NEW JERSEY
SHORE PROTECTION STUDY

US Army Corps
of Engineers
Philadelphia District

New Jersey Department
of Environmental
Protection

Hereford Inlet to Cape May Inlet

Volume- 3 Appendix

VOLUME 3

Appendix B.

Economic Analysis

APPENDIX B: ECONOMIC ANALYSIS

APPENDIX B – ECONOMIC ANALYSIS
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HEREFORD TO CAPE MAY INLET
SHORE PROTECTION FEASIBILITY STUDY

ECONOMIC CONDITIONS

1.0 INTRODUCTION

The following sections detail the economic analysis performed to evaluate the damages and potential damage reduction for the developed areas along the oceanfront from Hereford Inlet to Cape May Inlet. North Wildwood, Wildwood, and Wildwood Crest are three of the four municipalities contained within the barrier island located between the Hereford and Cape May Inlets. These three communities along with sound-side West Wildwood form a shore region known as the *Wildwoods' Five Mile Island,* or simply the *Wildwoods.* Figure 1 shows the three communities and a portion of a very small Lower Township community called Diamond Beach which will also be reviewed in this document. Benefit categories to be evaluated include reduction in storm, wave, and inundation damages, and increased recreation value. The basic underlying assumptions used an FY2014 discount rate of 3-½%, June 2007 price level, a 50-year period of analysis, and a base year of 2016. Project benefits for the tentatively selected plan (TSP) were updated to a March 2014 price level by applying a combination of the EM 1110-2-1304 CWCCIS Index and the McGraw Hill Engineering News Record Building Cost and Construction Cost Indices for comparison with the selected plan cost estimate.

2.0 SOCIOECONOMIC RESOURCES

2.1 Population and Land Use

The study area is located in a coastal community in Cape May County, New Jersey along the Atlantic Ocean. Within the USACE – Philadelphia District boundaries, Cape May County is one of the four counties including Atlantic, Ocean, and Monmouth counties located along the New Jersey coast. Cape May County is surrounded by the Atlantic Ocean on the east and south, borders the Delaware Bay on the west, and Atlantic County on the north. The county covers 454 square miles, with almost 60% consisting of usable land area and the remainder being marshes and flood plains. Two main transportation arteries in the county are the Garden State Parkway and US Route 9. Other major nearby roads which allow residents and visitors to access the area include State Routes 47 and 50, the Black and White Horse Pikes, and the Atlantic City Expressway. North Wildwood, Wildwood, and Wildwood Crest with a combined land area of 4.1 square miles cover approximately five linear miles along the coast.

The three municipalities ranked six, seven, and eight respectively on the list of the ten largest municipalities in Cape May County. As shown in Table B-1, Wildwood was the most densely populated of the three communities with 4,096 people per square mile. More vacationers flock to Wildwood and North Wildwood than to Wildwood Crest as indicated by the estimated summer population in Figure 2. The *Wildwoods* is a popular destination for vacationers seeking sunbathing, water sports, amusements, and recreational fishing among other leisure activities.

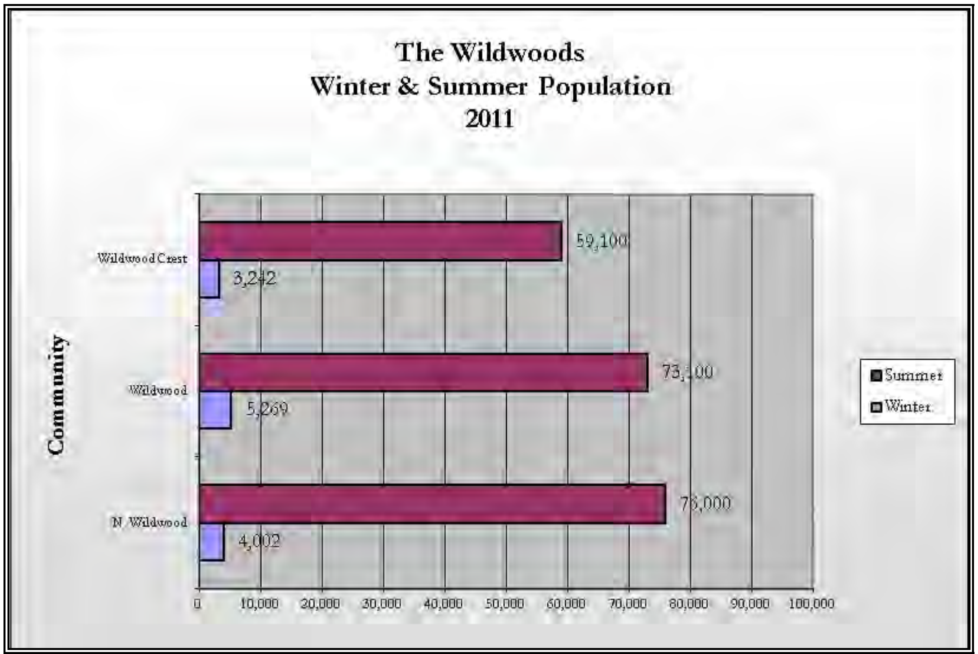

New Jersey
Delaware Bay
Atlantic Ocean
Study Area
Stone Harbor
Hereford Inlet
Grassy Sound
Ottens Basin
West Wildwood
North Wildwood
Wildwood
Sunset Lake
Wildwood Crest
Five Mile Island or The Wildwoods
Atlantic Ocean
Diamond Beach
SCALE IN FEET
0
2,500
5,000
Feet
NEW JERSEY SHORE PROTECTION
FEASIBILITY STUDY
HEREFORD INLET TO CAPE MAY INLET
THE WILDWOODS
CAPE MAY COUNTY, NJ

Figure B-1

Table B-1
POPULATION DENSITY - 2010

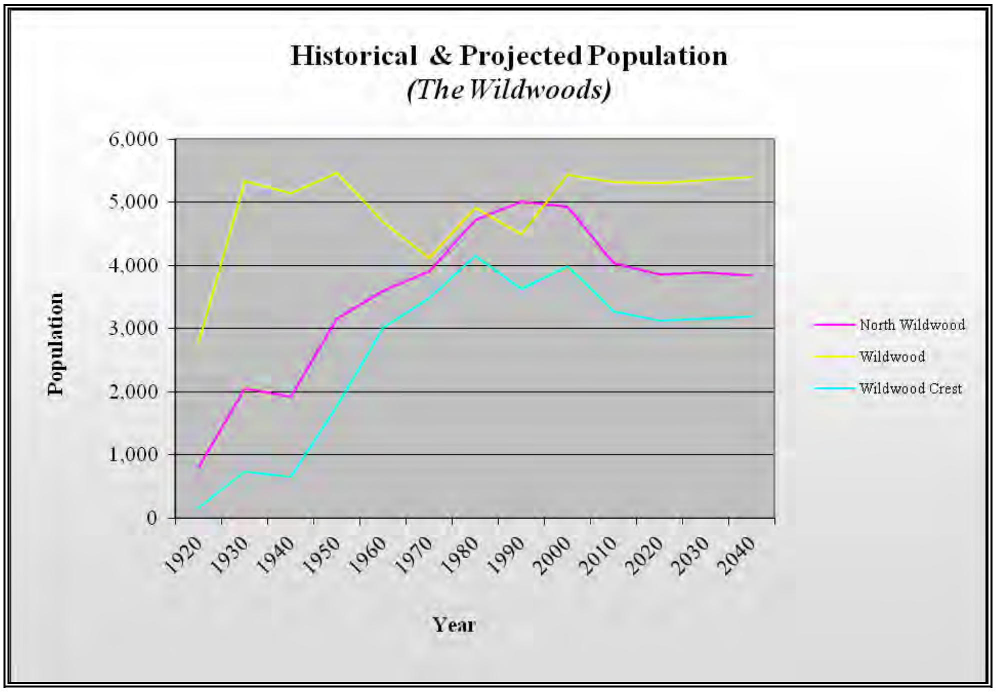
Municipality	Total Square Miles	Population	Persons Per Square Mile
North Wildwood	1.7	4,041	2,377
Wildwood	1.3	5,325	4,096
Wildwood Crest	1.1	3,270	2,973
The Wildwoods	*4.1*	*12,636*	*9,446*

Source: Cape May County Planning Department



Source: Cape May County Planning Department *Figure B-2*

The year-round population of many coastal communities has increased as baby-boomers started to retire and housing development increased. The *Wildwoods* experienced substantial growth in population throughout most of the 20th century. The steepest increase in population for Wildwood occurred in the decade between 1920 and 1930, while the steepest increase for North Wildwood occurred between 1940 and 1950 and occurred for two decades in Wildwood Crest between 1940 and 1960. Wildwood experienced a sharp decline in population over the period from 1950 to1970, population soared back up through 1980, dipped again through 1990 and spiked through 2000 nearly to the level of its peak population in the 1950s. As shown in Figure B-3, Wildwood and Wildwood Crest are two communities that had increased year-round population for the ten years between 1990 and 2000. During this time period North Wildwood population growth remained relatively flat. Year-round population decreased slightly in all three municipalities during the initial years of the 21st century.



Source: Cape May County Planning Department *Figure B-3*

2.2 Employment and Income

The tourism industry is one of the most important industries in the State of New Jersey and in Cape May County. Tourism generates 32,000 or one out of every three jobs in the county. The economy of Cape May County and the adjacent coastal counties relies to some extent on a transient workforce to supply tourism industry employees, especially in the summer. Businesses in communities along the coast have augmented their workforce with foreign employees during the busy summer months. The importance of seasonal employment in Cape May County contributes to its higher unemployment rate when compared to that of the entire state as shown in Table B-2. The data show lower unemployment rates in each successive northern coastal county. Employers within the service industry and the public sector account for many of the jobs in the county. Morey's Amusement Pier, the City of Wildwood, and the City of North Wildwood are among the top employers in Cape May County. The recent economic downturn in the financial services and retail industries has also negatively impacted employment in the region. Those industries have recently posted job losses in New Jersey.

Table B-2
EMPLOYMENT COMPARISON – 2012

	STATE	COASTAL COUNTY			
Year – 2012	**New Jersey**	**Cape May**	**Atlantic**	**Ocean**	**Monmouth**
Unemployment Rate	9.5	13.4	13.5	10.3	8.9
Unemployed	435,000	7,793	18,377	27,944	29,904
Employed	4,158,000	50,397	136,125	244,125	304,904

Source: U.S. Department of Labor – Bureau of Labor Statistics

Cape May County has consistently experienced higher unemployment rates than state and national levels. A study area may qualify for a national economic development (NED) benefit if it is found to have substantially and persistently unemployed or underemployed labor resources. This condition would exist: (a) if the unemployment rate for the most recent consecutive 12 month period averages 6 percent or more; and (b) if it is 50% above the national rate of unemployment for three of the preceding four calendar years, 75% above the national rate of unemployment for two of the preceding three calendar years, or 100% above the national unemployment rate for one of the preceding two calendar years. A comparison of unemployment rates for the five years beginning 2008 through 2012, as shown in Table B-3, indicates that although the unemployment rate in Cape May County exceeds that of the United States by more than two points for each of the five years in the time series, it does not meet the criteria to qualify for the unemployed or underemployed labor resource benefit.

Table B-3
RECENT UNEMPLOYMENT RATE COMPARISON
UNITED STATES, NEW JERESEY AND CAPE MAY COUNTY
(2008-2012)

Year	United States	New Jersey	Cape May County
2008	5.8	5.5	8.0
2009	9.3	9.0	11.1
2010	9.6	9.6	12.2
2011	8.9	9.4	12.6
2012	8.1	9.5	13.4

Source: U.S. Department of Labor – Bureau of Labor Statistics

The much higher unemployment rate in the study area of the *Wildwoods*, as shown in Table B-4, is indicative of its relative reliance on seasonal employment. The unemployment data updated for the most recent year shows the continued affect of the recession and possibly impacts from the devastating super-storm in 2012. The regional coastal economy had also been enhanced by a healthy construction industry with new development, "tear-downs" and renovations - a trend in which older structures are purchased, demolished, and replaced with much more expensive houses. The continued decline in manufacturing and the recent decrease in financial services employment resulting from the reduction in mortgage applications and the tightened credit market have also resulted in higher unemployment. However, certain subcategories within the service sector such as healthcare and educational services remain strong.

Table B-4
STUDY AREA EMPLOYMENT ESTIMATES COMPARISON – 2012

	North Wildwood	Wildwood	Wildwood Crest
Unemployment Rate	21.6	30.6	24.6
Unemployed	618	1,036	598
Employed	2,238	2,351	1,829

Source: U.S. Department of Labor – Bureau of Labor Statistics

As displayed in Table B-5, per capita income in both the State of New Jersey and Cape May County exceeds that of the United States. New Jersey and Cape May County's per capita incomes are about 25% and 12% more, respectively, than the U.S. per capita income. Per capita income in Wildwood Crest is about 10% more than the U.S. while that of North Wildwood and Wildwood falls below the national level. Per capita income in Wildwood nearly doubled and increased at a faster rate than that of the state over the first decade of this century. Median household income and median home value were lower in Wildwood when compared to the nation, the state and the other communities in the *Wildwoods*. The lower median home value may have existed in Wildwood rather than in the other communities because residents may pay a premium to live in areas away from high traffic volume and commercial activity.

Table B-5
INCOME COMPARISON – 2010

Municipality	Per Capita	Median Household	Median Home Value[1]
United States	$27,334	$51,914	$188,400
New Jersey	34,858	69,811	357,000
Cape May County	33,571	54,292	337,300
North Wildwood	$31,748	$45,041	$384,900
Wildwood	25,118	32,783	288,000
Wildwood Crest	40,032	46,111	398,400

Source: New Jersey Department of Labor & U.S. Census Bureau

2.3 Regional Economy and Development

Tourism, referencing 2006 data, was the top industry in Cape May County with over $4.8 billion in revenues generated from accommodations, food, retail, entertainment, and transportation. Cape May County is second only to Atlantic County in tourism dollars. Annual tourism revenue of Cape May and Atlantic Counties is more than three times the revenue produced by Ocean and Monmouth Counties. The popularity of the Jersey shore draws many visitors from neighboring states as well as from inland areas within the state. The summer seashore destinations' proximity to major population centers is ideal for attracting visitors especially with high fuel prices. A large percentage of tourists are repeat visitors who return each summer. Cape May County welcomes approximately 19 million visitors annually. More than three quarters of visitors come from outside New Jersey and the weakened value of the dollar is expected to attract more international visitors to the county as well.

The construction industry has also been important to the regional economy. Construction within some commercial sectors such as healthcare and education facilities has maintained a steady pace. However, residential construction has decreased significantly nationally and in the region since 2006. As shown in Table B-6, the number of proposed residential site plans plummeted by more than half from 2005 to 2006 and dropped more precipitously in 2007. The greatest number of dwellings proposed during the ten year period from 2003 to 2012 was developed in the City of Wildwood. The *Wildwoods* has a relatively limited area for new development and most of the new development occurs in the form of renovations and/or replacements. Historically, cyclical declines in housing starts have experienced several years of reductions. Currently, the slow but

[1] Median home value of owner-occupied housing units (2000 & 2010)

steady upturn in the U.S. economy following the deep 2008-2009 recession provides encouragement for housing starts going forward.

Table B-6
PROPOSED RESIDENTIAL DWELLINGS IN SITE PLANS

Municipality	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total #
North Wildwood	245	414	356	70	4	5	0	0	2	26	1,122
Wildwood	840	441	1074	732	7	37	0	10	3	147	3,291
Wildwood Crest	117	607	345	12	0	0	0	0	0	0	1,081
The Wildwoods	1,202	1,462	1,775	814	11	42	0	10	5	173	5,494

Source: Cape May County Planning Department

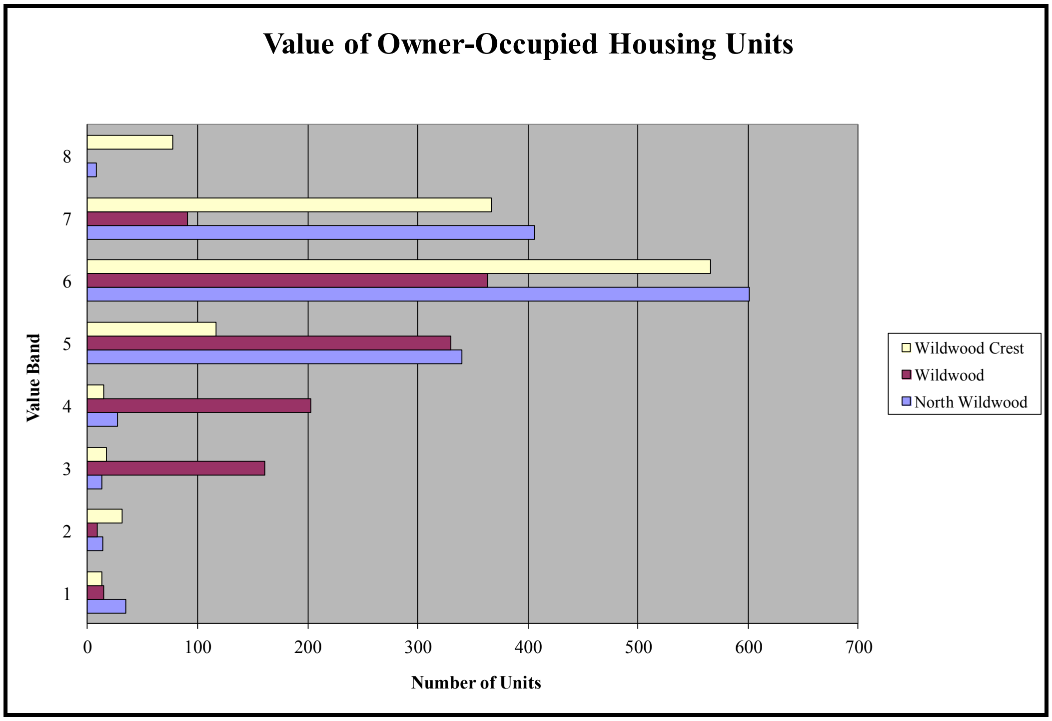
Table B-7 displays the number of housing units by usage category for the three coastal cities of the *Wildwoods*. In 2010, seasonal and/or rental housing units represent a large percentage of housing units in the coastal counties of New Jersey. Almost half of the seasonal and/or rental properties in New Jersey are located in Cape May County and 47% of dwellings in the county are vacation homes. Consistent with other popular summer destinations, the majority of housing units in the *Wildwoods* are vacant and categorized as seasonal, recreational, and occasional use units. Therefore, condominiums, townhouses, and vacation homes dominate the housing stock.

Table B-7
HOUSING UNITS BY USAGE CATEGORY (2010)

	North Wildwood		Wildwood		Wildwood Crest	
Usage Category	**Housing Units**	**Percentage**	**Housing Units**	**Percentage**	**Housing Units**	**Percentage**
Occupied	**2,047**	**23.2%**	**2,251**	**32.9%**	**1,532**	**27.5%**
Owner	1,282	14.5%	798	11.7%	1,011	18.2%
Renter	765	8.7%	1,453	21.2%	521	9.4%
Vacant	**6,793**	**76.8%**	**4,592**	**67.1%**	**4,037**	**72.5%**
For Rent	504	5.7%	1,138	16.6%	307	5.5%
For sale only	91	1.0%	188	2.7%	130	2.3%
Rented or sold, not occupied	19	0.2%	35	0.5%	34	0.6%
For seasonal, recreational or occasional use	6,116	69.2%	3,035	44.4%	3,468	62.3%
Other vacant	63	0.7%	196	2.9%	98	1.8%
TOTAL	**8,840**	**100.0%**	**6,843**	**100.0%**	**5,569**	**100.0%**

Source: U.S. Census Bureau

Figure 4, *Value of Owner-Occupied Housing Units*, shows a concentration of more affordable housing located in Wildwood. According to data from the 2008-2012 American Community Survey (ACS) estimates, none of the housing units in Wildwood were valued at or above one million dollars. One third of the owner-occupied units in the City of Wildwood were valued below $200,000. Conversely, approximately 6% of the homes were valued at less than $200,000 in either North Wildwood or Wildwood Crest. House market values skyrocketed for the first five or six years of the new century and have only recently declined slightly in shore communities.



Source: U.S. Census Bureau

Value Band:	*1 - Less than $50,000*	*5 - $200,000 – 299,999*
	2 - $50,000 – 99,999	*6 - $300,000 – 499,999*
	3 - $100,000 – 149,999	*7 - $500,000 – 999,999*
	4 - $150,000 – 199,999	*8 - $1,000,000 or more*

Figure B-4

Highlights in major commercial development include the completion of a $70 million convention center in Wildwood in 2002. Portions of Wildwood have also been designated as an Urban Enterprise Zone (UEZ). This program encourages business investment and job creation through various incentives. Merchandise can be purchased at a reduced sales tax as a benefit to patronizing shops in these special zones.

Most new development projects in all three communities cater to the tourism industry and are characterized as hotel/motel or multifamily dwellings such as condominiums as shown in the following listings from 2006 and 2012 data. Another new residential development with almost 70 new units located in Diamond Beach (Lower Township) was under construction during the time of this study. Table B-8 lists significant development projects built recently during the study period. These projects are apparently located outside the inventoried ocean block of the study area. No significant non-residential development within the study area occurred in the more recent timeframe of 2012; therefore Table B-9 shows data for 2006 only. Non-residential development of 5,000 square feet or more is reported as significant by the county.

Table B-8
SIGNIFICANT RESIDENTIAL
DEVELOPMENT PROJECTS – 2006 & 2012

Municipality	Project Name	Dwelling Type	# of Units/Lots
Year - 2006			
North Wildwood	Champagne Island Resorts	Hotel/Motel	24
North Wildwood Subtotal			*24*
Wildwood	The Riviera	Hotel/Motel	86
Wildwood	The Riviera	Multi Family	288
Wildwood	Martinique Resorts	Multi Family	254
Wildwood	Anchor Beach Condo	Multi Family	30
Wildwood	Petunia, LLC	Multi Family	22
Wildwood	Westgate Village	Multi Family	13
Wildwood Subtotal			*693*
Wildwood Crest	Sanzone Condos	Multi Family	13
Wildwood Crest Subtotal			*13*
The Wildwoods			***789***
Year - 2012			
North Wildwood	Hawaiian Beach Resort	Multi Family	22
North Wildwood Subtotal			*22*
Wildwood	Grand Wildwoodian	Multi Family	138
Wildwood Subtotal			*138*
The Wildwoods			***160***

Source: Cape May County Planning Department

Table B-9
MAJOR NON-RESIDENTIAL SPACE - 2006

Municipality	Project Name	Description	Square Feet
North Wildwood	Champagne Island Resort	Commercial	16,275
North Wildwood	The Beach House	Commercial	9,442
Wildwood	Anchor Beach Condominium	Commercial	6,000

Source: Cape May County Planning Department

Each summer tourists flock to Cape May County's beaches, boardwalks, promenades, and amusement piers for day trips and extended vacations. The county is also a popular birding destination for tourists seeking to catch a glimpse of the migratory birds that stop along the shoreline. A two-mile boardwalk with four amusement piers, water parks, roller coasters, arcade and carnival games, and shopping characterizes Wildwood. The *Wildwoods* has received many distinctions and positive ratings from publications and organizations such as "America's Best Beaches", "Top Tourist Town in the Northeast", and "Best Sports Beach". Recently, a survey conducted by the New Jersey Marine Sciences Consortium (NJMSC) to determine New Jersey's top ten beaches ranked Wildwood as the best with approximately 14 percent of the vote. Wildwood won top honor in a field of over 60 beaches from Cape May to Monmouth Counties. Wildwood Crest and North Wildwood ranked second and fourth, respectively. According to the NJMSC, Wildwood Crest was chosen as the best location for a family vacation in a special category of the survey.

This region of the coast is also well known for its "Doo Wop" motels and hotels which feature mid 20th century style architecture. It's a decorative style that incorporates bright colors, boomerang shapes, and angled walls and roofs. The name originated from the popular music enjoyed by many in the 1950s. Many shore communities have increased the number of off-season festivities to entertain a growing population and to draw more tourists throughout the year. The *Wildwoods* have marketed this seashore location and garnered attention as an increasingly popular destination for conventioneers. The Wildwood Convention Center has been a catalyst for drawing non-seasonal visitors to Five Mile Island and neighboring coastal communities. Table B-10 shows double-digit increases in toll volumes since 1970 in each decade up to 2000 for which round-trip volumes were available.

Table B-10
CAPE MAY TOLL VOLUMES

Month	2000	1990	1980	1970
January	496,754	446,112	228,904	92,442
February	551,867	428,831	204,682	96,736
March	639,809	487,619	255,719	131,512
April	692,249	602,715	299,850	156,233
May	986,735	824,296	521,234	280,945
June	1,228,834	1,137,115	754,290	413,122
July	1,631,363	1,457,586	1,085,620	705,272
August	1,610,985	1,474,358	1,222,330	763,402
September	1,078,875	597,582	616,200	383,952
October	780,884	602,155	349,060	163,288
November	632,448	485,524	285,900	127,515
December	598,975	441,973	267,530	118,150
Total	*10,929,778*	*8,985,866*	*6,091,319*	*3,432,569*
% Change	*22%*	*48%*	*77%*	

Source: Cape May County Planning Department

3.0 HISTORICAL DAMAGES

3.1 Recent Storms

The shoreline of the *Wildwoods* has been characterized by severe erosion near Hereford Inlet in North Wildwood in the northeastern portion of the island and generous accretion toward the south of the island in Wildwood and Wildwood Crest. This accretion in the south from the down drift transport of sand has resulted in nontraditional damages such as clogged and damaged outfall pipes, subsequent standing water on the beach, and internal drainage problems of water overflow into local streets. Meanwhile, residents at the northeastern end of the island have endured loss of land and dune encroachment. Several damage causing storms occurred in the late 1980s, early 1990s, 2011, and most recently in 2012. Hurricane Sandy made landfall on the New Jersey shore in late October in 2012 causing millions of dollars of damage to residential, commercial and public property in coastal communities, debris and sand dispersal, and extensive damage and disruption to utilities and transportation systems. Superstorm Sandy, as it has been called, registered the third highest observed stage at the Atlantic City tidal station in the 100 years from 1912 to 2012. Shore communities north of the storm's landfall received the most devastating damage during this event. Although the *Wildwoods* fared better than barrier island towns up the coast, beach erosion and coastal structure damage were incurred.

North Wildwood: Local officials were contacted to determine the extent of historical damage. Table B-11 displays an example of the most damaging events for which information was available. In general, the beach in North Wildwood has eroded significantly over the years while the beach in the middle and southern end of the island has accreted. According to emergency management officials in North Wildwood, much of the beach loss has occurred on the oceanfront between 2nd Avenue and 19th Avenue. No recent structural or content damage to buildings has been recorded from ocean wave or inundation infiltration. A damaging storm occurred in February 2003 in which concrete walkways on Allen Drive at the Anglesea Beach Colony collapsed. One or two houses on Ocean Avenue received some water in the ground floor/basement from the bay (8-foot tide) during this same event. Street flooding from the bay is common in North Wildwood. In 2008, the Mother's Day northeaster from May 12 through 13 caused minor flooding when the ocean extended beyond the beach, below the boardwalk, and over the streets. An amusement pier bulkhead was severely damaged during this storm event. Erosion in front of Surfside Pier was so severe that the pier owner constructed a bulkhead to protect against continued storm damage. In October 2012, the borough experienced beach erosion and damage to shoreline structures such as bulkheads and boardwalks from Superstorm Sandy. Repairs to oceanfront protective structures and replacement of sand and required walkovers are estimated to be approximately $3 million.

Table B-11
NORTH WILDWOOD HISTORICAL DAMAGE EVENTS

Date	Event	Major Damage Category	Dollar Loss*
Oct. 1991	20-year	Sewage system	$150,000
Dec. 1992	25-year	Debris removal	$130,000
Feb. 1998	5-year	Drainage system	$232,000
May 2008	3-year	Pier bulkhead	$726,000
Oct. 2012	30-year	Bulkheads and boardwalk	$2.6 million

**Dollar loss in September 2007 dollars*

<u>Wildwood</u>*:* Damage in Wildwood has mostly affected infrastructure. Outfall pipe damage creates street flooding and vehicle damage. A large beach has been the major problem area from the oceanfront causing outfalls to back up into the community. Some commercial structures have received damage recently. Businesses were inundated by a storm event in August 2012 when there was no time to deploy sandbags. Amusement piers and rides that are on the beach, and unprotected may be vulnerable to oceanfront damage. The west side of town floods from the bay similarly to North Wildwood. The magnitude of Hurricane Sandy affected the entire region including the City of Wildwood. According to published reports, 400 residences were damaged and almost 800 businesses were impacted. Nevertheless, the wide beaches provided a critical buffer to mitigate some of the damage to the oceanfront structures.

<u>Wildwood Crest</u>*:* The southern portion of the island has wide beaches and has experienced inconvenience, and expenses associated with having a wide beach. The beach has grown at about 80 – 100 feet per year. Wildwood Crest has had to extend its outfall pipes. Outfalls were extended several years ago at a cost of approximately $400,000. The town has sought permits to extend the outfalls again. The municipality has also built walkways for the convenience of recreational users with gear who must walk many yards to reach the water's edge. The municipality experienced erosion as the result of a severe storm more than five years ago. Superstorm Sandy caused damage to sand fences, walkways, and access ramps on the oceanfront in addition to bay front bulkhead and railing damage. Also, it was reported that property damage was sustained by nearly 100 residences and approximately 250 businesses.

<u>Superstorm Sandy</u>*:* The storm left millions of dollars of damage to east coast communities from the Mid-Atlantic to New England when it made landfall north of Atlantic City in late October 2012. The nature of the storm destroyed property in the shore counties north and northeast of the

landfall zone and, to a lesser extent, in the counties south and southwest. In New Jersey from north to south, nine counties were impacted by the hurricane: Bergen, Essex, Hudson, Union, Middlesex, Monmouth, Ocean, Atlantic, and Cape May. Atlantic, Ocean, Monmouth, and Hudson Counties were hardest hit by Superstorm Sandy. Published reports assert that about 1% of the approximately 300,000 residential structures damaged by this significant storm will require elevating.

The study area of the *Wildwoods* is in Cape May County and located approximately 60 miles south of the storm's landfall. Beach erosion and back-bay inundation were the major damage mechanisms experienced on Five Mile Island. Overall, the protective berm, dune, and bulkhead took the brunt of storm waves and erosion and buffered oceanfront structures in the erosion-susceptible northern section of the study area. The deepest flooding occurred from the bay (Grassy Sound) to New Jersey and 15th Avenues. According to local officials, no ocean-block structures were washed away, and demolition of structures was not required as a result of Hurricane Sandy. This confirmation along with review of post-Sandy aerial photography indicates that structures in the potential benefits pool remain in the analysis.

4.0 ECONOMIC ANALYSIS

The study area was delineated based on physical setting, hydraulic characteristics, and economic factors. The oceanfront communities of the *Wildwoods* were analyzed by community from the representative beach profiles as shown in Table B-12. Overall, the study area is less than 6 miles in length. The U.S. Coast Guard base is buffered by hundreds of feet of beach and the surrounding vegetation of the Cape May National Wildlife Refuge. It was, therefore, not further considered in the damage analysis. Damages and benefits in subsequent project formulation tables prior to determination of the tentatively selected plan (TSP) combination are based on a June 2007 price level for comparison to costs which were provided in a June 2007 price level.

Table B-12
STUDY AREA DELINEATION

Community	Cell	Profile	Length (ft)	From	To
North Wildwood	1	WW02	3,549	2nd Street	15th Street
North Wildwood	2	WW03	2,959	15th Street	26th Street
Wildwood	3	WW07	6,965	26th Street	Cresse Street
Wildwood Crest	4	WW10	4,585	Cresse Street	Rambler Road
Wildwood Crest/ Lower Township	5	WW13	5,835	Rambler Road	Memphis Ave
Lower Township	6	WW15	1,090	Memphis Avenue	Madison Avenue
Coast Guard Base	7	WW17	6,267	Madison Avenue	Cape May Inlet

The communities have proactively approached shoreline maintenance to protect residential, commercial, and public property from the impact of storm-related encroachment. Consideration of local and state-sponsored projects to preserve the baseline without project conditions is inherent in the analysis. Provision of beach material in North Wildwood and outfall pipe maintenance and extension in Wildwood and Wildwood Crest along with limited availability of developable land and adherence to floodplain management plans indicate the stability of the barrier island's local and state-sponsored maintenance program.

4.1 Structure Inventory

A structure database was compiled containing information pertinent to the calculation of hurricane and storm damage for the study area. Initially in 2005 and 2007, the inventory focused on North Wildwood, the erosion prone portion of the study area; because field conditions established that the beaches in Wildwood and Wildwood Crest were extremely wide, in excess of 1,500 and 1,100 feet, respectively. The inventory was later expanded in 2010 to include structures in Wildwood and Wildwood Crest to evaluate the extent of potential damage to reaches without dunes and assess the impact of sand backpassing. The inventory of structures has not changed since the fieldwork was conducted in the study area.

Available digital aerial photos, street centerlines, and footprints of structures derived from a geographic information system were reviewed, and unique identification numbers were assigned to each structure. Data collected in the field, listed in Table B-13, included address, quality and construction type, number of stories, and occupancy type. A handheld computer with a digital map of the study area was used to code structure characteristics on electronic forms. Photographs of each inventoried structure were taken for in-office verification. Figure B-5 displays an example of a map and photo. Additional data such as first floor elevations, ground elevations, footprint area, and foundation type (pile or slab) were also obtained for each inventoried structure. Professional surveyors conducted the elevation survey on a structure by structure basis.

The construction characteristics of each building were entered into the Marshall & Swift Valuation Service software to calculate depreciated replacement cost value. Table B-14 displays total and mean residential and non-residential structure values by foundation type for the study area. The inventory consists of approximately 60% commercial and 40% residential structures. The associated content value of each residential structure is assumed to be 25% of the structural replacement cost. This assumption is based on previous studies that established content value to be about 40% of structural value in primary homes and 15 to 20% of structural value in secondary/vacation homes. The study area consists of a combination of rental or vacation homes, and year round residential homes. However, nearly 70% of the residential structures are vacation and rental homes, and typically the contents of structures with these types of occupancies are insured at a much lower percent, therefore, a conservative weighted content-to-structure value of 25% was adopted. Field observations and site-specific interviews with local residents during the conduct of the Townsends Inlet to Cape May Inlet Feasibility Study, which included a portion of the *Wildwoods,* substantiate that the ratio is suitable. Also, information from a local insurer confirmed that personal property in secondary homes is typically insured at a lower percentage than that of primary residences. Typically applied in urban areas, affluence is an inundation reduction benefit defined as an increase in residential content-to-structure value ratio in relation to future increases in residential income. The benefit is based on the prevention of damages to potentially increased content values of residential structures in the future. Affluence is a minor potential benefit which has not been claimed by the District in any coastal studies.

Table B-13
PHYSICAL CHARACTERISTICS OBTAINED
FOR BUILDING INVENTORY

1.) Type – Residential, Commercial, etc.
2.) Usage
3.) Town
4.) Structure Size
4.) Number of Stories
5.) Basement/Foundation
6.) Exterior Material
7.) Roof Material
8.) Quality
9.) Condition
10.) Garage/Shed
11.) Ground Elevation
12.) First Floor Elevation
13.) Total Units
14.) Distance from Reference Line

Table B-14
SUMMARY OF DEPRECIATED STRUCTURE VALUES

Type (North Wildwood)	Structures	Value ($000)	Mean
Pile			
Residential	99	$43,179	$436
Commercial	63	$108,965	$1,730
Subtotal	*162*	*$152,144*	
Slab			
Residential	18	$22,403	$1,245
Commercial	13	$22,993	$1,769
Subtotal	*31*	*$45,396*	
Total	*193*	*$197,540*	
Type (Wildwood)	**Structures**	**Value ($000)**	**Mean**
Pile			
Residential	0	$0	$0
Commercial	11	$28,034	$2,549
Subtotal	*11*	*$28,034*	
Slab			
Residential	28	$5,594	$200
Commercial	97	$37,115	$383
Subtotal	*125*	*$42,709*	
Total	*136*	*$70,743*	
Type (Wildwood Crest)	**Structures**	**Value ($000)**	**Mean**
Pile			
Residential	0	$0	$0
Commercial	24	$186,917	$7,788
Subtotal	*24*	*$186,917*	
Slab			
Residential	46	$32,223	$700
Commercial	59	$201,155	$3,409
Subtotal	*105*	*$233,378*	
Total	*129*	*$420,295*	


NORTH WILDWOOD
NEW JERSEY SHORE PROTECTION
FEASIBILITY STUDY
HEREFORD INLET TO CAPE MAY INLET
THE WILDWOODS
CAPE MAY COUNTY, NJ
542
540
537
539
E. 4th Ave
534
531
530
529
528
527
526
524
John F Kennedy Blvd
E. 5th Ave
525

Figure B-5

COSTDAM (**CO**astal **ST**orm **D**amage **A**ssessment **M**odel), developed by Wilmington District, was used to estimate erosion, wave, and inundation damage to the structures in the database. The economic model incorporates pertinent structure characteristics such as location, ground and first floor elevations, structure and content values and foundation type along with coastal storm parameters such as wave zone, erosion zone, and water level by distance from the shore/reference line. The COSTDAM model and methodologies have been applied and approved for six studies conducted previously along the coast of New Jersey. The model has been approved for continued use for this study as discussed in Section 5.5.1 of the main report. A description of the program's damage estimation methodology is provided in the following paragraphs.

4.2 Storm Damage Modeling

Damages (for without and with project conditions) were calculated for seven frequency storm events (5, 10, 20, 50, 100, 200, and 500 year events) for erosion, wave and inundation damage to structures, infrastructure and improved property. The calculations were performed using COSTDAM and EAD. COSTDAM reads an ASCII 'Control' file which contains the storm frequency parameters for each cell and an ASCII 'Structure' file which contains the information database of each structure. An excerpt from the structure file is shown in Table B-15. COSTDAM checks if a structure has been damaged by wave attack, based on the relationship between a structure's first floor elevation and the total water elevation that sustains a wave. Then COSTDAM checks for erosion damage at a structure. Finally, COSTDAM calculates inundation damages if the water elevation is higher than the first floor elevation based on FIA depth-damage curves adjusted for increased salt-water damageability. Examples of these curves are shown in Table B-16. To avoid double counting, if damage occurs by more than one mechanism, COSTDAM takes the maximum damage of any given mechanism (wave, erosion, or inundation) and drops the rest of the damages from the structure's total damages.

Table B-15
EXCERPT OF COSTDAM STRUCTURE FILE

1	1	102.0	152.4	7.4	1.3	1818	454S17MT2 3 1
1	2	228.8	242.8	6.5	1.0	1384	346S03S04 3-1
1	3	276.1	287.3	6.9	2.2	758	190S17MT2 3 1
1	4	271.3	287.0	6.6	2.6	279	70S03S04 3-1

Columns 1-3 contain the Reach ID.
Columns 4-9 contain the Structure ID.
Columns 10-19 are blank.
Columns 20-27 contain the distance to the front of the structure.
Columns 28-35 contain the distance to middle of structure.
Columns 36-40 contain the ground elevation.
Columns 41-44 contain distance between the first floor and ground.
Columns 45-53 contain structure replacement cost value.
Columns 54-62 contain content replacement cost value.
Columns 63-65 contain structure depth damage curves.
Columns 66-68 contain content depth damage curves.
Columns 69-70 contain a code to make the structure "active".
Columns 71-72 contain the damage category

Table B-16
EXCERPT OF DEPTH DAMAGE CURVES

S03 (2 story, no basement, residential structure)
# of Rows (free format)
13
Depth Damage (expressed as a decimal) (free format)

-2	0
-1	.01
0	.10
1	.24
2	.30
3	.36
4	.39
5	.42
6	.47
7	.49
8	.56
9	.64
10	.67

S15 (1 story, masonry, no basement, commercial structure)
# of Rows (free format)
13
Depth Damage (expressed as a decimal) (free format)

-1	0
-1	.01
0	.05
1	.21
2	.29
3	.38
4	.46
5	.48
6	.53
7	.55
8	.59
9	.67
10	.73

4.3 Erosion Damages

The distance between the reference (profile) line and the oceanfront and back walls were measured in ArcGIS using georeferenced mapping of the study area. This technique reduces the amount of human error and photographic distortion. For the structure damage/failure analysis, it was assumed that a structure is destroyed at the point that the land below the structure is eroded halfway through the structure's footprint if the structure is not on a pile foundation. If the structure is on piles, the land below the structure must have eroded through the entire footprint of the structure before total damage is claimed. Prior to this, for both foundation types, the percent damage claimed is equal to the linear proportion of erosion under the structure's footprint relative to the total damage point. Figure 6 graphically depicts the relationship between percent damage and percent of footprint compromised. The damage relationship was developed during the initial assessment of storm erosion damage susceptibility on the Delaware and New Jersey coasts, has been applied regionally, and is considered a reasonable method to estimate aggregate erosion damages to the structure types represented in this coastal environment.

