggregations of the humpback whale in the western North Atlantic ocean. Rep. IWC Special Issue 12: 295-306.

Keinath, J.A. 1993. Movements and behavior of wild and head-started sea turtles. Ph.D. Diss. College of William and Mary, Gloucester Point, Va., 206 pp.

Klima, E.F. 1986. Summary report on biological impacts of offshore petroleum platform severance using explosives. NMFS Galveston Laboratory.

Klima, E.F., G.R. Gitschlag, and M.L. Renaud. 1988. Impacts of the explosive removal of offshore petroleum platforms on sea turtles and dolphins. Marine Fisheries Review, 50(3) pp 33-42.

Laist, D.W., A.R. Knowlton, J.G. Mead, A.S. Collet, and M. Podesta. 2001. Collisions between ships and whales. Mar. Mamm. Sci. 17: 35-7

Laist, D.W. 1997. Impacts of marine debris: entanglement of marine life in marine debris including a comprehensive list of species with entanglement and ingestion records. In: Coe, J.M. and D.B. Rogers, eds. Marine debris: sources, impacts, and solutions. New York: Springer-Verlag. Pp. 99-139.

Laurent, L, P. Casale, M.N. Bradai, B.J. Godley, G. Gerosa, A.C. Broderick, W. Schroth, B. Schierwater, A.M. Levy, D. Freggii, E.M. Abd El-Mawla, D.A. Hadoud,H.E. Gomati, M. Domingo, M. Hadjichristophorou, L. Kornaraky, F. Demirayak, and Ch. Gautier. 1998. Molecular resolution of marine turtle stock composition in fishery bycatch: a case study in the Mediterranean. Molecular Ecol. 7:1529-1542.

Law, R.J., Fileman, C.F., Hopkins, A.D., Baker, J.R., Harwood, J., Jackson, D.B., Kennedy, S., Martin, A.R. and R.J. Morris. 1991. Concentrations of trace metals in the livers of marine mammals (seals, porpoises and dolphins) from waters around the British Isles. Marine Pollution Bulletin 22:183-191.

Lazell, J.D. 1980. New England waters: critical habitat for marine turtles. Copeia 1980 (2):290-295.

LeBuff, C.R., Jr. 1990. The loggerhead turtle in the eastern Gulf of Mexico. Caretta Research, Inc., Sanibel, Fla, 216 pp.

LeBuff, C.R., Jr. 1974. Unusual nesting relocation in the loggerhead turtle, *Caretta caretta*. Herpetologica 30:29-31.

Leary, T. R. 1957. A schooling of leatherback turtles, *Dermochelys coriacea*, on the Texas coast. Copeia 1957(3):232.

Leatherwood, S. and R.R Reeves. 1983. The Sierra Club handbook of whales and dolphins. Sierra Club Books, San Francisco. 302 pp.

Limpus, C.J., V. Baker, and J.D. Miller. 1979. Movement induced mortality of loggerhead eggs. Herpetelogica 35(4): 335-338.

Lutcavage, M.E., P. Plotkin, B. Witherington, and P.L. Lutz. 1997. Human impacts on sea turtle survival. In: Lutz, P.L. and J.A. Musick, eds. The Biology of Sea Turtles. Boca Raton, Fla.: CRC Press. pp. 387-409.

Lutcavage, M.E., P.L. Lutz, G.D. Bossart, and D.M. Hudson. 1995. Physiologic and clinicopathologic effects of crude oil on loggerhead sea turtles. Arch. Environ. Contam. Toxicol. 28:417-422.

Lutz, P.L., 1987. Effects of ingestion of non-biodegradable debris in sea turtles. Final Report for the U.S. Department of Commerce; RFP No. FSN-5-0178.

Magnuson, J.J., K.A. Bjorndal, W.D. DuPaul, G.L. Graham, D.W. Owens, P.C.H. Pritchard, J.I. Richardson, G.E. Saul, and C.W. West. 1990. Decline of the sea turtles: causes and prevention. National Academy Press, Washington, D.C. 274 pp.

Mann, T.M. 1977. Impact of developed coastline on nesting and hatchling sea turtles in southeastern Florida. M.S. thesis. Florida Atlantic University, Boca Raton, Fla.

Márquez-M., R. 1990. FAO Species Catalogue, Vol. 11. Sea turtles of the world, an annotated and illustrated catalogue of sea turtle species known to date. FAO Fisheries Synopsis, 125, 81 pp.