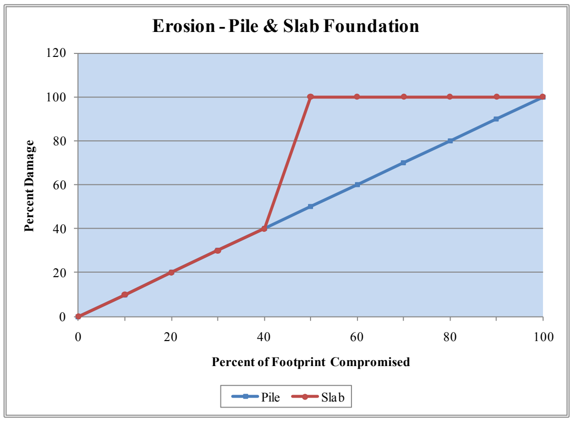


Figure B-6

The communities' participation in the National Flood Insurance Program (NFIP) ensures that requirements are met to build structures with first floors beyond the base flood elevation. NFIP effective dates are in 1979 for North Wildwood and in 1980 for both Wildwood, and Wildwood Crest. It is likely that structures closest to the oceanfront are newer and elevated. According to local officials, piling depth requirements are contingent upon several factors, vary for each property, and pile depth data on a structure by structure basis was not available at the time of study commencement. Furthermore, if the data were available it could be addressed qualitatively only because structure pile depth is not a variable in the modeled calculation of hurricane and storm damage reduction benefits.

In addition to estimating erosion damage to structures, damage to the land the structures are on or improved property was calculated. The improved property value was determined by comparing market value of the near shore land to the cost of filling in the eroded land for reutilization and using the more conservative estimate. The cost of filling/restoring the improved property is based on the different depths, widths and cubic yards of erosion produced by each storm event. The cost of filling/restoring eroded improved property was determined to be less expensive than market value of near shore land. The cost was prorated for the width of each cell to estimate total land erosion damage.

Erosion damage to infrastructure was also calculated. An erosion damage curve was developed for damage to infrastructure within the erosion limits. Values for roads, sidewalks, storm drains, electrical lines, and other utilities were estimated using standard engineering criteria. The judgment was made that all infrastructure damaged would be replaced in-kind. The replacement cost does not necessarily relate to the number of structures in the area. Road and utilities replacement costs consisted of fixed and variable costs based on ranges of feet of replacement/repair. In general, the unit replacement cost of roads decreased with greater quantities eroded reflecting economies of scale. Distance from the reference line and feet of erosion per event for each road and associated utilities were used to determine damage susceptibility. Once damages were calculated for infrastructure for the storm events the expected annual damages were calculated by using the Hydrologic Engineering Center's (HEC) Expected Annual Damage (EAD) program. The EAD program determines expected average annual damage by relating the dollar value of damage for different event magnitudes to the percent chance of exceeding those events. A sample EAD input file is shown in Table B-17.

Table B-17
EAD INPUT FILE EXAMPLE

```
TT HEREFORD INLET TO CAPE MAY INLET (THE WILDWOODS) (NAVD88)
TT FEASIBILITY PHASE JUNE 2007 P.L. ($000)
TT EROSION DAMAGE ANALYSIS EXISTING COND. INFRASTRUCTURE DAMAGE 5-500 YR
J1    50    2007    2012 06 2007
J2 3.500
CN     3   INFRA   BDWLK   PIERS
PN     1 WITHOUT PROJECT CONDITIONS (REVISED)
RN 1
FR             7      20      10       5       2       1      .5      .2
DG     1       1   379.6   496.3   559.4   595.2  4126.0  5967.5  7048.0
DG     1       2     0.0     0.0     0.0     0.0     0.0     0.0     0.0
DG     1       3     0.0     0.0     0.0     0.0     0.0     0.0     0.0
ER     1
```

4.4 Wave-Inundation Damages

A structure in the COSTDAM model is considered damaged by a wave when there is sufficient force (from a 3-foot high breaking wave) in the total water elevation to completely destroy a structure. Figure B-7 illustrates the various components of waves. Partial wave damages are not calculated; instead the structure is subjected to inundation damages. Large masonry structures like high-rise condominiums are not expected to experience failure by wave damage. The wave attack damage relationship developed by Wilmington District for Atlantic coast studies was adopted for use in the New Jersey coast hurricane and storm damage reduction analyses of seven projects. Since waves cause similar types of damage as inundation, assessing damage prior to full wave impact on a structure would, in essence, duplicate the inundation damage estimate.

Percentages of total depreciated replacement cost used to calculate damage by the depth-damage function curves for inundation damage reflect various characteristics of a structure. The depth-damage curves display the percent damaged at various stages relative to the first floor. The curves used to estimate inundation damage to structures were derived from well-established FIA (Federal Insurance Administration) depth-damage curves and previous studies of saltwater areas are applicable for this study. The distinguishing characteristics are construction type and the number of stories in a structure. The FIA curves were developed by sampling the various types of structures and contents at New Jersey seashore communities in Cape May and Atlantic counties. Curve percentages were compared to survey data of the additional damage that corrosive saltwater would cause. An example of the frequency at which damage begins and the damage mechanism for the *Wildwoods* is shown below.

	Damage Start	
Community	**Frequency**	**Type**
North Wildwood	5 YR	Flooding
Wildwood	5 YR	Flooding
Wildwood Crest/Lower Township	50 YR	Flooding

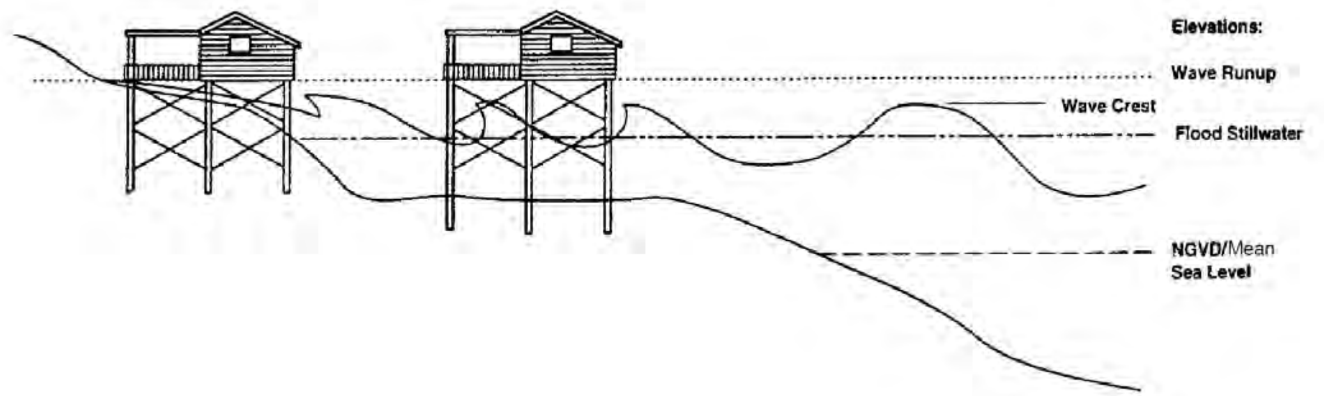


Figure B-7 (Source: FEMA)

4.5 Emergency/Clean-Up Information

Clean-up costs for individual structures are based on the time for clean-up and additional meal and travel costs. Travel and meal costs are conservatively included as opposed to evacuation costs because most residential structures and many commercial structures are occupied only on a seasonal basis, and oftentimes, not by the structure's owner. Clean-up costs are applied to those structures affected by a particular storm event.

Emergency and clean-up costs were calculated for North Wildwood. The cost of emergency public services during or immediately after storm events was analyzed using information provided by the municipality. As a point of reference, the municipality reported damages for the December 1992 event with associated elevations that correspond to a 25-year event. Damage frequency curves were developed and extrapolated for major flood events consistent with the damage frequency distribution for buildings, and historic data.

5.0 ECONOMIC BENEFIT EVALUATION

5.1 WITHOUT PROJECT CONDITIONS – NORTH WILDWOOD

5.1.1 Damage Zone Structures

The number of structures affected and total damages by damage zone or damage frequency for structures in North Wildwood is presented in Table B-18. Damage from the different mechanisms (wave, erosion, or inundation) decreases between storm events because structures may be susceptible to more damage from a different mechanism at different storm frequencies. However, overall damage from all damage mechanisms increases with higher intensity storms. Structural damage below the 5-year event is negligible. Storms equivalent to a 2-year event have occurred in which no structural damages were reported.

Table B-18
NORTH WILDWOOD
WITHOUT PROJECT CONDITIONS
STRUCTURES AFFECTED AND
TOTAL DAMAGE BY FREQUENCY
(Dollars in thousands)

North Wildwood	5-YR	10-yr	20-YR	50-YR	100-YR	200-YR	500-YR
Structures	1	1	1	64	148	160	176
Wave Damage	0	0	0	$485	$54,954	$136,861	$180,796
Erosion Damage	0	0	0	0	$3,395	$17,167	$10,175
Inundation Damage	$140	$152	$165	$15,349	$36,774	$6,418	$7,263
Total Damage	$ 140	$ 152	$ 165	$15,834	$95,123	$160,446	$198,234

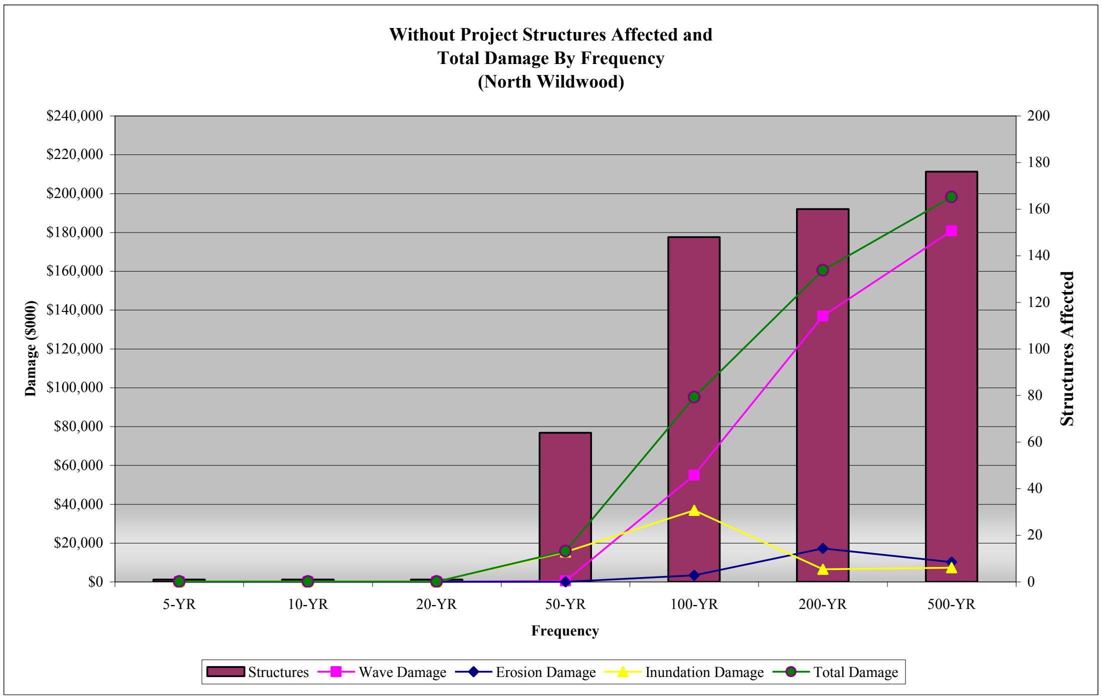


Figure B-8

Table B-19
NORTH WILDWOOD
WITHOUT PROJECT CONDITIONS
AVERAGE ANNUAL STRUCTURE DAMAGE
(Dollars in thousands)

Location	Cell	Erosion	Wave	Inundation	Average Annual Damage
North Wildwood	1	$23	$919	$269	$1,211
North Wildwood	2	$97	$502	$401	$1,000
Total		$ 120	$1,421	$ 670	$2,211

Table B-20
NORTH WILDWOOD
WITHOUT PROJECT CONDITIONS
RESIDENTIAL AND COMMERCIAL
AVERAGE ANNUAL STRUCTURE DAMAGE
(Dollars in thousands)

Location	Cell	Residential	Commercial	Average Annual Damage
North Wildwood	1	$316	$895	$1,211
North Wildwood	2	$247	$753	$1,000
Total		$ 563	$1,648	$2,211

5.1.2 Infrastructure and Improved Property Damages

Total infrastructure damages by frequency are shown in Table B-21A. The without project average annual damages (AAD) for the infrastructure such as roads, storm drains, the boardwalk, piers, bulkheads, and improved property are displayed in Table B-21B.

Table B-21A
NORTH WILDWOOD
WITHOUT PROJECT CONDITIONS
TOTAL INFRASTRUCTURE DAMAGES BY FREQUENCY
(Dollars in thousands)

Category	5-YR	10-YR	20-YR	50-YR	100-YR	200-YR	500-YR
Infrastructure	$1,440	$3,350	$3,418	$3,852	$15,089	$18,173	$22,124
Boardwalk	0	0	0	0	5,540	5,540	5,540
Bulkhead	0	0	0	0	1,239	1,239	1,239
Total	$1,440	$3,350	$3,418	$3,852	$21,868	$24,952	$28,903

Table B-21B
NORTH WILDWOOD
WITHOUT PROJECT CONDITIONS
AVERAGE ANNUAL INFRASTRUCTURE AND IMPROVED PROPERTY DAMAGES
(Dollars in thousands)

Category	Total
Infrastructure	$ 226
Boardwalk	83
Bulkhead	19
Improved Property	28
Total	$ 356

5.1.3 Summary of Damages

Total estimated average annual damages in North Wildwood by location/cell and damage mechanism are $3,070,000 as presented in Table B-22. Average annual damages to structures only are estimated to be $2,211,000.

Table B-22
NORTH WILDWOOD
WITHOUT PROJECT
TOTAL AVERAGE ANNUAL DAMAGE
(Dollars in thousands)

Location	Cell	Structure	Infrastructure	Improved Property	Average Annual Damage
North Wildwood	1	$1,211	$185	$24	$1,420
North Wildwood	2	$1,000	$646	$4	$1,650
Total		$2,211	$ 831	$ 28	$3,070

5.1.4 Emergency/Clean-Up Costs

The number of structures affected and the estimated costs for each storm event are presented in Table B-23 for North Wildwood. Average annual emergency and clean-up costs for all affected individuals and public entities are $103,000, combined. Total expected average annual damage under without project conditions including emergency costs is $3,173,000.

Table B-23
NORTH WILDWOOD
WITHOUT PROJECT CONDITIONS
EMERGENCY/CLEAN-UP COSTS
(Dollars in thousands)

North Wildwood	5-YR	10-YR	20-YR	50-YR	100-YR	200-YR	500-YR
Structures	1	1	1	64	148	160	176
Individual Clean-up Costs	$1	$1	$3	$65	$351	$812	$1,786
Municipal Emergency Costs	$11	$92	$141	$826	$2,410	$4,122	$6,005

5.1.5 Back Bay Flooding

Storm damage resulting from infiltration of waves, beach erosion, and inundation from the ocean shoreline was the focus of the proposed plan recommended by the study. Many barrier islands, including the *Wildwoods*, are traditionally subject to the impacts of bay flooding from any combination of storm events and high tides. This phenomenon was not evaluated as part of this study. As an example, the model was run for the stages associated with the back-bay (stillwater) inundation. The result represents inundation damages specific only to the oceanfront/nearshore structures in the database that would not be eliminated by a project on the oceanfront of North

Wildwood. These back-bay residual damages for these structures total $153,000 in average annual damages.

5.2 WITHOUT PROJECT CONDITIONS – WILDWOOD, WILDWOOD CREST & LOWER TOWNSHIP

5.2.1 Accreted Area

The study area at the *Wildwoods* is a dynamic system, characterized by the movement of sand down-shore from North Wildwood to the beaches in Wildwood and Wildwood Crest. This redistribution of sand from North Wildwood has created an on-shore borrow area of built-up accreted sand in Wildwood and Wildwood Crest which has caused water to pond at clogged outfalls, and increased costs for beach maintenance and outfall pipe extension. At the beginning of the study, initial review of field conditions in Wildwood and Wildwood Crest indicated that beach width was in excess of 1,500 and 1,100 feet, respectively. Therefore, the study focused on the highly eroded oceanfront of North Wildwood.

In addition to the down drift structures south of North Wildwood, property located on the piers seaward of the proposed project may be susceptible to damage from hurricanes and storms. Three piers in North Wildwood and Wildwood have extensions sloping down near beach level and are not uniformly elevated on tall piles as in other shore communities like Atlantic City. Structures located in these areas were reviewed to determine potential damages and the impact of extending various plan alternatives around the piers.

5.2.2 Damage Zone Structures

The number of structures affected and total damages by damage zone or damage frequency for structures in Wildwood, Wildwood Crest, and Lower Township are presented in Tables B-24 through B-26. To avoid double counting, if damage is incurred by more than one of the potential three mechanisms (wave, erosion, or inundation), the COSTDAM program takes the maximum damage of any one given mechanism, and disregards the lower damages estimated by the two other mechanisms. Overall damage from all damage mechanisms increases with higher intensity storms.

The problems of clogged outfall pipes and street flooding are an on-going challenge which has required continuous maintenance by Wildwood. Many of the nearshore structures in Wildwood are commercial activities and several have first floors with elevations at grade or slightly above, that are located within the modeled 5-year inundation profile area in terms of distance from the shoreline and inundation susceptibility. Wildwood has no dune system to impede over-berm flow of floodwaters; therefore the model carries the water elevation inland. The difference between historical observations and modeled results could be caused by a combination of factors. Officials and business owners implement mitigation measures such as sandbag placement and constructing building closures. When there has been no time to deploy protective measures damage has occurred in Wildwood. Businesses experienced with frequent potentially damaging storm events also may have employed storm proofing and modifications to property to reduce the impacts of flooding. Natural landscaping may also act as a barrier to infiltration of water into buildings. These variables are not model parameters.

Table B-24
WILDWOOD
WITHOUT PROJECT CONDITIONS
STRUCTURES AFFECTED AND
TOTAL DAMAGE BY FREQUENCY
(Dollars in thousands)

Wildwood	5-YR	10-yr	20-YR	50-YR	100-YR	200-YR	500-YR
Structures	32	47	54	63	115	125	131
Wave Damage	0	0	0	0	0	$48,306	$51,036
Erosion Damage	0	0	0	0	0	$70	$1,603
Inundation Damage	$1,797	$3,650	$5,543	$9,298	$29,236	$3,933	$3,578
Total Damage	$1,797	$3,650	$5,543	$9,298	$29,236	$52,309	$56,217

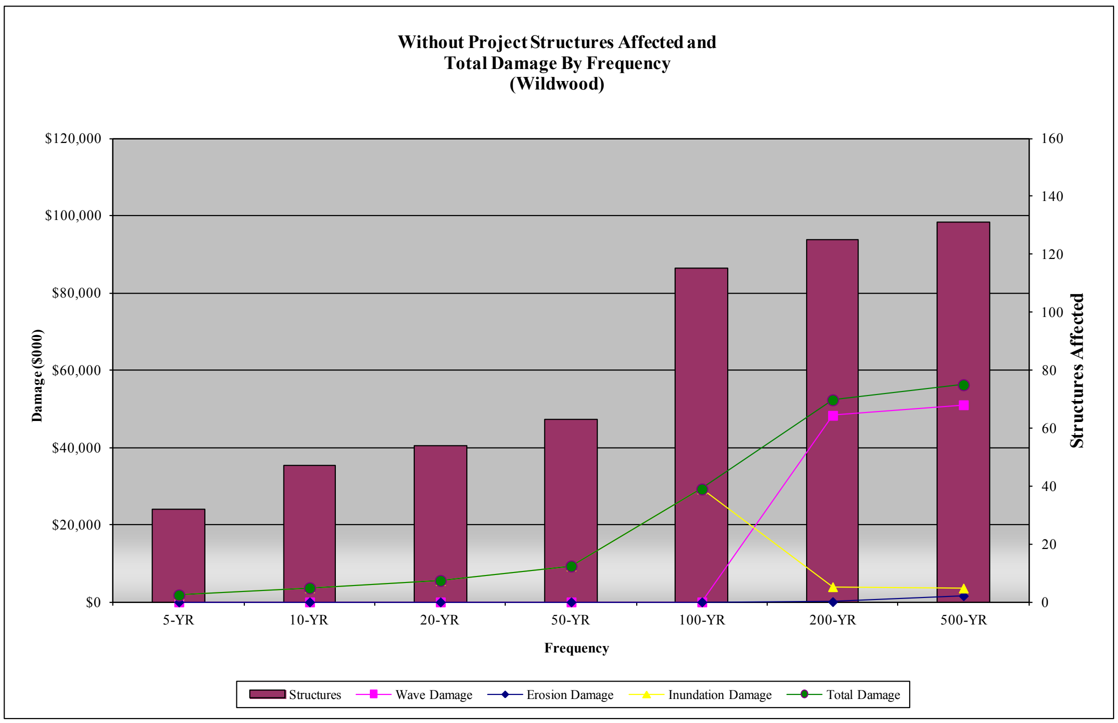


Figure B-9

Table B-25
WILDWOOD CREST
WITHOUT PROJECT CONDITIONS
STRUCTURES AFFECTED AND
TOTAL DAMAGE BY FREQUENCY
(Dollars in thousands)

Wildwood Crest	5-YR	10-yr	20-YR	50-YR	100-YR	200-YR	500-YR
Structures	0	0	0	19	81	100	105
Wave Damage	0	0	0	0	$1,406	$20,881	$41,371
Erosion Damage	0	0	0	0	$29,497	$22,301	$6,071
Inundation Damage	0	0	0	$5,598	$17,299	$53,059	$111,406
Total Damage	$ 0	$ 0	$ 0	$5,598	$48,202	$96,241	$158,848

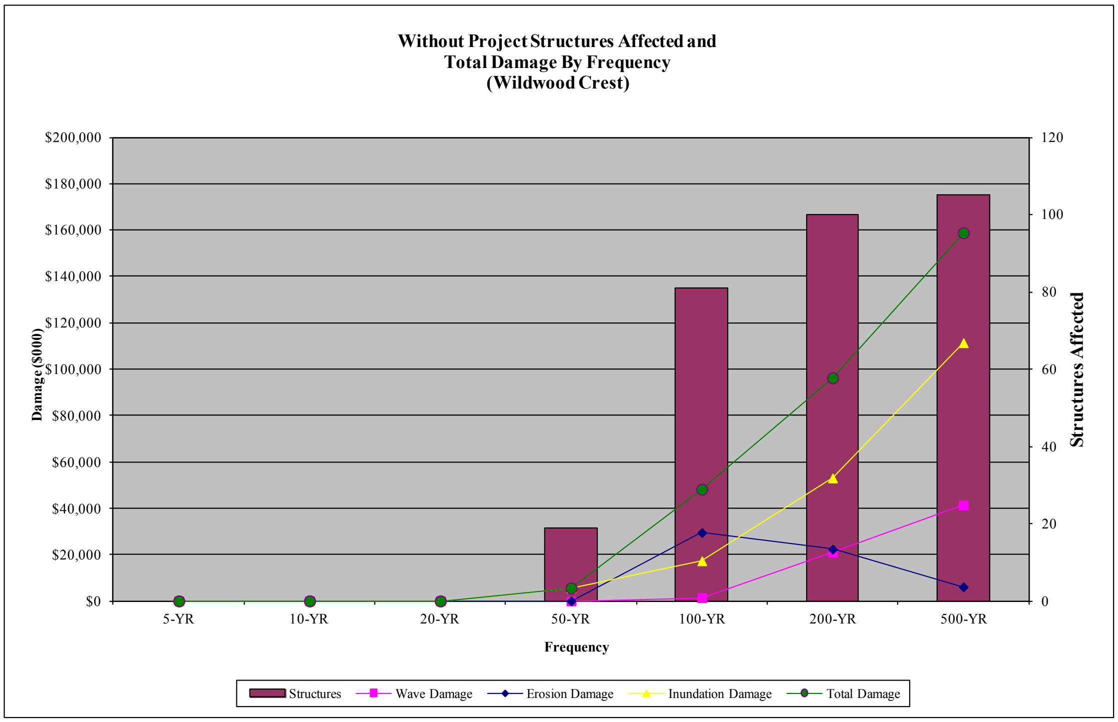
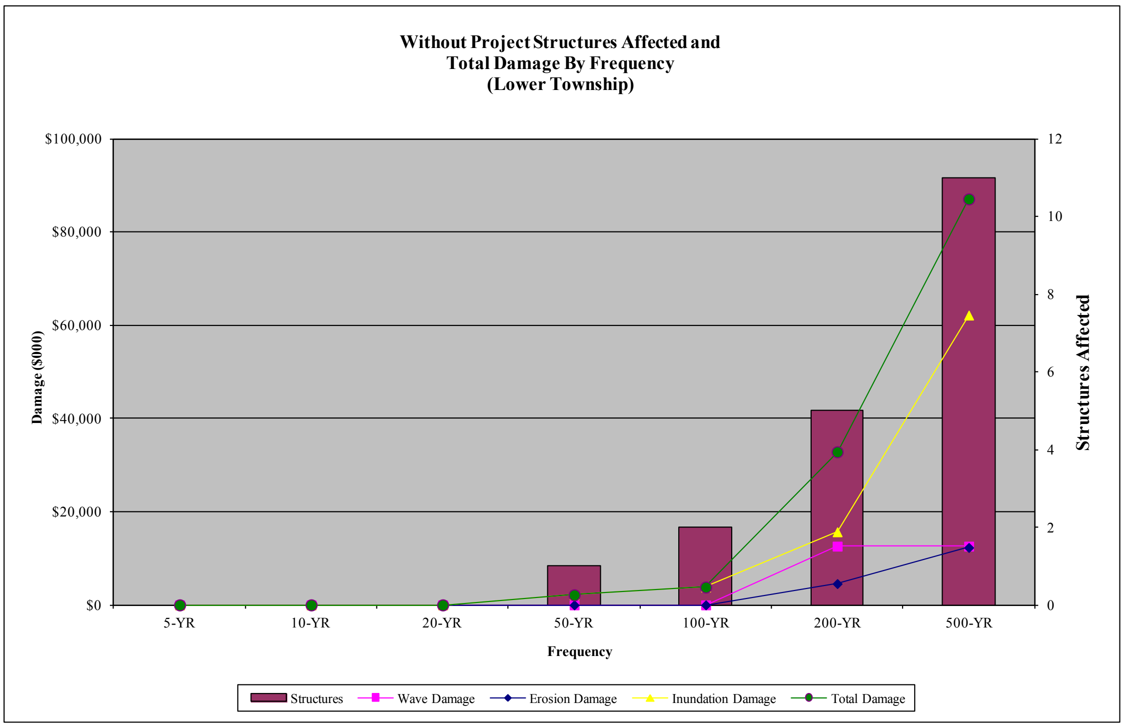


Figure B-10

**Table B-26
LOWER TOWNSHIP
WITHOUT PROJECT CONDITIONS
STRUCTURES AFFECTED AND
TOTAL DAMAGE BY FREQUENCY
(Dollars in thousands)**

Lower Township	5-YR	10-yr	20-YR	50-YR	100-YR	200-YR	500-YR
Structures	0	0	0	1	2	5	11
Wave Damage	0	0	0	0	$0	$12,605	$12,605
Erosion Damage	0	0	0	0	$0	$4,566	$12,318
Inundation Damage	0	0	0	$2,153	$3,826	$15,675	$62,169
Total Damage	$ 0	$ 0	$ 0	$2,153	$3,826	$32,846	$87,092



5.2.3 Accreted Area Damage Summary

Expected average annual damages by location/cell and damage mechanism for structures and other damage elements in the communities within the potential backpass area are presented in Table B-27. A breakdown of damage by structure type for Wildwood, Wildwood Crest, and Lower Township is shown in Table B-28. Average annual damages to structures only are an estimated $3,081,000 of the $5,124,000.

Table B-27
WILDWOOD, WILDWOOD CREST, LOWER TOWNSHIP
WITHOUT PROJECT
TOTAL AVERAGE ANNUAL DAMAGE
(Dollars in thousands)

Location	Cell	Erosion	Wave	Inundation	Infrastructure	Improved Property	Structure Subtotal	Average Annual Damage
Wildwood	3	$4	$298	$1,192	$1,306	$0	$1,494	$2,800
Wildwood Crest	4	$15	$5	$198	$498	$4	$ 218	$ 720
Wildwood Crest	5	$288	$178	$482	$212	$11	$ 948	$1,171
Lower Township	6	$49	$82	$290	$12	$0	$ 421	$ 433
Total		$ 356	$ 563	$2,162	$2,028	$ 15	$3,081	$5,124

Table B-28
WILDWOOD, WILDWOOD CREST, LOWER TOWNSHIP
WITHOUT PROJECT CONDITIONS
RESIDENTIAL AND COMMERCIAL
AVERAGE ANNUAL STRUCTURE DAMAGE
(Dollars in thousands)

Location	Cell	Residential	Commercial	Average Annual Damage
Wildwood	3	$52	$1,443	$1,495
Wildwood Crest	4	$0	$218	$ 218
Wildwood Crest	5	$518	$429	$ 947
Lower Township	6	$406	$15	$ 421
Total		$ 976	$2,105	$3,081

5.2.4 Amusement Piers Damages

A major attraction of the *Wildwoods* are the amusement piers which offer an assortment of mild to high thrill rides, kids' rides, game booths, and concessions, as well as waterparks. The unique nature of analyzing damage to the amusement piers required a separate database for the pier structures. Amusement pier ride replacement cost values were provided by the pier operator and depreciated using an amusement ride depreciation schedule. Specialized depth damage curves from similar activities were used in the inundation analysis. Estimated average annual damage to the amusement pier rides is $122,000. Table B-28 presents a breakdown of the damage estimate by community/pier and damage category.

Table B-29
NORTH WILDWOOD & WILDWOOD
WITHOUT PROJECT CONDITIONS
AVERAGE ANNUAL PIER DAMAGES
(Dollars in thousands)

Location	Pier	Erosion	Wave	Inundation	Average Annual Damage
North Wildwood	Surfside	$27	$7	$0	$ 34
Wildwood	Mariner's Landing	$44	$1	$0	$ 45
Wildwood	Adventure	$3	$12	$28	$ 43
Total		*$ 74*	*$ 20*	*$ 28*	*$ 122*

5.3 ESTIMATED TOTAL DAMAGES

Total estimated without project average annual damage for all categories in North Wildwood, the eroding portion of the study area, and Wildwood and Wildwood Crest, the down-drift accreting area, is $8,194,000. Table B-30 presents a breakdown of the damage estimate by community.

Table B-30
WITHOUT PROJECT CONDITIONS
TOTAL AVERAGE ANNUAL DAMAGES
(Dollars in thousands)

Community	Total
North Wildwood	$3,070
Wildwood	2,800
Wildwood Crest/ Lower Township	2,324
Total	*$8,194*

6.0 BENEFIT ANALYSIS

6.1 WITH PROJECT ALTERNATIVES

6.1.1 Storm Damage Reduction

Expected damages for several different project alternatives were calculated using the same methodologies and databases as previously detailed in the without project conditions. The benefits from the project alternatives were estimated by evaluating damage to structures under with and without project conditions. Potential damage reduction to infrastructure, improved property, and other auxiliary categories is expected to parallel reduced damage to structures and, therefore, was not calculated for the matrix of alternatives. The eroded shoreline in North Wildwood was analyzed first. Plan alternatives A-N are aligned with the current beach profile landward of the amusement pier structures and, therefore, would not protect those structures from storm damage. Table B-31 and Figure B-11 display the results of the storm damage reduction analysis for the oceanfront and nearshore structures in North Wildwood.

The plan alternative selected to alleviate the severe erosion in North Wildwood includes the construction of a dune with a height of 16 feet (NAVD) and a berm with a width of 75 feet. Dredging and backpassing were two options analyzed for acquiring sand for the project. The backpass option was reviewed and selected in an effort to maximize benefits and employ a systems approach to combine protecting property and infrastructure at the northern end of the island with improving beach conditions in Wildwood and Wildwood Crest/Lower Township. The plan would also provide storm damage reduction benefits for the southern Five Mile Island communities. The presence of a wide feeder beach provides adequate sand to form protective dunes in the cells of the study area that lack this additional height buffer. Tables B-32 and B-33 display the results of the storm damage reduction analysis for the oceanfront and nearshore structures in Wildwood, and Wildwood Crest, respectively.

Table B-34 compares the aggregate incremental benefits from constructing a consistent dune of various heights in Wildwood and Wildwood Crest/Lower Township.

Table B-31
NORTH WILDWOOD
STORM DAMAGE REDUCTION BENEFITS
BY PLAN ALTERNATIVE

Plan	Project Type	Without Project Storm Damages	With Project Storm Damages	Storm Damage Reduction Benefits	Percent Reduced
A	12’ Dune, 115’ Berm	$2,211,000	$1,887,000	$324,000	15%
B	14’ Dune, 95’ Berm	$2,211,000	$1,137,000	$1,074,000	49%
C	16’ Dune, 75’ Berm	$2,211,000	$687,000	$1,524,000	69%
D	12’ Dune, 140’ Berm	$2,211,000	$1,287,000	$924,000	42%
E	14’ Dune, 120’ Berm	$2,211,000	$975,000	$1,236,000	56%
F	16’ Dune, 100’ Berm	$2,211,000	$531,000	$1,680,000	76%
G	12’ Dune, 165’ Berm	$2,211,000	$1,180,000	$1,031,000	47%
H	14’ Dune, 145’ Berm	$2,211,000	$644,000	$1,567,000	71%
I	16’ Dune, 125’ Berm	$2,211,000	$459,000	$1,752,000	79%
J	18’ Dune, 80’ Berm	$2,211,000	$461,000	$1,750,000	79%
K	18’ Dune, 105’ Berm	$2,211,000	$212,000	$1,999,000	90%
L	20’ Dune, 85’ Berm	$2,211,000	$203,000	$2,008,000	91%
M	20’ Dune, 110’ Berm	$2,211,000	$197,000	$2,014,000	91%
N	20’ Dune, 160’ Berm	$2,211,000	$121,000	$2,090,000	95%

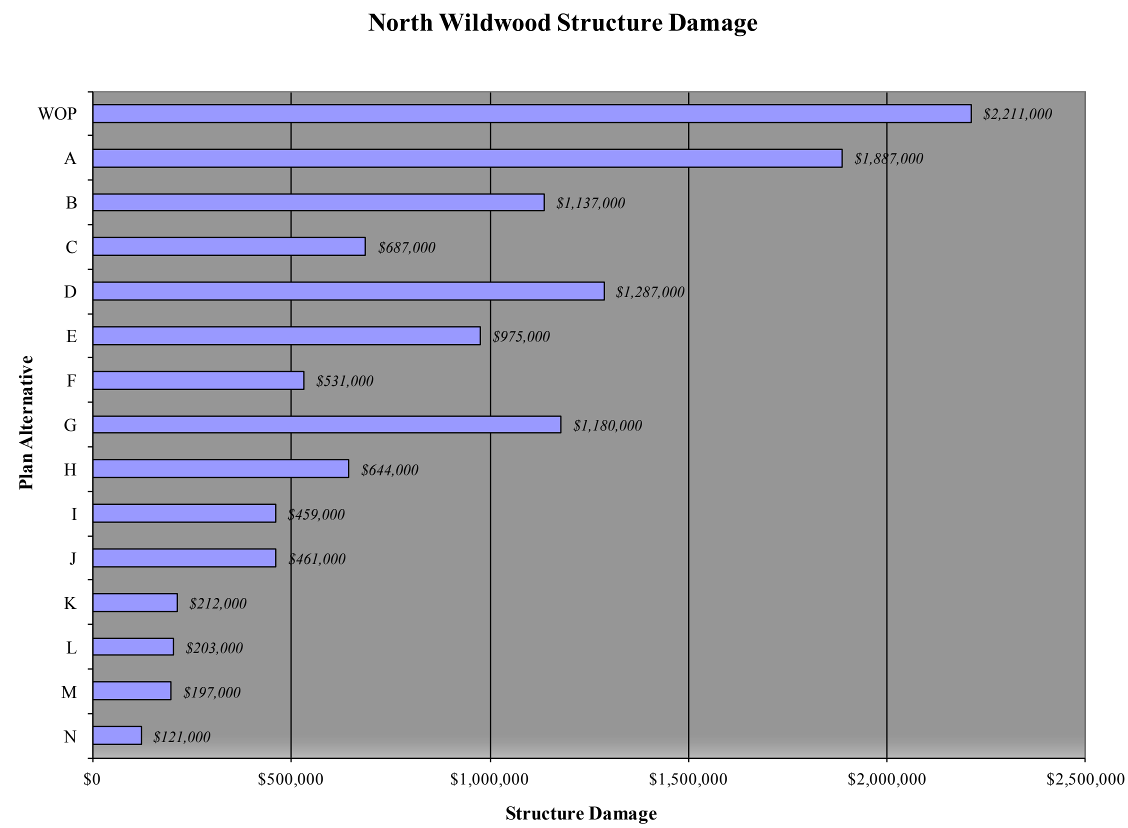


Figure B-12

Table B-32
WILDWOOD
STORM DAMAGE REDUCTION BENEFITS
BY PLAN ALTERNATIVE

Plan	Project Type	Without Project Storm Damages	With Project Storm Damages	Storm Damage Reduction Benefits	Percent Reduced
AA	12' Dune	$1,494,000	$432,000	$1,062,000	71%
BB	14' Dune	$1,494,000	$222,000	$1,272,000	85%
CC	16' Dune	$1,494,000	$121,000	$1,373,000	92%

Table B-33
WILDWOOD CREST/LOWER TOWNSHIP
STORM DAMAGE REDUCTION BENEFITS
BY PLAN ALTERNATIVE

Plan	Project Type	Without Project Storm Damages	With Project Storm Damages	Storm Damage Reduction Benefits	Percent Reduced
AA	12' Dune	$1,165,000	$653,000	$512,000	44%
BB	14' Dune	$1,165,000	$452,000	$713,000	61%
CC	16' Dune	$1,165,000	$306,000	$859,000	74%

Table B-34
WILDWOOD AND WILDWOOD CREST/LOWER TOWNSHIP
AAB, AAC, NET BENEFITS & BCR BY PLAN ALTERNATIVE

Plan	Project Type	AAB	AAC	Net Benefits	BCR
BYPASS					
AA	12' Dune	$1,574,000	$112,000	$1,462,000	14.05
BB	14' Dune	$1,986,000	$173,000	$1,813,000	11.48
CC	16' Dune	$2,231,000	$245,000	$1,986,000	9.11

**May not add exactly due to rounding*

An interim analysis was conducted to determine the impact of backpassing sand to North Wildwood without construction of the complete project with a protective dune of any height in Wildwood and Wildwood Crest/Lower Township. The reduced berm without inclusion of the dune component of the proposed plan alternative would result in an estimated 6% increase in without project average annual damage to structures from $3,081,000 to $3,263,000.

Plan C with a 16-foot dune and a 75-foot berm was used as a base plan to extend protection to the relatively low-lying amusement piers. The 100-foot berm seaward of the piers is essentially the same as the 75-foot berm landside of the piers at the boardwalk parallel to the shoreline to support the dune. Plans C1, C2, and C3 were developed to determine whether additional beachfill to protect the piers would be incrementally justified. Table B-35 shows the resulting incremental average annual costs to expand protection around the ends of the piers. The benefits include the maximum potential storm damage reduction benefits to pier infrastructure. A steel sheet pile barrier around the piers was also evaluated and is presented. These options were eliminated from the analysis due to the limited benefit potential and prohibitively high cost to extend protection around the piers.

Table B-35
NORTH WILDWOOD AND WILDWOOD PIERS
AAB, AAC, NET BENEFITS & BCR BY PLAN ALTERNATIVE

Plan	Project Type	AAB	AAC	Net Benefits	BCR
BYPASS (4-YR Nourishment Cycle)					
C1	12' Dune, 100' Berm	$400,000	$857,000	($457,000)	0.47
C2	14' Dune, 100' Berm	$401,000	$1,135,000	($734,000)	0.35
C3	16' Dune, 100' Berm	$497,000	$1,410,000	($913,000)	0.35
STEEL SHEET PILE					
S1	Steel Sheeting	$497,000	$1,658,000	($1,161,000)	0.30

6.1.2 Local Costs Forgone Benefits

Benefits of coastal storm management projects include reductions in non-physical damages as well as reductions in physical damages to homes, commercial buildings, public property and critical infrastructure. The Coastal Storm Risk Management National Economic Development (NED) Manual (2011) includes reduced costs for public protective measures or local costs forgone, as it is referred to in this document, as a benefit category. This benefit captures future costs that would be expended by the state and local municipalities to protect coastal property in the absence of a plan of protection. The local costs forgone benefits described in the following paragraphs are expected to be realized with implementation of any proposed project.

The beaches of the *Wildwoods* have been historically protected and maintained through state and local government-sponsored beachfill projects in North Wildwood to allay erosion, daily outfall maintenance to remove sand and place barriers around water that ponds at clogged outfalls, and construction projects in Wildwood and Wildwood Crest to extend outfall pipes beyond the accreted shoreline. In 2009, the State of New Jersey constructed a beachfill project of over one million cubic yards of sand at the northern section of the *Wildwoods* to control erosion with subsequent emergency sand placements after other storm events. The future without project condition was based on the expectation that the state would continue to partner and provide protection to the communities. The implementation of a federal project will preclude this action and provide a savings from public protective measures to the State of New Jersey and the local municipalities.