Márquez, R., R. Byles, P. Burchfield, N. Thompson, M. Sanchez, J. Diaz, M.A. Carrasco, A.S. Leo, and C. Jimenez. 1995. The Recovery of the Kemp’s ridley sea turtle population in the Mexican Beach of Rancho Nuevo, Tamaulipas. Draft submitted to the Marine Turtle Newsletter.

Matos, R., E. Belardo, and G. Roman. 1992. 1991 Annual Report, Vieques Island Sea Turtle Conservation Project With Management Recommendations. Department of Natural and Environmental Resources, San Juan, Puerto Rico. Report to U.S. Naval Station Roosevelt Roads.

McGehee, M.A. 1990. Effects of moisture on eggs and hatchlings of loggerhead sea turtles (*Caretta caretta*). Herpetologica 46(3):251-258.

McKenzie, C., Godley, B.J., Furness, R.W., and D.E. Wells. 1999. Concentrations and patterns of organochlorine contaminants in marine turtles from Mediterranean and Atlantic waters. Marine Environmental Research 47:117-135.

Mead, J.G. 1977. Records of sei and Bryde's whales from the Atlantic coast of the United States, the Gulf of Mexico, and the Caribbean. Rep. Int. Whal. Commn., Special Issue 1: 113-116.

Mendonca, M.T. and L.M. Ehrhart. 1982. Activity, population size and structure of immature *Chelonia mydas* and *Caretta caretta* in Mosquito Lagoon, Florida. Copeia. (1):161_167.

Meylan, A. 1995. Facsimile dated April 5, 1995, to Sandy McPherson, National Sea Turtle Coordinator, U.S. Fish and Wildlife Service, Jacksonville, Fla. Florida Dept. of Environmental Protection, St. Petersburg, Fla.

Mexico. 1966. Instituto Nacional de Investigaciones Biologico_Pesqueras. Programa nacional de marcado de tortugas marinas. Mexico, INIBP:1_39.

Meyers_Schone, L. and B.T. Walton.1994. Turtles as monitors of chemical contaminants in the environment. Rev. Environ. Contam. Toxicol.; 1994, v. 135, p. 93_153

Meylan, A., B. Schroeder, and A. Mosier. 1995. Sea Turtle Nesting Activity in the State of Florida. Florida Marine Research Publications, No. 52.

Meylan, A.B. 1984. The Ecology and Conservation of the Caribbean Hawksbill (*Eretmochelys imbricata*). Final Report: WWF Project No. 1499.

Mignucci-Giannoni, A.A., B. Pinto-Rodriguez, M. Velasco-Escudero, R.A. Montoya-Ospina, N.M. Kimenez-Marrero, M.A. Rodriguez-Lopez, E.H. Williams, Jr., and D.K. Odell. 1999. Cetacean strandings in Puerto Rico and the Virgin Islands. J. Cetacean Res. Manage. 1: 191-198.

Mignucci-Giannoni, A.A. 1998. Zoogeography of cetaceans off Puerto Rico and the Virgin Islands. Carib. J. Sci. 34: 173-190.

Mignucci-Giannoni, A.A. 1996. Marine mammal strandings in Puerto Rico and the United States and British Virgin Islands. PhD thesis, University of Puerto Rico, Mayaguez Campus.

Mignucci-Giannoni, A.A. 1989. Zoogeography of marine mammals in Puerto Rico and the Virgin Islands. M.S. thesis, Univ. Rhode Island. 448 pp.

Miller, G.S. 1991. The bow shock environment from a 16-inch projectile flyby. NSWC Technical Report TR91-621, October.

Miller, K., G.C. Packard, and M.J. Packard. 1987. Hydric conditions during incubation influence locomotor performance of hatchling snapping turtles. Journal of Experimental Biology 127:401-412.

Milton, S. L., S. Leone_Kabler, A.A. Schulman, and P.L. Lutz. 1994. Effects of Hurricane Andrew on the sea turtle nesting beaches of South Florida. Bulletin of Marine Science 54-3: 974_981.

Moncada-G., A. Rodriguez, R. Marquez-M., and E. Carrillo. 2000. Marine Turtle Newsletter No. 90, pp. 13-15.

Morreale, S.J. 1993. Personal Communication. Cornell University, Ithaca, New York.

Morreale, S.J. and E.A. Standora. 1999. Vying for the same resources: potential conflict along migratory corridors. U.S. Dep. Commer. NOAA Tech. Mem. NMFS-SEFSC-415: 69.

Morreale, S.J. and E.A. Standora. 1998. Early life stage ecology of sea turtles in northeastern U.S. waters. U.S. Dep. Commer. NOAA Tech. Mem. NMFS-SEFSC-413, 49 pp.

Mrosovsky, N. and A. Carr. 1967. Preference for light of short wavelengths in hatchling green sea turtles (*Chelonia mydas*) tested on their natural nesting beaches. Behavior 28:217-231.

Mrosovsky, N. and S.J. Shettleworth. 1968. Wavelength preferences and brightness cues in water-finding behavior of sea turtles. Behavior 32:211-257.

Mullin, K.D. and W. Hoggard. 2000. Visual surveys of cetaceans and sea turtles from aircraft and ships, p.111- 322. In R.W. Davis, W.E. Evans, and B. Wursig, eds. Cetaceans, sea turtles and seabirds in northern Gulf of Mexico: distribution, abundance and habitat associations. Unpublished report. USGS/BRD/CR-1999-0006, OCS Study MMS 2002-002. Department of Marine Biology, Texas A&M University, Galveston, Texas.

Mullin, K.D., W. Hoggard, C.L. Roden, R.R. Lohoefener, C.M. Rogers, and B. Taggart. 1994. Cetaceans on the upper continental slope in the north-central GOM. Fishery Bulletin 92: 773-786.

Munsell, E. 2000. Department of the Navy. Deputy Assistant Secretary of the Navy for Installations and Environment. Personal Communication to Eric Hawk, NMFS. October 12.

NMFS & FWS. 1998. Recovery Plan for U.S. Pacific populations of the olive ridley sea turtle (*Lepidochelys olivacea*). NMFS, Silver Spring, MD.

NMFS & FWS. 1992. Recovery Plan for leatherback turtles in the U.S. Caribbean, Atlantic and Gulf of Mexico. NMFS, Washington, D.C.

NMFS & FWS. 1991. Recovery plan for the U.S. population of loggerhead turtle. National Marine Fisheries Service, Washington, D.C.

National Research Council. 1990. Decline of the sea turtles: Causes and prevention. National Academy Press, Washington, D.C., 259 p.

NMFS. 2001. Endangered Species Act Section 7 Reinitiation of consultation on the Atlantic Highly Migratory Species Fishery Management Plan and its Associated Fisheries. Biological Opinion. June 8.

NMFS SEFSC. 2001. Southeast Fisheries Science Center. Stock assessments of loggerhead and leatherback sea turtles and an assessment of the impact of the pelagic longline fishery on the loggerhead and leatherback sea turtles of the Western North Atlantic. U.S. Department of Commerce, National Marine Fisheries Service, Miami, Fla, SEFSC Contribution PRD-00/01-08; Parts I-III and Appendices I-V1.

NMFS. 2000. Endangered Species Act Section 7 consultation on the Atlantic Pelagic Fisheries for Swordfish, Tuna, Shark, and Billfish in the U.S. Exclusive Economic Zone. Biological Opinion. June 30.

NMFS. 2000b. Endangered Species Act Section 7 consultation on the proposed shock testing of the DDG- 81 WINSTON CHURCHILL destroyer. Biological Opinion. October 10.

NMFS. 2000. E-mail from Wendy Teas to Terri Jordan regarding loggerhead turtle strandings in Puerto Rico since 1990.

NMFS. 1998. Turtle Expert Working Group, An Assessment of the Kemp's ridley (*Lepidochelys kempii*) and Loggerhead (*Caretta caretta*) Sea Turtle Populations in the Western North Atlantic. NOAA Technical Memorandum NMFS_SEFSC_409. 96 pp.

NMFS. 1998. Recovery plan for the blue whale (*Balaenoptera musculus*). Prepared by R.R. Reeves, P.J. Clapham, R.L. Brownell, and G.K. Silber for the National Marine Fisheries Service, Silver Spring, MD. 39 pp.

NMFS. 1998. Endangered Species Act Section 7 consultation on shrimp trawling in the southeastern U.S. under the sea turtle conservation regulations. Biological Opinion, March 24. 32 pp.

NMFS. 1997a. Endangered Species Act Section 7 consultation on Navy activities off the southeastern United States along the Atlantic Coast, May 15. 73 pp.

NMFS. 1997b. Endangered Species Act Section 7 consultation on the Atlantic Pelagic Fishery for Swordfish, Tuna, and Shark, in the Exclusive Economic Zone. Biological Opinion, May 29. 95 pp.

NMFS. 1997c. Endangered Species Act Section 7 consultation on the continued hopper dredging of channels and borrow areas in the southeastern United States. Biological Opinion, September 25. 15 pp.

NMFS. 1997e. Endangered Species Act Section 7 consultation on the continued operation of the circulating water system of the St. Lucie nuclear generating plant. Biological Opinion, February 7. 39 pp.