Savings to the State of New Jersey and local communities could potentially be, depending upon the source of material, an estimated average annual $954,000 as a result of the beachfill and nourishment components of a proposed plan. Table B-36 displays this savings for North Wildwood. Acquisition of sand from Hereford Inlet via dredging would ignore the systems approach to the problems of congested outfalls and eliminate realization of local costs forgone benefits to Wildwood or Wildwood Crest (shown in Table B-38). Therefore, the option to dredge material from Hereford Inlet was removed from further consideration.

Local costs forgone were included in the average annual benefits for the backpass alternatives in Table B-37 because the protective dune and berm will be constructed with the accreted beach material from Wildwood and Wildwood Crest. The expected range of the remaining berm widths after implementation of the tentatively selected plan (TSP) will vary with the beach profile from 300 to 1,100 feet.

Table B-36
NORTH WILDWOOD
LOCAL COSTS FORGONE
UNDER WITH PROJECT CONDITIONS

Year	North Wildwood	PW Factor	PW North Wildwood
1	$0	0.966184	$0
2	$0	0.933511	$0
3	$0	0.901943	$0
4	$0	0.871442	$0
5	$0	0.841973	$0
6	$9,750,000	0.813501	$7,931,631
7	$0	0.785991	$0
8	$0	0.759412	$0
9	$0	0.733731	$0
10	$0	0.708919	$0
11	$0	0.684946	$0
12	$0	0.661783	$0
13	$0	0.639404	$0
14	$0	0.617782	$0
15	$0	0.596891	$0
16	$9,750,000	0.576706	$5,622,883
17	$0	0.557204	$0
18	$0	0.538361	$0
19	$0	0.520156	$0
20	$0	0.502566	$0
21	$0	0.485571	$0
22	$0	0.469151	$0
23	$0	0.453286	$0
24	$0	0.437957	$0
25	$0	0.423147	$0
26	$9,750,000	0.408838	$3,986,167
27	$0	0.395012	$0
28	$0	0.381654	$0
29	$0	0.368748	$0
30	$0	0.356278	$0
31	$0	0.344230	$0
32	$0	0.332590	$0
33	$0	0.321343	$0
34	$0	0.310476	$0
35	$0	0.299977	$0
36	$9,750,000	0.289833	$2,825,869
37	$0	0.280032	$0
38	$0	0.270562	$0
39	$0	0.261413	$0
40	$0	0.252572	$0
41	$0	0.244031	$0
42	$0	0.235779	$0
43	$0	0.227806	$0
44	$0	0.220102	$0
45	$0	0.212659	$0
46	$9,750,000	0.205468	$2,003,312
47	$0	0.198520	$0
48	$0	0.191806	$0
49	$0	0.185320	$0
50	$0	0.179053	$0
Total Present Worth:			$22,369,862
CRF (50 years @ 3.500% (FY14)):			0.042634
Average Annual Savings:			**$954,000**

6.2 OPTIMIZATION

Optimization of the alternatives is based on maximizing storm damage reduction to structures, which is the priority benefit category. Project induced benefits were considered during optimization. Storm damage reduction to infrastructure and improved property, and recreation were not used in the optimization process. Benefits which will accrue for those categories will be evaluated for the selected plan alternative. Initial and nourishment costs for the various project alternatives are annualized for comparison to the average annual benefits for each project alternative. Initial construction and periodic nourishment costs are annualized over a 50-year period of analysis at an FY14 discount rate of 3-½%. Monitoring, major rehabilitation, and real estate costs will be included for the selected plan alternative. The average annual costs are subtracted from and compared to average annual benefits to calculate net benefits and the benefit-cost ratio and select the optimal plan, which maximizes net benefits. Theoretically, the plan of improvement identified as the most efficient use of funds is the one in which benefits exceed cost by the maximum amount. The average annual benefits and costs, net benefits and benefit-cost ratio for storm damage reduction are included in Table B-37 for the backpass option.

Plan C, a 16'dune and 75' berm, is the alternative with the greatest net benefits in each periodic nourishment cycle evaluated. Engineering judgment in assessing nourishment cycle performance, recent historical rates of erosion, the lower risk of occurrence of a potentially damaging storm event with a shorter periodic nourishment cycle and the negligible difference between the 4 and 5-year cycle net benefits led to the selection of Plan C within the 4-year nourishment cycle group.

Table B-37

NORTH WILDWOOD

AAB, AAC, NET BENEFITS & BCR BY PLAN ALTERNATIVE (BACKPASS)

Plan	Project Type	AAB	AAB w/LCF	AAC	Net Benefits	BCR
3-YR Nourishment Cycle						
A	12' Dune, 115' Berm	$324,000	$1,278,000	$2,007,000	($729,000)	0.64
B	14' Dune, 95' Berm	$1,074,000	$2,028,000	$2,030,000	($2,000)	1.00
C	16' Dune, 75' Berm	$1,524,000	$2,478,000	$2,056,000	$422,000	1.21
D	12' Dune, 140' Berm	$924,000	$1,878,000	$2,481,000	($603,000)	0.76
E	14' Dune, 120' Berm	$1,236,000	$2,190,000	$2,503,000	($313,000)	0.87
F	16' Dune, 100' Berm	$1,680,000	$2,634,000	$2,543,000	$91,000	1.04
G	12' Dune, 165' Berm	$1,031,000	$1,985,000	$3,012,000	($1,027,000)	0.66
H	14' Dune, 145' Berm	$1,567,000	$2,521,000	$3,035,000	($514,000)	0.83
I	16' Dune, 125' Berm	$1,752,000	$2,706,000	$3,064,000	($358,000)	0.88
J	18' Dune, 80' Berm	$1,750,000	$2,704,000	$2,577,000	$127,000	1.05
K	18' Dune, 105' Berm	$1,999,000	$2,953,000	$3,095,000	($142,000)	0.95
L	20' Dune, 85' Berm	$2,008,000	$2,962,000	$3,140,000	($178,000)	0.94
M	20' Dune, 110' Berm	$2,014,000	$2,968,000	$4,182,000	($1,214,000)	0.71
N	20' Dune, 160' Berm	$2,090,000	$3,044,000	$6,367,000	($3,323,000)	0.48
4-YR Nourishment Cycle						
A	12' Dune, 115' Berm	$324,000	$1,278,000	$1,781,000	($503,000)	0.72
B	14' Dune, 95' Berm	$1,074,000	$2,028,000	$1,803,000	$225,000	1.12
C	16' Dune, 75' Berm	$1,524,000	$2,478,000	$1,831,000	$647,000	1.35
D	12' Dune, 140' Berm	$924,000	$1,878,000	$2,223,000	($345,000)	0.84
E	14' Dune, 120' Berm	$1,236,000	$2,190,000	$2,257,000	($67,000)	0.97
F	16' Dune, 100' Berm	$1,680,000	$2,634,000	$2,285,000	$349,000	1.15
G	12' Dune, 165' Berm	$1,031,000	$1,985,000	$2,703,000	($718,000)	0.73
H	14' Dune, 145' Berm	$1,567,000	$2,521,000	$2,727,000	($206,000)	0.92
I	16' Dune, 125' Berm	$1,752,000	$2,706,000	$2,755,000	($49,000)	0.98
J	18' Dune, 80' Berm	$1,750,000	$2,704,000	$2,319,000	$385,000	1.17
K	18' Dune, 105' Berm	$1,999,000	$2,953,000	$2,794,000	$159,000	1.06
L	20' Dune, 85' Berm	$2,008,000	$2,962,000	$2,834,000	$128,000	1.05
M	20' Dune, 110' Berm	$2,014,000	$2,968,000	$3,776,000	($808,000)	0.79
N	20' Dune, 160' Berm	$2,090,000	$3,044,000	$5,735,000	($2,691,000)	0.53
5-YR Nourishment Cycle						
A	12' Dune, 115' Berm	$324,000	$1,278,000	$1,784,000	($506,000)	0.72
B	14' Dune, 95' Berm	$1,074,000	$2,028,000	$1,796,000	$232,000	1.13
C	16' Dune, 75' Berm	$1,524,000	$2,478,000	$1,823,000	$655,000	1.36
D	12' Dune, 140' Berm	$924,000	$1,878,000	$2,201,000	($323,000)	0.85
E	14' Dune, 120' Berm	$1,236,000	$2,190,000	$2,224,000	($34,000)	0.98
F	16' Dune, 100' Berm	$1,680,000	$2,634,000	$2,255,000	$379,000	1.17
G	12' Dune, 165' Berm	$1,031,000	$1,985,000	$2,696,000	($711,000)	0.74
H	14' Dune, 145' Berm	$1,567,000	$2,521,000	$2,719,000	($198,000)	0.93
I	16' Dune, 125' Berm	$1,752,000	$2,706,000	$2,747,000	($41,000)	0.99
J	18' Dune, 80' Berm	$1,750,000	$2,704,000	$2,284,000	$420,000	1.18
K	18' Dune, 105' Berm	$1,999,000	$2,953,000	$2,781,000	$172,000	1.06
L	20' Dune, 85' Berm	$2,008,000	$2,962,000	$2,819,000	$143,000	1.05
M	20' Dune, 110' Berm	$2,014,000	$2,968,000	$3,747,000	($779,000)	0.79
N	20' Dune, 160' Berm	$2,090,000	$3,044,000	$5,787,000	($2,743,000)	0.53

**Notes: Dune elevation in feet NAVD 88*

June 2007 price level and FY14 - 3.500% discount rate

Figures include local cost forgone (LCF)

Figures excluded infrastructure, improved property, and emergency costs

Table B-38
WILDWOOD AND WILDWOOD CREST/LOWER TOWNSHIP
LOCAL COSTS FORGONE
UNDER WITH PROJECT CONDITIONS

Year	Wildwood	Wildwood Crest	PW Factor	PW Wildwood	PW Wildwood Crest
1	$59,000	$500,000	0.966184	$57,005	$483,092
2	$59,000	$0	0.933511	$55,077	$0
3	$59,000	$0	0.901943	$53,215	$0
4	$95,000	$0	0.871442	$82,787	$0
5	$59,000	$0	0.841973	$49,676	$0
6	$59,000	$500,000	0.813501	$47,997	$406,750
7	$59,000	$0	0.785991	$46,373	$0
8	$59,000	$0	0.759412	$44,805	$0
9	$59,000	$0	0.733731	$43,290	$0
10	$59,000	$0	0.708919	$41,826	$0
11	$59,000	$800,000	0.684946	$40,412	$547,957
12	$59,000	$0	0.661783	$39,045	$0
13	$59,000	$0	0.639404	$37,725	$0
14	$95,000	$0	0.617782	$58,689	$0
15	$59,000	$0	0.596891	$35,217	$0
16	$59,000	$500,000	0.576706	$34,026	$288,353
17	$59,000	$0	0.557204	$32,875	$0
18	$59,000	$0	0.538361	$31,763	$0
19	$59,000	$0	0.520156	$30,689	$0
20	$59,000	$0	0.502566	$29,651	$0
21	$59,000	$500,000	0.485571	$28,649	$242,785
22	$59,000	$0	0.469151	$27,680	$0
23	$59,000	$0	0.453286	$26,744	$0
24	$95,000	$0	0.437957	$41,606	$0
25	$59,000	$0	0.423147	$24,966	$0
26	$59,000	$800,000	0.408838	$24,121	$327,070
27	$59,000	$0	0.395012	$23,306	$0
28	$59,000	$0	0.381654	$22,518	$0
29	$59,000	$0	0.368748	$21,756	$0
30	$59,000	$0	0.356278	$21,020	$0
31	$59,000	$500,000	0.344230	$20,310	$172,115
32	$59,000	$0	0.332590	$19,623	$0
33	$59,000	$0	0.321343	$18,959	$0
34	$95,000	$0	0.310476	$29,495	$0
35	$59,000	$0	0.299977	$17,699	$0
36	$59,000	$500,000	0.289833	$17,100	$144,916
37	$59,000	$0	0.280032	$16,522	$0
38	$59,000	$0	0.270562	$15,963	$0
39	$59,000	$0	0.261413	$15,423	$0
40	$59,000	$0	0.252572	$14,902	$0
41	$59,000	$800,000	0.244031	$14,398	$195,225
42	$59,000	$0	0.235779	$13,911	$0
43	$59,000	$0	0.227806	$13,441	$0
44	$95,000	$0	0.220102	$20,910	$0
45	$59,000	$0	0.212659	$12,547	$0
46	$59,000	$500,000	0.205468	$12,123	$102,734
47	$59,000	$0	0.198520	$11,713	$0
48	$59,000	$0	0.191806	$11,317	$0
49	$59,000	$0	0.185320	$10,934	$0
50	$59,000	$0	0.179053	$10,564	$0
			Total Present Worth:	$1,472,361	$2,910,998
			CRF (50 years @ 3.500% (FY14)):	0.042634	
			Average Annual Maintenance Savings:	**$63,000**	**$124,000**

Table B-39 presents a summary of the combined selected plan by community. The estimated average annual benefits include storm damage reduced and local costs forgone or reduced maintenance costs from a 16' dune and 75' berm in North Wildwood with excess sand conveyed from Wildwood and an engineered 16' dune and enduring berm to supplement oceanfront protection in Wildwood, Wildwood Crest, and Lower Township. The estimated costs include initial construction, periodic nourishment, and interest during construction.

Table B-39
NORTH WILDWOOD, WILDWOOD, AND WILDWOOD CREST/LOWER TOWNSHIP
SUMMARY OF AAB, AAC, NET BENEFITS AND BCR FOR THE SELECTED PLAN

Community	Cell	Selected Plan	AAB	AAC	Net Benefits	BCR
North Wildwood	1-2	16' Dune, 75' Berm	$2,478,000	$1,831,000	$647,000	1.4
Wildwood	3	16' Dune	$1,243,000	$117,000	$1,126,000	10.6
Wildwood Crest/ Lower Township	4-6	16' Dune	$674,000	$132,000	$542,000	5.1
The Wildwoods	1-6	16' Dune, 75' Berm; 16' Dune	$4,395,000	$2,080,000	$2,315,000	2.1

6.3 INCIDENTAL BENEFITS

6.3.1 Recreation Benefits

Beaches are consistently the number one travel destination in New Jersey. Tourist dollars contribute directly and indirectly to the regional economy. In 2008, the New Jersey Division of Travel and Tourism reported that travel and tourism generated 359,000 jobs in the state with a total payroll of $11.8 billion.

The Rutgers State University completed in 1994, for previous New Jersey coastal studies, a contingent valuation method survey for the New Jersey Department of Environmental Protection and Energy and the U.S. Army Corps of Engineers (Corps) to determine willingness to pay for the existing beach and an enhanced beach. This was done on a regional basis, encompassing the major beach communities of the New Jersey Atlantic coast such as the communities of Absecon Island, Seven Mile Island, Brigantine, as well as Stone Harbor and Avalon which is just north of the *Wildwoods*. The survey was designed in accordance with the NED Procedures Manual – Recreation II (A Guide for Using the Contingent Value Methodology in Recreation Studies). The original report is included as an attachment to this appendix. The survey consisted of 1,063 interviews of a random sample of recreational beach users. The interviews were conducted in person on the beach. The survey scope was intended for use with all South Jersey shore feasibility studies. The *Wildwoods* is also close, both qualitatively and geographically, to Stone Harbor therefore, it is reasonable that survey results can be representative of the conditions on the island.

Beachgoers were asked to indicate how important different factors were in deciding whether to visit a New Jersey beach. Respondents voiced similar desires. The primary factors of consideration were the quality of the beach scenery, the maintenance of the beach, the width of the beach, the number of lifeguards, and the family-friendliness of the beach.

The survey also used a density measure developed in cooperation with the Corps to determine if crowding was a problem. It was found that over 60% of the time there was at least several yards of space between beach towels or blankets, and only 7% of the time was it very crowded (only 2 feet between towels). Further it was determined that crowding was not considered a very important issue to the majority of beachgoers by asking respondents how important being alone is and how important is it to be with a large number of people. As might be expected, areas with more crowding tended to be frequented by people who like large numbers. People who like to be alone frequented areas that tended to have little crowding.

To estimate the value of the beach, as it exists currently, an iterative bidding process was applied. Beachgoers were first asked if a day at the beach would be worth $4.00 to each member of their household. Based on their answers, they were then asked progressively higher or lower amounts until the amount they value the beach was determined. Using this method it was found that the average value of a day at the beach is $4.22.

Beachgoers were asked how much more they were willing to pay if the beach were widened. While the majority was unwilling to pay any extra, approximately 16% of Stone Harbor beachgoers were willing to pay, on average, $2.47 more per visit. This would be equivalent to an average of $0.39 for all beachgoers. This willingness to pay value for Stone Harbor was adopted because it is the nearest beach to North Wildwood. This value was indexed to a June 2007 price level from an October 1994 price level for the purposes of this study. Since access to the beaches of the *Wildwoods* is free, the number of visitor days was obtained from City of North Wildwood estimates and by comparing beach size within the project area of North Wildwood with that of Stone Harbor. The total number of visitor days for the beach within the project area is estimated at 1,000,000.

Benefits were not found to accrue from increased capacity because crowding was found not to be a significant factor and the selected plan involves conveying accreted sand from Wildwood and Wildwood Crest. Removal of sand from the down drift areas is not expected to negatively affect the recreation experience because the beaches are extremely wide and require beachgoers to walk quite some distance to reach the water’s edge. In addition, alleviating the negative impacts of ponding is expected to improve the appearance of the beach. Benefits do, however, arise from an increase in the value of the recreational experience in North Wildwood.

Benefits resulting from this increase in recreational experience were calculated by multiplying the average daily value per beachgoer by the number of visitor days within the project area. This gives total recreational benefits of $580,000, as displayed in Table B-40.

Table B-40
RECREATION VISITOR DAYS & BENEFITS
(June 2007 Price Level)

Community	Visitor Days	Day Value	Total Value
North Wildwood	1,000,000	0.58	$580,000

There is a very low risk and uncertainty to the recommendation for the selected plan of improvement from the derivation of the recreation benefits by utilizing the somewhat dated Rutgers University Contingent Valuation Method (CVM) report as a key input. This report was contracted by the Philadelphia District to Rutgers University, and was spearheaded by a professor with substantial CVM expertise. The Rutgers University effort entailed a large random sample of interviews with approximately 1000 New Jersey beachgoers. The initial starting point for a visitor day beach experience valuation of $4.22 from the Rutgers report was within the lower range of valuation that could be expected to be applied from an alternate recreation benefit evaluation technique, Unit Day Values. The incremental increase in the willingness to pay, applied as the basis for benefits for an improved recreational experience with a widened with project condition beach berm, was a modest $0.69 per person per day (2014 PL). Also, the recreation benefits are strictly a secondary incidental project purpose for this study and were not used in the formulation/optimization process. The selected plan has positive BCRs for all the communities within the project area (without recreation benefits): North Wildwood (1.4); Wildwood (10.6); Wildwood Crest/Lower Township (5.1); and the Total Project (2.1). The recreation average annual benefits of $693,000 represent only 11% of the total project average annual benefits of $6,253,000. The impact of adding the recreation benefits at the end of the formulation process resulted in the project Benefit-Cost Ratio being adjusted slightly upward from 2.1 to 2.3.

6.3.2 Benefits During Construction

The proposed project will be constructed over nine months with an additional month before and after construction for mobilization and demobilization. Portions of the beach will be fully nourished before the project is completed in its entirety. The portions of the beach nourished early in the construction phase will provide storm damage reduction benefits. Table B-41 shows the monthly benefits during construction (BDC) and the resulting estimated average annual benefit of $86,000.

Table B-41
BENEFITS DURING CONSTRUCTION (BDC)

		Discount Rate:	3.500%	
		Price Level:	Jun-2007	
Construction Month	**Work**	**Monthly Benefit**	**Interest Factor**	**Total Benefit**
1	Mob	$0	1.026137	$0
2	The Wildwoods	113,000	1.023199	$115,622
3	The Wildwoods	113,000	1.020270	$115,291
4	The Wildwoods	206,000	1.017349	$209,574
5	The Wildwoods	206,000	1.014437	$208,974
6	The Wildwoods	310,000	1.011533	$313,575
7	The Wildwoods	326,000	1.008637	$328,816
8	The Wildwoods	363,000	1.005750	$365,087
9	Demob	364,000	1.002871	$365,045
			Total Benefits During Construction:	$2,021,983
			Capital Recovery Factor (50yrs. @3.500% (FY14)):	0.042634
			BDC (Rounded):	**$86,000**

7.0 SELECTED PLAN COMBINATION

Plan C (16' dune, 75' berm) meets the NED criteria of maximization of net benefits within the 4-year periodic nourishment cycle band and, therefore, is the selected plan for North Wildwood. The backpass method of delivering sand to North Wildwood and the implementation of **Plan CC (16' dune)** in Wildwood, Wildwood Crest, and Lower Township will provide additional benefits to those communities. Costs and benefits for the combined selected plan are shown at a March 2014 price level and 3.500% discount rate in the following tables.

7.1 Interest During Construction

Table B-42 displays the calculations for interest during construction. The duration of construction for the project is estimated at nine months. It is assumed the construction costs would be evenly distributed over this period.

Table B-42
INTEREST DURING CONSTRUCTION (IDC)

Annual Discount Rate (FY14):			3.500%	
Monthly Interest Factor (FY14):			0.00287	
Price Level:			Mar-14	
IDC -	9	Months	Interest Factor	Total Cost
Month	1	$5,185,854	0.026137	$135,542
Month	2	$2,052,449	0.023199	$47,615
Month	3	$2,052,449	0.020270	$41,604
Month	4	$2,052,449	0.017349	$35,609
Month	5	$2,052,449	0.014437	$29,632
Month	6	$2,052,449	0.011533	$23,671
Month	7	$2,052,449	0.008637	$17,728
Month	8	$2,052,449	0.005750	$11,802
Month	9	$2,052,449	0.002871	$5,892
Total First Cost:		$21,605,444		
			Total Investment Cost:	$349,094
			Rounded:	$349,000

7.2 Average Annual Costs

Table B-43 displays the calculations for average annual costs. Additional average annual project costs include expenditures for monitoring as shown in Table B-44.

Table B-43
BEACHFILL & NOURISHMENT
PRESENT WORTH ANALYSIS

	Base Year:		2016	
	Discount Rate (FY14):		3.500%	
	Price Level:		Mar-14	
TYPE	**YEAR**	**COST**	**PW FACTOR**	**PW COST**
First Cost	0	20,331,933	1.000000	20,331,933
Real Estate	0	1,273,511	1.000000	1,273,511
IDC	0	349,094	1.000000	349,094
Periodic Nourishment	4	5,952,431	0.871442	5,187,200
Periodic Nourishment	8	5,952,431	0.759412	4,520,345
Periodic Nourishment	12	6,191,877	0.661783	4,097,681
Periodic Nourishment	16	6,191,877	0.576706	3,570,892
Periodic Nourishment	20	6,191,877	0.502566	3,111,826
Major Rehabilitation	24	7,920,450	0.437957	3,468,818
Periodic Nourishment	28	6,191,877	0.381654	2,363,157
Periodic Nourishment	32	6,191,877	0.332590	2,059,355
Periodic Nourishment	36	6,191,877	0.289833	1,794,609
Periodic Nourishment	40	6,191,877	0.252572	1,563,898
Periodic Nourishment	44	6,191,877	0.220102	1,362,846
Periodic Nourishment	48	6,191,877	0.191806	1,187,642
Total Cost				$56,242,805
	Capital Recovery Factor (3.500%, 50 yrs):			0.042634
			Average Annual Costs:	$2,397,839
			Rounded:	$2,398,000

Table B-44

MONITORING COSTS
PRESENT WORTH COST ANALYSIS

Base Year: 2016
Discount Rate (FY14): 3.500%

TYPE	YEAR	COST	PW FACTOR	PW COST
Monitoring	0	0	1.000000000	0
Monitoring	1	214,500	0.966183575	207,246
Monitoring	2	150,000	0.933510700	140,027
Monitoring	3	90,500	0.901942706	81,626
Monitoring	4	215,500	0.871442228	187,796
Monitoring	5	146,000	0.841973167	122,928
Monitoring	6	90,500	0.813500644	73,622
Monitoring	7	90,500	0.785990961	71,132
Monitoring	8	215,500	0.759411556	163,653
Monitoring	9	146,000	0.733730972	107,125
Monitoring	10	90,500	0.708918814	64,157
Monitoring	11	90,500	0.684945714	61,988
Monitoring	12	215,500	0.661783298	142,614
Monitoring	13	146,000	0.639404153	93,353
Monitoring	14	90,500	0.617781790	55,909
Monitoring	15	90,500	0.596890619	54,019
Monitoring	16	215,500	0.576705912	124,280
Monitoring	17	146,000	0.557203779	81,352
Monitoring	18	90,500	0.538361140	48,722
Monitoring	19	90,500	0.520155690	47,074
Monitoring	20	215,500	0.502565884	108,303
Monitoring	21	146,000	0.485570903	70,893
Monitoring	22	90,500	0.469150631	42,458
Monitoring	23	90,500	0.453285634	41,022
Monitoring	24	215,500	0.437957134	94,380
Monitoring	25	146,000	0.423146989	61,779
Monitoring	26	90,500	0.408837671	37,000
Monitoring	27	90,500	0.395012242	35,749
Monitoring	28	215,500	0.381654340	82,247
Monitoring	29	146,000	0.368748155	53,837
Monitoring	30	90,500	0.356278411	32,243
Monitoring	31	90,500	0.344230348	31,153
Monitoring	32	215,500	0.332589709	71,673
Monitoring	33	146,000	0.321342714	46,916
Monitoring	34	90,500	0.310476052	28,098
Monitoring	35	90,500	0.299976862	27,148
Monitoring	36	215,500	0.289832717	62,459
Monitoring	37	146,000	0.280031610	40,885
Monitoring	38	90,500	0.270561942	24,486
Monitoring	39	90,500	0.261412505	23,658
Monitoring	40	215,500	0.252572468	54,429
Monitoring	41	146,000	0.244031370	35,629
Monitoring	42	90,500	0.235779102	21,338
Monitoring	43	90,500	0.227805895	20,616
Monitoring	44	215,500	0.220102314	47,432
Monitoring	45	146,000	0.212659241	31,048
Monitoring	46	90,500	0.205467866	18,595
Monitoring	47	90,500	0.198519677	17,966
Monitoring	48	215,500	0.191806451	41,334
Monitoring	49	146,000	0.185320243	27,057
Monitoring	50	90,500	0.179053375	16,204
		$6,874,500	TOTAL	$3,276,658
Capital Recovery Factor (50 Years @ 3.500%)				0.04263371
			AVERAGE ANNUAL MONITORING COSTS:	$139,696
			Rounded:	$140,000

7.3 Benefit-Cost Summary

Annualized costs are displayed by category in Table **B-45**. The selected plan is expected to provide **$6,253,000** in storm damage reduction and other NED benefits.

Table B-45
BENEFITS AND COSTS FOR THE SELECTED PLAN

DISCOUNT RATE (FY14)	3.50%	
PERIOD OF ANALYSIS	50 YEARS	
PRICE LEVEL	March 2014	
BASE YEAR	2016	
AVERAGE ANNUAL BENEFITS:		
Storm Damage Reduction	4,095,000	
Local Costs Forgone	1,363,000	
Recreation	693,000	
Benefits During Construction	102,000	
TOTAL NED BENEFITS		**$6,253,000**
TOTAL COSTS:		
Initial Construction Costs (including Real Estate)	$21,605,000	
Interest During Construction	349,000	
Periodic Nourishment (cycles 1, 2)	5,952,000	
Periodic Nourishment (other cycles)	6,192,000	
Major Rehabilitation (year 24)	7,920,000	
Average Annual Construction Costs		$ 2,398,000
Average Annual Monitoring Costs		140,000
Average Annual OMRR&R Costs		150,000
TOTAL AVERAGE ANNUAL COSTS		**$ 2,688,000**
NET BENEFITS		**$ 3,565,000**
BENEFIT-COST RATIO		**2.3**
BENEFIT-COST RATIO (computed at 7%)		**1.9**
RESIDUAL DAMAGES	**$ 5,818,000**	

8.0 RISK AND UNCERTAINTY ANALYSIS

Modeling a complex and dynamic coastal environment is subject to various changes and over time there is variation in economic conditions as well as hydraulic and hydrological parameters. Detailed information has been collected to the extent defined by the scope of work for the feasibility analysis. The analysis used statistical modeling techniques that took into account probability of occurrence of storm events, mechanism of storm damages, and resources that take into account regional labor and construction rates.

Approach: Potential sources of risk and uncertainty were reviewed, a damage level risk matrix was developed, and an extensive sensitivity analysis was conducted. The variables included structure elevations and square footage, discount rate, depreciated replacement cost value, content-to-structure percentage as well as other components of the damage analysis. The level of uncertainty of several components was considered to be low because data was collected with a relatively high degree of precision.

Assumptions: The previously provided best estimates of coastal storm parameters and economic parameters serve as the mean condition. The economic risk and uncertainty analysis used the new control files from the Empirical Simulation Technique (EST), which was explained in the H&H Risk and Uncertainty Methodology Section of this report, as model inputs for the COSTDAM modeling while performing a sensitivity analysis by varying key economic parameters that could affect AAD, AAB, Net Benefits and BCRs. Discount rate, depreciated replacement cost value, content-to-structure percentage, and the curves for stage damage were varied for the economic portion of the analysis. The risk and uncertainty evaluation was also performed over a 50-year period of analysis, at the plan formulation discount rate and price level.

Background: Seven frequency storm events (5, 10, 20, 50, 100, 200, and 500 year events) from the SBEACH model were provided for calculation of erosion, wave and inundation damage to structures, infrastructure and improved property. The calculations were performed using COSTDAM (**CO**astal **ST**orm **D**amage **A**ssessment **M**odel). COSTDAM reads an ASCII 'Control' file which contains the storm frequency parameters for each cell and an ASCII 'Structure' file which contains information for each structure. Additional files were created to evaluate the lower and upper 90% confidence interval curve values for the H&H parameters and the economic variables.

Methodology: The economic risk and uncertainty analysis used the new control files from the EST-generated 90% confidence interval bands as model input to determine the “low” and “high” risk damage scenarios while varying key economic parameters. The economic parameters were varied independently and in a multiple-factor sensitivity analysis together with the 90% confidence interval bands determined in the H&H analysis. The following economic components of the analysis were adjusted in the sensitivity analyses:

- It is recognized that the discount rate is likely to change. The federal discount rate is established annually and according to law is not allowed to vary by more than one quarter of one percentage point in any fiscal year. The discount rate was varied by -¼ from the baseline rate in effect at the time of the risk and uncertainty analysis for the “low” risk scenario and by +¼ for the “high” risk scenario;

- The Marshall & Swift Valuation Service was used for estimating depreciated replacement cost values from a combination of structure characteristics such as square footage, construction material, foundation type, and systems. The current depreciated replacement cost values serve as the mean value for each structure. Typically, depreciated replacement cost values have been modified by +/- 10% in a sensitivity analysis to determine the "low" and "high" risk scenarios. This approach was employed to examine the effects on net benefits of the lower and upper 90% confidence interval bands determined in the H&H analysis. Depreciated replacement cost values were also varied for the most likely case scenario independently from the revised H&H parameters;

- The content-to-structure percentage was established using existing percentages from previous studies on the topic. Empirical data established a content value to be approximately 40% of structure value in primary homes and 15 to 20% of structure value in vacation homes. Nearly 70% of the residential structures in North Wildwood are vacation or rental homes. A conservative weighted content-to-structure value of 25% was adopted because it was determined that use of a 40% content-to-structure ratio would overestimate damage potential in a predominately vacation coastal community. The current content-to-structure value ratio of 25% for district coastal studies represents the mean. A sensitivity to show the impact of varying the ratio to 10% for the "low" risk scenario and 40% under the "high" risk scenario was performed. The content-to-structure ratio was also varied for the most likely scenario independently from the EST low and high H&H model results; and

- The stage damage curves for the mean condition were varied by a reasonable level to determine the results' sensitivity to changes in this inundation damage variable. Reasonable levels of variation were obtained by prorating the original stage damage curves by percentage of change for minimum and maximum saltwater curves empirically observed in another coastal area. The significant coastal hydraulics parameters which determine erosion and wave damage vulnerability were addressed within the SBEACH and EST models which are incorporated in the storm damage analysis through revised control files, the engineering component of the program. These critical response parameters include, as explained in the H&H Risk and Uncertainty Methodology Section of this report, sea level rise (SLR), eroded beach volume, shoreline retreat, wave height above dune, and other variables. Sea level rise of approximately 0.66 feet is incorporated during development of the ocean stage frequency analysis which is integrated with the coastal engineering parameters of the model as it calculates damages for each year over the period of analysis.

The combined impact of these changes was applied to the new input files from the EST lower and upper limit 90% confidence interval curves to determine a range of average annual damage for the without project condition and the selected plan.

The COSTDAM model evaluates structure erosion based on the presence of piles for all structures that are identified with a pile foundation. If a structure is on piles, the land below the structure must have eroded through the entire footprint of the structure before total damage is claimed. Prior to this, the percent damage claimed is equal to the linear proportion of erosion under the structure's footprint relative to the total damage point. Pile depths were not evaluated as part of this analysis because actual pile depth or range is not a model parameter. Therefore, the R&U for this variable could not be addressed within the confines of the COSTDAM model. In addition, pile depth for each inventoried structure was not readily available from the municipalities. Pile depth varies for each structure and is dependent upon soil conditions, structure characteristics, and regulations in place at the time the structure was built. Also, variation in the first floor elevation surveys was not evaluated. The level of uncertainty in the parameters of structure first floor elevation and square footage is considered low. Professional surveyors conducted the elevation survey on a structure by structure basis and the square footage was derived from a geographic information systems (GIS) database.

Due to the effects of long term erosion resulting in a receding shoreline an additional model was set up to evaluate the damage effect of long term erosion which includes the impact of sea level rise. Long term erosion is a dynamic process, however. From a historical perspective this process has been checked at a certain point through local intervention to preclude further erosion as the natural erosion process approaches the footprint of a structure such as a bulkhead. For modeling purposes the natural long term erosion process is assumed not to retreat beyond the toe of the bulkhead. The limit of this condition is realized approximately five years from the base year. This retreat occurs at different rates in different sections of the North Wildwood oceanfront and was taken into account in the sensitivity analysis. The additional modeling allowed assessing expected average annual (EAD) damages for the 50-year period of analysis, weighing in future damages for the range of exceedance probabilities in the computation of EAD. Long term erosion potential is most pronounced in the area adjacent to Hereford Inlet.

The landfall of Hurricane Sandy was one critical parameter in determining which portions of the shore would be most damaged. A plethora of other storm characteristics, shoreline conditions, property location, damage susceptibility, and many other factors combined to establish the level of damage experienced. Areas north of Sandy's landfall received the most destructive impact of the storm, while the areas south of landfall were affected to a lesser extent. The uncertainty and risks associated with coastal storms was clearly displayed in the fall of 2012 when Sandy hit. Commitments to following resilient rebuilding techniques and assigning appropriate risk premiums in flood insurance policies over time have been adopted. A concerted effort has also been continued in some areas and begun in others to protect the shoreline and implement sustainable solutions that can reduce damage. Hurricane Sandy's impact will be felt for many years as stakeholders prepare for the eventuality of future storms.

Figure B-13 indicates the potential damage level to oceanfront and nearshore structures by overlaying a hypothetical future storm comparable to Superstorm Sandy with a landfall south of the study area. It displays potential total damages under future conditions without and with the tentatively selected plan for inventoried structures.

Table B-46 displays a range of hurricane storm damage reduction benefits from a low of $1,043,000 to a high of $34,123,000, compared to the most likely scenario benefit of $4,030,000 (shown in Table B-38). The result of incorporating the cost component of the selected plan, including discount rate variation, in the sensitivity analysis is shown in Table B-47. Net benefits of the different scenarios range from $2,825,000 to $33,035,000 for ten of the twelve sensitivities. The two scenarios with the lowest net benefits are outweighed by the costs which were not varied.

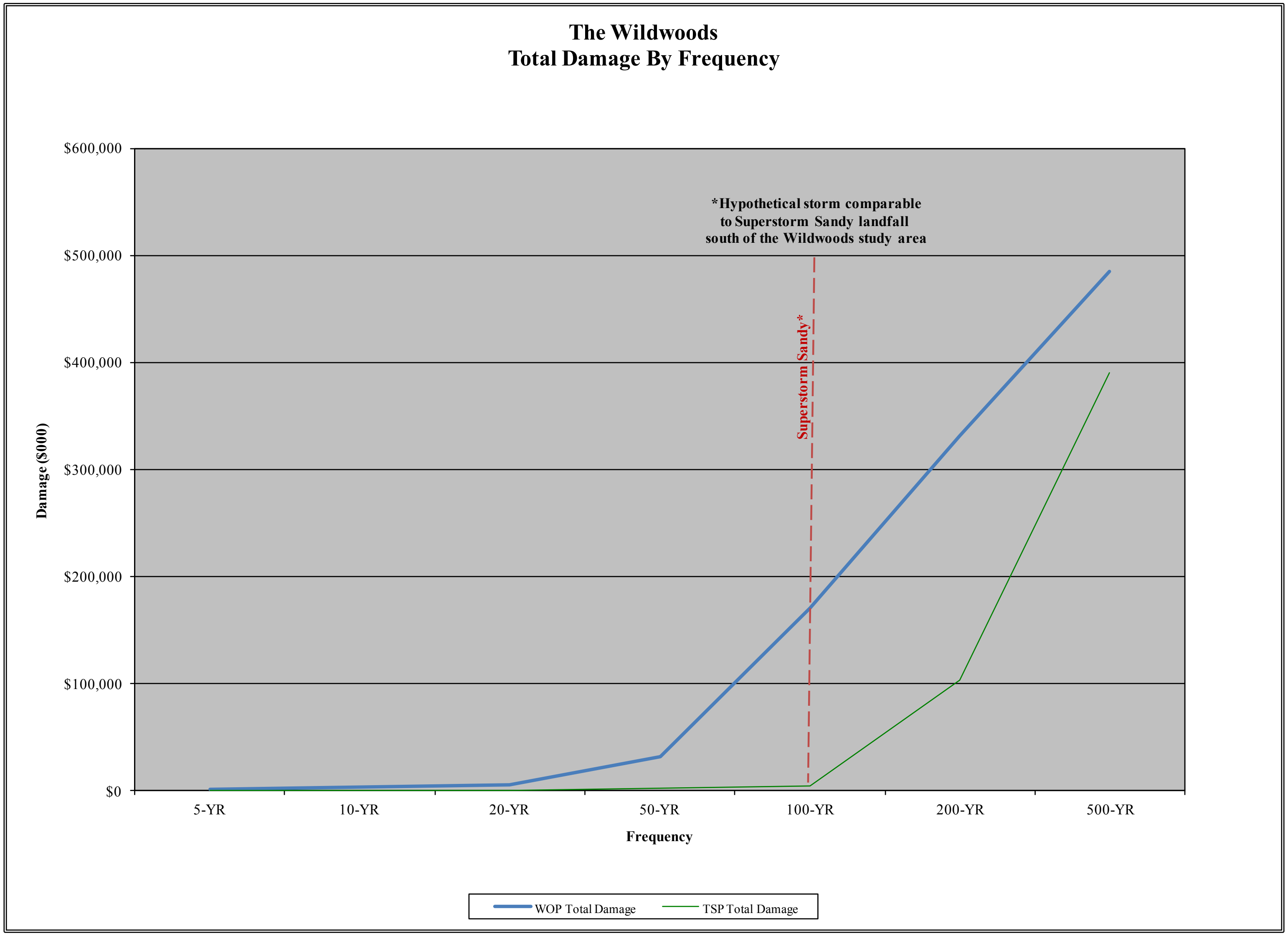

The Wildwoods
Total Damage By Frequency
$600,000
$500,000
$400,000
$300,000
$200,000
$100,000
$0
Damage ($000)
*Hypothetical storm comparable
to Superstorm Sandy landfall
south of the Wildwoods study area
Superstorm Sandy*
5-YR
10-YR
20-YR
50-YR
100-YR
200-YR
500-YR
Frequency
WOP Total Damage
TSP Total Damage

Figure B-13

Table B-46

SUMMARY OF RISK AND UNCERTAINTY ANALYSIS RESULTS ORDERED
ANNUALIZED HSDR BENEFITS FOR
PLAN C: 16' DUNE; 75' BERM - NORTH WILDWOOD
PLAN CC: 16' DUNE - WILDWOOD & WILDWOOD CREST
(In $000, 4.125% Discount Rate; June 2007 Price Level)

Category	Combined Low	EST Lower	CSR 10%	SDRCV -10%	DDC Min	Most Likely	SDRCV +10%	DDC Max	CSR 40%	EST Upper	Combined High
Storm Damage Reduction											
Erosion	$81	$99	$1,290	$1,319	$1,462	$1,466	$1,612	$1,436	$1,625	$3,512	$4,309
Inundation	$499	$866	$1,580	$1,590	$1,275	$1,766	$1,944	$2,378	$2,084	$16,567	$25,918
Wave	$459	$580	$1,591	$1,629	$1,810	$1,810	$1,991	$1,810	$2,047	$3,161	$3,895
Total Average Annual Benefits	$1,040	$1,545	$4,460	$4,539	$4,547	$5,042	$5,547	$5,624	$5,756	$23,240	$34,123

Risk & Uncertainty Sensitivity Notes:
Combined Low *- EST Lower Limit 90% Confidence Interval, 10% Content-to-Structure Ratio, 10% Decrease in Structure Depreciated Replacement Cost Value, Minimum Stage-Damage Curve*
EST Lower *- H&H Lower Limit 90% Confidence Interval Parameters*
CSR10% *- Content-to-Structure Ratio 10% of Structure Depreciated Replacement Cost Value*
SDRCV-10% *- Structure Depreciated Replacement Cost Value Decreased by 10%*
DDCMin *- Minimum Depth-Damage Curve*
Most Likely *- Mean Condition Scenario*
SDRCV+10% *- Structure Depreciated Replacement Cost Value Increased by 10%*
DDCMax *- Maximum Depth-Damage Curve*
CSR40% *- Content-to-Structure Ratio 40% of Structure Depreciated Replacement Cost Value*
EST Upper *- H&H Upper Limit 90% Confidence Interval Parameters*
Combined High *- EST Upper Limit 90% Confidence Interval, 40% Content-to-Structure Ratio, 10% Increase in Structure Depreciated Replacement Cost Value, Maximum Stage-Damage Curve*

Columns may not add exactly due to rounding; discount rate sensitivity not included in the above table

Table B-47
SUMMARY OF RISK AND UNCERTAINTY ANALYSIS RESULTS
ANNUALIZED NED BENEFITS AND COSTS FOR
PLAN C: 16' DUNE; 75' BERM – NORTH WILDWOOD
PLAN CC: 16' DUNE – WILDWOOD AND WILDWOOD CREST

	Most Likely Scenario	Discount Rate		Structure Depreciated Replacement Cost Value		Content-to-Structure Ratio		Stage Damage Curves		EST Confidence Interval		Combined Variations	
Category		3⅞%	4⅜%	-10%	+10%	10%	40%	Min	Max	-90%	+90%	Low	High
Storm Damage Reduction:	$5,042	$5,042	$5,042	$4,539	$5,547	$4,460	$5,756	$4,547	$5,624	$1,545	$23,240	$1,040	$34,123
Benefits During Construction:	93	89	97	84	102	82	106	84	104	28	429	19	629
Recreation:	580	580	580	580	580	580	580	580	580	580	580	580	580
Total AAB:	$5,715	$5,711	$5,719	$5,203	$6,229	$5,122	$6,442	$5,211	$6,308	$2,153	$24,249	$1,639	$35,332
Avg. Ann. Construction Costs:	$2,178	$2,519	$2,602	$2,178	$2,178	$2,178	$2,178	$2,178	$2,178	$2,178	$2,178	$2,178	$2,178
Avg. Ann. Monitoring Costs:	119	119	119	119	119	119	119	119	119	119	119	119	119
Total AAC:	$2,297	$2,638	$2,721	$2,297	$2,297	$2,297	$2,297	$2,297	$2,297	$2,297	$2,297	$2,297	$2,297
Benefit-Cost Ratio:	2.5	2.2	2.1	2.3	2.7	2.2	2.8	2.3	2.7	0.9	10.6	0.7	15.4
Net Benefits:	$3,418	$3,073	$2,998	$2,906	$3,932	$2,825	$4,145	$2,914	$4,011	($ 144)	$21,952	($ 658)	$33,035

Appendix B – Supplement

Contingent Value Method (CVM) Recreation Analysis

Appendix B – Supplement

Contingent Value Method (CVM) Recreation Analysis

REPORT ON FIVE SURVEYS
FOR THE UNITED STATES ARMY CORPS OF ENGINEERS

ABSECON ISLAND AND SEVEN MILE ISLAND, NEW JERSEY:
STONE HARBOR, AVALON, ATLANTIC CITY, LONGPORT, MARGATE, VENTNOR

SURVEYS OF BEACH USERS, BUSINESSES, AND HOMEOWNERS

The Forum for Policy Research and Public Service
Rutgers University, Camden

Data Analysis and Report: Ross Koppel, Ph.D.