NMFS. 1996a. Endangered Species Act Section 7 consultation on the Fishery Management Plan (FMP) for Summer Flounder to include the management and fishing activities under the Draft FMPs for Scup and Black Sea Bass. Biological Opinion.

NMFS. 1996b. Endangered Species Act Section 7 consultation on the proposed shock testing of the U.S.S. SEAWOLF submarine off the Atlantic Coast of Florida during the summer of 1997. Biological Opinion, December 12. 50 pp.

NMFS. 1995. Endangered Species Act Section 7 consultation on United States Coast Guard vessel and aircraft activities along the Atlantic coast. Biological Opinion, September 15. 56 pp.

NMFS. 1995a. Endangered Species Act Section 7 consultation on channel maintenance dredging using a hopper dredge in the Galveston and New Orleans Districts of the Army Corps of Engineers. Biological Opinion, September 22. 23 pp.

NMFS. 1991. Recovery plan for the humpback whale (*Megaptera novaeangliae*). Prepared by the Humpback Whale Recovery Team for the National Marine Fisheries Service, Silver Spring, MD. 105 pp.

NMFS. 1991a. Endangered Species Act Section 7 consultation on Corps of Engineeers' dredging of channels in the southeastern United States from North Carolina through Cape Canaveral, Florida. Biological Opinion, November 25, 1991. 28 pp.

NRC. 1990. National Research Council (USA), Committee on Sea Turtle Conservation. Decline of the Sea Turtles: Causes and Prevention. National Academy Press, Washington DC.

NWS. 1999. National Weather Service. Hurricane Georges Preliminary Storm Report. From the Tropical Atlantic to the United States Virgin Islands and Puerto Rico.

Norrgard, J. 1995. Determination of stock composition and natal origin of a juvenile loggerhead turtle population (*Caretta caretta*) in Chesapeake Bay using mitochondrial DNA analysis. M.S. Thesis, College of William and Mary, Gloucester Point, Virginia. 47 pp.

Norris and Mohl. 1983. Can odontocetes debilitate prey with sound? American Naturalist. 122(1): 85_104.

Ogren, L.H. Biology and Ecology of Sea Turtles. 1988. Prepared for National Marine Fisheries, Panama City Laboratory. September 7.

Oravetz, C. 2001. Personal communication to Eric Hawk, NMFS, St. Petersburg, Fla.

Packard, G.C., M.J. Packard, K. Miller, and T.J. Boardman. 1988. Effects of temperature and moisture during incubation on carcass composition of hatchling snapping turtles (*Chelydra serpentina*). Journal of Comparative Physiology B 158:117-125.

Packard, G.C., M.J. Packard, T.J. Boardman, and MD. Ashen. 1981. Possible adaptive value of water exchange in flexible-shelled eggs of turtles. Science 213:471-473.

Paladino, F.V., M.P. O'Connor, and J.R. Spotila. 1990. Metabolism of leatherback turtles, gigantothermy and thermoregulation of dinosaurs. Nature 344:858-860.

Palsboll, P.J. J. Allen, M. Berube, P.J. Clapham, T.P Feddersen, et al. 197. Genetic tagging of humpback whales. Nature 388: 767-769.

Parsons, J.J. 1962. The green turtle and man. Gainesville, University of Florida Press.

Pater, L.L. 1981. Gun blast far field peak overpressure contours. NSWC TR79-442. Combat Systems Department, Naval Surface Weapons Center, Dahlgren, VA. March.

Peters, J.A. 1954. The amphibians and reptiles of the coast and coastal sierra of Michoacan, Mexico. Occ. Pap. Mus. Zool. 554:1_37.

Philbosian, R. 1976. Disorientation of hawksbill turtle hatchlings (*Eretmochelys imbricata*) by stadium lights. Copeia 1976:824.

Pilling, D. 2000. Captitol Hill Hearing Testimony by Admiral Donald Pilling, February 29.

Plotkin, P.T. 1995. Personal Communication. Drexel University, Philadelphia, Pennsylvania.

Plotkin, P.T., M.K. Wicksten, and A.F. Amos. 1993. Feeding ecology of the loggerhead sea turtle *Caretta caretta* in the Northwestern Gulf of Mexico. Marine Biology 115: 1-15.

Plotkin, P. and A.F. Amos. 1990. Effects of anthropogenic debris on sea turtles in the northwestern Gulf of Mexico. *in* R.S. Shomura and M.L. Godfrey (eds.). Proceedings of the Second International Conference on Marine Debris. NOAA Tech. Memo NMFS- SWFSC-154: 736-743.

Plotkin, P. and A.F. Amos. 1988. Entanglement in and ingestion of marine debris by sea turtles by sea turtles stranded along the south Texas coast. The Eighth Annual Workshop on Sea Turtle Conservation and Biology, Fort Fisher, North Carolina.

Prescott, R.L. 1988. Leatherbacks in Cape Cod Bay, Massachusetts, 1977-1987. In: Schroeder, B.A. (compiler). Proceedings of the Eighth Annual Workshop on Sea Turtle Conservation and Biology. NOAA Tech. Memo. NMFS-SEFC-214:83-84.

Pritchard, P.C.H. 1969. Sea turtles of the Guianas. Bull. Fla. State Mus. 13(2):1_139.

Provancha, J. 1998. Annual report for sea turtle nesting in Mosquito Lagoon. Kennedy Space Center Florida.

Provancha, J. 1997. Annual report for sea turtle nesting in Mosquito Lagoon. Kennedy Space Center Florida.

Quantum Resources, Inc. 1994. Florida Power & Light Co., St. Lucie Unit 2 annual environmental operating report. Prepared by Quantum Resources, Inc. for Florida Power & Light Co. Juno Beach, Florida. Vol. 1, 49 pp.

Rankin-Baransky, K.C. 1997. Origin of loggerhead turtles (*Caretta caretta*) in the western North Atlantic as determined by mt DNA analysis. M.S. Thesis, Drexel University, Philadelphia, Penn.

Rebel, T.P. 1974. Sea turtles and the turtle industry of the West Indies, Florida and the Gulf of Mexico. Univ. Miami Press, Coral Gables, Florida.

Rice, D.W. Sperm Whale – *Physeter macrocephalus* Linnaeus, 1758. In: S. H. Ridgway and R. Harrison. Handbook of Marine Mammals. Vol. 4: River Dolphins and the Larger Toothed Whales. Academic Press, London. pp. 177 - 234.

Richardson, J.I. 1982. A population model for adult female loggerhead sea turtles (*Caretta caretta*) nesting in Georgia. Ph.D. Dissertation, University of Georgia, Athens, Georgia, 204 pp.

Richardson, J.I. and T.H. Richardson. 1982. An experimental population model for theloggerhead sea turtle (*Caretta caretta*), pp. 165-174. In K.A. Bjorndal, ed. Biology and Conservation of Sea Turtles. Smithsonian Institution Press, Washington, D.C.

Roden, C.L. and K.D. Mullin. In press. Sightings of cetaceans in the northern Caribbean Sea and adjacent waters, Winter 1995. Carib. J. Sci.

Ross, J.P. and M.A. Barwani. 1982. Review of sea turtles in the Arabian area. In: Bjorndal, K.A. (editor), Biology and Conservation of Sea Turtles. pp. 373-383. Smithsonian Institution Press, Washington, D.C. 1995.

Ryder, C. 1995. Personal Communication. NMFS Northeast Fisheries Science Center.

Sakai, H., Ichihashi, H., Suganuma, H., and R. Tatsukawa. 1995. Heavy metal monitoring in sea turtles using eggs. Marine Pollution Bulletin 30:347-353.

Salmon, M., and J. Wyneken. 1990. Orientation by Swimming Sea Turtles: Role of Photic Intensity Differences While Near-shore. Proceedings of the Tenth Annual Workshop on Sea Turtle Biology and Conservation. NOAA Tech. Memo SEFSC-278. pp: 107-108

Sarti M., L., S.A. Eckert, N. Garcia T., A.R. Barragan. 1996. Decline of the world's largest nesting assemblage of leatherback turtles. Marine Turtle Newsletter 74: 2_5.

Schmidley, D.J. 1981. Marine mammals of the southeastern United States and the Gulf of Mexico. U.S. Fish and Wildlife Service. Office of Biological Services, Washington, DC, FWS/OBS-80/41, 165 pp.

Schmidt, H. 2000. Professor and Acting Head of Ocean Engineering, Massachusetts Institute of Technology. E-mail to Eric Hawk, NMFS, St. Petersburg, Fla.

Schroeder. B.A. 2000. Personal Communication to Anne Meylan, Florida Department of Environmental Protection, FMRI, St. Petersburg, Florida.

Schroeder. B.A. 1995. Personal Communication. Florida Department of Environmental Protection. Tequesta, Florida.

Schroeder, B.A. 1994. Florida index nesting beach surveys: are we on the right track? Pages 132-133 in Bjorndal, K.A., A.B. Bolten, D.A. Johnson, and P.J. Eliazar (compilers). Proceedings of the 14th Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-351.