November, 1994

In the summer of 1994, The Forum for Policy Research and Public Service of Rutgers University (Camden) administered three surveys to samples of beach users, of businesses and of homeowners in the New Jersey communities of Stone Harbor, Avalon, Atlantic City, Longport, Margate, Ventnor.

The surveys examine respondents' valuations of the beach, the desired characteristics and facilities of a beach, the perceived impact of the beach on properties and businesses, and a variety of demographic measures.

Survey Administration:

The beach user survey was administered to a random sample of over one thousand people. Interviewers were trained to visually segment the beach into strata starting at the ocean. Strata were sampled according to their density (number of people). In addition, interviewers were trained to seek representative weightings of gender, age, and group size. Review of demographic data, of the beach use pattern data (distance from ocean and distribution of people) and of interviewer codes reveals no significant systematic skew or bias.

The homeowner survey was at first administered face-to-face. The process was laborious because so many residents were not at home (i.e., we met renters instead of owners, or homeowners were in their a non-shore house, at work, or on the beach). In consultation with the Corps, it was decided that we would use telephone interviews.

The business survey was generally administered face-to-face. At off-peak hours, business managers and owners are usually "in" and available.

Pretesting

Each of the research instruments was pretested on its target population. Each survey went through several iterations. Fortunately, because the populations were large, we were able to modify the questionnaires and retest them on new respondents. Each iteration of the three main questionnaires (beach users, homeowners, and businesses) were pretested on samples of 25 to 55 people. As with our other surveys, the sample presented here does not incorporate any of the responses from the pretest questionnaire.

Role of the Corps

We would like to thank the members of the Economics and Social Analysis Branch of the U.S. Army Corps of Engineers (Philadelphia District) for their help in developing the research instruments. They provided several examples of questionnaires used by earlier researchers in addition to useful background papers and methodological guides from previous researchers and from Corps documents. They also maintained a willingness to consider our efforts at survey improvement or enhancement. We appreciated their reviews of the many versions of each of the interview schedules that were eventually approved and administered. More important, we also appreciated their suggestionsand refinements to each document.

Training, Supervision and Additional Research

The interviewers were initially trained by Dr. Ross Koppel. Mr. Stephen Kucharski supervised the interviewers, coordinated their work, and provided additional training. Mr. Kucharski was also responsible for the SPSS data formatting, for supervising data entry, and for collection of additional data from State, Federal and local sources.

Structure of This Report

I. In the first section, we analyze the responses to the Beach Users Survey from respondents at the six communities on Absecon and Seven Mile Island (N = 1063).

Frequency distributions and crosstabulations of every item by several key variables have been calculated and are found in the appendix. They are also presented on disk. The following is a list
of the crosstabulations we have calculated. Every variable is crosstabulated by:

Weather (Sunny vs. All Other)
Density of Beach Use (Categories 1 and 2 ["Light Use"] vs. 3, 4, 5 ["Full or More Crowded"])
Community location (Stone Harbor, Avalon, Atlantic City, Longport, Margate, Ventnor)
Yearly Visit Pattern (Visit Every Year; Most or Some Years; First Visit)
Days On Beach (Few -- 1-14; Many -- 15-30; Most -- 31-98)

Own or Rent Property at Shore
Year of Purchase [for owners] ("New" 1985-1994; "Old" 1900 to 1984)
Resident Status (Permanent; Staying for at least a week; Staying less than a week)
Income (Less than $49,999; $50,000 and over)
Education (High School or less vs. Some College or more)
Age (categorized in two formats because the age breakdowns for residents is skewed sharply to the right -- they tend to be over 60 years old)
Age-1 (under 60 vs. 60 and older)
Age-2 (under 40 vs. 40 and older)

As noted, the Appendix presents these crosstabulations for every question in the questionnaire. These data are also provided on disk in SPSS system files.

II. The second section presents the data from the interviews with Business Managers and Owners in the six towns in Absecon and Seven Mile Island. As with the previous findings, the appendix provides a range of crosstabulations in hard copy, and the accompanying disk files (SPSS system files) contain both the crosstabs and a full copy of the data.

The Survey of Businesses is a comparatively small sample (N =156). After review of the data, we have calculated and provide the following two crosstabulations (for every variable):

Business Schedule (Open all year vs. Open summer only)
No. of Employees (0-9 vs. 10-125)

III. The Survey of Homeowners is comprised of two samples:

1. a survey of homeowners from face-to-face interviews and via telephone interviews with residents; and

2. the subset of beach users who owned homes in the shore communities. (This latter group received a separate battery of questions from within the beach users' survey.)

Wherever possible and logical, we combine results from the two instruments. The sample size of the direct survey of homeowners is 251; the sample size of homeowners who were interviewed on the beach is 370. The combined sample size is 621. As with all the data, an SPSS file on disk is also provided.

The following crosstabulations were calculated for the homeowners' data:

Age (under 60 vs. 60 and older)
Education (High School or less vs. Some College or more)
Year of Purchase ("New" 1985-1994; "Old" 1900 to 1984)
Number of Blocks from Beach (1 or less vs more than 1)

Length of Stay (Permanent Resident vs. other)

IV. In the fourth section we use the beach valuation data from the surveys of beach users, businesses and homeowners to calculate a combined valuation figure for the beach and its impact on the communities.

V. The survey of Brigantine Beach users comprises the fifth section. This survey is somewhat shorter than the general beach users survey and addresses issues requested by the Corps. Many of the questions, however, are identical to those used in the other questionnaires.

The sample size is 255, and SPSS files on disk are provided.

VI. A complete copy of all questionnaires is included in section VI.

The Beach Users Survey
The Business Owners/Managers Survey
The Homeowners Survey
The Brigantine Beach Users Survey

Appendix 1 (Book "A") -- Frequency Distributions of:
1.1. The Beach Users Survey
1.2. The Business Owners/Managers Survey
1.3. The Homeowners Survey
1.4. The Brigantine Beach Users Survey

Appendix 2 -- Cross Tabulations (See full listing below)

Appendix 3 -- Digital: SPSS files of all data

APPENDIX TABLE SETS: CROSSTABULATION OF SURVEY DATA

BEACH USERS

APPENDIX
BOOK NO.

1 LOCATION (SIX COMMUNITIES' BEACHES) BY ALL OTHER VARIABLES

1 SHORE VISITING PATTERNS BY ALL OTHER VARIABLES
Recoded: Every year (1); Most or some years (2,3); First visit (4)

2 BEACH USER DENSITY BY ALL OTHER VARIABLES
Recoded: Few (1,2) vs. Crowded

2 WEATHER BY ALL OTHER VARIABLES
Recoded: Sunny (1) vs. All other (2,3,4)

2 DAYS SPENT ON THE BEACH BY ALL OTHER VARIABLES
Recoded: Few (1 to 14); Many (15 to 30); Most (31 to 98)

3 OWN HOME V. RENT BY ALL OTHER VARIABLES

3 YEAR OF HOME PURCHASE BY ALL OTHER VARIABLES
Recoded: "New" -- 1985 to 1994; "Old" -- 1900 to 1984
[for homeowners only]

3 RESIDENT STATUS BY ALL OTHER VARIABLES
Recoded: Permanent (1); All Summer to More than a week (2 to 5); Few days (6,7)

4 EDUCATION BY ALL OTHER VARIABLES
Recoded: High School or less (1,2,3,4) vs. Some College or more (5,6,7)

4 INCOME BY ALL OTHER VARIABLES
Recoded: Income: Less than $49,999 (1); $50,000 and over

5 AGE BY ALL OTHER VARIABLES
Recoded in two formats:

Age-1: under 60 vs. 60 and older

Age-2: under 40 vs. 40 and older

BUSINESS OWNERS AND MANAGERS

6 BUSINESS SCHEDULE BY ALL OTHER VARIABLES
Open all year vs. Open summer only

6 NUMBER OF EMPLOYEES BY ALL OTHER VARIABLES
Recoded: Few (0 to 9) vs. Many (10 to 125)

HOMEOWNERS

7 AGE BY ALL OTHER VARIABLES
Recoded: under 60. vs 60 and older

7 LENGTH OF STAY BY ALL OTHER VARIABLES
Recoded: Permanent Resident vs. All other categories

7 EDUCATION BY ALL OTHER VARIABLES
Recoded: High School or less (1,2,3,4) vs. Some College or more (5,6,7)

7 YEAR OF HOME PURCHASE BY ALL OTHER VARIABLES
Recoded: "New" -- 1985 to 1994;
"Old" -- 1900 to 1984

7 DISTANCE FROM BEACH (No. of Blocks) BY ALL OTHER VARIABLES
Recoded: One or less vs. More than one

I. SURVEY OF BEACH USERS

ON ABSECON ISLAND AND SEVEN MILE ISLAND, NEW JERSEY: STONE HARBOR, AVALON, ATLANTIC CITY, LONGPORT, MARGATE, VENTNOR

Introduction

The analysis in this section generally follows the survey instrument. All of the substantive items in the survey are reviewed except a few concerning homeowners, which are fully discussed inSection III, in the review of homeowner data.

Administration of the Interviews

Month

The Survey was conducted during the summer of 1994. Over two-thirds of the interviews were administered in July. See Table 1.

Table 1
MONTH OF THE INTERVIEW

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
JUNE	6	133	12.5	12.5	12.5
JULY	7	731	68.8	68.8	81.3
AUGUST	8	182	17.1	17.1	98.4
SEPTEMBER	9	17	1.6	1.6	100.0
	Total	1063	100.0	100.0	

Valid cases 1063 Missing cases 0

Day of Week

Intentionally, each day of the week was not equally represented in the sample. That is, if each day of the week were to account for exactly one-seventh of the sample, then the weekend would reflect 28.57% of the sample. Our sampling of the week, however, seeks to reflect the actual beach usage patterns. Thus, as can be seen in Table 2, the weekend accounts for 36.4% of the sample, rather than 28.57% of the sample.

Table 2
DAY OF THE WEEK

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
SUNDAY	1	159	15.0	15.0	15.0
MONDAY	2	61	5.7	5.7	20.7
TUESDAY	3	97	9.1	9.1	29.8
WEDNESDAY	4	205	19.3	19.3	49.1
THURSDAY	5	141	13.3	13.3	62.4
FRIDAY	6	172	16.2	16.2	78.6
SATURDAY	7	228	21.4	21.4	100.0
	Total	1063	100.0	100.0	

Time of Interview

Our earliest interview occurred at 09:45; our last interview was at 18:05. Most of the interviews were conducted in the afternoon. A full listing of the interview times is found in the Appendix.

Air Temperature

The median and modal temperature was 85 degrees Fahrenheit. Ninety-eight percent of the days were between 70 and 90 degrees Fahrenheit. (See Appendix for full listing.)

Water Temperature

The median water temperature was 65 degrees Fahrenheit. The low was 54 degrees F, the high was 75 degrees F. Note that the interviewers were instructed to request both air and water temperature readings from the life guards. They were not always exact.

Wind Speed

The median wind speed was 4.5 mph. The low was 0, the high was 15. Undoubtedly, there were days with higher wind speeds. But the beach tends to be less populated at such times. Note that as with temperature readings, the interviewers were also instructed to ask the life guards about wind speeds.

Weather

Almost three-fifths (59.6%) of the sample was collected during sunny weather; and about a quarter (23.8%) was collected on partly cloudy days. Our sampling focus, of course, was beach users, who tend to be on the beach in better weather. (See Table 3.)

Table 3
TYPE OF DAY

Value Label	Value	Frequency	Valid Percent	Cum Percent
SUNNY	1	634	59.6	59.6	59.6
PARTLY CLOUDY	2	253	23.8	23.8	83.4
CLOUDY	3	149	14.0	14.0	97.5
RAINY	4	27	2.5	2.5	100.0
	Total	1063	100.0	100.0	

Density of People on the Beach

We used a density measure developed for this study in cooperation with the Corps. As seen in Table 4, the beaches were seldom very crowded (about 7% of the time). Our scale and findings are:

Table 4

	Frq	Pct
1. PEOPLE SCATTERED ABOUT BEACH, BEACH MOSTLY EMPTY:	148	13.9
2. ON AVERAGE, SEVERAL YARDS BETWEEN TOWELS/BLANKET:	518	48.7
3. ON AVERAGE, SEVERAL FEET BETWEEN TOWELS/BLANKETS:	317	29.8
4. ON AVERAGE, DENSE, ONLY A FOOT OR TWO BETWEEN TOWELS/BLANKETS:	54	5.1
5. ON AVERAGE, VERY DENSE, LITTLE ROOM TO WALK:	26	2.4
Totals	1063	100.0%

Distribution of People on the Beach

The distribution of beach users reflects a standard bell shape. Table 5 displays the figures.

Table 5

		Frq	Pct
WATER:	1. MOST AT WATER; REST DISTRIBUTED EQUALLY:	41	3.9
	2. MOST AT WATER; REST TENDING UP BEACH:	12	1.1
	3. MOST AT WATER; REST TENDING MID BEACH:	287	27.0
EQUAL:	4. EQUALLY DISTRIBUTED: UP, MID AND WATERSIDE:	452	42.5
MID:	5. MOST IN MIDDLE; REST EQUALLY DISTRIBUTED:	140	13.2
	6. MOST IN MIDDLE; REST TENDING WATERSIDE:	92	8.7
	7. MOST IN MIDDLE; REST TENDING UP BEACH:	12	1.1
UP:	8. MOST UP BEACH; REST EQUALLY DISTRIBUTED:	9	.8
	9. MOST UP BEACH; REST TENDING TO MIDDLE:	14	1.3
	10. MOST UP BEACH; REST TENDING TO WATERSIDE:	4	.4
	Totals	1063	100.0%

Location: Communities

The communities of Stone Harbor and Avalon (Seven Mile Island) are reflected with samples of 293 and 250, respectively. Thus, the island is "represented" via a combined sample of 543 -- or 51% of our total sample. Absecon Island encompasses the communities of Atlantic City, Longport, Margate, and Ventnor. The samples are: 125, 132, 126, and 137, respectively -- or 49% of our total sample.

Table 6 indicates the information in conventional format.

Table 6
LOCATION OF BEACH

Value Label	Value	Frequency	Valid Percent	Cum Percent	
STONE HARBOR	1	293	27.6	27.6	27.6
AVALON	2	250	23.5	23.5	51.1
ATLANTIC CITY	3	125	11.8	11.8	62.8
LONGPORT	4	132	12.4	12.4	75.3
MARGATE	5	126	11.9	11.9	87.1
VENTNOR	6	137	12.9	12.9	100.0
		-------	-------	-------	
	Total	1063	100.0	100.0	

SUBSTANTIVE FINDINGS

Visiting Patterns: Yearly Visits

Over three-quarters of the beach users (76.2%) visit the shore every year. Only 2.5% report that it was their first visit.

Table 7
DO YOU VISIT NEW JERSEY BEACHES?

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
EVERY YEAR	1	810	76.2	76.2	76.2
MOST YEARS	2	123	11.6	11.6	87.8
SOME YEARS	3	102	9.6	9.6	97.4
FIRST VISIT	4	27	2.5	2.5	99.9
	40	1	.1	.1	100.0
	Total	1063	100.0	100.0	

Days Spent on Beach

The median number of days on the beach during the summer is 18. The minimum is one (presumably, the day of the interview) and the maximum for the "season" is 98. The median, not surprisingly, however, may be deceptive. The data show the expected "lumpiness" of vacation schedules. About one-third spend between 7 and 15 days on the beach. 16% spend less than 7 days on the beach. An additional 10% spend over 70 days on the beach.

The reader must keep in mind that the respondents are trying to calculate both their schedules and probable good "beach days" -- See Appendix Table for full distribution.

Residence at the Shore

We asked respondents if they owned a home or rented a property at the shore. About two-thirds (67.5%) owned or rented. Of those with some type of residence at the shore, 51.7% (370) are owners, and 48.3% (346) are renters.

Number of people in Beach Outing

We asked respondents how many people usually accompanied them to the beach. (The question read: "On the average, including yourself, how many people typically go to the beach with you?") Less than 7% went alone, about one-fifth went with one other person (a party of two), another fifth went with two other people, and another fifth went with three other people. The median number was three. Less than 9% went with more than five people (party of six).

Table 8
NUMBER OF PEOPLE GO TO BEACH WITH

Value Label	Value	Frequency	Valid Percent	Cum Percent
	1	71	6.7	6.7	6.7
	2	236	22.2	22.3	29.0
	3	227	21.4	21.4	50.4
	4	216	20.3	20.4	70.8
	5	121	11.4	11.4	82.2
	6	70	6.6	6.6	88.9
	7	25	2.4	2.4	91.2
	8	24	2.3	2.3	93.5
	9	7	.7	.7	94.1
	10-15	46	4.3	4.3	98.5
	16-50	16	1.5	1.5	100.0
	-1	4	.4	Missing	
		-------	-------	-------	
Total		1063	100.0	100.0	

Which Beach?

Almost nine-tenths (87.8%) of the respondents told us the usual beach they visited was the beach on which we conducted the interview. Most of the remaining 12.2% visited nearby New Jersey beaches. Less than 2% listed non-New Jersey beaches.

Table of "other" beaches in Appendix

Beach Tags

Our pretest sensitized us to the number of people who avoid purchasing beach tags. We therefore asked the questions about beach tags in two parts:

To the question: "Do you usually have to buy a beach tag to use this beach? 85.1% responded "Yes" and 14.9% responded "No."

Table 9
DO YOU USUALLY HAVE TO BUY A BEACH TAG?

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	904	85.0	85.1	85.1
NO	2	158	14.9	14.9	100.0
	-1	1	.1	Missing	
	Total	1063	100.0	100.0	

"If yes: We asked, "Do you have a tag, and if so what kind is it?" We received the following:

Table 10
DO YOU HAVE A TAG, WHAT KIND?

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
SEASON	1	675	63.5	74.6	74.6
WEEK	2	150	14.1	16.6	91.2
WEEKEND	3	3	.3	.3	91.5
DAY	4	21	2.0	2.3	93.8
NO PAY/NO TAG	5	56	5.3	6.2	100.0
	.	158	14.9	Missing	
	Total	1063	100.0	100.0	

Note that 6.2% of the sample indicated they were "cheaters." Note also the high proportion of season and weekly pass holders. This is consistent with our other data on length of stay.

Desired Characteristics of a Beach

The next sixteen questions are within a battery of items on desired characteristics of a beach. Respondents were read the following statement:

"There are several reasons why you might choose to visit New Jersey's beaches. Please indicate how important each of the following reasons is to you?" The following answer codes were also read: 1-not at all important; 2-slightly important; 3-moderately important; 4-very important; 5-extremely important; 6- NA

The questions and results are presented below:

a. To be with a large number of people

This was generally not a prominent reason for coming to the beach. Less than 7% called it very important and only about 10% called it extremely important.

Table 11
TO BE WITH A LARGE NUMBER OF PEOPLE

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NOT AT ALL IMPORTANT	1	515	48.4	48.4	48.4
SLIGHTLY IMPORTANT	2	160	15.1	15.1	63.5
MODERATELY IMPORTANT	3	201	18.9	18.9	82.4
VERY IMPORTANT	4	73	6.9	6.9	89.3
EXTREMELY IMPORTANT	5	108	10.2	10.2	99.4
NA	6	6	.6	.6	100.0
	Total	1063	100.0	100.0	

b. To experience the visual qualities of the beach scenery

Respondents report that this is a compelling reason. Over three-quarters said this was very important or extremely important.

Table 12
EXPERIENCE VISUAL QUALITIES OF BEACH?

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	31	2.9	2.9	2.9
SLIGHTLY IMPORTANT	2	35	3.3	3.3	6.2
MODERATELY IMPORTANT	3	191	18.0	18.0	24.2
VERY IMPORTANT	4	308	29.0	29.0	53.2
EXTREMELY IMPORTANT	5	498	46.8	46.8	100.0
	Total	1063	100.0	100.0	

c. To socialize with family, friends and others

This reason was of importance. Almost two-thirds called it very important or extremely important.

Table 13
SOCIALIZE WITH FAMILY, FRIENDS & OTHERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	82	7.7	7.7	7.7
SLIGHTLY IMPORTANT	2	67	6.3	6.3	14.0
MODERATELY IMPORTANT	3	228	21.4	21.5	35.5
VERY IMPORTANT	4	299	28.1	28.2	63.7
EXTREMELY IMPORTANT	5	383	36.0	36.1	99.8
NA	6	4	.4	.1	100.0
	Total	1063	100.0	100.0	

d. To relax

Relaxation emerges as a prime reason to visit the beach. Almost nine-tenths list this as very important or extremely important.

Table 14
TO RELAX

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	12	1.1	1.1	1.1
SLIGHTLY IMPORTANT	2	9	.8	.8	2.0
MODERATELY IMPORTANT	3	87	8.2	8.2	10.2
VERY IMPORTANT	4	180	16.9	16.9	27.1
EXTREMELY IMPORTANT	5	775	72.9	72.9	100.0
	Total	1063	100.0	100.0	

e. To participate in beach activities (swim, surf, etc)

About 30% are not interested in active beach activities. The remaining 70% divide somewhat equally in defining these activities as moderately- very- or extremely important.

Table 15
TO PARTICIPATE IN BEACH ACTIVITIES?

Value Label	Value	Frequency	Percent	Percent	
NOT AT ALL IMPORTANT	1	195	18.3	18.4	18.4
SLIGHTLY IMPORTANT	2	128	12.0	12.1	30.4
MODERATELY IMPORTANT	3	269	25.3	25.3	55.7
VERY IMPORTANT	4	233	21.9	21.9	77.7
EXTREMELY IMPORTANT	5	237	22.3	22.3	100.0
	-1	1	.1	Missing	
	Total	1063	100.0	100.0	

f. To enjoy being alone

Solitude is "extremely" desired by a quarter of the sample, and very important to another fifth. Only 18% called solitude "not at all important."

Table 16
TO ENJOY BEING ALONE

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	192	18.1	18.1	18.1
SLIGHTLY IMPORTANT	2	120	11.3	11.3	29.4
MODERATELY IMPORTANT	3	292	27.5	27.5	56.8
VERY IMPORTANT	4	197	18.5	18.5	75.4
EXTREMELY IMPORTANT	5	257	24.2	24.2	99.5
NA	6	5	.5	.5	100.0
		-------	-------	-------	
	Total	1063	100.0	100.0	

g. There is little or no cost to enjoy the beach

This is a major factor, noted by over three-quarters of the respondents.

Table 17
LITTLE OR NO COST TO ENJOY BEACH

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	154	14.5	14.5	14.5
SLIGHTLY IMPORTANT	2	110	10.3	10.3	24.8
MODERATELY IMPORTANT	3	264	24.8	24.8	49.7
VERY IMPORTANT	4	198	18.6	18.6	68.3
EXTREMELY IMPORTANT	5	328	30.9	30.9	99.2
NA	6	9	.8	.8	100.0
		-------	-------	-------	
	Total	1063	100.0	100.0	

h. It is a wide enough beach to enjoy many activities

Almost 85% said a wide beach was important. Most claim it is very important or extremely important. (Note, this question is also addressed in the comparison photos of replenished beaches vs. non-replenished beaches. Note also that older persons tended not to want wider beaches because of the difficulty of walking across the sand.)

Table 19
IT BEACH WIDE ENOUGH BEACH TO ENJOY MANY ACTIVITIES

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	91	8.6	8.6	8.6
SLIGHTLY IMPORTANT	2	73	6.9	6.9	15.4
MODERATELY IMPORTANT	3	222	20.9	20.9	36.3
VERY IMPORTANT	4	299	28.1	28.1	64.4
EXTREMELY IMPORTANT	5	376	35.4	35.4	99.8
NA	6	2	.2	.2	100.0
		-------	-------	-------	
Total		1063	100.0	100.0	

i. It is a nice family-oriented beach

More than 90% find this important. Over half say it is extremely important.

Table 20
IT IS A NICE FAMILY-ORIENTED BEACH

Value Label	Value	Frequency	Valid Percent	Cum Percent	
NOT AT ALL IMPORTANT	1	51	4.8	4.8	4.8
SLIGHTLY IMPORTANT	2	43	4.0	4.1	8.9
MODERATELY IMPORTANT	3	137	12.9	12.9	21.8
VERY IMPORTANT	4	274	25.8	25.8	47.6
EXTREMELY IMPORTANT	5	553	52.0	52.1	99.7
NA	6	3	.3	.3	100.0
	-1	2	.2	Missing	
		-------	-------	-------	
	Total	1063	100.0	100.0	

j. It is well protected by lifeguards

Not surprisingly, protection by lifeguards is a major factor. Almost four-fifths call it very important or extremely important.

Table 21
IT IS WELL PROTECTED BY LIFE GUARDS

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	50	4.7	4.7	4.7
SLIGHTLY IMPORTANT	2	44	4.1	4.1	8.9
MODERATELY IMPORTANT	3	130	12.2	12.3	21.1
VERY IMPORTANT	4	218	20.5	20.5	41.7
EXTREMELY IMPORTANT	5	618	58.1	58.2	99.9
NA	6	1	.1	.1	100.0
	-1	2	.2	Missing	
		-------	-------	-------	
	Total	1063	100.0	100.0	

k. It is well maintained

A well maintained beach is viewed as important as one protected by lifeguards. Over 96% call this factor important to extremely important.

Table 22
IT IS WELL MAINTAINED

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	21	2.0	2.0	2.0
SLIGHTLY IMPORTANT	2	19	1.8	1.8	3.8
MODERATELY IMPORTANT	3	111	10.4	10.4	14.2
VERY IMPORTANT	4	267	25.1	25.1	39.3
EXTREMELY IMPORTANT	5	645	60.7	60.7	100.0
		-------	-------	-------	
	Total	1063	100.0	100.0	

l. There is good fishing

Fishing does not emerge as important to most of the sample. Less than 30% seem to care about this activity at the beach.

Table 23
THERE IS GOOD FISHING

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	620	58.3	58.3	58.3
SLIGHTLY IMPORTANT	2	129	12.1	12.1	70.5
MODERATELY IMPORTANT	3	137	12.9	12.9	83.3
VERY IMPORTANT	4	67	6.3	6.3	89.7
EXTREMELY IMPORTANT	5	78	7.3	7.3	97.0
NA	6	32	3.0	3.0	100.0
		-------	-------	-------	
	Total	1063	100.0	100.0	

m. It is close to where I am staying at the shore

Proximity is critical. Only 6% fail to call it important.

Table 24
IT IS CLOSE TO WHERE I AM STAYING

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	43	4.0	4.0	4.0
SLIGHTLY IMPORTANT	2	21	2.0	2.0	6.0
MODERATELY IMPORTANT	3	131	12.3	12.3	18.3
VERY IMPORTANT	4	270	25.4	25.4	43.7
EXTREMELY IMPORTANT	5	570	53.6	53.6	97.4
NA	6	27	2.5	2.5	99.9
	8	1	.1	.1	100.0
		-------	-------	-------	
	Total	1063	100.0	100.0	

n. It is close to my permanent residence

Proximity of the beach to permanent residence is significantly less important than proximity of the beach to a temporary shore location.

Table 25
IT IS CLOSE TO MY PERMANENT RESIDENCE

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	166	15.6	15.6	15.6
SLIGHTLY IMPORTANT	2	97	9.1	9.1	24.7
MODERATELY IMPORTANT	3	210	19.8	19.8	44.5
VERY IMPORTANT	4	222	20.9	20.9	65.4
EXTREMELY IMPORTANT	5	338	31.8	31.8	97.2
NA	6	30	2.8	2.8	100.0
		-------	-------	-------	
	Total	1063	100.0	100.0	

o. There is enough parking

Parking emerges as a central concern for many beach users. Three-fifths call it very important or extremely important. There is, also, understandably, at least a sixth of the sample who do not drive to the beach and for whom parking is irrelevant.

Table 26
THERE IS ENOUGH PARKING

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	166	15.6	15.6	15.6
SLIGHTLY IMPORTANT	2	75	7.1	7.1	22.7
MODERATELY IMPORTANT	3	192	18.1	18.1	40.7
VERY IMPORTANT	4	252	23.7	23.7	64.4
EXTREMELY IMPORTANT	5	364	34.2	34.2	98.7
NA	6	14	1.3	1.3	100.0
		-------	-------	-------	
	Total	1063	100.0	100.0	

p. There are adequate snack bars and shops

Because so many respondents have homes, rental units, or hotel rooms near the beach, the importance of snack bars and shops is often less critical than it would be to a more transient population. Nevertheless, less than 30% say it is "not important at all." It is possible that this question should be separated into two: one for snack bars or restaurants, and one for shops that sell non-food items.

Table 27
THERE ARE ADEQUATE SNACK BARS & SHOPS

Value Label	Value	Frequency	Percent	Valid Percent	Cum
NOT AT ALL IMPORTANT	1	312	29.4	29.4	29.4
SLIGHTLY IMPORTANT	2	141	13.3	13.3	42.6
MODERATELY IMPORTANT	3	239	22.5	22.5	65.1
VERY IMPORTANT	4	173	16.3	16.3	81.4
EXTREMELY IMPORTANT	5	196	18.4	18.4	99.8
NA	6	2	.2	.2	100.0
		-------	-------	-------	
	Total	1063	100.0	100.0	

Note: The question about snack bars and shops is the last of the battery. The next group of questions comprise the first of the beach valuation series.

PERCEIVED VALUE OF THE BEACH

We employed the Corps' previously tested series of questions to elicit the respondents' perceived dollar value for a day at the beach. The introductory wording is:

> "The next questions will help us measure the value society places on beaches. We do this by asking about the dollar value of enjoyment for a day on the beach. These estimates reflect only personal values and will not influence beach fees. Beach fees are set by towns; our research is for the U.S. Army Corps of Engineers."

Then, the first question is:

> "Previous studies reveal that, on average, people would be willing to pay about $4.00 per

day per person to use a beach in New Jersey. Do you feel that a day using a New Jersey beach would be worth $4.00 to each member of your household?"

If the respondent says "Yes," he/she is asked about higher figures (e.g., $5.00, $6.00, or more). If the respondent says "No," he/she is asked about $3.00, $2.00 or less. If the respondent indicates zero, he/she is asked:

"Which of the following statements best describes the reasons for your response:

Not enough information
Did not want to place a dollar value
Object to the way the question was presented
That is what it is worth to me
(Other)

Analysis of this series of questions requires combining the responses from all of the items within it. When we do that, we find that the mean perceived value is $5.04 -- for those with non-zero responses; and is $4.22 if those with zero responses are included. The frequency distribution (combining all questions in the series) is:

Table 28

Dollar Value Offered	Frequency
0	167
$.05-.50	30
1.00	83
1.50	1
2.00	220
3.00	129
4.00	114
5.00	129
6.00	84
7.00	7
8.00	6
10.00	49
12.50	1
15.00	3
20.00	3
25.00	2
100.00	1
300.00	1

Mean w/ zeros = $4.22; Mean without zeros = $5.04

Those not willing to pay any amount (the zero responses) indicated the following explanations:

Table 29
REASONS FOR NOT ANSWERING

	Pct of Total	Pct Answering This Question
Not enough information	.3%	1.8%
Did not want to place a dollar value	2.0	12.7
Object to the way the question was presented	.2	1.2
That is what it is worth to me	2.5	16.3
(Other, see below)	10.3	65.7
NA	84.8	2.4

Answers to the "other" category were (in order, from most frequent to least frequent):

	Pct of those answering this "other" category
Taxes should pay for beach	45%
Should be free/public land	21
It's natural; cost inappropriate	18
I'm a resident/land owner	7
I refuse	6
Other	3

Impact of Cost on Number of Visits

The next question was built on the final answer to the bidding process above. Respondents were asked:

If an entry fee of____ [the amount respondent indicated in above question] were charged, how would that affect the number of visits you would make to New Jersey's beaches?

More than now__   If more, how many more visits _____
Same as now __
Fewer than now.   If fewer, how many fewer visits_____

Not surprisingly, very few respondents (1%) said "more than now." Most said "same as now" (74.1%); and 25% reported "fewer than now."

Of the 1% (10 people) who said "more than now," two people estimated they would make one more visit, two estimated they would make two more visits, and five estimated they would make five more visits.

Of the 25% who said "fewer than now," the median was 9.5 fewer visits. The "low" was one fewer visits, and the "high" was 78 fewer visits (See Table 30)

Table 30
IF FEWER, HOW MANY FEWER VISITS?

Value Label	Value	Frequency	Valid Percent	Percent	Cum
	1	5	.5	2.1	2.1
	2	21	2.0	8.6	10.7
	3	13	1.2	5.3	16.0
	4	7	.7	2.9	18.9
	5	38	3.6	15.6	34.6
	7	18	1.7	7.4	42.0
	8	2	.2	.8	42.8
	9	3	.3	1.2	44.0
	10	36	3.4	14.8	58.8
	11	3	.3	1.2	60.1
	12	7	.7	2.9	63.0
	13	2	.2	.8	63.8
	14	5	.5	2.1	65.8
	15	14	1.3	5.8	71.6
	16	2	.2	.8	72.4
	19	1	.1	.4	72.8
	20	18	1.7	7.4	80.2
	22	2	.2	.8	81.1
	25	5	.5	2.1	83.1
	28	1	.1	.4	83.5
	30	9	.8	3.7	87.2
	32	3	.3	1.2	88.5
	35	3	.3	1.2	89.7
	36	1	.1	.4	90.1
	37	1	.1	.4	90.5
	40	3	.3	1.2	91.8
	42	5	.5	2.1	93.8
	45	3	.3	1.2	95.1
	48	1	.1	.4	95.5
	49	6	.6	2.5	97.9
	50	1	.1	.4	98.4
	56	2	.2	.8	99.2
	68	1	.1	.4	99.6
	78	1	.1	.4	100.0
	.	820	77.1	Missing	
		-------	-------	-------	
	Total	1063	100.0	100.0	

Perceived Value of Wider Beaches: Response to Photo

The next group of questions seeks to ascertain the perceived value of wider beaches -- an obvious result of beach replenishment. Respondents are shown a photograph of a beach and of a wide beach. They are asked the following:

Interviewer: Show photographs of the two beaches -- "A" with sand replenishment; "B" without sand replenishment. Ask: This survey is part of a study to assess the costs and benefits associated with beach sand replenishment.

Would you be willing to pay: More __ Less __ The Same __ than [amount respondent stated in earlier beach valuation question] if the NJ beach you usually visit were widened like the beach in Photo B [Bottom Photo]?

If more, how much more than [amount stated in earlier question]

If less, how much less than [amount stated in earlier question]

About one-sixth of the sample (16%) were willing to pay more for a wider beach. A small fraction (3.4%) would pay less for a wider beach. And most (80.6%) would pay the same.

Some of these results are associated with the age distribution of the sample. Older people tend to view wide beaches as an obstacle rather than as a benefit. Also, the photograph supplied by the Corps appears to offer a comparison of two rather wide beaches. It is possible that respondents, unaware of the impact of erosion and winter storms, felt the beach without replenishment was sufficient for summeractivities.

Valuation of wider beach: Those willing to pay more suggested a median figure of $1.00 -- with a low of $.50 and a top value of $100.00. (See Table 30 for the distribution.) It must be remembered that the figures here are "added" to the valuations established earlier. In general, one could add the one dollar median to the average $5.04 valuation established above -- to arrive at a "total" average value of $6.04.

Table 30 presents the frequency distribution for the "additional" dollars.

Table 30
IF MORE, HOW MUCH MORE

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	.00	1	.1	.6	.6
	.50	5	.5	3.0	3.6
	1.00	79	7.4	47.9	51.5
	1.50	3	.3	1.8	53.3
	2.00	44	4.1	26.7	80.0
	3.00	11	1.0	6.7	86.7
	4.00	2	.2	1.2	87.9
	5.00	12	1.1	7.3	95.2
	7.00	2	.2	1.2	96.4
	10.00	3	.3	1.8	98.2
	12.00	1	.1	.6	98.8
	50.00	1	.1	.6	99.4
	100.00	1	.1	.6	100.0
	.	898	84.5	Missing	
		-------	-------	-------	
	Total	1063	100.0	100.0	

Of the few people (under 3%) wishing to pay less for a wider beach, the median figure is also $1.00.

Conceptually, these people would like to subtract a dollar from their earlier valuation of a day at the beach. Note that the range varies from fifteen cents to $4.00.

Table 31
IF LESS, HOW MUCH LESS

Value Label	Value	Frequency		Valid Percent	Cum Percent
	.00	1	.1	3.0	3.0
	.15	1	.1	3.0	6.1
	.25	1	.1	3.0	9.1
	.50	4	.4	12.1	21.2
	1.00	9	.8	27.3	48.5
	2.00	10	.9	30.3	78.8
	3.00	4	.4	12.1	90.9
	4.00	3	.3	9.1	100.0
	.	1030	96.9	Missing	
		-------	-------	-------	
	Total	1063	100.0	100.0	

A Wider Beach, Fees and the Number of Visits

This next question builds on the above question about the value of a wider beach. It was asked of those who indicated that they were willing to pay more (or, for a very few, who wanted to pay less) for wider beaches. The question reads:

If a beach fee of [the amount stated in the question above] were charged, how would that affect the number of visits you would make to New Jersey's beaches?
More than now__ If more, how many more visits _____
Same as now __
Fewer than now. If fewer, how many fewer visits_____

The first tier of responses indicate little change:

Table 32

	N.	Pct.	Adj. Pct.
MORE THAN NOW	4	.4	2.0
SAME AS NOW	153	14.4	77.7
FEWER THAN NOW	40	3.8	20.3
NOT APPLICABLE	866	81.5	--
		100.0	

Because the question only affects less than one-fifth (18.5%) of the sample, results should be approached with some caution.

The very few (three valid responses) who say "more than now" indicate that they would visit the beach one to ten "additional" times.

The 3.8% who say "less than now" indicate that they would visit the beach, on average, 4 fewer times each season. See Appendix for distribution.

Erosion and the Beach

The earlier group of questions concerned wider beaches. This next question addresses the issue of erosion and the role of the beach. The question reads:

> This next question is not about widening beaches, but about maintaining beaches -- stopping them from eroding away. How important is it to you that there be a beach here at all?

The responses indicate that almost all of the sample understand the role of the beach. Less than one percent call the beach not important, and three-quarters call it very- or extremely important (See Table 33).

Table 33
IMPORTANCE OF BEACH AT ALL?

Value Label	Value	Frequency	Valid Percent	Percent	Cum
NOT AT ALL IMPORTANT	1	10	.9	.9	.9
SLIGHTLY IMPORTANT	2	37	3.5	3.5	4.4
MODERATELY IMPORTANT	3	113	10.6	10.7	15.1
VERY IMPORTANT	4	224	21.1	21.1	36.2
EXTREMELY IMPORTANT	5	675	63.5	63.6	99.8
NA	6	1	.1	.1	100.0
	-1	3	.3	Missing	
		-------	-------	-------	
	Total	1063	100.0	100.0	

We then asked if respondents would "stop coming to this area if it did not have a beach"? More than four-fifths (83%) said "yes, they would stop coming.

Establishing an Erosion Protection Fund

Some of the more interesting theoretic debates pertain to the perceived value of a common good, in this case a beach. The question reads:

> Imagine there were a fund established for New Jersey beach protection against erosion. If you were to make a voluntary once-a-year contribution to this fund, even if you did not use the beach, what would be the maximum yearly amount that you would be willing to give?
>
> Keep in mind that this contribution would be in addition to any daily fees that you might pay?

Less than one-fifth (18.6%) indicated that they would contribute nothing. Among those who would contribute some money, the median amount is $50. The range is from less than one dollar to $10,000. Most responses are between $10.00 and $200.00. See appendix for frequency distribution.

Table 34
REASONS FOR NOT CONTRIBUTING

Those who would not contribute (18.6%) suggested that:

	Pct of Total
They did not have enough information	4.2%
They did not want to place a dollar value	2.0
"Zero" was what it is worth to them	2.8

Or a range of reasons, of which the most common were:

Beach fees should pay	3%
Taxes should pay	5%
Other	1%

Cost of Trip to Beach

We asked respondents the perceived relative value of a trip to the beach. The question reads, "All in all, how expensive do you consider a trip to the beach"? Most respondents defined the beach as a very good buy. Table 35 reflects the responses:

Table 35
HOW COSTLY THINK TRIP TO BEACH?

Value Label	Value	Frequency	Valid Percent	Percent	Cum
VERY EXPENSIVE	1	31	2.9	2.9	2.9
SOMEWHAT EXPENSIVE	2	207	19.5	19.5	22.4
SOMEWHAT INEXPENSIVE	3	333	31.3	31.3	53.7
VERY INEXPENSIVE	4	492	46.3	46.3	100.0
		-------	-------	-------	
	Total	1063	100.0	100.0	

DEMOGRAPHICS

The last set of questions are provided to evaluate the sample and allow crosstabulations. The data reflect a robust representation of the beach users.

Employment Status

Table 36
PRESENT EMPLOYMENT STATUS

Value Label	Value	Frequency		Valid Percent	Cum Percent
EMPLOYED FULL TIME	1	624	58.7	58.7	58.7
EMPLOYED PART TIME	2	106	10.0	10.0	68.7
NOT EMPLOYED	3	27	2.5	2.5	71.2
RETIRED	4	119	11.2	11.2	82.4
FULL TIME HOMEMAKER	5	113	10.6	10.6	93.0
STUDENT	6	70	6.6	6.6	99.6
OTHER	7	4	.4	.4	100.0
		-------	-------	-------	
	Total	1063	100.0	100.0	

OTHER (EMPLOYMENT STATUS)

	Frq	Pct
DISABILITY	1	.1%
SELF EMPLOYED	3	.3%

Marital Status

Almost two-thirds (65%) are married. Singles represented 34%.

Keep in mind that the interviewers were instructed to interview people who appeared to be 18 years old or older. (See the "age"question, below.)

Household Income, Before Taxes

Questions about income is one of the more delicate items in any survey. In our surveys, only 10% refused to answer. The data suggest that respondents were reasonably truthful. (The median response is $40,000 through $49,999; higher than the national median but not unexpected for vacationers who can rent or who own shore properties.

Table 37
WHICH BEST DESCRIBES TOTAL INCOME?

Value Label	Value	Frequency	Percent	Valid Percent	Cum
UNDER $10,000	1	54	5.1	5.6	5.6
$10,000 TO $19,999	2	45	4.2	4.7	10.4
$20,000 TO $29,999	3	84	7.9	8.8	19.1
$30,000 TO $39,999	4	128	12.0	13.4	32.5
$40,000 TO $49,999	5	169	15.9	17.7	50.2
$50,000 TO $74,999	6	183	17.2	19.1	69.4
$75,000 TO $99,999	7	127	11.9	13.3	82.6
$100,000 AND OVER	8	166	15.6	17.4	100.0
	-1	107	10.1	Missing	
		-------	-------	-------	
	Total	1063	100.0	100.0	

Number of People in Household this Year

The median number of household members was between two and three.

Table 38
HOW MANY PEOPLE IN YOUR HOUSEHOLD?

Value Label	Value	Frequency	Valid Percent	Percent	Cum
NO. OF PEOPLE IN HOUSEHOLD	1	139	13.1	13.3	13.3
	2	318	29.9	30.4	43.7
	3	213	20.0	20.4	64.1
	4	215	20.2	20.6	84.6
	5	102	9.6	9.8	94.4
	6	32	3.0	3.1	97.4
	7	15	1.4	1.4	98.9
	8	5	.5	.5	99.3
	9	1	.1	.1	99.4
	10	4	.4	.4	99.8
	12	2	.2	.2	100.0
	-1	17	1.6	Missing	
		-------	-------	-------	
	Total	1063	100.0	100.0	

Education

Over half the sample had at least some college.

Table 39
HOW MUCH EDUCATION HAVE YOU COMPLETED?

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NO SCHOOL	1	6	.6	.6	.6
GRADE SCHOOL (6 YRS)	2	8	.8	.8	1.3
SOME HIGH SCHOOL (7-11)	3	20	1.9	1.9	3.2
HIGH SCHOOL GRADUATE	4	201	18.9	18.9	22.1
SOME COLLEGE (13 TO 15)	5	311	29.3	29.3	51.5
COLLEGE GRADUATE (16)	6	330	31.0	31.1	82.6
POST GRADUATE (OVER 16)	7	185	17.4	17.4	100.0
	-1	2	.2	Missing	
		-------	-------	-------	
	Total	1063	100.0	100.0	

Race/Ethnicity

The sample was overwhelmingly white. Whites represented 95.6% of the sample. African Americans represented only 1.9% of the sample, and Latinos comprised only 1%. While these ratios do not reflect the region, they do appear to approximate beach usage in the communities in which we conducted the research.

Table 40
DESCRIPTION OF RACIAL OR ETHNIC BACKGROUND

Value Label	Value	Frequency	Valid Percent	Percent	Cum
WHITE OR CAUCASIAN	1	1015	95.5	95.6	95.6
BLACK/AFRICAN AMERICAN	2	20	1.9	1.9	97.5
LATINO	3	11	1.0	1.0	98.5
ASIAN	4	13	1.2	1.2	99.6
NATIVE AMERICAN	5	2	.2	.2	100.0
	-1	2	.2	Missing	
		-------	-------	-------	
	Total	1063	100.0	100.0	

Age

The model category is age 30 to 39. Over half of the age distribution is under 39. (Compare this to the population of homeowners -- which is significantly older.)

Table 41
WHICH BEST DESCRIBES YOUR AGE GROUP?

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
10 TO 19	1	32	3.0	3.0	3.0
20 TO 29	2	237	22.3	22.4	25.4
30 TO 39	3	300	28.2	28.3	53.7
40 TO 49	4	236	22.2	22.3	75.9
50 TO 59	5	131	12.3	12.4	88.3
60 TO 69	6	95	8.9	9.0	97.3
70+	7	29	2.7	2.7	100.0
	.	3	.3	Missing	
		-------	-------	-------	
	Total	1063	100.0	100.0	

Clarity Question

The last close-ended question asked about the wording in the our survey. Only 0.4% of the sample claimed that the wording was unclear.

Table 42
CLARITY: HOW DID YOU FIND THE WORDING?

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY CLEAR	1	367	34.5	41.1	41.1
CLEAR	2	451	42.4	50.5	91.6
MODERATE	3	71	6.7	8.0	99.6
UNCLEAR	4	3	.3	.3	99.9
VERY UNCLEAR	5	1	.1	.1	100.0
	.	170	16.0	Missing	
		-------	-------	-------	
Total		1063	100.0	100.0	

General Comments

One-sixth of the respondents offered additional comments or suggestions regarding New Jersey's ocean beaches.

The major themes were:

-- Additional efforts should be made to clean up the beaches.
-- The beach fees are needed
-- The beach fees are resented
-- Beach replenishment is needed
-- Taxes should pay for beach replenishment

The appendix and the SPSS data disks contain a complete listing.

Crosstabulations

Crosstabulations of every item by several key variables have been calculated and are found in the appendix. Every variable iscrosstabulated by:

Weather (Sunny vs. All Other)
Density of Beach Use (Categories 1 and 2 ["Light Use"] vs. 3, 4, 5 ["Full or MoreCrowded"])
Community location (Atlantic City, Longport, Margate, Ventnor)
Yearly Visit Pattern (Visit Every Year; Most or Some Years; First Visit)
Days On Beach (Few -- 1-14; Many -- 15-30; Most -- 31-98)
Own or Rent Property at Shore
Year of Purchase [for owners] ("New" 1985-1994; "Old" 1900 to 1984)
Resident Status (Permanent; Staying for at least a week; Staying less than 8 days)
Income (Less than $49,999; $50,000 and over)
Education (High School or less vs. Some College or more)
Age (categorized in two formats because the age breakdowns for residents is skewed sharply to the right -- they tend to be over 60 years old)
Age-1 (under 60 vs. 60 and older)
Age-2 (under 40 vs. 40 and older)

II. SURVEY OF BUSINESSES

STONE HARBOR, AVALON,
ATLANTIC CITY, LONGPORT, MARGATE, AND VENTNOR

In appraising the value of a beach, previous research has generally focused on beach users. In our survey of shore businesses, we seek to extend the analysis to include this population (of business
owners and managers) that also benefits from beaches and beach replenishment.

The Survey

The Survey was administered to 157 businesses in the six shore communities identified by the Corps -- Stone Harbor, Avalon, Atlantic City, Longport, Margate and Ventnor. The interviews were conducted in July and August of 1994.

Location

The location of the interviews (the distribution among the six communities) generally reflects the density of businesses in thevarying towns. Thus, for example, there are few business interviews in Longport, but a substantial number in Stone Harbor. Table 1 provides a breakdown of the locations:

Table 1
LOCATION OF INTERVIEW

Value Label	Value	Frequency	Percent	Valid Percent	Cum
Stone Harbor	1	38	24.2	24.4	24.4
Avalon	2	41	26.1	26.3	50.6
Atlantic City	3	24	15.3	15.4	66.0
Longport	4	5	3.2	3.2	69.2
Margate	5	24	15.3	15.4	84.6
Ventnor	6	24	15.3	15.4	100.0
	.	1	.6	Missing	
		-------	-------	-------	
	Total	157	100.0	100.0	

Proximity to the Beach

Because proximity to the beach is usually desirable for a business and because we ask businesspersons about the value of the beach for their businesses, we recorded the number of

blocks to the beach from each business property.
Four businesses (2.6%) were less than one bock from the beach; about a quarter (24.5%) were within one block. Most of the businesses (52.3%) were within two blocks of the beach. (See Table 2 for a full listing.)

Table 2
BLOCKS NUMBER OF BLOCKS TO THE BEACH

Value Label	Value	Frequency	Valid Percent	Percent	Cum
	0	4	2.5	2.6	2.6
	1	33	21.0	21.9	24.5
	2	42	26.8	27.8	52.3
	3	47	29.9	31.1	83.4
	4	16	10.2	10.6	94.0
	5	2	1.3	1.3	95.4
	6	1	.6	.7	96.0
	8	2	1.3	1.3	97.4
	10	1	.6	.7	98.0
	12	1	.6	.7	98.7
	20	1	.6	.7	99.3
	25	1	.6	.7	100.0
	.	6	3.8	Missing	
	-------		-------	-------	
Total		157	100.0	100.0	

Type of Business

The sample consists of the expected range of retail establishments. The sample is:

Clothing, shoes, jewelry, tee shirts	16
Restaurants, bars, fast foods	15
Food Markets	6
Home repair and hardware	5
Hotel and motels	4
Hairdressers, nail shops	4
Realtors	3
Cleaners and tailors	3

ALSO: bait and tackle shop, art gallery, bank, bike store, camera shop, book store, tv repair (2), tv cable dealer, cab service, limo service, car rental agent, baby furniture, furniture (2), liquor store, yarn store, video stores (2), sports supplies (2), pest and bug removal, museum, library,

insurance agents (2), law office, pottery shop, surf shop, and drug stores (2).
Seasonal or Year-Round

Two-thirds of the businesses were open all year -- see Table 3.

Table 3
IS BUSINESS OPEN ALL YEAR OR ONLY DURING SUMMER

Value Label	Value	Frequency	Percent	Valid Percent	Cum
ALL YEAR	1	105	66.9	67.3	67.3
SUMMER SEASON	2	51	32.5	32.7	100.0
	.	1	.6	Missing	
		-------	-------	-------	
	Total	157	100.0	100.0	

Valid cases 156 Missing cases 1

SUBSTANTIVE FINDINGS

Role of Beach

Our first substantive question asked businesspersons to estimate the percentage of customers who were at the shore because of the beach.

The businesspeople recognize the overwhelming role of the beach to their economic existence. The median estimate was that three-quarters of the customers were "due" to the beach. A third of the sample indicated that between 90% to 100% of the customers were attributable to the presence of the beach. Table 4 presents a complete listing. (See next page for Table 4.)

Table 4
WHAT PERCENTAGE OF YOUR CUSTOMERS AT SHORE BECAUSE OF BEACH

Value Label	Value	Frequency	Valid Percent	Percent	Cum
PERCENT OF CUSTOMERS	0	1	.6	.7	.7
"DUE" TO BEACH	1	1	.6	.7	1.3
	4	1	.6	.7	2.0
	5	3	1.9	2.0	3.9
	8	1	.6	.7	4.6
	10	7	4.5	4.6	9.2
	15	1	.6	.7	9.8
	20	9	5.7	5.9	15.7
	25	6	3.8	3.9	19.6
	30	5	3.2	3.3	22.9
	35	2	1.3	1.3	24.2
	40	2	1.3	1.3	25.5
	50	17	10.8	11.1	36.6
	55	1	.6	.7	37.3
	60	2	1.3	1.3	38.6
	65	2	1.3	1.3	39.9
	70	7	4.5	4.6	44.4
	75	11	7.0	7.2	51.6
	80	14	8.9	9.2	60.8
	85	5	3.2	3.3	64.1
	90	23	14.6	15.0	79.1
	95	11	7.0	7.2	86.3
	98	2	1.3	1.3	87.6
	99	2	1.3	1.3	88.9
	100	17	10.8	11.1	100.0
	-1	4	2.5	Missing	
		-------	-------	-------	
	Total	157	100.0	100.0	

Valid cases 153 Missing cases 4

Impact of Erosion

The next question addresses the perceived impact of beach erosion on business income. The question reads:

If the beach were to erode away completely, how would this affect your business? Would it lose:

1. a quarter of its income	2. a half of its income__
3. three-quarters of its income	4. almost all of its income__
5. all of its income	6. other

The results indicate that the question is almost too threatening to consider. Although the above question reveals that businesspersons are aware of the role of the beach in bringing customers, businesspeople are frequently less willing to examine the consequences of total erosion. Table 5 (frequencies) and Table 6 (responses within the "other" category) reveal the inconsistency. Only 4.5% insist that total erosion with have no affect. But at least one-fifth claim the impact of total beach erosion would be less than 25% of their business income. (Note that about half of the sample report that they would lose at least half of their business income if there were total erosion.)

Table 5
HOW WOULD EROSION AFFECT YOUR BUSINESS?

Value Label	Value	Frequency	Valid Percent	Percent	Cum
A QUARTER OF ITS INCOME	1	28	17.8	18.1	18.1
HALF OF ITS INCOME	2	33	21.0	21.3	39.4
THREE-QUARTERS OF ITS INCOME	3	26	16.6	16.8	56.1
ALMOST ALL OF ITS INCOME	4	25	15.9	16.1	72.3
ALL OF ITS INCOME	5	17	10.8	11.0	83.2
OTHER	6	26	16.6	16.8	100.0
	-1	2	1.2	Missing	
Total			100.0	100.0	

Table 6
"OTHER" RESPONSE TO HOW EROSION AFFECTS BUSINESS

Value Label	Value	Frequency	Valid Percent	Percent	Cum
		134	85.4	85.4	85.4
LOSS PERCENTAGE	10%	2	1.3	1.3	86.6
	15%	2	1.3	1.3	87.9
	2/3	1	.6	.6	88.5
	20%	1	.6	.6	89.2

5%	2	1.3	1.3	90.4
60%	1	.6	.6	91.1
80%	1	.6	.6	91.7
90%	1	.6	.6	92.4
DON'T KNOW	1	.6	.6	93.0
NOT SPECIFIED	2	1.3	1.3	94.3
NO AFFECT	7	4.5	4.5	98.7
UNCERTAIN	2	1.3	1.3	100.0
	-------	-------	-------	
Total	157	100.0	100.0	

Business and the Existence of a Beach

The next question is a follow-up item. It reads: "How important is it to your business that there be a beach here at all?" The results are in line with the earlier question. While over three-quarters call it very- to extremely important, a fifth are less sure.

Table 7
HOW IMPORTANT IS IT TO YOUR BUSINESS THAT THERE BE A BEACH AT ALL

Value Label	Value	Frequency	Valid Percent	Percent	Cum
NOT AT ALL IMPORTANT	1	9	5.7	5.8	5.8
SLIGHTLY IMPORTANT	2	8	5.1	5.1	10.9
MODERATELY IMPORTANT	3	16	10.2	10.3	21.2
VERY IMPORTANT	4	36	22.9	23.1	44.2
EXTREMELY IMPORTANT	5	87	55.4	55.8	100.0
	.	1	.6	Missing	
		-------	-------	-------	
	Total	157	100.0	100.0	

Taxes and Replenishment

Beliefs about tax allocations may influence respondents attitudes toward beach replenishment. We wanted to know if businesspersons believed that local taxes are used in any federal/U.S. Army Corps of Engineer projects. The question reads:

> "Do you know if any of the local taxes go toward replacing the sand lost to storms or waves?" Yes Think so No

The results suggest that most believe that their local taxes are not directed toward beach replenishment. See Table 8

Table 8
DO YOU KNOW IF ANY OF THE LOCAL TAXES GO TO BEACH REPLENISHMENT

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
yes	1	24	15.3	15.4	15.4
think so	2	24	15.3	15.4	30.8
no	3	108	68.8	69.2	100.0
	.	1	.6	Missing	
		-------	-------	-------	
	Total	157	100.0	100.0	

The reader is cautioned, however, that the question is potentially flawed. It is not absolutely clear how to interpret the responses. "No," for example, could mean that the respondent does not know if local taxes are used for beach replenishment, or "no" could mean he/she does not believe that local taxes are used for beach replenishment.

The pattern of the data suggest that we may be overly cautious. Given the distribution of "think so" vs. "no," it appears that "no" probably does mean "no." Nevertheless, it is important to maintain some doubt.

Paying More Taxes For a Wider Beach

In a format similar to that used with the beach users' study, we contrasted photographs of a beach with sand replenishment with one without send replenishment.

One-quarter (25.3%) reported that they would be willing to pay more taxes for a wider beach. (And three-quarters said they did not want to pay increased taxes for a wider beach.)

Table 9
WOULD YOU PAY MORE TAXES FOR WIDER BEACH

Value Label	Value	Frequency	Percent	Valid Percent	Cum
more	1	39	24.8	25.3	25.3
no	2	115	73.2	74.7	100.0
	.	3	.9	Missing	
		-------	-------	-------	
	Total	157	100.0	100.0	

Valid cases 154 Missing cases 3

Those who reported they were willing to pay more taxes were asked "how much more."

The "additional" taxes ranged from 1% to 200%. The median increase is 9%. (See Table 10 next page.)

IF MORE, HOW MUCH MORE? Table 10

Value Label	Value	Frequency	Percent	Valid Percent	Cum
PERCENTAGE INCREASE	1.00	1	.6	4.5	4.5
	2.00	4	2.5	18.2	22.7
	5.00	2	1.3	9.1	31.8
	8.00	1	.6	4.5	36.4
	10.00	6	3.8	27.3	63.6
	17.00	1	.6	4.5	68.2
	20.00	3	1.9	13.6	81.8
	25.00	3	1.9	13.6	95.5
	200.00	1	.6	4.5	100.0
	.	135	86.0	Missing	
		-------	-------	-------	
	Total	157	100.0	100.0	

(No respondents indicated how much less they would like to give.)

An Annual Fund for Erosion Protection

As with the beach users survey, we also asked businesspersons if they would contribute to a fund for N.J. beach erosion protection.

Almost a third (29.2%) offered no additional funds -- the .00 in Table 11. The range of non-zero responses was from $5.00/yr to $10,000/yr. The median of all responses (i.e., with zeros included) is approximately $75/yr. The median of all positive responses is approximately $175/yr.

Table 11
YEARLY CONTRIBUTION TO A GENERAL FUND

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	.00	35	22.3	29.2	29.2
	5.00	1	.6	.8	30.0
	10.00	1	.6	.8	30.8
	25.00	5	3.2	4.2	35.0
	50.00	8	5.1	6.7	41.7
	100.00	37	23.6	30.8	72.5
	150.00	2	1.3	1.7	74.2
	200.00	11	7.0	9.2	83.3

250.00	1	.6	.8	84.2
300.00	1	.6	.8	85.0
500.00	6	3.8	5.0	90.0
750.00	1	.6	.8	90.8
1000.00	9	5.7	7.5	98.3
1500.00	1	.6	.8	99.2
10000.00	1	.6	.8	100.0
-1.00	37	23.5	Missing	
	-------	-------	-------	
Total	157	100.0	100.0	

SAMPLE CHARACTERISTICS

Age of Business

The median age of businesses in our sample was 10 years. The minimum was under one year (first season/year), and the longest running business was 100 years. Table 11 displays the distribution.

Table 11

HOW OLD IS BUSINESS?

Value Label	Value	Frequency		Valid Percent	Cum Percent
YEARS IN BUSINESS	0	1	.6	.6	.6
	1	6	3.8	3.9	4.5
	2	4	2.5	2.6	7.1
	3	9	5.7	5.8	12.9
	4	10	6.4	6.5	19.4
	5	10	6.4	6.5	25.8
	6	9	5.7	5.8	31.6
	7	10	6.4	6.5	38.1
	8	6	3.8	3.9	41.9
	9	4	2.5	2.6	44.5
	10	12	7.6	7.7	52.3
	11	4	2.5	2.6	54.8
	12	6	3.8	3.9	58.7
	13	2	1.3	1.3	60.0
	14	2	1.3	1.3	61.3
	15	4	2.5	2.6	63.9
	16	1	.6	.6	64.5
	17	4	2.5	2.6	67.1
	18	3	1.9	1.9	69.0

20	5	3.2	3.2	72.3
22	3	1.9	1.9	74.2
23	2	1.3	1.3	75.5
24	2	1.3	1.3	76.8
25	2	1.3	1.3	78.1
26	2	1.3	1.3	79.4
27	1	.6	.6	80.0
28	2	1.3	1.3	81.3
30	8	5.1	5.2	86.5
36	1	.6	.6	87.1
38	2	1.3	1.3	88.4
40	5	3.2	3.2	91.6
45	2	1.3	1.3	92.9
49	1	.6	.6	93.5
50	6	3.8	3.9	97.4
60	1	.6	.6	98.1
70	1	.6	.6	98.7
73	1	.6	.6	99.4
100	1	.6	.6	100.0
-1	2	1.2	Missing	
	-------	-------	-------	
Total	157	100.0	100.0	

Number of Employees

The businesses ranged in size from no employees (just owner) to 125 employees. The median was 5 employees -- about half had fewer employees and half had more than 5 employees.

Table 12

HOW MANY PEOPLE EMPLOYED AT THIS BUSINESS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NUMBER OF EMPLOYEES					
	0	1	.6	.7	.7
	1	13	8.3	8.6	9.3
	2	15	9.6	9.9	19.2
	3	15	9.6	9.9	29.1
	4	17	10.9	11.3	40.4
	5	17	10.9	11.3	51.7
	6	10	6.4	6.6	58.3
	7	6	3.8	4.0	62.3

8	8	5.1	5.3	67.5
9	3	1.9	2.0	69.5
10	4	2.6	2.6	72.2
11	1	.6	.7	72.8
12	6	3.8	4.0	76.8
13	1	.6	.7	77.5
14	2	1.3	1.3	78.8
15	8	5.1	5.3	84.1
20	1	.6	.7	84.8
23	1	.6	.7	85.4
25	7	4.5	4.6	90.1
26	1	.6	.7	90.7
28	2	1.3	1.3	92.1
30	5	3.2	3.3	95.4
35	1	.6	.7	96.0
40	3	1.9	2.0	98.0
50	1	.6	.7	98.7
60	1	.6	.7	99.3
125	1	.6	.7	100.0
-1	5	3.2	Missing	
	-------	-------	-------	
Total	156	100.0	100.0	

Valid cases 151 Missing cases 5

Education Level of Manager/Owner

Most owners or managers had some college or more schooling. Less than a quarter had a high school education or fewer years of education.

HOW MUCH EDUCATION HAVE YOU COMPLETED?

Value Label	Value	Frequency	Percent	Valid Percent	Cum
GRADE SCHOOL	2	2	1.3	1.3	1.3
SOME HIGH SCHOOL	3	6	3.8	3.9	5.2
HIGH SCHOOL GRADUATE	4	30	19.1	19.6	24.8
SOME COLLEGE	5	46	29.3	30.1	54.9
COLLEGE GRADUATE	6	64	40.8	41.8	96.7
POST GRADUATE	7	5	3.2	3.3	100.0
	-1	4	2.2	Missing	
		-------	-------	-------	
	Total	157	100.0	100.0	

Valid cases 153 Missing cases 4

In the appendix, are crosstabulations of every variable in the businesspersons survey by the following two variables:

Business Schedule (Open all year vs. Open summer only)

No. of Employees (0-9 vs. 10-125)

III. SURVEY OF HOMEOWNERS

We interviewed 251 homeowners in the six shore communities on Absecon and Seven Mile Island. The questionnaire focused on the perceived affects of beach erosion on property values, on perceived tax allocations, on use of the beaches, and on perceptions of sand replenishment efforts.

The primary sample for the homeowners study is comprised of respondents we interviewed in their homes in face-to-face interviews and via phone interviews (N = 251). A second sample is comprised of homeowners we interviewed as part of the beach users survey, i.e., beach users who owned homes in the nearby communities. In the beach user questionnaire we included a series of questions that are identical to questions in the homeowners' survey (N = 370). We present the combined results below.

The Surveys: Comparing the Samples

One task is to compare the two samples -- to contrast the similarities and differences so that the combined results can be better understood.

The 251 homeowners were interviewed in the summer of 1994, the same time as the beach user survey. While there are some systematic differences between the two samples, the similarities predominate. The major difference appears to be age: homeowners interviewed at their homes are, on average, older than homeowners interviewed on the beach.

Because few readers are interested in the methodological concerns of comparing samples, our discussion of the similarities and differences of the two samples is found at the end of this section -- after the review of the substantive findings. The specific data comparing the two samples on demographic and other characteristics are presented in that methodological subsection, in Tables M1 to M11.

FINDINGS

The Cost of Erosion

Our first substantive question seeks to ascertain the homeowners' perceived cost of erosion. The question reads:

> If the beach were to erode away completely, how would this affect the value of your property? Would it lose:
>
> a quarter of its value__ a half of its value__

three-quarters of its value__ almost all of its value__
all of its value__ other

The samples are very consistent. Both homeowners interviewed at their homes (hereafter homeowners) and homeowners interviewed on the beach (hereafter homeowners o-t-b) reported that their properties would lose much of the value in the event of total beach erosion. Review of Table 1 reveals that approximately two-thirds of both samples say their homes would lose at least 75% of the value.

Table 1
HOW WOULD VALUE OF HOUSE CHANGE

	Homeowners percent	Homeowners O-T-B percent
A QUARTER OF ITS VALUE	22.1	25.8
A HALF OF ITS VALUE	5.6	11.1
3/4 OF ITS VALUE	32.1	32.8
ALL OF ITS VALUE	12.9	15.3
ALMOST ALL OF ITS VALUE	4.8	4.2
OTHER	22.5	10.8
	(N=251)	(N=370)

Summary of "Other" Category (Percentages for total samples):

	percent	percent
ABOUT HALF TO THREE-QUARTERS	5.0	3.0
NO AFFECT	7.0	5.0
NO IDEA	9.0	3.0

Allocation of Taxes

We asked respondents if any of their local taxes are allocated toward replacing the sand lost to storms or waves. About three-fifths of the homeowners (both samples) indicated that local taxes were not allocated to beach replenishment. Another quarter said the "think so."

Table 2
TAXES TO REPLENISHMENT?

	Homeowner percent	Homeowner O-T-B percent
YES	17.2	12.8
THINK SO	26.4	26.0
NO	56.4	61.1

Note: As discussed in the first section, the reader is cautioned that the wording of this question is potentially ambiguous. It is possible that respondents are not telling us about the allocation of taxes, but rather about their familiarity with the allocation process.

Taxes/Payments for a Wider Beach

In a question format similar to that discussed in the first section, we asked respondents if they would be willing to pay more taxes for wider beaches.

Less than one-fifth (in either sample) felt that wider beaches were worth the cost of additional taxes or payments. Table 3 presents the results for both the homeowners and the homeowners o-t-b. The similarity in the responses is striking.

Table 3
PAY MORE TAXES/PAYMENTS FOR WIDER BEACH

	Homeowner percent	Homeowner O-T-B percent
WILLING TO PAY MORE	17.5	17.5
NOT WILLING TO PAY MORE	81.2	79.9
WILLING TO PAY LESS	1.3	3.1

Those willing to pay more, were asked "how much more?"

It is difficult to compare the two samples because the follow-up questions were asked somewhat differently for each of the samples. For the homeowners, the question was direct (e.g., "how much more"). But for the homeowners o-t-b, the question was related to an earlier valuation question; respondents were essentially asked "how much more than you were willing to spend in [an earlier question]". Equally significant, the homeowner sample was asked the question in terms of additional taxes, whereas the homeowner o-t-b sample were asked the question in terms of additional payments. (In later economic analysis, we disaggregate the two groups.)

Table 4
"ADDITIONAL" TAXES/PAYMENT FOR WIDER BEACH

	Homeowner percent	Homeowner O-T-B percent
Minimum	0.1%	$0.50
Maximum	200.0%	$100.00
Median	10.0%	$6.72

Keeping Beaches Where They Are

Our next item switches focus to ask not about widening the beach, but rather about the danger of serious erosion. The question reads:

> This next question is not about widening beaches, but about maintaining beaches -- stopping them from eroding away. How important is it to you that there be a beach here at all?
>
> 1-not at all important; 2-slightly important; 3-moderately important; 4-very important; 5-extremely important; 6- NA]

Again, the results for both samples are consistent. Almost four-fifths call it "extremely important." Under 3% call it not important.

Table 5
IMPORTANCE OF BEACH AT ALL?

	Homeowner percent	Homeowner O-T-B percent
NOT AT ALL IMPORTANT	2.4	.3
SLIGHTLY IMPORTANT	.8	.3
MODERATELY IMPORTANT	4.8	2.4
VERY IMPORTANT	23.5	16.7
EXTREMELY IMPORTANT	68.1	79.8
NA	.4	--

Fund Against N.J. Beach Erosion

The last substantive question we examined asks respondents if they would contribute to a general fund for beach protection. The question reads:

> Imagine there were a fund established for New Jersey beach protection against erosion. If you were to make a voluntary once-a-year contribution to this fund, even if you did not use the beach, what would be the maximum yearly amount that you would be willing to give?
>
> Keep in mind that this contribution would be in addition to any taxes and daily fees that you might pay?

The results of this question reflects some divergence between the samples. One possible cause of the differences is the questionnaire structure and length. Given the different contexts, however, we are impressed with the similarities. These are open-ended questions; no guides are offered, and the respondents knew that the questions were hypothetical.

The median offered to the "fund" is $25 to $46.00. The maximum (in each case offered by one person) is $10,000.00 to $20,000.00. The typical high offer is $100 to $300.00. (The full distributions are in the appendix tables.)

Table 6
GIVE MONEY TO A FUND FOR N.J. BEACHES

	Homeowner percent	Homeowner O-T-B percent
Minimum	0.00	0.00
Percent offering $0.00	42.2%	19.4%
Maximum	$20,000.00	$10,100.00
Median with zero offers included	$25.00	$46.00
Median with only non-zero offers included	$380.00	$79.00

Non-Contributors

We asked those who refused to give dollar values why they refused. The responses are:

Table 7
WHAT STATEMENT DESCRIBES YOUR REASON FOR NOT CONTRIBUTING

	Homeowner percent	Homeowner O-T-B percent
NOT ENOUGH INFORMATION	11.6	4.2
NOT WANT TO PLACE $ VALUE	5.2	1.4
OBJECT TO PRESENTATION	.4	0.0
WHAT IT'S WORTH TO ME	6.0	.7
OTHER	22.7	12.7

Reasons in the "other" category include: "can't afford more," "taxes should cover the cost," and "businesses should pay."

Summary

As seen in the previous surveys, homeowners in both samples appear to appreciate the importance of erosion and the need for beach replenishment. While they may not want (nor want to pay for) wider beaches, they certainly do not wish to see the water any closer to their homes than it is currently.

In general, the similarity of the responses between the two samples is striking.

COMPARING THE SAMPLES: HOMEOWNERS AND HOMEOWNERS ON THE BEACH

The data below are provided for those who wish to contrast the two samples.

Age

As noted, homeowners interviewed in their homes were generally older than the homeowners interviewed on the beaches. See Table M1.

Table M1

AGE

	Homeowner Percent	Homeowner O-T-B Percent
10 to 19	3.3	3.0
20 to 29	4.1	14.1
30 to 39	11.0	20.9
40 to 49	16.7	26.4
50 to 59	17.9	16.8
60 to 69	25.6	14.7
70+	21.5	4.7
	(N = 251)	(N = 370)

Homeowners interviewed at home (column on the left) were generally more elderly (and near elderly), i.e., 60 - 69 and those 70 or older.

Visiting Patterns

The homeowners interviewed in their homes and the homeowners interviewed on the beaches (o-t-b) had almost identical visitingpatterns.

Table M2

HOW OFTEN DO YOU COME TO NJ BEACHES?

	Homeowner percent	Homeowner o-t-b percent
EVERY YEAR	95.2	96.7
MOST YEARS	.4	2.7
SOME YEARS	1.6	0.0
FIRST YEAR HERE	0.0	0.5

Days on the Beach

Not all of the homeowners interviewed in their homes visited the beach; 16.8% never went to the beach. In contrast, and by definition, all of the homeowners we interviewed on the beach spent at least one day on the beach. Thus, there is some basic difference in the two samples. On the other hand, if you compare the median days on the beach of the two samples for those who visit the beach at least once, they are very close: 38 days vs. 39 days (see Table M3).

Table M3

MEDIAN NUMBER OF DAYS ON THE BEACH

	Med. no. of days
Homeowners who go to beach	38
Homeowners interviewed on the beach	39

(The median for homeowners interviewed in their homes, when including the 16.8% who never visit the beach, is 22 days.)

Period of Time Spent at the Shore

We asked respondents about the portion of the summer they spent at their N.J. shore residences. Results, overall, are somewhat similar for the two groups. Those interviewed on the beach are less likely (by 5%) to be permanent residents, and are less likely to spend the entire summer at the shore.

Table M4
HOW LONG ARE YOU STAYING AT THE SHORE

	Homeowner percent	Homeowner O-T-B percent
PERMANENT RESIDENT	45.6	40.3
HERE ALL SUMMER, ALL	43.2	34.4
WEEKENDS, ALL SUMMER	4.0	17.4
HERE FOR TWO WEEKS	6.4	4.5
HERE FOR ONE WEEK	.8	1.7
HERE FOR WEEKEND ONLY	--	.3
HERE FOR THE DAY ONLY	--	1.4

Buy House

We asked homeowners when they purchased their houses. The most recent were bought this summer. The least recent was 1900. The median year for home purchases by homeowners was 1978; The median purchase year for homeowners o-t-b was 1983. The difference is consistent with other patterns reflecting the older status of the homeowners interviewed in their homes.

We also asked them if the house was inherited or purchased. No noteworthy difference emerges.

Table M5
INHERITED OR BOUGHT

	Homeowner percent	Homeowner O-T-B percent
INHERITED	9.3%	11.5%
BOUGHT	90.7%	88.5%

Income and Race

The homeowners and homeowners o-t-b appear to be quite similar in income distribution (Table M6) and race/ethnicity (Table M7). The median income is $50,000 to $74,999. The sample is overwhelmingly white.

Table M6

INCOME	Homeowner percent	Homeowner O-T-B percent
UNDER $10,000	4.7	3.2
$10,000 TO $19,999	7.4	2.8
$20,000 TO $29,999	7.4	5.6
$30,000 TO $39,999	9.5	6.9
$40,000 TO $49,999	11.1	10.5
$50,000 TO $74,999	19.5	21.8
$75,000 TO $99,999	12.6	19.0
$100,000 AND OVER	27.2	30.2

Table M7

ETHNIC/RACIAL	Homeowner percent	Homeowner O-T-B percent
WHITE	94.4	98.9
BLACK	3.9	.3
LATINO	.8	.5
NATIVE AMERICAN	.4	0

Education

Homeowners appear to have a higher percentage of post graduate degrees. Overall, however, the education distributions are similar.

Table M8

EDUCATION	Homeowners percent	Homeowners O-T-B percent
GRADE SCHOOL (0-6)	.4	.3
SOME HIGH SCHOOL (7-11)	2.4	1.0
HIGH SCHOOL GRADUATE	25.1	1.7
SOME COLLEGE (13-15)	19.0	16.3
COLLEGE GRADUATE (16)	32.0	24.6
POST GRADUATE (16+)	20.6	32.9

Employment Status

Homeowners interviewed at their homes are more than twice as likely to be retired than those interviewed on the beach (44.6% vs. 19%). Correspondingly, those interviewed on the beach are more likely to be employed. These differences are obviously related to the age distribution.

Table M9

EMPLOYMENT STATUS	Homeowner percent	Homeowner O-T-B percent
EMPLOYED FULL TIME	27.6	52.6
EMPLOYED PART TIME	11.6	10.4
NOT EMPLOYED	2.0	4.2
RETIRED	44.6	19.0
FULL-TIME HOMEMAKER	10.4	9.7
STUDENT	3.8	3.8
OTHER	1.2	.3
DISABILITY	--	.3

Location

The samples differ somewhat in the proportions associated with each of the towns.

Table M10
LOCATION ON THE BEACH

	Homeowner percent	Homeowner O-T-B percent
STONE HARBOR	31.9	14.5
AVALON	33.9	20.8
ATLANTIC CITY	10.4	12.6
LONGPORT	17.9	9.7
MARGATE	1.6	23.5
VENTNOR	4.4	18.7

The differential is due to several factors:

1. Communities differ in the average age of their residents and the differing age groups had differential use rates for the beach.

2. Some beaches are more popular than others -- they have a net in-flow of residents from other towns.

3. We sampled homeowners on the beach with a different methodology than that used for contacting homeowners in their homes. The beach survey was designed to interview one-half of the sample on each of the two islands -- and it achieved that ratio.

4. Some communities have much higher ratios of homeowners than others during the summer.

Marital Status

About seven-tenths of both samples are married.