Schroeder, B.A., A.M. Foley, B.E. Witherington, and A.E. Mosier. 1998. Ecology of marine turtles in Florida Bay: Population structure, distribution, and occurrence of fibropapilloma. U.S. Dep. Commer. NOAA Tech. Memo. NMFS-SEFSC-415:265-267.

Schultz, J.P. 1975. Sea turtles nesting in Surinam. Zoologische Verhandelingen (Leiden), Number 143: 172 pp.

Sears, C.J. 1995. Preliminary genetic analysis of the population structure of Georgia loggerhead sea turtles. Presented at the Fifteenth Annual Symposium of Sea Turtle Biology and Conservation, February 1995, Hilton Head, SC.

Sears, C.J. 1994. Preliminary genetic analysis of the population structure of Georgia loggerhead sea turtles. U.S. Dep. Commer. NOAA Tech. Memo NMFS-SEFSC-351:135-139.

Sears, C.J., B.W. Bowen, R.W. Chapman, S.B. Galloway, S.R. Hopkins-Murphy, and C.M.

Woodley. 1995. Demographic composition of the juvenile loggerhead sea turtle (*Caretta caretta*) feeding population off Charleston, South Carolina: evidence from mitochondrial DNA markers. Mar. Biol. 123:869-874.

Shaver, D.J. 2000. Personal communication regarding Head Start turtles nesting on Padre Island, Texas.

Shaver, D.J. 1994. Sea turtle abundance, seasonality and growth data at the Mansfield Channel, Texas. In B.A. Schroeder and B.E. Witherington (compilers), Proceedings of the thirteenth annual symposium on sea turtle biology and conservation, NOAA Tech. Memo NMFS-SEFC-341: 166-169.

Shaver, D.J. 1991. Feeding ecology of wild and head-started Kemp's ridley sea turtles in south Texas waters. Journal of Herpetology. Vol. 23. 1991.

Shoop, C.R. and R.D. Kenney. 1992. Seasonal distributions and abundance of loggerhead and leatherback sea turtles in waters of the northeastern United States. Herpetological Monographs. 6:43-67.

Simpendorfer, C.A. 2000. Predicting population recovery rates for endangered western Atlantic sawfishes using demographic analyses. Environmental Biology of Fishes 58:371-377.
Simpendorfer, C.A. 2001. Essential habitat of smalltooth sawfish (*Pristis pectinata*). Mote Marine Laboratory Technical Report 786, November 2001. 21pp.

Smith, T.D., J.Allen, P.J. Clapham, S. Katona, F. Larsen, J. Lien, D. Mattila, et al. 1997. An ocean-basin wide mark-recapture study of the North Atlantic humpback whale. Mar. Mammal Sci. 15(1):1-32.

South, C. and S. Tucker. 1991. Personal communication regarding sea turtle nesting in the state of Alabama. U.S. Fish and Wildlife Service, Daphne Field Office, Alabama.

Stanley. K.M., E.K. Stabenau, and A.M. Landry. 1988. Debris ingestion by sea turtles along the Texas Coast. Eighth Annual Workshop on Sea Turtle Conservation and Biology, Fort Fisher, North Carolina.

Standora, E.A., S.J. Morreale, A. Bolten, M.D. Eberle, J.M. Edbauer, T.S. Ryder; and K.L. Williams. 1993. Diving behavior, daily movements, and homing of loggerhead turtles (Caretta caretta) at Cape Canaveral, Florida. March and April 1993. Contr. Report to COE.

Starr-Hillis, Z. 2000. Personal communication to Anne Meylan, Florida Marine Research Institute, FMRI. St. Petersburg, Fla.

Stabenau, E.K. and K.R. Vietti. 1999. Physiological effects of short-term submergence of loggerhead sea turtles, *Caretta caretta*, in TED-equipped commercial fishing nets. Final Report to National Marine Fisheries Service, Pascagoula Laboratory, Pascagoula, Mississippi.

Storelli, M.M., E.Ceci and G.O. Marcotrigiano. 1998. Distribution of heavy metal residues in some tissues of *Caretta caretta* (Linnaeus) specimens beached along the Adriatic Sea (Italy). Bulletin of Enviromental Contamination and Toxicology 60:546-552.

Swingle, W.M., S.G. Barco, T.D. Pitchford, W.A. McLellan, and D.A. Pabst. 1993. Appearance of juvenile humpback whales feeding in the nearshore waters of Virginia. Mar. Mamm. Sci. 9: 309-315.

Teas, W. 2000. NMFS SEFSC, Personal Communication to Eric Hawk, NMFS St. Petersburg, Fla.

Teas, W.G. and A. Martinez. 1992. Annual report of the sea turtle stranding and salvage network Atlantic and Gulf coasts of the United States, January-December 1989.