Table M11

MARRIED OR SINGLE

	Homeowner percent	Homeowner O-T-B percent
MARRIED	70.3	68.7
SINGLE	29.7	31.3

Number of People in Permanent Residence

Those interviewed in their homes tend to have slightly smaller households than homeowners interviewed on the beach. The median number of people in the household for homeowners (in homes) was 2;

The median number of people in the household for homeowners O-T-B was 2.7.

Comparison of Samples: Summary

While those interviewed at home are, on average, older and less likely to be in the labor force, many issues under analysis in this study -- homeownership and shore visiting patterns -- remain quite similar across a range of comparisons. The similarities include date of purchase, method of acquiring house (inherited or purchased), income, marital status, time spent at the shore, race/ethnicity.

OTHER REFERENCE DATA

Distance from the Beach

We recorded the location of each house in relation to the beach. Typically, wealthier homes are closer to the beach. Most homes were within two blocks of the beach.

A caution is noted, however, that these six communities are on barrier islands; they are typically only a few blocks wide (with some exceptional portions). Thus, the fact that most homes are not far from the beach should not be interpreted as an indication of great wealth.

Table M12
NUMBER OF BLOCKS TO THE BEACH? (Homeowner Survey Only)

Value Label	Value	Frequency	Percent	Valid percent	Cum percent
	1	1	.4	.4	.4
	1	81	32.3	32.8	33.2
	2	88	35.1	35.6	68.8
	3	47	18.7	19.0	87.9
	4	13	5.2	5.3	93.1
	5	7	2.8	2.8	96.0
	6	3	1.2	1.2	97.2
	7	1	.4	.4	97.6
	10	4	1.6	1.6	99.2
	15	1	.4	.4	99.6
	20	1	.4	.4	100.0
	-1	4	1.6	Missing	
		-------	-------	-------	
Total		251	100.0	100.0	
Total		251	100.0	100.0	

Valid cases 244 Missing cases 7

IV. PERCEIVED VALUE AND DOLLARS

In the previous sections we presented the findings from our surveys on the beaches, in homes, and in businesses. In this section we try to link key survey findings on the individual's value of beaches to dollar estimates for the communities.

In this brief review we can only sketch some of the possible analyses. We hope these examples, however, help suggest some directions for economic use of the survey data.

BEACH USERS AND PERCEIVED VALUE OF A DAY AT THE BEACH

A series of questions in the beach user questionnaire engages the respondent in a process to determine the perceived value of a day at the beach. We derived two figures from that process:

1. The mean value of a day at the beach based on all beach users, including those who provided a "zero" value. The mean was $4.22

2. The mean value of a day at the beach based on all beach users who provided values greater than "zero" -- those who indicated a positive value. This mean was $5.04

Which measure to use? Once a perceived value of a day at the beach is determined, the next step is to multiply that value by the number of beach users. But which measure is more appropriate? Those with zero values, or only those with positive values? We argue that the best measure is the lower figure ($4.22) because it incorporates in it the 16% of beach users who assign a zero value in the bidding process. That is, it already reflects those who might have to be "subtracted" from the higher mean of $5.04. Thus, the more conservative figure will be used in the next step.

Important Note on Beach Tags and Beach Fees: Much of the previous research incorporating this valuation procedure did not involve beaches with beach tags or beach fees. It is most probable that without a beach tag fee we would have derived a higher valuation for a day at the beach (and fewer respondents suggesting a zero contribution). Thus, users of these data are urged to consider the downward impact of these beach fees. Five of the six beaches we surveyed had beach tags/beach fees.

Number of Beach Users: Data on the number of beach users at six communities are derived from the several tourism boards and chambers of commerce. For five of our communities, the best usage figures are obtained from the sale of beach tags. Atlantic City, which is the only community without beach tags, reports what it insists are reliable estimates of beach usage.

To derive a common denominator for the data, we convert each of the beach tag sales figures to daily estimates. Thus, weekly tags are multiplied by 7 (days), and season tags are multiplied by 98 (days).

Estimate of Beach Days for Beach Tag Communities

Community	Season Tags	Weekly Tags
Margate	28,400	4,699
Ventnor	28,985	29,900
Stone Harbor	22,700	11,100
Avalon	41,961	17,160
Longport	8,883	1,490
Subtotal	130,929	64,349

To derive the total number of days:

130,929 X 98 = 12,831,042

64,349 X 7 = 450,443

Subtotal 13,281,485

To this we correct by the average number of beach tag cheaters (6.2%) ascertained in the beach users survey (see Table 10, Section I).

13,281,485 x 106.2% = 14,104,937 beach user days.

Atlantic City: To the above figure we must add the beach user figures from Atlantic City, the one community without beach tags. Atlantic City informs us that the average daily number of beach users is 100,000. Multiplied by the 98 days in the official season = 9,800,000 beach user days.

(Note that there is no "cheater" correction for the Atlantic City data because there are no beach tags.)

Combining the two figures yields: 23,904,937 beach user days.

The final product: Multiplying the number of beach user days by the mean value of a beach day ($4.22) generates a figure of $100,878,834.00. That is, the beach users' valuation of the beach is almost $101 million each season. Moreover, this figure only reflects the "official" season. The beach is used much more than the 98 days of our analysis. Also, the $101 million does not reflect the value of the beach for children, who do not buy beach tags. Arguably, many children value the beach more than many adults.

The Value of A Wider Beach

About one-sixth of the beach users (16%) were willing more to pay for a wider beach. (A few [3.4%] are willing to pay for a narrower beach.) Among those willing to pay for a wider beach, the median additional amount (added to perceived value of a day at the beach) was $1.00. Thus if beach widening were undertaken, one could conceivably add $1.00 for 16% of the beach user-days. (And subtract $1.00 for 3.4% of the beach user' valuations.)

The arithmetic of that calculation is straightforward:

To add money for a wider beach:
No. of beach user-days (from above): 23,904,937 X .16 = 3,824,789 X $1.00 = $3,824,789

To subtract money for an (unwanted) wider beach:
No. of beach user-days (from above): 23,904,937 X .034 = 812,768 X $1.00 = $812,786

The net gain:

$3,824,789 (more for a wider beach) less 812,786 (less for a wider beach)
Net value increase= $3,012,003 for a wider beach.

Note that although few want to pay taxes for wider beaches, the beach user survey reveals that almost all respondents say they want wide beaches.

A Special Fund for New Jersey Beach Erosion Protection

Over four-fifths (81.4%) of the respondents indicated they would contribute on an annual basis (beyond taxes) to a special fund for beach erosion protection, even if they did not use the beach. The median contribution offered was $50.00 (with a low of a few cents and a high of $10,000).

Because the question includes the phrase, "even if you did not use the beach," it is unclear which groups could be included (or excluded) in the analysis. All visitors to New Jersey? All Americans? If we take the $50 figure plus the 81.4% contribution rate as a guide to the number who would contribute, we can theoretically extrapolate to any known population. For example, New Jersey is fifth-ranked state in total tourism dollars. If 81.4% of tourists contributed $50.00 each, the resulting figure would be extraordinary. Alternately, one could limit the population to beach users in the state. Here, again, the dollar values would still be remarkable.

BUSINESSES AND THE VALUE OF THE BEACH

We have two questions/measures in the business survey that reflect the value of the beach to businesses.

The first asks the owners/managers to estimate the percentage of their customers who are in the area because of the beach. The median estimate is 75% of customers.

The second measure represents a different approach. It asks business owners/managers to estimate the affect on business income if the beach were to erode away. The result is very similar to the first: the median loss estimate is 75% of income.

Number of Businesses: The next obvious step is to determine the number of businesses in the 6 communities. This information was obtained from the six chambers of commerce and city offices. The data are:

Community	No. of Businesses
Atlantic City	2,940
Ventnor	627
Margate	539
Longport	215
Stone Harbor	672
Avalon	85
Total	5,078

Value of Business Receipts: U.S. Department of Commerce data indicate that the average retail business's receipts are $2,675,270 (Adjusted from Table 861, Statistical Abstract of the United States. U. S. Bureau of the Census. Washington, D.C. 1991). As a heuristic exercise, we assume that the average beach community business is taking in only one-quarter of that amount; thus the average receipts would be $668,817.

Continuing the example, and assuming that the 5,078 businesses take in the average receipts of $668,175., then the total value of receipts is $3,396,255,265.

If we accept the owners/managers' estimates of the value of the beach for their businesses equals 75%, then one way of deriving the value of the beach is to "earmark" 75% of the receipts:

.75 X $3,396,255,265 = $2,447,191,448.

That is, using a modest set of assumptions, and employing either of the survey-derived estimates of the beaches' importance to local businesses (erosion loss or customers draw), indicates that the value of the beach to businesses could be calculated at almost $2.5 billion. Further analysis would require obtaining business receipt data and/or business tax data.

More Taxes for a Wider Beach

As with beach users, business owners and managers were asked if they would be willing to pay more taxes for a wider beach. One quarter (25.3%) stated that they would be willing to pay more taxes for such enhancement. The median increase in taxes offered was 9%. (The minimum percentage increase was 1%, the maximum percentage increase was 200%.) Obviously, if one-quarter of all shore businesses were willing to pay 9% more in taxes for wider beaches, the impact would be considerable.

Again, further analysis would require obtaining business receipt data and/or business tax data.

A Special Fund for New Jersey Beach Erosion Protection:

As with beach users, business owners and managers were asked if they would be willing to contribute on an annual basis (beyond taxes) to a special fund for beach erosion protection, even if they did not use the beach. Seven-tenths of the businesses claimed they would contribute. The minimum offered was $5.00; the maximum offered was $10,000. The median contribution offered (of those 70% offering contributions) was approximately $175.00

Unlike the example of the beach users, we do know the number of businesses in the six communities. Multiplying the 5,078 businesses by the contribution ratio of 70% = 3,555. Multiplying 3,555 (number of businesses contributing) by the median contribution of $175.00

indicates that the total fund contribution is $622,125.

HOMEOWNERS AND THE VALUE OF THE BEACH

Much of the same methodology used in understanding the value of the beach for businesses can be employed with homeowners. That is, while homeowners do not have receipts, they did estimate the cost of erosion to the value of their homes, and they did indicate their willingness to support wider beaches and erosion prevention funds.

Cost of erosion

Each homeowner was asked to estimate the value of his/her property if the beaches were to suffer major erosion -- were to erode away completely. The median response was "three-quarters of its value." Below, we list the median value of homes and the number of homes in the six target communities.

Community	Median House Price	Total No. of Homes
Atlantic City	$73,400	13,453
Ventnor	137,700	6,645
Margate	176,800	7,904
Longport	201,800	3,300
Stone harbor	285,600	7,266
Avalon	285,700	1,474
	Total	40,042

Multiplying each community's median house price by the number of houses, and summing the figures yields a total home value of almost 6.5 billion dollars ($6,462,126,000).

If, based on the survey's median estimate, three-quarters of the value were to be lost due to total beach erosion, than the loss would equal over 4.8 billion dollars -- $4,846,594,500.

Taxes for a Wider Beach

Homeowners were also asked if they would be willing to pay more taxes for a wider beach. About a sixth (17.5%) indicated that they were willing to pay more taxes for such enhancement. The median of additional taxes offered was 10%. The minimum was 0.1% and the maximum was 200% additional taxes.

A Special Fund for New Jersey Beach Erosion Protection:

Last, homeowners were also asked if they would be willing to contribute on an annual basis to a special fund for beach erosion -- even if they did not directly benefit from it. Seven-tenths said they would contribute to such a fund. The median contribution for those offering a contribution was $229.50

If we do the math, the additional contributions to the fund are:

40,042 homes X .70 (contribution ratio) = 28,029 X $229.50 (themedian contribution) = $6,432,655. Thus, homeowners indicate that they would be willing to contribute an additional $6.4 million for a general fund against beach erosion.

Summary and Linking of Estimates

Many factors (e.g., employment and its multipliers, tourism expenditures, beach fees, and rental income) determine the value of the beach to a community or region. This report has focused on several measures obtained from our surveys. It is clearly beyond the scope of this report to ascertain exact dollar figures for the total value of the beach. We have, however, attempted to sketch some of the possible economic analyses and computations that can be based on the survey data and/or on the survey data in concert with other data.

Below, we combine the figures we have derived to provide partial estimates of the value of the beach -- estimates that would not be possible without the survey data:

Beach Users
The beach users' valuation of the beach (official season days only)................... $100,878,834

Net tax increase for a wider beach............ 3,012,003

Contributions to a beach erosion fund ($50 X 81.4% of sample) Specific value... undetermined

Businesses
Value of beach to businesses (percent of customers or loss if total erosion)...... 2,447,191,448

Businesses willing to pay more taxes for wider beach (25.3% of businesses @ median of 9% increase).................................... undetermined

Businesses willing to contribute to a beach erosion fund.................................. 622,125

Homeowners
Cost of erosion to homeowners (their estimate of loss)...................................... 4,846,594,500
(Note: Unlike the other figures in this list, this number is not repeated annually.)

Homeowners willing to pay more for a wider beach.................................. undetermined

Homeowners willing to contribute to a beach erosion fund.......................... 6,432,655

Total annual value = $2.659 billion
Total one-time value = $4.847 billion

The data indicate that the annual added value of the beach, based only on these survey estimates, is $2.659 billion.

This figure does not include any estimate of: beach users contributions to a beach erosion fund; additional taxes that businesses say they would pay for a wider beach; or additional taxes that homeowners say they are willing to pay for wider beaches. Note also that our calculations do not include the funds paid to the municipalities for beach fees. The undetermined monies could well dwarf the sums listed above.

Last, the $2.659 billion annual figure does not reflect the $4.8 billion that homeowners estimate as their loss to erosion.

Clearly the importance of the beach -- as perceived by its users and as estimated by businesses and homeowners -- is enormous. The data presented in this report should allow analysts to more fully and accurately estimate the true value of this resource.

Appendix C.

Clean Air Act Calculations

General Conformity Review and Emission Inventory
Hereford Inlet to Cape May Inlet Feasibility Study

Table 2. Pollutant Emissions from Employee Vehicles

Assumptions:	Average trip distance (1 way) is 30 miles.
	Every member of the work crew drives their own vehicle.
	Mob/Demob work crew comprised of 12 people.
	Mob/Demob work crew works 20 days.
	Beach construction work crew comprosed of 12 people.
	Beach construction work crew works 248 days with 3 shift changes.
	Average NOx vehicle emission factor is 0.96 g/mile.
	Average VOC vehicle emission factor is 0.84 g/mile.

NOx

Mob/Demob Work Crew
12 workers * 2 trips/day *20 days * 30 miles/trip * 0.96 g of NOx/mile
NOx emissions from the Mob/Demob work crew = 0.015 tons

Beach Construciton Work Crew
12 workers * 6 trips/day *248 days * 30 miles/trip * 0.96 g of NOx/mile
NOx emissions for beach work crew = 0.57 tons

Total NOx resulting from employee vehicles = 0.582 tons.

VOC

Mob/Demob Work Crew
20 workers * 2 trips/day * 5 days * 30 miles/trip * 0.84 g of VOC/mile
VOC emissions from the Mob/Demob work crew = 0.006 tons

Beach Construction Work Crew
12 workers * 2 trips/day *385 days * 30 miles/trip * 0.84 g of VOC/mile
VOC emissions for beach work crew = 0.257 tons

Total VOC resulting from employee vehicles = 0.263 tons.

Table 3. Total Estimated Pollutant Emissions from Construction Equipment and Employee Vehicles

Nox= 86.8 Tons
VOCs= 3.3 Tons

General Conformity Review and Emission Inventory
Hefeford to Cape May Feasibility Study

Table 1. Project Emission Sources and Estimated Power

Load Factor (LF) represents the average percentage of rated horsepower used during a source's operational profile

Hp-hr = # of engines*Hp*LF*hrs of operation

Emissions (g) = Power Demand (Hp-hr) * Emission Factor (g Nox or VOC/Hp-hr)

Emissions (tons) = Emissions (g) * (1 ton/907180 g)

	# of		Load	Total		Emissions Factors		Total Emissions (Tons)	
Equipment/Engine Category	**engines**	**Hp**	**Factor**	**Hours**	**Hp-Hours**	**Nox**	**VOCs**	**Nox**	**VOCs**
Crane, hydraulic, truck mounted 14 ton	1	130	0.43	589	32,925	9.5	0.2	0.34479205	0.007259
Boat, outboard, 18' river runner, CAP 1,350 lbs	1	115	0.29	800	26,680	9.7	0.37	0.28527525	0.010882
Generator set, portable, 10KW	1	19	0.74	5,501	77,344	9.5	0.2	0.80994794	0.017052
Generator set, skid mtd, 300KW	1	428	0.74	4,800	1,520,256	9.5	0.2	15.9201393	0.335161
Generator set, portable, 5.6KW, 120/240 V 60 Hz	1	11	0.74	286	2,328	9.5	0.2	0.02437926	0.000513
Drill,earth/auger, hydraul auger, 14" dia	1	58	0.74	32	1,373	9.5	0.2	0.01438268	0.000303
Cranes, hydraul.self-propelled, rough terrain, 50 ton, 110' boom, 4X4	1	240	0.43	4,896	505,267	9.5	0.2	5.29116427	0.111393
Loader/backhoe, wheeled, 0.8 CY front end bkt.	1	67	0.59	24	949	9.5	0.2	0.00993501	0.000209
Pump,water,horiz booster, skid mtd, GIW 12"dia	1	341	0.80	11,424	3,116,467	9.7	0.37	33.3227494	1.271074
Water pump, submersible agitator dredge pump, TOYO, 150 hp	1	150	0.80	4,800	576,000	9.7	0.37	6.15886594	0.234926
Light set, Trailer Mtd, 4-1000W, w/6KW Gen, Man Mast winch	1	12	0.68	5,501	44,888	9.5	0.2	0.47006936	0.009896
Tractor, crawler (dozer), 310 Hp, LGP, w/ 15.3 CY blade	1	310	0.21	9,640	627,564	9.5	0.2	6.57185785	0.138355
Truck, highway, 4x2, 25,000 lbs GVW	1	210	1.00	24	5,040	8.16	0.76	0.04533433	0.004222
Truck, highway, 6x4, 50,000 lbs GVW	1	310	1.00	270	83,700	10.72	0.67	0.98906942	0.061817
Truck,hwy, crew, 1 Ton Pickup, 4X4	1	180	1.00	6,290	1,132,200	10.33	0.54	12.8922882	0.673943
Truck, hwy, conventional, 3/4 ton pickup, 4X4	1	130	1.00	2,024	263,120	10.33	0.54	2.99613043	0.156623
Welder, gas, 300 amp, 3 KW, trailer mtd.	1	45	0.43	210	4,064	9.5	0.2	0.04255302	0.000896
				Total Hp-Hours	8,020,165		**TOTAL:**	**86.2**	**3.0**

Mob/demob Crew: Crew of 12 will travel to work 10 days. Crew of 12 will travel from work 10 days.
Construction Crew: Crew of 12 will travel to work 248 days for 3 8-hr shifts/day. Crew of 12 will travel from work 385 days for 3 shifts/day (total of 6 trips/day).

Load Factors and Emissions Factors were obtained from emissions estimates provided for USACE (2013) and USEPA (2004)

Appendix D.
U.S. Fish and Wildlife Coordination

Planning Aid Report
2b Report

PLANNING AID REPORT

HEREFORD INLET TO CAPE MAY INLET FEASIBILITY STUDY

CAPE MAY COUNTY, NEW JERSEY

Prepared by:

U.S. Fish and Wildlife Service
Ecological Services, Region 5
New Jersey Field Office
Pleasantville, New Jersey 08232

February 2008

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Field Office
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http://www.fws.gov/northeast/njfieldoffice

In Reply Refer to:

2007-FA-0316

FEB 0 1 2008

Minas M. Arabatzis, Chief
Planning Division, Philadelphia District
U.S. Army Corps of Engineers
Wanamaker Building – 100 Penn Square East
Philadelphia, Pennsylvania 19107 - 3390
Attn: Beth Brandreth

Dear Mr. Arabatzis:

Enclosed is a U.S. Fish and Wildlife Service (Service) planning aid report (PAR) on the U.S. Army Corps of Engineers, Philadelphia District (Corps) Hereford Inlet to Cape May Inlet Feasibility Study, Cape May County, New Jersey. The information presented in this PAR addresses potential beneficial or adverse impacts on fish and wildlife resources from proposed shore protection along the five-mile-long barrier island. This report has been prepared pursuant to the Scope-of-Work and Fiscal Year-2007 and 2008 interagency agreement between the Corps and the Service.

This PAR is provided as technical assistance and does not constitute the report of the Secretary of the Interior pursuant to Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401; 16 U.S.C. 661 *et seq.*). This PAR is valid only for the described conditions and must be revised if changes to the proposed project take place prior to initiation.

The information presented in this PAR is also provided pursuant to the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to ensure the protection of endangered and threatened species and the Migratory Bird Treaty Act of 1918 (MBTA) (40 Stat. 755; 16 U.S.C. 703-712), as amended. These comments do not preclude future review and comments by the Service on any forthcoming environmental documents pursuant to the National Environmental Policy Act of 1969 (NEPA) (83 Stat. 852; 42 U.S.C. 4321 *et seq.*), as amended.

FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

The federally listed (threatened) piping plover (*Charadrius melodus*) nests on the beaches in the vicinity of North Wildwood, U.S. Coast Guard's LORAN site, and Cape May National Wildlife Refuge; and are known to forage along the beaches of Wildwood Crest and Lower Township.

On a rare note, one pair previously nested in Wildwood Crest in 1998. Piping plovers nest on sandy beaches above high-tide line on mainland coastal beaches, sand flats, and barrier island coastal beaches. The nesting sites are typically located on gently sloping foredunes, blowout areas behind primary dunes, washover areas cut into or between dunes, ends of sandpits, and on sites with deposits of suitable dredged or pumped sand.

Coastal development for residential and commercial uses, and the subsequent stabilization of the once shifting and dynamic ecosystem, have resulted in the degradation and alteration of natural beaches to such an extent along the Atlantic coast that many beaches no longer provide suitable habitat for piping plovers. Disturbance by humans and the direct loss of nests have become major contributing factors to the population decline of the piping plover (U.S. Fish and Wildlife Service 1996a).

Dredged spoil deposition has the potential to create sub-optimal piping plover nesting habitat, provided the material is deposited prior to nesting (U.S. Fish and Wildlife Service 1996a). As a result, piping plovers could expand their nesting range within the project area after nourishment is completed. This occurred as a result of Corps - New York District beach nourishment projects in Monmouth County, New Jersey in July 2000 (U.S. Fish and Wildlife Service 2002). Prior to initial beach nourishment in 1994, piping plovers were not documented in that project area for at least a decade.

The project may also create habitat for seabeach amaranth (*Amaranthus pumilus*), a federally listed (threatened) plant (U.S. Fish and Wildlife Service 1996b). Seabeach amaranth is an annual plant, endemic to Atlantic coastal plain beach, primarily occurring on overwash flats at the accreting ends of barrier beach islands and lower foredunes of non-eroding beaches. The species occasionally establishes small temporary populations in other areas, including bayside beaches, blowouts in foredunes, and sand and shell materials placed as beach replenishment or dredge spoil. Occurrences of seabeach amaranth are known within the proposed project area, the species has recently naturally recolonized coastal sites within New York and Maryland. Therefore, it is possible that seabeach amaranth may become naturally reestablished within the project area during the project life. Colonization of seabeach amaranth occurred in July 2000 after a Corps - New York District beach nourishment project in Monmouth County, New Jersey (U.S. Fish and Wildlife Service 2002).

Other than the piping plover and seabeach amaranth, the federally and State-listed roseate tern (*Sterna dougallii*) (occasional transient) and State-listed peregrine falcon (*Falco peregrinus*) are known to use the project area. In addition, the Federal candidate species red knot (*Calidris canutus rufa*) is known to stopover in Delaware Bay and Hereford Inlet during spring (northward) migration where they feed mainly on the eggs of horseshoe crabs (*Limulus polyphemus*) to build fat reserves for the 3,000 kilometer flight to the arctic breeding grounds and to ensure survival if they arrive when food availability is low (New Jersey Department of Environmental Protection 2007). The crucial importance of Delaware Bay and Hereford Inlet must be considered when evaluating potential project impacts. Red knots also use Hereford Inlet and Delaware Bay during fall migration for feeding and roosting (New Jersey Department of Environmental Protection 2007).

The lead Federal agency for a project has the responsibility, under Section 7(c) of the ESA, to prepare a Biological Assessment (BA) if the proposal is a major construction project that requires an Environmental Impact Statement or if the proposal may affect a federally listed species. Therefore, the Corps must prepare a BA to address potential project-related adverse impacts to the piping plover and seabeach amaranth. The assessment should contain information concerning the piping plover and seabeach amaranth within the action area and an analysis of any potential effect of the proposed action on these species. We strongly recommend including potential effects on the red knot in the BA as the red knot could become federally listed species in the future. The BA may be incorporated into the Corps NEPA documentation.

The National Marine Fisheries Service (NMFS) must be consulted regarding Essential Fish Habitat, as required under Section 305 (b)(2) of the Magnuson – Stevens Fishery Conservation and Management Act (16 U.S.C. 1801-1882). The NMFS must also be consulted regarding the ESA due to the potential presence of the federally listed (endangered) Kemp's ridley sea turtle (*Lepidochelys kempii*), hawksbill sea turtle (*Eretmochelys imbricata*) and leatherback sea turtle (*Dermochelys coriacea*), and the federally listed (threatened) loggerhead sea turtle (*Caretta caretta*) and green sea turtle (*Chelonia mydas*) within the project area and any borrow areas. Appendix A provides a current list of federally listed (endangered and threatened) and candidate species in New Jersey.

Any questions regarding this PAR or federally listed endangered or threatened species should be directed to Ron Popowski. Mr. Popowski is deaf and uses video relay service. He can be reached at (877) 467-4877, extension 42421 or e-mail at Ron_Popowski@fws.gov. The Service looks forward to continued cooperation with the Corps in the planning stages of the proposed project.

Sincerely,

J. Eric Davis Jr.

J. Eric Davis Jr.
Supervisor

Enclosure

LITERATURE CITED

New Jersey Department of Environmental Protection. 2007. Status of the Red knot (*Calidris canutus rufa*) in the Western Hemisphere. Prepared for U.S. Department of the Interior, Fish and Wildlife Service, Region 5, New Jersey Field Office, Pleasantville, NJ. 287 pp.

U.S. Fish and Wildlife Service. 1996a. Piping plover (*Charadrius melodus*), Atlantic Coast population, revised recovery plan. U.S. Department of the Interior, Fish and Wildlife Service, Region 5, Hadley, MA. 245 pp.

_____. 1996b. Recovery plan for seabeach amaranth (*Amaranthus pumilus*) Rafinesque. U.S. Department of the Interior, Fish and Wildlife Service, Region 4, Atlanta, GA. 70 pp.

_____. 2002. Biological opinion on the effects of completion of sections I and II of the Atlantic Coast of New Jersey beach erosion control project Sea Bright to Manasquan, Monmouth County, New Jersey on the piping plover (*Charadrius melodus*) and seabeach amaranth (*Amaranthus pumilus*). U.S. Department of the Interior, Fish and Wildlife Service, Region 5, New Jersey Field Office, Pleasantville, NJ. 124 pp.

EXECUTIVE SUMMARY

The Philadelphia District, U.S. Army Corps of Engineers (Corps) was authorized to conduct a feasibility study to investigate storm damage reduction, beach restoration, and water quality improvement alternatives within Hereford Inlet, North Wildwood and Cape May Inlet, Lower Township project area (project area), Cape May County, New Jersey. The length of the project area is approximately seven miles long and exhibits several different coastal issues. The North Wildwood portion of the project area is prone to moderate to severe erosion, leaving the surrounding community vulnerable to storm damages. Meanwhile, the beaches of Wildwood and Wildwood Crest have been accreting large quantities of sand resulting in a large, low, flat beach offering little habitat value and resulting in human health and water quality concerns due to clogged outfall pipes on the beach. Potential alternatives currently being considered for the project include "bypassing" sand from Wildwood to North Wildwood and changing the beach configuration in Wildwood by increasing berm height or adding a dune. Within the project area no work is planned for either the Cape May National Wildlife Refuge or the U.S. Coast Guard's LORAN site.

In this planning aid report (PAR), the U.S. Fish and Wildlife Service (Service) identifies fish and wildlife resources in the vicinity of the five-mile-long barrier island bordered to the north by Hereford Inlet and to the south by Cape May Inlet (formerly Cold Spring Inlet), discusses potential impacts on those resources from erosion control activities, identifies opportunities for fish and wildlife habitat improvements, and updates the current state of knowledge concerning the proposed activities and their potential beneficial or adverse impacts on fish and wildlife resources, including federally listed species.

The federally listed (threatened) piping plover (*Charadrius melodus*) nests on the beaches within the project area in the vicinity of North Wildwood, U.S. Coast Guard's LORAN site, and Cape May National Wildlife Refuge; and are known to forage along the beaches of Wildwood Crest and Lower Township. Piping plovers nest on sandy beaches above the high-tide line on mainland coastal beaches, sand flats, and barrier island coastal beaches. The Service views this beach nourishment project, specifically at North Wildwood, as an opportunity to enhance nesting habitat for piping plover, shorebirds, and colonial nesting waterbirds, including the Federal candidate red knot (*Calidris canutus rufa*), and the State-listed (endangered) black skimmer (*Rynchops niger*) and least tern (*Sterna antillarum*).

In addition to piping plover, shorebirds, and colonial nesting waterbirds, the project may also create habitat for seabeach amaranth (*Amaranthus pumilus*), a federally listed (threatened) plant (U.S. Fish and Wildlife Service 1996b). Seabeach amaranth is an annual plant, endemic to Atlantic coastal plain beaches, primarily occurring on overwash flats at the accreting ends of barrier beach islands and lower foredunes of non-eroding beaches. Occurrences of seabeach amaranth are known within the proposed project area. The species has recently naturally recolonized coastal sites within New York and Maryland; therefore, it is possible that seabeach amaranth may become naturally reestablished within the project area during the life of the project. Colonization of seabeach amaranth occurred in July 2000 after a New York District Corps beach nourishment project in Monmouth County, New Jersey (U.S. Fish and Wildlife Service 2002). To minimize potential adverse impacts associated with renourishment activities along the Atlantic Coast in New Jersey, the Service developed a streamlined biological opinion to assess and evaluate project impacts to piping plovers and seabeach amaranth.

In December 2005, the Service developed a Programmatic Biological Opinion (PBO), in accordance with Section 7 of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended,16 U.S.C. 1531 *et seq.*), on the effects of beach nourishment, renourishment, stabilization, and restoration projects funded, permitted, or conducted by the Corps along the Atlantic Coast of New Jersey on the federally listed (threatened) species piping plover and seabeach amaranth. The purpose of the PBO is to expedite review of Corps funded and permitted Program activities.

In closing, this PAR ends with recommendations for beach communities, borrow areas, and beach habitat enhancements. In order to avoid and minimize potential adverse impacts on State-listed and federally listed threatened and endangered species within project area, the Service recommends incorporating nine measures into project planning. The PAR also includes eight recommendations for borrow areas; and six recommendations for habitat enhancement.

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I. INTRODUCTION

The purpose of this U.S. Army Corps of Engineers (Corps) study is to investigate storm damage reduction, beach restoration, and water quality improvement alternatives within the Hereford Inlet, North Wildwood to Cape May Inlet project area (project area), Lower Township, Cape May County, New Jersey (Figure 1) . The project area exhibits several different coastal issues. The North Wildwood portion of the project area is prone to moderate to severe erosion, leaving the surrounding community vulnerable to storm damages. The beaches of Wildwood and Wildwood Crest have been accreting large quantities of sand, resulting in human health and water quality concerns due to clogged outfall pipes on the beach. Potential alternatives currently being considered for the project include "bypassing" sand from Wildwood to North Wildwood and changing the beach configuration in Wildwood by increasing berm height or adding a dune.

In this planning aid report (PAR), the U.S. Fish and Wildlife Service (Service) identifies fish and wildlife resources in the vicinity of the five-mile-long barrier island bordered to the north by Hereford Inlet and to the south by Cape May Inlet (formerly Cold Spring Inlet), discusses potential impacts on those resources from erosion control activities, identifies opportunities for fish and wildlife habitat improvements, and updates the current state of knowledge concerning the proposed activities and their potential adverse impacts on fish and wildlife resources.

II. PROJECT AREA

The length of the project area is approximately seven miles, including the five-mile-long barrier island from Hereford Inlet to Cape May Inlet located in coastal Cape May County, New Jersey. Municipalities, Boroughs, and Townships on the island include North Wildwood, Wildwood, Wildwood Crest, West Wildwood, Diamond Beach, and Lower Township (Figure 1). The Two-Mile Beach Unit of the Cape May National Wildlife Refuge (CMNWR) managed by the Service and a natural area within the U.S. Coast Guard LORAN site are located at the northern boundary of Cape May Inlet within Lower Township (Figure 1). Hereford Inlet opens to the Atlantic Ocean and is located between Stone Harbor Point and North Wildwood. The inlet contains a scour hole, located along the southern end of the seawall at Angelesea in North Wildwood. The scour hole possibly resulted from dredging of fill materials for the Townsends Inlet to Hereford Inlet or another beach nourishment project. At this time, no detailed information has been provided regarding the physical and biological characteristics of the scour hole.

III. METHODS AND PROCEDURES

This PAR incorporates information compiled from the Service's New Jersey Field Office library and office files, personal communications, the New Jersey Department of Environmental Protection (NJDEP) database, CMNWR, New Jersey Audubon Society (NJAS), and the Corps' Hereford Inlet to Cape May Inlet Feasibility Study Project Management Plan (U.S. Army Corps of Engineers 2005). The database was reviewed for information regarding federally listed species, State-listed species, and other fish and wildlife in the vicinity of Hereford Inlet to Cape

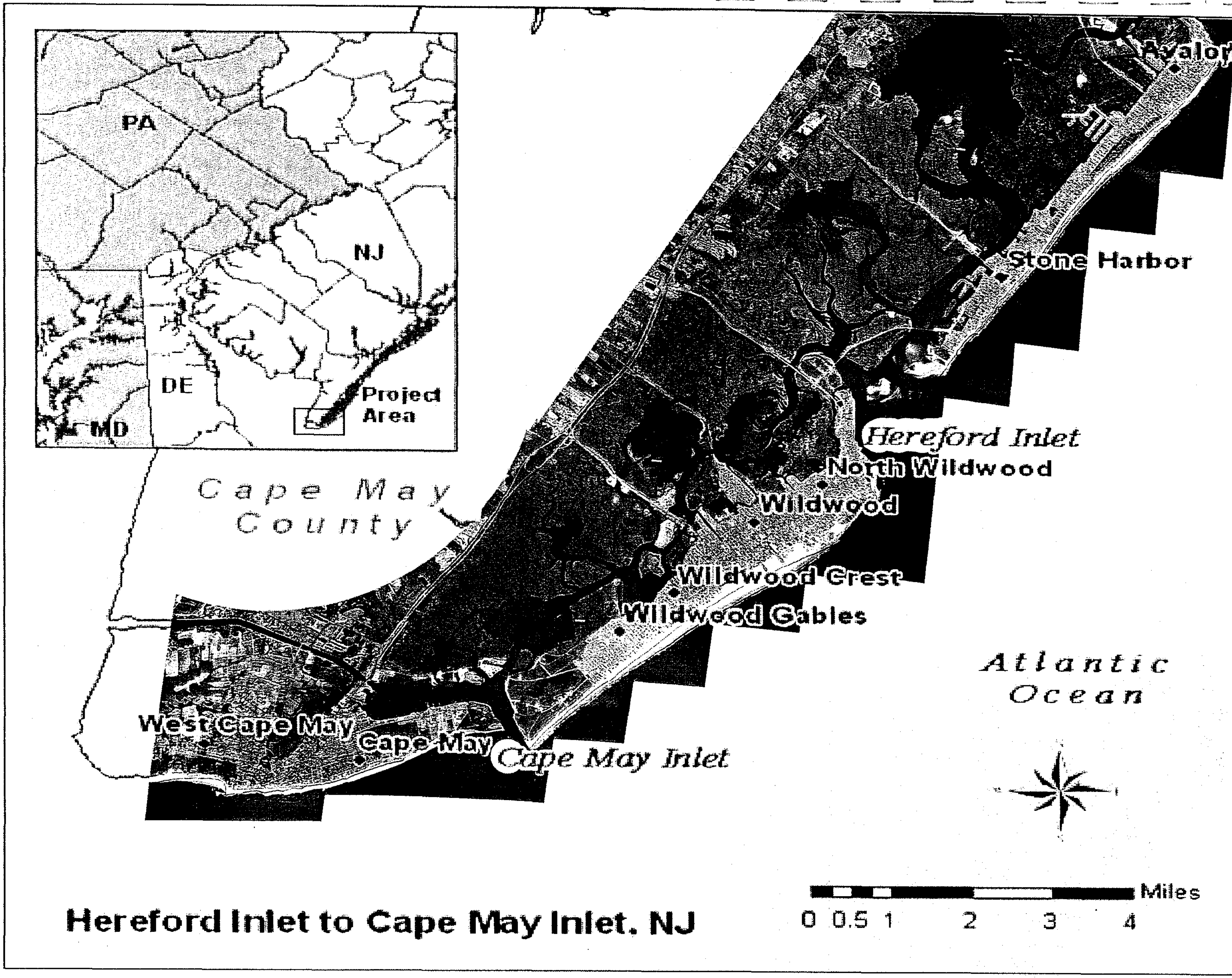

Figure 1. Project area - Hereford Inlet to Cape May Inlet, Cape May County, New Jersey

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May Inlet. In addition, personal communications were held with personnel from the CMNWR, New Jersey Division of Fish and Wildlife (NJDFW); New Jersey Bureau of Shellfisheries; New Jersey Bureau of Marine Fisheries; and the National Marine Fisheries Service (NMFS). Representatives of the Corps, the NJDEP, and the Service conducted a site visit of the project area on October 30, 2007. The discussion during the site visit concluded with support to move forward the necessary steps to reconfigure the North Wildwood beach to withstand potential storm damage. The interagency study team determined that beach enhancements such as the creation of gently sloping foredunes within project area would benefit piping plover (*Charadrius melodus*) and other beach nesting birds.

IV. BEACH COMMUNITIES

A. AVIAN AND OTHER WILDLIFE RESOURCES

1. Shorebirds and Colonial Nesting Waterbirds

Migratory shorebirds are a Federal trust resource responsibility of the Service. Wetland areas in the vicinity of the five-mile-long barrier island provide high quality habitats for a variety of migratory shorebirds. Shorebirds that use beach areas and associated estuarine wetlands in the vicinity of the proposed project area include the federally listed (threatened) piping plover and Federal candidate species red knot (*Calidris canutus rufa*), American oystercatcher (*Haematopus palliatus*) (currently proposed as a State species of special concern), short-billed dowitcher (*Limnodromus griseus*), black-bellied plover (*Pluvialis squatarola*), semipalmated plover (*Charadrius semipalmatus*), killdeer (*C. vociferous*), ruddy turnstone (*Arenaria interpres*), dunlin (*Calidris alpina*), sanderling (*C. alba*), least sandpiper (*C. minutilla*), pectoral sandpiper (*C. melanotos*), semipalmated sandpiper (*C. pusilla*), stilt sandpiper (*C. himantopus*), western sandpiper (*C. mauri*), spotted sandpiper (*Actitis macularius*), willet (*Tringa semipalmatus*), and greater yellowlegs (*T. melanoleuca*). During the 2007 nesting season, Service biologists observed piping plovers foraging within the intertidal zone of the project area (Egger,USFWS, pers. comm. 2007).

The colonial nesting waterbirds present within the project area include the State-listed (endangered) least tern (*Sterna antillarum*) and black skimmer (*Rynchops niger*); State-listed (threatened) little blue heron (*Egretta caerulea*) and yellow-crowned night heron (*Nyctanassa violacea*); State species of special concern common tern (*Sterna hirundo*), tricolored heron (*Egretta tricolor*), great blue heron (*Ardea herodias*), and breeding population threatened black-crowned night heron (*Nycticorax nycticorax*). Other colonial species include double-crested cormorant (*Phalacrocorax auritus*), great egret (*Ardea albus*), snowy egret (*Egretta thula*), great black-backed gull (*Larus marinus*), herring gull (*L. argentatus*), laughing gull (*L. atricilla*), ring-billed gull (*L. delawarensis*), glossy ibis (*Plegadis falcinellus*), Forster's tern (*Sterna forsteri*), gull-billed tern (*S. nilotica*), and royal tern (*S. maxima*).

A list of colonial nesting birds and shorebirds prepared by the NJAS for the Hereford Inlet to Cape May Inlet project area is provided in Appendix B.

2. Waterfowl

Migratory waterfowl are also a Federal trust resource responsibility of the Service and are protected under the Migratory Bird Treaty Act of 1918 (MBTA) (40 Stat. 755; 16 U.S.C. 703-712), as amended. The project area is within the Atlantic Coast Joint Venture's New Jersey Waterfowl Focus Area (South Coast Atlantic Focus Area) under the North America Waterfowl Management Plan. Areas adjacent to the project area, including CMNWR are important resting and feeding areas for migratory waterfowl on the Atlantic flyway and provide habitat for Atlantic brant (*Branta bernicla*), Canada goose (*B. canadensis*), American black duck (*Anas rubripes*), northern pintail (*A. acuta*), blue-winged teal (*A. discors*), green-winged teal (*A. crecca*), mallard (*A. platyrhynchos*), gadwall (*A. strepera*), American wigeon (*A. americana*), Northern shoveler (*A. clypeata*), common goldeneye (*Bucephala clangula*), bufflehead (*B. albeola*), oldsquaw (*Clangula hyemalis*), canvasback (*Aythya valisineria*), greater scaup (*A. marila*), wood duck (*Aix sponsa*), hooded merganser (*Lophodytes cucullatus*), red-breasted merganser (*Mergus serrator*), and tundra swan (*Cygnus columbianus*).

3. Raptors

Raptors that occur in the project area include the State-listed (endangered) peregrine falcon (*Falco peregrinus*); State-listed (endangered) short-eared owl (*Asio flammeus*); State-listed (threatened) osprey (*Pandion haliaetus*), barred owl (*Strix varia*), Cooper's hawk (*Accipiter cooperii*), and red-shouldered hawk (*Buteo lineatus*). The osprey feeds primarily on fish in the back bays and inlets of the project area. The red-shouldered hawk and Cooper's hawk migrate over the study area in the spring and fall; however, these transient visitors rarely stay within the area for any significant length of time.

4. Other Wildlife

The five-mile-long barrier island area also supports numerous other wildlife species. Avifauna include the boat-tailed grackle (*Quiscalus major*), sharp-tailed sparrow (*Ammodramus caudacutus*), seaside sparrow (*A. maritimus*), eastern kingbird (*Tyrannus tyrannus*), tree swallow (*Tachycineta bicolor*), northern bobwhite (*Colinus virginianus*), and red-winged blackbird (*Agelaius phoeniceus*).

The northern diamondback terrapin (*Malaclemys terrapin terrapin*) is also known to inhabit marshes, tidal flats, and beaches in New Jersey estuaries. The terrapin has been subject to recent population declines due to entrapment in crab pots and a reduction in nesting habitat. Northern diamondback terrapins occur primarily in emergent wetlands and shallow water habitat and feed on crustaceans, mollusks, and other invertebrates (Palmer and Cordes 1988). During the winter, terrapins burrow into the mud of tidal creeks and ponds to hibernate either individually or in groups. Terrapins mate in the spring and lay their eggs in sandy substrates above the levels of high tides. Predation of eggs and hatchlings represent the major source of natural mortality in most terrapin populations. Eggs and juveniles are preyed upon by raccoons (*Procyon lotor*), crows (*Corvus* sp.), and gulls (*Larus* sp.) (Palmer and Cordes 1988).

Mammals known to occur within the vicinity of project area include raccoon, gray squirrel (*Sciurus carolinensis*), striped skunk (*Mephitis mephitis*), eastern cottontail (*Sylvilagus *floridanus*), Virginia opossum (*Didelphis virginiana*), and white-tailed deer (*Odocoileus virginianus*).

B. FEDERALLY LISTED AND CANDIDATE SPECIES UNDER SERVICE JURISDICTION

1. Piping Plover

The piping plover was listed as a protected species under the ESA in 1986. Along the Atlantic Coast the species is federally designated as threatened. The piping plover has been State-listed as endangered in New Jersey since 1984 (U.S. Fish and Wildlife Service 1996a).

The Atlantic Coast population breeds on coastal beaches from Newfoundland and southeastern Quebec to North Carolina and primarily overwinters from North Carolina to Florida. In New Jersey, piping plovers nest on the coastline of Monmouth, Ocean, Atlantic, and Cape May counties (U.S. Fish and Wildlife Service 2005). Detailed background information regarding piping plover, including species biology, life history, recovery criteria and actions, and management issues are provided in the Service's Programmatic Biological Opinion (PBO) on the effects of beach nourishment, renourishment, stabilization, and restoration projects funded, permitted, or conducted by the Corps along the Atlantic Coast of New Jersey on piping plover and seabeach amaranth (U.S. Fish and Wildlife Service 2005). A summary is provided below.

a. Species Description

Piping plovers are small, sandy-colored territorial shorebirds, approximately 7 inches in length (Palmer 1967; U.S. Fish and Wildlife Service 1985; 1996a). The bird's name was derived from its call, which resembles plaintive bell-like whistles that are often heard before the birds are seen. Breeding adults have orange legs, a black ring around the base of the neck and across the forehead, and an orange bill with a black tip. The female's neck band is often incomplete and is usually thinner than the male's neck band. In winter, the black band completely disappears, and adults and juveniles look similar, with pale yellow legs and a solid black bill. Chicks have speckled gray, buff, and brown down feathers, black beaks, orange legs, and a white collar around the neck.

b. Life History

Piping plovers inhabit New Jersey beaches between March and August, arriving at their breeding grounds in late March through early April (U.S. Fish and Wildlife Service 2005). After choosing mates and establishing territories, piping plovers scrape depressions in the sand to form a nest and lay their eggs (Bent 1929; Burger 1987; Cairns 1982; Patterson 1988; Flemming *et al.* 1990; MacIvor 1990; Strauss 1990). The birds nest above the high tide line, usually on sandy ocean beaches and barrier islands, but also on gently sloping foredunes, blowout areas behind primary dunes, washover areas cut into or between dunes, the ends of sandspits, and deposits of suitable dredged or pumped sand (U.S. Fish and Wildlife Service 1996a; 2005). The nests are frequently lined with shell fragments and often located near small clumps of vegetation such as beachgrass (*Ammophila* spp.) (Patterson 1988; Flemming *et al.* 1990; MacIvor 1990). Plovers will lay their eggs (up to 4) from mid-April through late June or early July and may renest more than once during the season if earlier clutches are lost (Wilcox 1959; Cairns 1977; MacIvor 1990). The eggs are well camouflaged and blend extremely well with their surroundings. Both the male and female will incubate the nest for about 30 days. After the eggs hatch, the chicks may be present on the beaches with their parents until the end of August when they are ready to fly (Patterson 1988; Goldin 1990; MacIvor 1990; Howard *et al.* 1993).

Piping plover adults and chicks feed on marine macroinvertebrates such as worms, fly larvae, beetles, crustaceans, and mollusks (Bent 1929; Cairns 1977; Nicholls 1989). Feeding areas include the intertidal zone of ocean beaches, ocean washover areas, mudflats, sandflats, wrack lines (organic ocean material left by high tide), and the shorelines of coastal ponds, lagoons, and salt marshes (Gibbs 1986; Coutu *et al.* 1990; Hoopes *et al.* 1992; Loegering 1992; Goldin 1993; Elias-Gerken 1994).

c. Population Status

The Atlantic Coast population increased from 957 pairs in 1989 to 1,676 pairs in 2003, but the increase has been unevenly distributed. Between 1989 and 2003, the New England subpopulation increased by 481 pairs, while the New York-New Jersey subpopulation gained only 211 pairs. The Southern and Atlantic Canada subpopulations gained only 4 pairs and 23 pairs, respectively (U.S. Fish and Wildlife Service 2004). While rapid overall population growth between 1991 and 1995, driven largely by the New England subpopulation, was encouraging, growth in the later half of the decade was more modest, with an essentially flat population trend from 1997 to 2000 (U.S. Fish and Wildlife Service 2005). The New York-New Jersey subpopulation experienced a net decrease of 45 pairs between 1996 and 1998, followed by several years of steady gains accounting for a net increase of 192 nesting pairs (greater than 50% increase) over a 6-year period (1998-2003) (U.S. Fish and Wildlife Service 2004).

Productivity needed to maintain a stationary population for Atlantic Coast piping plovers is estimated at 1.24 fledged chicks per pair (Melvin and Gibbs 1994). Small populations may be highly vulnerable to extinction due to variability in productivity and survival rates; therefore, the average productivity for a stationary population may be insufficient to assure a high probability of species survival. To compensate for small populations, the recovery plan establishes productivity goals needed to assure a secure 2,000-pair population at 1.5 chicks per pair in each of the four recovery units, based on data from at least 90% of each recovery unit's population.

Table 1 provides a summary of piping plover productivity from 1994 to 2003. The 10-year (1994-2003) average productivity for piping plovers in the U.S. Atlantic Coast portion of their range is 1.32 chicks per pair. Peak productivity in the U.S. was observed in 1994 and 1999 when average productivity approached or exceeded the recovery plan productivity goal of 1.5 chicks per pair. However, productivity in 1997, 2000, and 2003 was considerably lower, 1.16, 1.17, and 1.24 chicks per pair, respectively, and well below or just reaching the 1.24 chicks per pair required to maintain a stationary population (U.S. Fish and Wildlife Service 2004). While weather events were major contributors to egg and chick losses in these years (U.S. Fish and Wildlife Service 1998), such periodic natural events are inevitable, and they underscore the need to reduce the species vulnerability by increasing the breeding population and protecting the species against human caused factors that impinge on productivity.

Mirroring the regional population trends, productivity rates have been unevenly distributed, with other recovery units lagging substantially behind New England. Average productivity from 1994 to 2003 in the New York-New Jersey Recovery Unit was 1.19 chicks per pair. In the New York-New Jersey Recovery Unit, over the past 10 years the 1.24 chicks per pair productivity needed to maintain a stationary population has been attained only four times, in 1994, 1999, 2001, and 2002. Nearly all pairs in the recovery unit for which productivity is unknown nested in New York (U.S. Fish and Wildlife Service 2004).

Table 1. Summary of Piping Plover Productivity Estimates for the U.S. Atlantic Coast, 1994-2003

	AVERAGE YOUNG FLEDGED PER PAIR										
STATE/REGION	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**1994 to 2003 AVG**
Maine	2.00	2.38	1.63	1.98	1.47	1.63	1.60	1.98	1.40	1.28	1.69
New Hampshire	-	-	-	0.60	2.40	2.67	2.33	2.14	0.14	1.00	1.58
Massachusetts	1.80	1.62	1.35	1.33	1.50	1.60	1.09	1.49	1.14	1.26	1.40
Rhode Island	2.00	1.68	1.56	1.34	1.13	1.79	1.20	1.50	1.95	1.03	1.48
Connecticut	1.47	1.35	1.31	1.69	1.05	1.45	1.86	1.22	1.87	1.30.	1.45
NEW ENGLAND	1.81	1.67	1.40	1.39	1.46	1.62	1.18	1.53	1.26	1.24	1.44
New York	1.34	0.97	1.14	1.36	1.09	1.35	1.11	1.27	1.62	1.15	1.26
New Jersey	1.16	0.98	1.00	0.39	1.09	1.34	1.40	1.29	1.17	0.92	1.07
NY-NJ REGION	1.25	0.97	1.07	1.02	1.09	1.35	1.19	1.28	1.49	1.07	1.19
Delaware	2.50	2.00	0.50	1.00	0.83	1.50	1.67	1.50	1.17	2.33	1.46
Maryland	2.41	1.73	1.49	1.02	1.30	1.09	0.80	0.92	1.85	1.56	1.36
Virginia	1.65	1.00	1.54	0.71	1.01	1.21	1.42	1.52	1.19	1.90	1.33
North Carolina	0.36	0.45	0.86	0.23	0.61	0.48	0.54	0.50	0.17	0.46	0.46
SOUTHERN REGION	1.37	1.06	1.34	0.68	0.99	1.04	1.09	1.22	1.27	1.63	1.17
U.S. TOTAL	1.56	1.35	1.30	1.16	1.27	1.45	1.17	1.40	1.34	1.24	1.32
EASTERN CANADA	1.25	1.69	1.72	2.10	1.84	1.74	1.47	1.77	1.18	1.62	1.62

d. Continuing Threats

Continuing threats to Atlantic Coast piping plovers in the breeding portion of their range include habitat loss and degradation, disturbance by humans and pets, increased predation, oil spills, and herbivory. These detailed descriptions of threats are provided in the revised recovery plan (U.S. Fish and Wildlife Service 1996a) and PBO (U.S. Fish and Wildlife Service 2005).

Habitat loss results from development as well as from beach stabilization, beach nourishment, and other physical alterations to the beach ecosystem (U.S. Fish and Wildlife Service 1996a). Commercial, residential, and recreational development reduce the amount of suitable habitat available for nesting and feeding. Structures such as seawalls, jetties, groins, and bulkheads promote stabilization of the beach and rapidly promote natural succession, decreasing the sandy, sparsely vegetated habitat required for nesting. Predation on chicks and eggs is intensified by development because predators such as foxes (*Vulpes vulpes*), rats (*Rattus norvegicus*), raccoons (*Procyon lotor*); domestic dogs (*Canis familiaris*), domestic cats (*Felis silvestris*) and gulls (*Larus* spp.), thrive in developed areas and are attracted to beaches by food scraps and trash (Riepe 1989; Jenkins and Nichols 1994; Elias-Gerken 1994; Jenkins and Niles 1999; U.S. Fish and Wildlife Service 1996a; Canale 1997).

Human disturbance of nesting birds includes foot traffic, sunbathing, kite flying, pets, fireworks displays, beach raking, construction, and vehicle use. These disturbances can result in crushing of eggs, failure of eggs to hatch, and death of chicks (Wilcox 1959; Tull 1984; Burger 1987; Patterson *et al.* 1991). Excessive disturbance may cause the parents to desert the nest, exposing eggs or chicks to the summer sun and predators (Welty 1982; Bergstrom 1991). Piping plovers are vulnerable to domestic animals before and after the eggs hatch. Adult plovers will stagger and act as if they have a broken wing to distract predators from their nest or chicks. Flightless chicks are no match for an agile cat or dog that instinctively sees a chick as something to hunt or chase. Camouflaged chicks can also become trapped in tire ruts and be run over by recreational or municipal vehicles.

While removal of human-created trash on the beach is desirable to reduce predation threats, the indiscriminate nature of mechanized beach-cleaning adversely affects piping plovers and their habitat. In addition to danger of directly crushing piping plover nests and chicks and the prolonged disturbance from the machine's noise, this method of beach-cleaning removes the birds' natural wrack line feeding habitat (Eddings and Melvin 1991; Howard *et al.* 1993), and shell fragments, a preferred feature of nesting habitat.

Intensive management, including municipal beach management plans (BMP) to protect piping plovers from disturbance by beach recreationists, pets, and beach-cleaning operations have been implemented at many New York-New Jersey plover nesting sites in recent years. The Service and NJDFW are currently working with several coastal municipalities to develop and implement BMPs. Piping plover protection in this recovery unit is highly dependent on the efforts of State and local government agencies, conservation organizations, and private landowners.

2. Red knot

The Service has designated the red knot as a candidate for ESA protection. The *rufa* subspecies of red knot winters near the tip of South America and begins its long journey north in mid-February. By the time birds arrive, they have depleted their fat reserves and must refuel before continuing their migration to their Arctic breeding grounds. The birds rely heavily on the eggs of horseshoe crabs (*Limulus polyphemus*) to replenish their energy. At the end of May or the beginning of June, the birds depart the mid-Atlantic coast on the last leg of their journey, arriving in the Arctic in early mid-June.

a. Species Description

The red knot is a medium-sized shorebird about 9 to 11 inches (in) (23 to 28 centimeters) in length with a proportionately small head, small eyes, short neck, short tibia, and stout tarsus. The black bill tapers steadily from a relatively thick base to a relatively fine tip; bill length is not much longer than head length. Legs are typically dark gray to black, but sometimes greenish in juveniles or older birds in non-breeding plumage (Harrington 2001). During the breeding season, the plumage of the red knot is distinctive and easily recognizable. The face, breast, and upper belly are a rich rufous-red, while the lower belly and under tail-covert region are light-colored with dark flecks. Upperparts are dark brown with white and rufous feather edges; outer primary feathers are dark brown to black (Davis 1983; Harrington 2001). Females are similar to males, though rufous colors are typically less intense, with more buff or light gray on dorsal parts (Niles *et al.* 2005). Non-breeding plumage is dusky gray above and whitish below. Juveniles resemble non-breeding adults, but the feathers of the scapulars and wing coverts are edged with white and have narrow, dark subterminal bands, giving the upperparts a scalloped appearance (Davis 1983). Body mass varies seasonally, with lowest mean mass during early winter (125 grams (gm)) and highest mean values during spring (205 gm) and fall (172 gm) migration (Harrington 2001; New Jersey Department of Environmental Protection 2007).

b. Life History

Each year red knots travel approximately 30,000 kilometers (km) between wintering grounds in southern South America and breeding areas within the Canadian Arctic. Although a small population is believed to overwinter in northern Brazil, most red knots winter in southern South America along the coast of Patagonia, from approximately San Antonio Oeste, Argentina, southward to the eastern coast of Tierra del Fuego in Chile and Argentina (Harrington 2001; Baker *et al.* 2004; Morrison *et al.* 2004). In austral South American wintering areas, red knots are found principally in intertidal marine habitats, especially near coastal inlets, estuaries, and bays, or along *restinga* formations (an intertidal shelf of densely-packed dirt blown by strong, offshore winds) (Harrington 2001).

During migration, red knots undertake long flights that may span thousands of kilometers without stopping. At some stages of migration, very high proportions of entire populations may use a single migration staging site to prepare for long flights. Migrating red knots are principally found in marine and estuarine habitats (Harrington 2001). During the spring migration, red knots stop over for a period of approximately two to three weeks along the Atlantic coast of the United

States to rebuild energy reserves needed to complete the journey to the Arctic and arrive on the breeding grounds in good condition (Harrington 1996; Baker *et al.* 2004). Historically, the Delaware Bay region of Delaware and New Jersey has supported the largest known spring migration concentration of red knots and is the last major stopover area used by red knots migrating to Arctic breeding areas (Harrington 1996). In the southeastern and mid-Atlantic United States, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks.

In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans (Harrington 2001). An exception occurs each May when the majority of red knots departing South America arrive within the Delaware Bay of Delaware and New Jersey to feed on eggs of horseshoe crabs (Wander and Dunne 1982; Harrington 1996, 2001; Niles *et al.* 2005).

In addition to the large flocks of red knots found in the Delaware Bay, red knots are found in lesser numbers elsewhere along the Atlantic Coast, including the project area during the spring migration, which may be related to these other areas having lesser numbers of breeding horseshoe crabs (Niles *et al.* 2005).

On the breeding grounds, the red knot's diet consists mostly of terrestrial invertebrates, though early in the season, before insects and other macroinvertebrates are active and accessible, red knots will eat grass shoots, seeds, and other vegetable matter (Harrington 2001).

c. Population Status

The range of *C. c. rufa* during migration extends along the Atlantic and Gulf of Mexico coasts of North, Central, and South America, from the Canadian arctic to the southernmost extent of South America. With the exception of a few key wintering areas in South America and the spring migratory stopover site in Delaware Bay, little comparative information is available regarding the historical versus current distribution of the subspecies throughout its range.

Assessing the population size of wide-ranging migratory species such as the red knot is difficult. Counts on the expansive Arctic breeding areas are not feasible. Morrisson *et al.* (2001) compiled published and unpublished counts of shorebirds by season and region to generate a coarse flyway population estimate for North America breeding shorebirds. Populations were determined by summing maximum counts at various sites within a region. Using this method the red knot population was estimated at approximated 170,000 birds for the period of the late 1980s to early 1990s. However, the authors included the central flyway population of approximately 20,000 red knots (Morrison *et al.* 2001). While the origins of the central flyway red knots are uncertain, these birds are generally thought to be *C. c. roselaari* (Harrington 2001; U.S. Fish and Wildlife Service 2003; Niles *et al.* 2005). Morrison *et al.* 2001 estimated the eastern North America flyway population of *C. c. rufa* for the period of the late 1980s to early 1990s at approximately 150,000 birds, and noted that based on information through 1999, the population could be substantially lower.

While the peak count of red knots observed at Delaware Bay is often described as the population estimate for the Bay, raw data from aerial surveys are not useful in estimating total populations of shorebirds in the Bay due to unknown turnover and detection rates (U.S. Fish and Wildlife

Service 2003). The shorebird survey methods used in the Delaware Bay can, however, be used to evaluate trends of migrating red knots. The aerial surveys provide comparative annual counts of numbers of red knots observed once per week during a 5-week survey period in May to early June (Clark *et al.* 1993). Peak aerial survey counts of migrating red knots on the Delaware Bay between 1982 and 1998 varied considerably, with highest recorded peaks of 95,360 and 94,460 birds occurring in 1982 and 1989, respectively, and lowest peak counts of 16,859 and 19,445 birds occurring in 1983 and 1996.

During the period of 1982 to 1998, aerial survey counts were somewhat cyclic where high peak years were generally followed by 1 to 2 years of declining peak counts followed by several years of rebounding peak counts (Dunne *et al.* 1983; Clark *et al.* 1993; Niles *et al.* 2005). However, from 1999-2004 red knot numbers in the Delaware Bay declined, reaching an all-time low peak count of 13,315 birds in 2004 (Niles *et al.* 2005). The 2005 peak count increased to 15,345; however, the peak count for 2006 dropped to 13, 445 (Niles *et al.* 2005). Thus, although 2005 showed an increase, there has been an overall decline in the counts at Delaware Bay in recent years. Insufficient information is available to determine trends of migrating *C. c. rufa* in other areas of the Atlantic coastal United States.

Although many counts of spring migrant red knots have involved the Delaware Bay, as noted above, this provides an index of the status of the species using the Bay but does not necessarily represent the total population of spring migrants along the eastern seaboard. In 2005, for example, the peak aerial count for Delaware Bay was 15,345 red knots (Niles *et al.* 2005). However, in May 2005, an aerial survey for red knots along Virginia's barrier islands recorded an estimated 9,150 knots (Watts and Truitt 2005), and a peak count of approximately 20,000 red knots was reported on the same survey date from ground counts of an Atlantic coastal site in New Jersey, where most Delaware Bay red knots are believed to congregate at a nighttime roost (Sitters 2005). Thus, more red knots were accounted for during the spring 2005 migration than are reflected by the Delaware Bay peak aerial count for that year (Niles *et al.* 2005).

As noted above, the peak counts of red knots at Delaware Bay declined each year from 1999 to 2004. In 2004, following 5 years of reduced horseshoe crab harvest in the bay, the availability of horseshoe crab eggs on principal shorebird foraging beaches increased over previous years. In 2005 the peak count of migrant red knots in the Delaware Bay was 15,345, an increase over the 2004 peak of 13,315 and the first increase in the annual count for Delaware Bay since 1999 (Niles *et al.* 2005). Further, although red knots departed from the Delaware Bay in 2005 about 5 days later on average than in previous years, the majority of red knots reached satisfactory body weights (threshold departure mass) prior to departure (Minton and Taylor 2005). The 2006 surveys by the Canadian Wildlife Service of the principal South American wintering areas indicate that although the counts are at historic lows, there was only a minimal difference in the number observed in 2006 as compared to 2005. Taken together, this information from Delaware Bay and at key wintering areas suggests the possibility that the declining trend may have halted. While these numbers indicate that no further decline has occurred, numbers of red knots remain low and there has been no indication of recovery. The change in horseshoe crab management and the upturn in availability of eggs in 2004, and the finding that the majority of red knots reached satisfactory body weights prior to departure from Delaware Bay, also suggests that the conditions have changed in comparison to the 1997 to 2002 period used for the model of annual survival.

3. Seabeach Amaranth

In 1993, seabeach amaranth was added to the List of Endangered and Threatened Wildlife and Plants as a federally listed (threatened) species. The listing was based upon the elimination of seabeach amaranth from two-thirds of its historic range, and continuing threats to the 55 populations that remained at the time (U.S. Fish and Wildlife Service 1993). Since its rediscovery in New Jersey in 2000, one seabeach amaranth plant was found at the USCG LORAN site in 2003 and six plants in 2004.

a. Species Description

Seabeach amaranth is an annual species and a member of the Amaranth family (Amaranthaceae). Upon germination, the plant initially forms a small, unbranched sprig, but soon begins to branch profusely, forming a low-growing mat. Seabeach amaranth's fleshy stems are prostrate at the base, erect or somewhat reclining at the tips, and pink, red, or reddish in color. The leaves of seabeach amaranth are small, rounded, and fleshy, spinach-green in color, with a characteristic notch at the rounded tip. Leaves are approximately 1.3 to 2.5 cm in diameter and clustered towards the tip of the stem (Weakley and Bucher 1992). The foliage of seabeach amaranth turns deep red in the fall (Snyder 1996). Plants often grow to 30 cm in diameter consisting of 5 to 20 branches, but occasionally reach 90 cm in diameter, with 100 or more branches. Flowers and fruits are inconspicuous, borne in clusters along the stems. Seeds are 2.5 millimeters (mm) in diameter, dark reddish-brown, and glossy, borne in low-density, fleshy, indehiscent utricles (bladder-like seed capsules or fruits), 4 to 6 mm long (Weakley and Bucher 1992). The seed does not fill the utricle, leaving an air-filled space (U.S. Fish and Wildlife Service 1996b).

b. Life History

Individual plants live only one season, with only a single opportunity to produce seed. The species over-winters entirely as seeds. Germination of seedlings begins in April and continues at least through July. Reproductive maturity is determined by size rather than age, and flowering begins as soon as plants have reached sufficient size. Even very small plants can flower under certain conditions. Flowering typically commences in July and continues until the death of the plant. Seed production begins in July or August and usually peaks in September. Seed production likewise continues until the plant dies. Senescence and death occur in late fall or early winter (U.S. Fish and Wildlife Service 1996b).

Seabeach amaranth seems capable of essentially indeterminate growth (Weakley and Bucher 1992). However, predation and weather events, including rainfall, hurricanes, and temperature extremes, have significant effects on the length of the species reproductive season. As a result of one or more of these influences, the flowering and fruiting period can be terminated as early as June or July (U.S. Fish and Wildlife Service 1993).

Seabeach amaranth is native to Atlantic coast barrier island beaches from Massachusetts to South Carolina. The species' primary habitat consists of overwash flats at accreting ends of barrier islands, and lower foredunes and upper strands of non-eroding beaches. This species occasionally establishes small, temporary, and casual populations in secondary habitats including sound side beaches, blowouts in foredunes, and sand or shell dredge spoil or beach nourishment material (Weakley and Bucher 1992).

Seabeach amaranth occupies a narrow beach zone that lies at elevations from 0.2 to 1.5 m above mean high tide, the lowest elevations at which vascular plants regularly occur. Seaward, the plant grows only above the high tide line, as it is intolerant of even occasional flooding during the growing season. The species is, therefore, dependent on a terrestrial, upper beach habitat that is not flooded during the growing season. This zone is absent on beaches that are experiencing high rates of erosion. Seabeach amaranth is never found on beaches where the foredune is scarped by undermining water at high or storm tides (Weakley and Bucher 1992).

Seabeach amaranth usually occurs on a pure silica sand substrate, occasionally containing shell fragments. The habitat of seabeach amaranth is sparsely vegetated with annual herbs and, less commonly, perennial herbs (mostly grasses) and scattered shrubs. The number and type of seabeach amaranth's vegetative associates have been found to vary with specific habitat type (*i.e.*, overwash flat, accreting barrier island end, or lower foredune) (Chicone Undated). The most constant associates of seabeach amaranth, with which the species almost always co-occurs, are sea rocket (*Cakile edentula*) and seabeach spurge (*Chamaesyce polygonifolia*) (Weakley and Bucher 1992). Known vegetative associates of seabeach amaranth in New Jersey are given in Table 2.

Seabeach amaranth does not occur on well-vegetated sites, particularly where perennials have become strongly established (Weakley and Bucher 1992). Pauley *et al.* (1999) documented a negative correlation between seabeach amaranth and several dominant foredune species. A particularly strong negative association has been reported between seabeach amaranth and beach grasses U.S. Fish and Wildlife Service 1996b). However, a positive correlation has been observed between seabeach amaranth and sea rocket, an annual (Hancock 1995).

Table 2. Known Vegetative Associates of Seabeach Amaranth.

New Jersey (U.S. Fish and Wildlife Service 2002)	sea rocket (*Cakile edentula*) seabeach spurge (*Chamaesyce polygonifolia*) Russian thistle (*Salsola kali*) American beachgrass (*Ammophila breviligulata*) Beach clotbur (*Xanthium echinatum*) seaside goldenrod (*Solidago sempervirens*) goosefoot (*Chenopodium* spp.) crab grass (*Digitaria sanguinalis*) sand grass (*Triplasis purpurea*) seabeach sandwort (*Honkenya peploides*) seabeach orach (*Atriplex cristata*) wild bean (*Strophostyles* spp.) seabeach knotweed (*Polygonum glaucum*)

c. Population Status

Seabeach amaranth is limited by its habitat requirements to a very narrow strip of barrier islands and mainland oceanfront beach strands along the Atlantic coast. The original range of this species extended from Cape Cod in Massachusetts to central South Carolina, a stretch of coast approximately 1,600 km (1,000 miles) long. This stretch correlates with a geographic range of low tidal amplitude. Tidal amplitude and the relative importance of tidal versus wave energy in shaping coastal morphology are thought to limit the geographic range of seabeach amaranth, rather than availability of sandy beach substrates or sea water temperatures. The range of seabeach amaranth is characterized by islands developed by high wave energy, low tidal energy, frequent overwash, and frequent breaching by hurricanes with resulting formation of new inlets (Weakley and Bucher 1992).

Seabeach amaranth is considered globally rare (G2) by the New Jersey Natural Heritage Program (New Jersey Natural Heritage Program 2007). The current known range of naturally occurring seabeach amaranth is Water Mill Beach on Long Island, New York to Debidue Beach in South Carolina (Young 2001; Hamilton 2000). Historic records of seabeach amaranth are known from nine States. Largely due to human activities, the species was eliminated from seven of these States by the 1980s, remaining only in North and South Carolina. Seabeach amaranth is still considered extirpated from two States: Massachusetts and Rhode Island. Since 1990, the species has re-occupied five States from which it had previously been extirpated. Table 3 gives the dates of rediscovery and the last previously known occurrence of the plant in each State.

To date, theories of seabeach amaranth's return to the northern part of its range remain speculative. Sites in these five States may have been re-colonized by long-distance transport of seeds by wind or currents. At some sites, seeds may have been long buried in sediments used in beach nourishment projects. This hypothesis requires that seeds can remain viable after prolonged off-shore burial, an unknown factor.

Table 3. Re-colonization Dates of Seabeach Amaranth in Five States.

State	Date Rediscovered	Date of Last Previously Known Occurrence
New York	July 1990	1950 (Van Schoik and Antenen 1993)
New Jersey	July 2000	1913 (U.S. Fish and Wildlife Service 1996b)
Delaware	August 2000	1875 (McAvoy 2000)
Maryland	August 1998	1967 (Ramsey *et al.* 2000)
Virginia	September 2001	1973 (U.S. Fish and Wildlife Service 1996b)

d. Continuing Threats

The primary threats to seabeach amaranth are the adverse alterations of habitat caused by beach erosion and shoreline stabilization. Although seabeach amaranth does not persist on eroding beaches, erosion is not a threat to the continued existence of the species under natural conditions.

Erosion in some areas is balanced with habitat formation elsewhere, such as accreting inlets and overwash areas, resulting in an equilibrium that allows the plant to survive by moving around in the landscape. In the geologic past, seabeach amaranth has persisted through even relatively rapid episodes of sea level rise and barrier island retreat. A natural barrier island landscape, even a retreating one, contains localized accreting areas, especially in the vicinity of inlets (U.S. Fish and Wildlife Service 1996b).

Even minor structures such as dune stabilization by planting vegetation and vertical sand accretion caused by sand fences appear to be detrimental to seabeach amaranth and contradictory to its life history strategy. Seabeach amaranth only very rarely occurs when sand fences and vegetative stabilization have taken place and, in these situations, is present only as rare, scattered individuals or short-lived populations (Weakley and Bucher 1992).

Beach nourishment can have positive site-specific impacts on seabeach amaranth. Seabeach amaranth has colonized several nourished beaches, and has thrived in some sites through subsequent re-applications of fill material (U.S. Fish and Wildlife Service 1993; 2002). However, on the landscape level, beach nourishment is similar to other beach stabilization efforts in that it stabilizes the shoreline and curtails the natural geophysical processes of barrier islands. These effects are detrimental to the range-wide persistence of the species. In addition, beach nourishment may cause site-specific adverse effects by crushing or burying seeds or plants deeper, or by altering the beach profile or upper beach micro-habitats in ways not conducive to seabeach amaranth colonization or survival.

Intensive recreational use of beaches such as off-road vehicle (ORV) can threaten seabeach amaranth populations, both through direct damage and mortality of plants, and by impacting habitat. Light pedestrian traffic, even during the growing season, usually has little effect on seabeach amaranth (U.S. Fish and Wildlife Service 1993). Substantive impacts generally occur only on narrow beaches, or beaches which receive heavy recreational use. ORV uses on the beach during the growing season can have detrimental effects on the species, as the fleshy stems of this plant are brittle and easily broken. Plants generally do not survive even a single pass by a truck tire (Weakley and Bucher 1992).

Beach grooming may also have contributed to the previous extirpation of seabeach amaranth from that part of its range. Motorized beach rakes, which remove trash and vegetation from bathing beaches, do not allow seabeach amaranth to colonize long stretches of beach (U.S. Fish and Wildlife Service 1996b). In New Jersey, plants were found along a nearly continuous length of beach, noticeably interrupted by stretches that are routinely raked. Intensive management, including BMPs to protect seabeach amaranth from disturbance by beach recreationists and beach-cleaning operations have been implemented at many New York-New Jersey piping plover and seabeach amaranth sites in recent years.

Predation by webworms (caterpillars of small moths) is another source of mortality and lowered fecundity and may decrease seed production by more than 50% (Weakley and Bucher 1992). Five species of webworms so far identified that feed on seabeach amaranth are all native species, their use of barrier islands has probably been altered by changes in the coastal plain landscape (*i.e.*, extensive agricultural use), the development of barrier islands, and the introduction of weedy plants that can also serve as host plants. All five webworms are "weedy" species, probably much more abundant now than they were in pre-Columbian times. For this reason, the level of predation that seabeach amaranth is experiencing is likely unnaturally high (U.S. Fish and Wildlife Service 1996b). Webworm herbivory is probably a contributing, rather than a leading factor in the decline of seabeach amaranth. However, in combination with extensive habitat alteration, severe herbivory could threaten the existence of the species (Weakley and Bucher 1992).

New threats to seabeach amaranth have been documented since the species was listed in 1993. These factors are lesser threats than habitat modification, but may increase the risk of extinction by compounding the effects of other, more severe threats.

Several additional herbivores of seabeach amaranth have been observed including deer, eastern cottontail, and migratory song birds (Van Schoik and Antenen 1993). There is also strong circumstantial evidence for seabeach amaranth herbivory by grasshopper (U.S. Fish and Wildlife Service 2002). In addition, a cluster of New Jersey plants appeared to have been damaged by a congregation of loafing gulls (*Larus* spp.), based upon feathers and droppings. As with webworms, the abundance of these newly documented predators on barrier islands is increased by human activities.

Asiatic sand sedge (*Carex kobomugi*) has been suggested as another potential threat to seabeach amaranth. This sedge is strongly rhizomatous and dune-forming (National Park Service and Maryland Natural Heritage Program 2000). Asiatic sand sedge was introduced to the east coast (New Jersey to Virginia) from east Asia in the 1930s for erosion control and as a sand stabilizer. Asiatic sand sedge may be detrimental to seabeach amaranth by direct competition and by reducing habitat suitability through sand stabilization and dune building.

C. FEDERALLY LISTED SPECIES UNDER NMFS JURISDICTION

Several species of federally listed (endangered and threatened) sea turtles including the Kemp's ridley sea turtle (*Lepidochelys kempii*), hawksbill sea turtle (*Eretmochelys imbricata*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), and green sea turtle (*Chelonia mydas*) may occur in waters throughout the study area. These turtles feed primarily on mollusks, crustaceans, sponges, and a variety of marine grasses and seaweeds. In addition, the leatherback sea turtle may occupy the coastal waters of New Jersey foraging for jellyfish. These sea turtles may be found in New Jersey waters from late spring to mid-fall. The NMFS must be contacted regarding potential impacts, resulting from the proposed project, on federally listed species under its jurisdiction. The NMFS may be contacted at 74 Magruder Road, Highlands, New Jersey 07732; (732) 872-3023.

D. STATE LISTED SPECIES

A variety of State-listed endangered and threatened species inhabit or have been known to occur in the coastal and estuarine ecosystem within the study area. The State-listed (endangered) black skimmer and least tern nest in colonies on sandy islands in the bays and on beaches near inlets within the project area.

1. Black Skimmer

The State-listed (endangered) black skimmer nests within the project area. Piping plovers often nest within or in close proximity to skimmer colonies and least tern colonies. As with least terns, seabeach amaranth would also benefit from the presence of black skimmer colonies since restrictions on public access during the nesting season provides protected areas where plants can become established.

Total black skimmer numbers within colonies in New Jersey for the 8-year period of 1999 to 2006 are shown in Table 4 (New Jersey Endangered and Nongame Species Program 2001, 2002, 2003). All black skimmer nesting sites in New Jersey during this 8-year period were located within the Corps Philadelphia District Program Area. In addition, during summer of 2007 a total of 1,627 black skimmer adults, 719 peak adults, and 709 fledges were recorded at Champagne Island, just north of the project area (Todd Pover, NJDFW, pers. comm. 2007). Black skimmer information for the 2007 nesting seasons is not yet available.

Table 4. Number of Black Skimmers at New Jersey Nesting Sites: 1999-2006.

SITE	1999	2000	2001	2002	2003	2004	2005	2006
Sedge	2							
East Point Island				2	6	2		
Pettit	2	2	2					
North Clam		4	8					
Barrel Island				79				
Island Beach State Park – Dike					89	48		
Mordecai Island					302	316	795	900
East Sedge Island	34				75	15		12
Hester Island					29	55		24
Holgate		250		130	425	275		
Marshelder Island	150	125	180	86			4	
Middle Sedge	2						46	38
Tow Island	250	70	18	60	13		2	
Egg Island		56		12				
Ocean City – North		25	1212	496				
Strathmere Natural Area	1613	1459		562	463		73	
Strathmere Bay Island			465	147	153			
Stone Harbor Point	568	634	870	397	1337	1000	1831	704
Hereford Inlet (Champagne Island)		103		204			247	1619
Coast Guard EECEN				11				
Total Number of Birds	**2621**	**2728**	**2755**	**2186**	**2892**	**1711**	**2998**	**2593[1]**
Number of Active Colonies	**8**	**10**	**7**	**12**	**10**	**7**	**7**	**6**

[1]Stone Harbor Point and Champagne Island totals were not summed because they represent the same individuals who nested and failed at Stone Harbor Point and then renested at Champagne Island. Data collected and compiled by NJDEP, Division of Fish and Wildlife – Endangered and Nongame Species Program

2. Least Tern

Piping plovers often nest in association with State-listed (endangered) least tern colonies, presumably benefiting from the aggressive behaviors of terns in driving away predators and have often had higher success than those nesting out of tern colonies (Burger 1987). Total least tern numbers within colonies in New Jersey for the 8-year period of 1999 to 2006 and a summary of sites within and outside the Program Area are shown in Table 5 (Canale 2000; New Jersey Endangered and Nongame Species Program 2001, 2002, 2003; U.S. Fish and Wildlife Service 2005). Least tern information for the 2007 nesting seasons was not available. In addition, Seabeach amaranth also benefits from the presence of least tern colonies, since restrictions on public access in the nesting areas provide protected areas where plants can become established (Weakley and Bucher 1992).

Table 5. Number of Adult Least Terns at New Jersey Nesting Sites: 1999-2006.

SITE	1999	2000	2001	2002	2003	2004	2005	2006
Newark Airport			40				*	22
Sandy Hook:								
Coast Guard	26	20	36	77	95	6		
Critical Zone					75	77	21	
Gunnison	24	22	14	17	53	28	13	20
North Beach	118	46	51	23	74	5		70
Hidden Beach	8	35	109	145	71	24	5	16
Fee Beach	82	195	178	182	110	12	34	6
South Fee Beach					9	4	11	
Sea Bright - North	87	33	38	74	104	82	161	109
Monmouth Beach - North	842	233			281	343	256	80
Monmouth Beach - South	26	82	12	8				
Seven Presidents Park				70	86	176	52	140
Long Branch					128			
Belmar - Shark River Inlet		9	57	151	48		25	57
Sea Girt - Wreck Pond			24	21	191	153	64	
Sea Girt - NGTC		15	197	48	26		2	
Subtotal – Sites Outside Philadelphia Program Area	*1213*	*690*	*756*	*816*	*1351*	*910*	*644*	*520*
Gull Island		67					64	221
Island Beach State Park - Dike					17	32		
Barnegat Light	25			34	6	19	11	9
Holgate		100		70	60	120	60	42
North Brigantine Natural Area	6	4	28	23		16	3	42
Longport- Seaview Harbor Marina				16				155

Ocean City - North	195	379	354	215	12			
Ocean City - Center	191	67	15	12	19		18	31
Corson's Inlet St. Park				7				12
Strathmere – Upper Township						22	9	
Townsends Inlet		28	57	90	36	31	25	
Avalon - North		5	5					
Avalon - Dunes	158	135	142	293	213	110	20	161
Champagne Island				5		64		19
Stone Harbor Point	98	90	37	57	255	65	86	263
N. Wildwood- Hereford In.				105	490	345	342	202
USCG - LSU		4	84	152	41	4		
USCG - TRACEN	50							4
Cape May City – Poverty Beach					66	207	19	47
Cape May Meadows - TNC	30	132	16	38	34	30	150	128
Cape May Point State Park					10	21	118	84
Magnesite Plant			16	5				
Manumuskin River Preserve					*	28		3
Subtotal –Sites within Philadelphia District Program Area	*753*	*1025*	*754*	*1122*	*1259*	*1114*	*925*	*1423*
Total Number of Birds	**1966**	**1715**	**1510**	**1938**	**2610**	**2024**	**1569**	**1943**
Number of Colonies	**16**	**21**	**21**	**26**	**27**	**25**	**24**	**24**

* Birds actively nesting, but not counted
Data collected and compiled by NJDEP, Division of Fish and Wildlife – Endangered and Nongame Species Program.