Thompson, N.B., and H. Huang.1993. Leatherback turtles in southeast U.S. waters. NOAA Tech. Mem. NMFS-SEFSC-318. 11pp.

Townsend, C.H. 1935. The distribution of certain whales as shown by logbook records of American whale ships. Zoologica 19: 1-50.

Turtle Expert Working Group. 2000. Assessment update for the Kemp's ridley and loggerhead sea turtle populations in the western North Atlantic. U.S. Dep. Commer. NOAA Tech. Mem. NMFS_SEFSC-444, 115 pp.

Turtle Expert Working Group. 1998. (Byles, R., C. Caillouet, D. Crouse, L. Crowder, S. Epperly, W. Gabriel, B. Gallaway, M. Harris, T. Henwood, S. Heppell, R. Marquex-M, S. Murphy, W. Teas, N. Thompson, and B. Witherington). An Assessment of the Kemp’s ridley sea turtle (*Lepidochelys kempii*) and loggerhead (*Caretta caretta*) sea turtle populations in the Western North Atlantic. U.S. Dep. Commer. NOAA Tech. Mem. NMFS-SEFSC-409, 96 pp.

Underwood, G. 1951. Introduction to the study of Jamaican reptiles. Part 5. Nat. Hist. Notes Nat. Hist. Soc. Jamaica. 46:209_213.

U.S. Atomic Energy Commission. 1974. Final environmental statement related to construction of St. Lucie Plant Unit 2, Docket No. 50-389. USAEC, Directorate of Licensing. Washington, D.C.

Vargo, S., P. Lutz, D. Odell, E. Van Vleep and G. Bossart. 1986. Final report: Study of effects of oil on marine turtles. Tech. Rep. O.C.S. study MMS 86-0070. Vol. 2, 181pp.

Vicente, V.P. 1993. Spongivory in Caribbean hawksbill turtles, *Eretmochelys imbricata*: data from stranded specimens. Extended abstract for Proceedings: Thirteenth Annual Symposium on Marine Turtle Biology and Conservation. NOAA NMFS, Suite 1108, Banco de Ponce Building, Hato Rey, Puerto Rico 00918.

Wallmeyer, J. 2001. U.S. Navy Environmental Division, USN Southeast Region, Jacksonville, Florida. Personal communication to Eric Hawk, NMFS, St. Petersburg, Fla.

Wallmeyer, J. 2000. U.S. Navy Environmental Division, USN Southeast Region, Jacksonville, Florida. Personal communication to Eric Hawk, NMFS, St. Petersburg, Fla.

Waring, G.T., J.M. Quintal,and S.L. Swartz (Editors). 2000. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments. NOAA Technical Memorandum NMFS-NE-162. November. 303 pp.

Waring, G.T., D.L. Palka, P.J. Clapham, S. Swartz, M. Rossman, T.V.N. Cole, L.J. Hansen, K.D. Bisack, K.D. Mullin, R.S. Wells, and N.B. Barros. 1999. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments. NOAA Technical Memorandum NMFS-NE-153. October.

Waring, G.T., D.L. Palka, K.D. Mullin, J.W. Hain, L.J. Hansen, and K.D. Bisack. 1997. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 1996. NOAA Technical Memorandum NMFS-NE-114.

Waring, G.T., C.P. Fairfield, C.M. Ruhsam, and M. Sano. 1993. Sperm whales associated with Gulf Stream features off the northeastern U.S.A. shelf. Fish. Oceanogr. 2(2):101-105.

Watkins, W.A., K.E. Moore, and P. Tyack. 1985. Sperm whale acoustic behavior in the southeast Caribbean. Cetology 49. 15 pp.

Watkins, W.A. and K.E. Moore. 1982. An underwater acoustic survey for sperm whales (*Physeter catodon*) and other cetaceans in the southeast Caribbean. Cetology 46. 7 pp.
Weissman, R.X. 2001. Researchers fear Navy's sonar may harm whales. April 10. New York Times.

Wiley, D.N., R.A. Asmutis, T.D. Pitchford, and D.P. Gannon. 1995. Stranding and mortality of humpback whales in the mid-Atlantic and southeast U.S., 1985-1992. Fish. Bull. U.S. 93:196-205.

Winn, H.E. and N.E. Reichley. 1985. Humpback whale - *Megaptera novaeangliae*. In: Ridgway, S.H. and R. Harrison, eds. Handbook of marine mammals. Vol. 3: The sirenians and baleen whales. London: Academic Press, Inc. Pp. 241-274.

Witherington, B.E. *in review*. Ecology of neonate sea turtles inhabiting debris lines near the Gulf Stream front. Mar. Biol.

Witherington, B.E. 1992. Behavioral responses of nesting sea turtles to artificial lighting. Herpetologica 48:31-39.

Witherington, B.E. and R.E. Martin. 2000. Understanding, assessing, and resolving light pollution problems on sea turtle nesting beaches. Florida Marine Research Institute. 2nd Edition, revised Technical Report TR-2, Florida Dept. of Environmental Protection. 73 pp.

Witherington, B.E. and R.E. Martin. 1996. Understanding, assessing, and resolving light pollution problems on sea turtle nesting beaches. Florida Marine Research Institute. Technical Report TR-2, Florida Dept. of Environmental Protection. 73 pp.

Witherington, B.E. and K.A. Bjorndal. 1991. Influences of artifical lighting on the seaward orientation of hatchling loggerhead turtles (*Caretta caretta*). Biological Conservation 55:139-149.

Witkowski, S.A. and J.G. Frazier. 1982. Heavy metals in sea turtles. Marine Pollution Bulletin 13:254-255.

Witzell, W.N. In preparation. Pelagic loggerhead turtles revisited: additions to the life history model? 6 pp.

Witzell, W.N. 1999. Distribution and relative abundance of sea turtles caught incidentally by the U.S. pelagic longline fleet in the western North Atlantic Ocean, 1992-1995. Fisheries Bulletin. 97:200-211.

Witzell, W.N. and W.G. Teas. 1994. The impacts of anthropogenic debris on marine turtles in the Western North Atlantic Ocean, 1992-1995. Fish. Bull. 97:200-211.

Yeung, C. 1999. Estimates of marine mammal and marine turtle bycatch by the U.S. Atlantic pelagic longline fleet in 1998. U.S. Dep. Commer. NOAA Tech. Memo. NMFS_SEFSC_430, 26 pp.

Zug, G.R., and J.F. Parham. 1996. Age and growth in leatherback turtles, *Dermochelys coriacea* (Testudines: Dermochelyidae): a skeletochronological analysis. Chel. Conserv. Biol. 2(2):244-249.

ATTACHMENT 4
National Marine Fisheries Service April 8, 2013 Concurrence Letter
Consultation No. SER-2012-9284

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
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F/SER31:RGH

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United States Department of the Interior
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APR 8 2013

Ref.: Caminada Headland Beach and Dune Restoration Project, Increment II

Dear Mr. Christopher:

This responds to your October 24, 2012, letter requesting Endangered Species Act (ESA) Section 7 consultation for the lease of Outer Continental Shelf (OCS) sands to the State of Louisiana for Increment II of the Caminada Headland Beach and Dune Restoration Project along the south-central Louisiana coast. The project is meant to provide protection to the expansive wetlands of the Barataria-Terrebonne National Estuary and provide new sand to the near shore coastal system. This project will be an extension of the original Caminada Headland Project that was consulted on by NMFS on January 20, 2012 (I/SER/2011/06200). As noted in the January 20, 2012, letter, the Bureau of Ocean Energy Management (BOEM) has an existing Biological Opinion (BiOp) titled *Hopper and Hydraulic Cutterhead Dredging Associated with Sand Mining for Coastal Restoration Projects Along the Coast of Louisiana Using Sand from Ship Shoal in the Gulf of Mexico Central Planning Area, South Pelto Blocks 12, 13, and 19, and Ship Shoal Block 88* (Consultation No. F/SER/2003/01247) issued on September 19, 2005, that covers hopper dredging associated with sanding mining at Ship Shoal for restoration projects along the Louisiana coast. The BiOp analyzes and accounts for the effects of sand mining on listed species. Thus, any effects to sea turtles from the proposed project have been analyzed in the existing BiOp, are included in that opinion's incidental take statement, and are subject to the terms and conditions of that opinion. Contractors working on the Increment I phase of the project utilized cutterhead dredges instead of hopper dredges; therefore, the 2005 BiOp has not been utilized at this point. The proposed Caminada Headland Beach and Dune Restoration Project, Increment II encompasses the same scope of proposed activities as addressed in the 2005 BiOp.

The National Marine Fisheries Service believes the existing BiOp adequately addresses the issues associated with threatened and endangered species under our purview. Therefore, reinitiation of consultation is not required. Per the conditions of the existing BiOp, if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action, consultation will need to be reinitiated.

If you have any questions, please contact Mr. Ryan Hendren, ESA consultant, at (727) 551-5610, or by e-mail at Ryan.Hendren@noaa.gov.

Sincerely,

David Bernhart
Assistant Regional Administrator
for Protected Resources

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