3. Coordination with the State

The Service recommends that the Corps consider species of special concern and State-listed species (Appendix C) in project planning. The Service's PBO (Service 2005) contains conservation recommendations for least tern and black skimmer. The New Jersey Division of Fish and Wildlife, Endangered and Nongame Species Program (ENSP) and New Jersey Division of Parks and Forestry Natural Heritage Program (NJNHP) may be contacted for further information regarding State-listed endangered and threatened species.

The NJNHP maintains the most up-to-date information on Federal candidate species and State-listed species in New Jersey and may be contacted at the following address:

Natural Heritage Program
Division of Parks and Forestry
CN 404
Trenton, New Jersey 08625
(609) 984-1339

Additionally, information on New Jersey's State-listed wildlife species may be obtained from the following office:

David Jenkins, Chief
Endangered and Nongame Species Program
New Jersey Division of Fish and Wildlife
CN 400
Trenton, New Jersey 08625
(609) 292-9400

V. BORROW AREAS

A. MARINE FINFISH

Shore zones and estuaries provide migratory pathways and spawning, feeding, and nursery areas for many commercial and sport fish, as well as comprising the primary habitat for many forage fish. Such bathymetric contours provide important structure for a variety of commercially and recreationally important finfish species. Shoal areas along the Atlantic coast are highly productive for finfish. Fishing grounds are concentrated near these productive shoal areas.

Coastal waters within the Hereford Inlet to Cape May Inlet project area support significant commercial and recreational fisheries (Corbett, NJDFW, pers. comm. 2007). Commercially important species include: Atlantic croaker (*Micropogonias undulatus*), Atlantic menhaden (*Brevoortia tyrannus*), black sea bass (*Centropristis striata*), bluefish (*Pomatomus saltatrix*), summer flounder (*Paralichthys dentatus*), yellowtail flounder (*Limanda ferruginea*), scup (*Stenotomus chrysops*), tautog (*Tautoga onitis*), weakfish (*Cynoscion regalis*), and white perch (*Morone americana*). Commercial fishermen are not allowed to target American shad (*Alosa sapidissima*) in the ocean but they are allowed to keep a small percent as bycatch. Important recreational fisheries within nearshore of the project area include many of the above-mentioned species plus Atlantic mackerel (*Scomber scombrus*), striped bass (*Morone saxatilis*), red hake (*Urophycis chuss*), silver hake (*Merluccius bilinearis*), and northern kingfish (*Menticirrhus saxatilis*).

Portions of the project area have also been designated as essential fish habitat under the Magnuson - Stevens Fishery Conservation and Management Act (16 U.S.C. 1801-1882) for a number of federally managed species (Table 6):

Table 6. Federally Managed Fish Species within the Project Area (Karen Greene, pers. comm. 2007).

Species	Life Stage
Atlantic herring (*Clupea harengus*)	juveniles and adults
black sea bass (*Centropristis striata*)	juveniles and adults
bluefish (*Pomatomus saltatrix*)	juveniles and adults
butterfish (*Peprilus triacanthus*)	larvae, eggs and juveniles
cobia (*Rachycentron canadum*)	all life stages

king mackerel (*Scomberomorus cavalla*)	all life stages
monkfish (*Lophius americanus*)	eggs and larvae
red hake (*Urophycis chuss*)	eggs, larvae and juveniles
scup (*Stenotomus chrysops*)	juveniles and adults
Spanish mackerel (*Scomberomorus maculatus*)	all life stages
summer flounder (*Paralichthys dentatus*)	larvae, juveniles and adults
windowpane (*Scophthalmus aquosus*)	all life stages
winter flounder (*Pseudopleuronectes americanus*)	all life stages
witch flounder (*Glyptocephalus cynoglossus*)	eggs
clearnose skate (*Raja eglanteria*)	juvenile, adults
little skate (*Raja erinacea*)	juvenile, adult
winter skate (*Raja ocellata*)	juvenile, adult
Atlantic angel shark (*Squatina dumerili*)	all life stages
Atlantic sharpnose shark (*Rhizoprionodon terraenovae*)	adult
dusky shark (*Carcharhinus obscurus*)	neonate/early juvenile
sandbar shark (*Carcharhinus plumbeus*)	all life stages
sand tiger shark (*Odontaspis taurus*)	neonate/early juvenile and adult
scalloped hammerhead shark (*Sphyrna lewini*)	late juvenile/subadult
tiger shark (*Galeocerdo cuvieri*)	neonate/early juvenile

B. BENTHIC RESOURCES

Benthic macroinvertebrates are important food organisms in the marine and estuarine environment, and along with primary producers, perform a crucial role in supporting other forms of fish and wildlife. Approximately 58 species of benthic organisms have been identified from Townsends Inlet to Cape May Inlet (Chaillou and Scott 1996). Benthic organisms of interest in the shallow ocean waters and adjacent inlets and bays of the project area include Atlantic surf clam (*Spisula solidissima*), hard clam (*Mercenaria mercenaria*), and soft clam (*Mya arenaria*). In 2003, the regions south of Great Egg Harbor Inlet to Cape May Inlet accounted for only 10.2% of the total estimated standing stock of surf clams in New Jersey territorial waters. Preliminary data collected in 2007 indicate that the estimated standing stock in this region is now only 4% (Normant, NJDFW, pers. comm. 2007). In 1999, this region had 25% of estimated standing stock in New Jersey territorial waters. In 2003, 60.6% (by weight) of New Jersey molluscan landings were surf clams and 73.9% on total surf clam east coast harvest was landed in New Jersey. Approximately 246,000 bushels were harvested from New Jersey territorial waters in 2003 with 17.5% of harvest coming from this region. There has been a major decline of surf clams State-wide as well as in Federal waters off the Delmarva Peninsula. There has been virtually no harvest in New Jersey territorial waters in the last two years (Normant, NJDFW, pers. comm. 2007).

VI. PROJECT IMPACTS AND RECOMMENDED MITIGATIVE MEASURES

A. PIPING PLOVER

The Corps' activities occurring on or adjacent to sites currently occupied by federally listed species could have direct adverse effects. Beach nourishment generally involves operation of a pipeline to pump sand onto the targeted beach and subsequent contouring of the pumped sand by earth-moving equipment. Even in areas where sand placement will only occur seaward of the present high-tide line, significant disturbance of the upper beach from equipment and crews can be expected. Therefore, beach nourishment during the nesting/growing seasons would likely result in significant adverse effects to piping plovers where they occur.

In addition, other Corps activities, if conducted during the nesting season, could result in disturbance to nesting piping plovers or their young. Operation of equipment and crews on beaches in support of these maintenance and operation activities could destroy or diminish habitat suitability or kill or injure plover adults, nests, or young.

It can be anticipated that, following initial construction of the Federal nourishment projects, similar creation of potentially suitable habitat for piping plovers will occur in areas where they are currently absent. It should be noted that although the Corps nourishment projects will create sandy beach habitat that may attract piping plovers, the habitat created can be expected to be of lesser quality than habitat that is formed through natural coastal process such as overwash. Nevertheless, subsequent renourishment events throughout the coastal areas have the potential to benefit piping plovers by maintaining sandy beach habitat over the life of the project.

While the Federal nourishment projects have potential to create habitat for piping plovers, habitat creation alone will not create a beneficial effect for piping plover if the habitat is suboptimal and does not provide foraging habitat for plover chicks or if disturbance from municipal and recreational users cannot be managed to avoid loss of nests or chicks.

To ensure the continued protection of piping plover over the life of the project, the Service recommends that the Corps reinitiate consultation pursuant to Section 7 of the ESA:

- at least 135 days prior to beginning any beach nourishment associated with the project to allow 90 days for formal consultation and 45 days for issuance of a BO; and

- at least 135 days prior to any beach maintenance activities (*e.g.*, beach renourishment) for the life of the project (*i.e.*, 50 years).

Piping plover nesting activity may occur due to creation of suitable habitat as a result of the project. Therefore, to ensure the protection of piping plovers during the nesting and brood rearing periods from April 1 to August 15, the Service recommends that an endangered species BMP be developed for each municipality within the project area prior to initiation of dredging and beach nourishment. At a minimum, the BMP must adhere to the Service's "Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the ESA" (U.S. Fish and Wildlife Service 1994) (Appendix D) and the Service's 1997 Fireworks Guidelines (Appendix E). The Service recommends that the BMP specifically include, but not be limited to:

(1) coordination with NJDEP-ENSP to determine whether piping plovers are actively nesting in the project area;

(2) establishment and identification (*e.g.*, fencing and signing) of protective zones around piping plover nests;

(3) ORV (recreational and essential state/municipal) restrictions during the piping plover nesting and brood rearing periods (April 1 to August 15);

(4) monitoring of piping plovers during the nesting and brood rearing period (April 1 to August 15);

(5) prohibition of kite flying from April 1 to August 15;

(6) protection of piping plover nests, chicks, and adults from native and domestic predators;

(7) prohibiting of launching of fireworks within ¾ mile of nesting areas;

(8) restrictions of beach management and maintenance activities (*e.g.*, beach raking) during the nesting season; and

(9) mechanisms for enforcement of item 1-8 above.

Establishment of protective zones and other protective measures developed within the plan would be coordinated with the Service and the ENSP. If off-road vehicles (ORV) access the beach on the project site and if piping plovers nest adjacent to the project site, the Guidelines apply to ORV use. The management plans must be submitted to the Service and ENSP for review and comment prior to project initiation to determine if further consultation pursuant to Section 7 of the Act will be required.

In the event that piping plovers or other beach nesting birds do nest or expand their nesting areas within the project area, the Service recommends that the Corps develop educational materials (*e.g.*, brochures, informational signs) or provide funds for public education and outreach. Development of informational materials would educate beach users about beach nesting birds; thereby reducing disturbance to nesting areas. Public education would also promote public support for protecting beach nesting birds.

Finally, the Service recommends that the Corps develop and implement a shorebird monitoring program, in cooperation with the Service, to monitor the use of the nourished beaches for shorebirds, particularly piping plovers. This shorebird monitoring program should be designed to identify and report use of the project area beaches by shorebirds, particularly the piping plover, for the life of the project. Shorebird monitoring within the project area, except within currently known piping plover locations, is not conducted by ENSP. Monitoring of enhanced beach areas that are currently not surveyed by ENSP would be the responsibility of the project proponent (*i.e.*, Corps).

B. SEABEACH AMARANTH

Impacts to the beach zone providing potentially suitable habitat for seabeach amaranth from Corps activities are expected to be significant. Any seeds dispersed into previously unoccupied areas from nearby populations would likely be buried if occurring within the project impact area. Additionally, any undetected seabeach amaranth plants or seedlings would likely be buried or crushed.

It can be anticipated that, following initial construction of the Federal nourishment projects, similar creation of potentially suitable habitat for seabeach amaranth will occur in areas where habitat is currently absent. Subsequent renourishment events throughout the coastal areas may benefit seabeach amaranth by maintaining sandy beach habitat over the life of the project.

To ensure that seabeach amaranth will not be adversely affected by project activities, the Service recommends conducting surveys prior to initiation of the project. If plants are found, the Corps should establish a protective zone with a minimum 3-meter buffer around any seabeach amaranth site identified and avoid construction-related pedestrian and vehicular traffic; placement, movement, or maintenance of pipelines; stockpiling of construction materials and equipment; and pumping, placement, or distribution of sand within such zones. The Corps should refer to the Service's PBO (U.S. Fish and Wildlife Service 2005) for additional conservation measures and recommendations to protect seabeach amaranth.

C. RED KNOT, BLACK SKIMMER AND LEAST TERN

The types of impact and the potential benefits of beach nourishment projects to red knot, least tern, and black skimmer are similar to these for piping plovers as described above.

Avoiding or minimizing adverse impacts to red knot, least tern, and black skimmer from project-related activities, especially with respect to timing, should be incorporated in project planning and in post-nourishment monitoring and management. In addition to the direct positive benefits that such protection would afford to these species, piping plovers nesting within or adjacent to protected tern colonies may benefit from the defensive behaviors against avian predators that are typical of this colonial species.

To avoid potential impacts from construction, schedule and implement beach nourishment and associated project activities to avoid construction within 300 meters of least tern and/or black skimmer colonies during the nesting season. The least tern nesting season is generally early June through September.

To protect these species over the project life, include protection of red knot, least terns and black skimmers within endangered species BMPs.

The Service recommends contacting the New Jersey Division of Fish and Wildlife, Endangered and Nongame Species Program (ENSP) and New Jersey Division of Parks and Forestry Natural Heritage Program (NJNHP) for further information and guidance regarding State-listed endangered and threatened species.

D. BIOLOGICAL ASSESSMENT

Federally listed species are afforded protection under the ESA pursuant to Section 7(a)(2), which requires every Federal agency, in consultation with the Service, to ensure that any action it authorize, funds, or carries out, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. Project-related activities could adversely affect the piping plover and seabeach amaranth. The lead Federal agency for a project has the responsibility under Section 7(c) of the ESA to prepare a BA if the project is a construction project that requires an Environmental Impact Statement (EIS) and the project may affect a federally listed species. In accordance with the ESA, the Corps must prepare a BA to address potential project-related adverse impacts to the piping plover and seabeach amaranth.

The BA should contain information concerning listed or proposed species that may be present in the action area and an analysis of any potential effects of the proposed action on such species. The following may be considered for inclusion in a BA of the proposed project, although actual contents are at the discretion of the Federal authorizing agency:

(1) results of field surveys to determine if listed species are present or occur seasonally;

(2) views of recognized experts on the species;

(3) literature review;

(4) analysis of direct, indirect, and cumulative effects of the action on the species; and

(5) analysis of alternative actions.

The BA may be consolidated with procedures for interagency coordination required by other statutes such as the FWCA or the NEPA. However, satisfying the requirements of these other statutes does not in itself relieve a Federal agency of its obligation to comply with the BA procedures of the ESA. The results of a BA may be incorporated into an EIS. If the BA indicates that no listed or proposed species are present or will be affected, and the Service concurs, in writing, with the assessment, then no formal consultation pursuant to Section 7 will be required.

E. MUNICIPAL RESPONSIBILITIES

In order to prevent future misunderstanding regarding the protection of piping plovers and seabeach amaranth, the Service recommends that the Corps notify each municipality within the project area individually regarding potential restrictions on recreational activities and beach management (*e.g.*, beach raking and municipal vehicle traffic) if seabeach amaranth sites are identified and/or piping plovers expand their nesting areas as a result of the proposed project. In addition, each municipality should receive a copy of the aforementioned Guidelines to become familiar with potential recreational activity and beach management restrictions. The purpose of notifying municipalities in advance is to clarify the responsibilities of the municipalities that would be benefiting from the proposed Federal project. If municipalities are unwilling to cooperate with the Corps and the Service regarding piping plover and seabeach amaranth management, the Corps should consider eliminating the municipalities from the proposed project.

The purpose of developing a BMP for each municipality is to provide a framework for cooperation among local beach managers, NJDEP, and the Service in the stewardship of federally and State-listed endangered and threatened beach-nesting birds and flora occurring on New Jersey's beaches. The goal of a BMP is to provide for long-term protection and recovery of listed species populations, while recognizing the need for storm protection, recreation, and public works. Each plan includes descriptions of the roles and responsibilities of local beach managers, the NJDEP, and the Service in the protection and management of listed species. Upon completion, management plans are approved by the appropriate governmental body, such as a town council, and a memorandum of agreement is signed by all parties.

Plans are developed with full input of local officials and staff directly responsible for beach management activities including mechanical beach raking, trash removal, life guards, law enforcement, and recreational uses to reflect a beach's operational needs. Plans address a wide range of issues, including symbolic fencing for protection and management of listed species, trash collection and beach clean-ups, beach raking, sand fencing, vegetation management, predator control, enforcement of pet laws, and State Coastal Zone management rules, operation of vehicles on the beach, designation of portions of beach as protected management zones for listed species, and the role of local site managers in endangered species management.

F. BEACH HABITAT ENHANCEMENT

Beach fill and dune creation provides an opportunity to enhance fish and wildlife habitat. However, any proposed beach creation activities must be closely reviewed in regard to their effects on habitats (*e.g.*, shallow water habitat) within the project area. In addition, other accompanying adverse impacts to fish and wildlife resources, which may occur as a result of project implementation, must be considered in project planning.

Planning activities for beach fill and dune creation should include an evaluation of potential habitat enhancement for beach nesting birds. Wide beaches with gentle slopes generally provide good quality habitat for beach nesting birds (U.S. Fish and Wildlife Service 1996a). Creation of low, wide dunes with washover areas provides adequate foraging and nesting habitat. Dune configurations that are irregular (*e.g.*, staggered and discontinuous) may attract beach nesting birds. In addition, native dune grasses should be planted in sufficient quantity to provide stabilization, but also minimal enough not to prevent nesting opportunities. Fencing systems to trap sand and create dunes should be open to allow passage of juvenile shorebirds between and among the dunes. A broken, zig-zag pattern of fencing parallel to the shore or a Y-type fencing pattern perpendicular to shore are two examples of open fencing systems. The Service recommends the Corps coordinate with the Service for any dune and beach enhancement or restoration activities in beach-nesting bird or seabeach amaranth habitat.

Additionally, the Service recommends the use of perpetual deed restrictions or conservation easement to protect newly created beach and adjacent beach habitat for beach nesting shorebirds.

G. BORROW AREAS

Similar to other dredging, extraction of material from borrow areas has been documented as causing environmental impacts that may adversely affect fish and other marine species populations and the food chains on which they depend. Kantor (1984) provides a review of dredging impacts specific to New Jersey. These impacts can generally be subdivided into those affecting the water column and those affecting the bottom substrate. Adverse water quality impacts from material extraction include increased turbidity, changes in temperature and oxygen demand, and release or resuspension of toxins and bacteria. These factors may cause direct mortality to fish and shellfish, disrupt fish migrations, hamper fish and shellfish spawning, make shellfish unsuitable for human consumption, and reduce primary productivity. Settling of suspended sediment may result in smothering of shellfish and other benthic organisms downcurrent from the project site.

Bottom impacts include removal of existing benthic communities, change in circulation patterns, and modification of patterns of sediment deposition. Extraction from borrow areas may create bottom depressions with reduced flushing. These depressions can accumulate fine-grained sediments and organic material, including contaminants. Reduced flushing, combined with decomposition of organic materials, can lead to low oxygen conditions in such depressions. Originally occurring or different benthic forms may eventually recolonize the area of extraction depending on the water quality and substrate present.

The type of equipment used and the time of year extraction occur may greatly influence the nature and extent of potential adverse impacts in the water column. For example, the use of hydraulic dredging reduces Service concerns regarding short-term adverse impacts on water quality at and near the site of dredging, but hydraulic dredging may impact eggs and young fish or other slow-moving organisms unable to avoid entrainment. The entrainment of sea turtles has also been documented as an adverse impact of hydraulic dredging (U.S. Fish and Wildlife Service 1991). The NMFS has jurisdiction over endangered and threatened sea turtles and should be contacted if hydraulic dredging is proposed. Conversely, mechanical dredging has greater impacts on turbidity and dissolved oxygen at the dredge site, but, if conducted during periods of low seasonal biological productivity, adverse impacts to organisms can be minimized.

Potential alternatives to offshore borrow sites currently being considered for the project include bypassing sand from Wildwood to North Wildwood and changing the beach configuration in Wildwood by increasing berm height or adding a dune. These alternatives would avoid adverse impacts to finfish and other marine resources.

VI. CONCLUSIONS AND SUMMARY OF RECOMMENDATIONS

A. BEACH COMMUNITIES

In order to avoid and minimize potential adverse impacts on State-listed and federally listed threatened and endangered species within project area, the Service recommends incorporating the following measures into project planning.

1. Reinitiate consultation with the Service to ensure protection of the piping plover:

    a. at least 135 days prior to beginning of any beach nourishment associated with the project to allow for 90 days for formal consultation and 45 days for issuance of a BO; and

    b. at least 135 days prior to any beach maintenance activities (e.g., beach renourishment) for the life of the project (i.e., 50 years).

2. Conduct surveys and establish protective zones around any identified seabeach amaranth sites to ensure that seabeach amaranth will not be adversely affected by project activities

3. Contact NJDFW's ENSP and NJNHP's Natural Heritage Program in considering State species of special concern and State-listed species in project planning (Appendix C).

4. Prepare a BA to address potential project-related adverse impacts to piping plover, seabeach amaranth, and the candidate species red knot. Consult with the Service pursuant to Section 7 of the ESA prior to initial beach nourishment.

5. Require municipalities within the project area to develop and implement an endangered species BMP (should piping plovers expand their current nesting areas as a result of this project) for each municipality within the project area and prior to project initiation, in accordance with the Service "Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the ESA" (U.S. Fish and Wildlife Service 1996a) and the Service's 1997 Fireworks Guidelines (Appendix E).

6. Develop and provide funds for informational materials, public education and outreach, should piping plovers and other beach nesting shorebirds expand their nesting areas within the project area.

7. Implement a shorebird monitoring program, in cooperation with the Service and ENSP, to monitor the use of nourished beaches for shorebirds, particularly piping plovers.

8. Notify each municipality within the project area regarding recreational and beach maintenance restrictions if seabeach amaranth sites are identified and/or piping plovers expand their nesting areas as a result of the project.

9. Refer to the Service's 2005 PBO for additional recommendations, including beach habitat enhancement to protect listed species (U.S. Fish and Wildlife Service 2005).

B. BEACH HABITAT ENHANCEMENT

Incorporate the following recommendations into project planning to create additional shorebird habitat and protect or enhance any existing habitat.

1. Review and evaluate any proposed beach creation activity in regard to potential effects on other habitats within the project area.

2. Include shorebird habitat enhancement plans for beach fill and dune creation activities.

3. Establish native dune grasses in sufficient quantity to provide dune stabilization and nesting opportunities for beach nesting birds.

4. Design dune fencing systems that allow passage of juvenile shorebirds between and among the dunes and allow more natural dunes to form with adequate storm protection.

5. Obtain a perpetual deed restriction or conservation easement for the newly-created beach and adjacent beach areas.

6. Continue to coordinate with the Service and ENSP for any dune and beach enhancement or restoration activities in beach-nesting bird or seabeach amaranth habitat.

C. BORROW AREAS

1. Rely primarily on the components of the benthic diversity indices (*i.e.*, species diversity, species richness, and the distribution of the number of individuals among the species), rather than on the diversity indices alone, in evaluating benthic habitat quality.

2. Evaluate any borrow site alternatives that would minimize adverse impacts to surf clam communities through continued coordination with the New Jersey Bureau of Shellfisheries and the Service.

3. Conduct each renourishment phase in a limited section of the borrow area(s) and alternate locations for each subsequent renourishment cycle.

4. Avoid creating excessively deep, poorly flushed (anoxic) pits at the borrow sites.

5. Avoid dredging during shellfish or finfish spawning activities (the typical spawning period and early life stages of winter flounder are between January 1 and May 31).

6. Use hydraulic-pipeline dredging rather than hopper dredging in order to minimize turbidity at the borrow sites and minimize the potential entrainment of federally listed sea turtles.

7. Contact the NMFS regarding potential adverse impacts on federally listed (threatened or endangered) sea turtle and marine mammal species under its jurisdiction.

8. Coordinate with the New Jersey Bureau of Marine Fisheries regarding the selection of borrow sites.

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B. PERSONAL COMMUNICATIONS

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APPENDIX A

Federally Listed Endangered and Threatened Species,
and Candidate Species in New Jersey

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN NEW JERSEY

An **ENDANGERED** species is any species that is in danger of extinction throughout all or a significant portion of its range.

A **THREATENED** species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

	COMMON NAME	SCIENTIFIC NAME	STATUS
FISHES	Shortnose sturgeon*	*Acipenser brevirostrum*	E
REPTILES	Bog turtle	*Clemmys muhlenbergii*	T
	Kemp's ridley sea turtle*	*Lepidochelys kempii*	E
	Green sea turtle*	*Chelonia mydas*	T
	Hawksbill sea turtle*	*Eretmochelys imbricata*	E
	Leatherback sea turtle*	*Dermochelys coriacea*	E
	Loggerhead sea turtle*	*Caretta caretta*	T
BIRDS	Piping plover	*Charadrius melodus*	T
	Roseate tern	*Sterna dougallii dougallii*	E
	Red-cockaded woodpecker	*Picoides borealis*	E+
MAMMALS	Eastern cougar	*Felis concolor couguar*	E+
	Indiana bat	*Myotis sodalis*	E
	Gray wolf	*Canis lupus*	E+
	Delmarva fox squirrel	*Sciurus niger cinereus*	E+
	Blue whale*	*Balaenoptera musculus*	E
	Finback whale*	*Balaenoptera physalus*	E
	Humpback whale*	*Megaptera novaeangliae*	E
	Right whale*	*Balaena glacialis*	E
	Sei whale*	*Balaenoptera borealis*	E
	Sperm whale*	*Physeter macrocephalus*	E

	COMMON NAME	SCIENTIFIC NAME	STATUS
INVERTEBRATES	Dwarf wedgemussel	*Alasmidonta heterodon*	E
	Northeastern beach tiger beetle	*Cicindela dorsalis dorsalis*	T
	Karner blue butterfly	*Lycaeides melissa samuelis*	E+
	Mitchell's satyr butterfly	*Neonympha m. mitchellii*	E+
	American burying beetle	*Nicrophorus americanus*	E+
PLANTS	Small whorled pogonia	*Isotria medeoloides*	T
	Swamp pink	*Helonias bullata*	T
	Knieskern's beaked-rush	*Rhynchospora knieskernii*	T
	American chaffseed	*Schwalbea americana*	E
	Sensitive joint-vetch	*Aeschynomene virginica*	T
	Seabeach amaranth	*Amaranthus pumilus*	T

STATUS:			
E	endangered species	PE	proposed endangered
T	threatened species	PT	proposed threatened
+	presumed extirpated**		

* Except for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service.

** Current records indicate the species does not presently occur in New Jersey, although the species did occur in the State historically.

Note: For a complete listing of Endangered and Threatened Wildlife and Plants, refer to 50 CFR 17.11 and 17.12.

For further information, please contact:

U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main Street, Building D
Pleasantville, New Jersey 08232
Phone: (609) 646-9310
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Revised 08/09/2007

APPENDIX B

Colonial Nesting Birds and Shorebirds within
Hereford Inlet to Cape May Inlet Project Area
(prepared by New Jersey Audubon Society)

Colonial Nesting Birds and Shorebirds - Hereford Inlet to Cape May Inlet
Estuary and nearshore coastal waters, including associated beach, dune, salt marsh, mudflats and coastal forest/scrub
Compiled by Don Freiday
Very rare species (occuring less than annually) are excluded from this list

Nests - Y means known to currently nest

C - common: always seen, more than 20 individuals per day
F - fairly common: usually seen, 5 to 20 individuals per day
U - uncommon: seen in limited numbers, 1-4 per day
S - scarce: usually present, but not seen daily
R - rare: seen only a few times a season

Species	Common Name	Nests	Winter	Spring	Summer	Early fall	Late fall
PHALACROCORACIDAE (Cormorants)							
Phalacrocorax auritus	Double-crested Cormorant		U	C	C	C	C
Phalacrocorax carbo	Great Cormorant		U	U			U
ARDEIDAE (Herons, Egrets and Bitterns)							
Botaurus lentiginosus	American Bittern		S	S		U	U
Ixobrychus exilis	Least Bittern			R		R	R
Ardea herodias	Great Blue Heron		F	F	S	F	F
Ardea alba	Great Egret	Y	R	F	F	F	S
Egretta thula	Snowy Egret	Y		F	F	F	S
Egretta caerulea	Little Blue Heron	Y		U	U	U	S
Egretta tricolor	Tricolored Heron	Y		U	U	U	S
Bubulcus ibis	Cattle Egret			R	R	R	
Nycticorax nycticorax	Black-crowned Night-Heron	Y	U	F	F	F	F
Nyctanassa violacea	Yellow-crowned Night-Heron	Y		U	U	U	U
THRESKIORNITHIDAE (Ibis and Spoonbills)							
Threskiornithinae							
Plegadis falcinellus	Glossy Ibis	Y		F	F	F	U

Species	Common Name	Nests	Winter	Spring	Summer	Early Fall	Late Fall
CHARADRIIDAE (Plovers and Lapwings)							
Charadriinae							
Pluvialis squatarola	Black-bellied Plover		F	C	U	C	C
Pluvialis dominica	American Golden-Plover					S	S
Charadrius semipalmatus	Semipalmated Plover			C	U	C	C
Charadrius melodus	Piping Plover	Y		U	U	U	S
Charadrius vociferus	Killdeer	Y	U	F	F	F	F
HAEMATOPODIDAE (Oystercatchers)							
Haematopus palliatus	American Oystercatcher	Y	F	F	F	F	F
RECURVIROSTRIDAE (Avocets and Stilts)							
Recurvirostra americana	American Avocet				R	R	
SCOLOPACIDAE (Sandpipers and Allies)							
Scolopacinae							
Actitis macularius	Spotted Sandpiper	?		F	U	F	U
Tringa solitaria	Solitary Sandpiper			U	S	U	
Tringa melanoleuca	Greater Yellowlegs		F	C	U	C	C
Tringa semipalmata	Willet	Y	R	C	C	F	R
Tringa flavipes	Lesser Yellowlegs		S	F	U	C	C
Bartramia longicauda	Upland Sandpiper				R		
Numenius phaeopus	Whimbrel			U	S	F	U
Limosa haemastica	Hudsonian Godwit				R	R	
Limosa fedoa	Marbled Godwit		R	R	R	S	S
Arenaria interpres	Ruddy Turnstone		C	C	U	F	C
Calidris canutus	Red Knot		S	C	F	U	U
Calidris alba	Sanderling		C	C	F	C	C
Calidris pusilla	Semipalmated Sandpiper			C	C	C	C
Calidris mauri	Western Sandpiper				F	F	F
Calidris minutilla	Least Sandpiper		R	C	U	C	F
Calidris fuscicollis	White-rumped Sandpiper			U	U	U	U
Calidris bairdii	Baird's Sandpiper				R	R	R
Calidris melanotos	Pectoral Sandpiper			U	S	F	F
Calidris maritima	Purple Sandpiper		U	U			U
Calidris alpina	Dunlin		C	C	R	U	C

Species	Common Name	Nests	Winter	Spring	Summer	Early Fall	Late Fall
Calidris ferruginea	Curlew Sandpiper						
Calidris himantopus	Stilt Sandpiper			R	S	F	U
Tryngites subruficollis	Buff-breasted Sandpiper				R	R	
Limnodromus griseus	Short-billed Dowitcher		R	C	F	C	U
Limnodromus scolopaceus	Long-billed Dowitcher		R		R	U	U
Gallinago delicata	Wilson's Snipe		R	U		U	U
Scolopax minor	American Woodcock		R	U		U	U
Phalaropodinae							
Phalaropus tricolor	Wilson's Phalarope			R	R	R	R
LARIDAE (Gulls)							
Larus atricilla	Laughing Gull	Y	R	C	C	C	C
Larus philadelphia	Bonaparte's Gull		U	U		R	U
Larus delawarensis	Ring-billed Gull		C	C	S	F	C
Larus argentatus	Herring Gull	Y	C	C	C	C	C
Larus glaucoides	Iceland Gull		R				
Larus fuscus	Lesser Black-backed Gull		R	R			R
Larus hyperboreus	Glaucous Gull		R				
Larus marinus	Great Black-backed Gull	Y	C	C	C	C	C
Rissa tridactyla	Black-legged Kittiwake		R				R
STERNIDAE (Terns)							
Sternula antillarum	Least Tern	Y		F	F	F	
Gelochelidon nilotica	Gull-billed Tern	Y		U	U	U	
Hydroprogne caspia	Caspian Tern			R		U	U
Chlidonias niger	Black Tern			R	S	U	
Sterna dougallii	Roseate Tern			R	R	R	
Sterna hirundo	Common Tern	Y		C	C	C	F
Sterna forsteri	Forster's Tern	Y	S	C	C	C	C
Thalasseus maximus	Royal Tern	Y		F	U	C	C
Thalasseus sandvicensis	Sandwich Tern				R	S	
RYNCHOPIDAE (Skimmers)							
Rynchops niger	Black Skimmer	Y		F	F	C	F

APPENDIX C

State-Listed Endangered and Threatened Species

in New Jersey

Conserve Wildlife

New Jersey Department of Environmental Protection
Division of Fish & Wildlife
Endangered & Nongame Species Program

New Jersey's Endangered and Threatened Wildlife

Endangered Species are those whose prospects for survival in New Jersey are in immediate danger because of a loss or change in habitat, over-exploitation, predation, competition, disease, disturbance or contamination. Assistance is needed to prevent future extinction in New Jersey.

Threatened Species are those who may become endangered if conditions surrounding them begin to or continue to deteriorate.

There are other classifications for wildlife as well, including Stable, Species of Special Concern Special Concern and Undertermined.

Species names in the below tables link to PDF documents containing identification, habitat and status and conservation information. Additionally, in 2003 twelve species were highlighted as part of the celebration of the 30th anniversary of the NJ Endangered Species Conservation Act. See the "2003 Species of the Month" page for more information.

BIRDS			
Endangered		**Threatened**	
Bittern, American	*Botaurus lentiginosos* BR	Bobolink	*Dolichonyx oryzivorus* BR
Eagle, bald	*Haliaeetus leucocephalus* BR **	Eagle, bald	*Haliaeetus leucocephalus* NB **
Falcon, peregrine	*Falco peregrinus*	Hawk, Cooper's	*Accipiter cooperii*
Goshawk, northern	*Accipiter gentilis* BR	Hawk, red-shouldered	*Buteo lineatus* NB
Grebe, pied-billed	*Podilymbus podiceps*	Night-heron, black-crowned	*Nycticorax nycticorax* BR
Harrier, northern	*Circus cyaneus* BR	Night-heron, yellow-crowned	*Nyctanassa violaceus*
Hawk, red-shouldered	*Buteo lineatus* BR	Knot, red	*Calidris canutus* BR
Owl, short-eared	*Asio flammeus* BR	Osprey	*Pandion haliaetus* BR
Plover, piping	*Charadrius melodus***	Owl, barred	*Strix varia*
Sandpiper, upland	*Batramia longicauda*	Owl, long-eared	*Asio otus*
Shrike, loggerhead	*Lanius ludovicianus*	Rail, black	*Laterallus jamaicensis*
Skimmer, black	*Rynchops niger* BR	Skimmer, black	*Rynchops niger* NB
Sparrow, Henslow's	*Ammodramus henslowii*	Sparrow, grasshopper	*Ammodramus savannarum* BR
Sparrow, vesper	*Pooecetes gramineus* BR	Sparrow, Savannah	*Passerculus sandwichensis* BR
Tern, least	*Sterna antillarum*	Sparrow, vesper	*Pooecetes gramineus* NB
Tern, roseate	*Sterna dougallii***	Woodpecker, red-headed	*Melanerpes erythrocephalus*
Wren, sedge	*Cistothorus platensis*		
**Federally endangered or threatened			
BR - Breeding population only; NB - non-breeding population only			

REPTILES			
Endangered		**Threatened**	
Rattlesnake, timber	*Crotalus h. horridus*	Snake, northern pine	*Pituophis m. melanoleucus*
Snake, corn	*Elaphe g. guttata*	Turtle, Atlantic green	*Chelonia mydas***
Snake, queen	*Regina septemvittata*	Turtle, wood	*Clemmys insculpta*
Turtle, bog	*Clemmys muhlenbergii***		
Atlantic hawksbill	*Eretmochelys imbricata***		
Atlantic leatherback	*Dermochelys coriacea***		
Atlantic loggerhead	*Caretta caretta***		
Atlantic Ridley	*Lepidochelys kempi***		
**Federally endangered or threatened			

AMPHIBIANS			
Endangered		Threatened	
Salamander, blue-spotted	*Ambystoma laterale*	Salamander, eastern mud	*Pseudotriton montanus*
Salamander, eastern tiger	*Ambystoma tigrinum*	Salamander, long-tailed	*Eurycea longicauda*
Treefrog, southern gray	*Hyla chrysocelis*	Treefrog, pine barrens	*Hyla andersonii*

INVERTEBRATES			
Endangered		Threatened	
Beetle, American burying	*Nicrophorus mericanus***	Elfin, frosted (butterfly)	*Callophrys irus*
Beetle, northeastern beach tiger	*Cincindela d. dorsalis***	Floater, triangle (mussel)	*Alasmidonta undulata*
Copper, bronze	*Lycaena hyllus*	Fritillary, silver-bordered (butterfly)	*Bolaria selene myrina*
Floater, brook (mussel)	*Alasmidonta varicosa*	Lampmussel, eastern (mussel)	*Lampsilis radiata*
Floater, green (mussel)	*Lasmigona subviridis*	Lampmussel, yellow (mussel)	*Lampsilis cariosa*
Satyr, Mitchell's (butterfly)	*Neonympha m. mitchellii***	Mucket, tidewater (mussel)	*Leptodea ochracea*
Skipper, arogos (butterfly)	*Atrytone arogos arogos*	Pondmussel, eastern (mussel)	*Ligumia nasuta*
Skipper, Appalachian grizzled (butterfly)	*Pyrgus wyandot*	White, checkered (butterfly)	*Pontia protodice*
Wedgemussel, dwarf	*Alasmidonta heterodon***		
**Federally endangered or threatened			

MAMMALS	
Endangered	
Bat, Indiana	*Myotis sodalis***
Bobcat	*Lynx rufus*
Whale, black right	*Balaena glacialis***
Whale, blue	*Balaenoptera musculus***
Whale, fin	*Balaenoptera physalus***
Whale, humpback	*Megaptera novaeangliae***
Whale, sei	*Balaenoptera borealis***
Whale,sperm	*Physeter macrocephalus***
Woodrat, Allegheny	*Neotoma floridana magister*
**Federally Endangered	

FISH	
Endangered	
Sturgeon, shortnose	*Acipenser brevirostrum***
**Federally Endangered	

List updated 3/11/04

APPENDIX D

Guidelines for Managing Recreational Activities in
Piping Plover Breeding Habitat on the
U.S. Atlantic Coast to
Avoid Take Under Section 9 of the
Endangered Species Act

GUIDELINES FOR MANAGING RECREATIONAL ACTIVITIES IN PIPING PLOVER BREEDING HABITAT ON THE U.S. ATLANTIC COAST TO AVOID TAKE UNDER SECTION 9 OF THE ENDANGERED SPECIES ACT

Northeast Region, U.S. Fish and Wildlife Service
April 15, 1994

The following information is provided as guidance to beach managers and property owners seeking to avoid potential violations of Section 9 of the Endangered Species Act (16 U.S.C. 1538) and its implementing regulations (50 CFR Part 17) that could occur as the result of recreational activities on beaches used by breeding piping plovers along the Atlantic Coast. These guidelines were developed by the Northeast Region, U.S. Fish and Wildlife Service (Service), with assistance from the U.S. Atlantic Coast Piping Plover Recovery Team. The guidelines are advisory, and failure to implement them does not, of itself, constitute a violation of the law. Rather, they represent the Service's best professional advice to beach managers and landowners regarding the management options that will prevent direct mortality, harm, or harassment of piping plovers and their eggs due to recreational activities.

Some land managers have endangered species protection obligations under Section 7 of the Endangered Species Act (see section I below) or under Executive Orders 11644 and 11989[1] that go beyond adherence to these guidelines. Nothing in this document should be construed as lack of endorsement of additional piping plover protection measures implemented by these land managers or those who are voluntarily undertaking stronger plover protection measures.

This document contains four sections: (I) a brief synopsis of the legal requirements that afford protection to nesting piping plovers; (II) a brief summary of the life history of piping plovers and potential threats due to recreational activities during the breeding cycle; (III) guidelines for protecting piping plovers from recreational activities on Atlantic Coast beaches; and (IV) literature cited.

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[1] Executive Order 11644, Use of Off-Road Vehicles on the Public Lands and Executive Order 11989, Off-Road Vehicles on Public Lands pertain to lands under custody of the Secretaries of Agriculture, Defense, and Interior (except for Indian lands) and certain lands under the custody of the Tennessee Valley Authority.

Section 10 also allows permits to be issued for take that is "incidental to, and not the purpose of, carrying out an otherwise lawful activity" if the Service determines that certain conditions have been met. An applicant for an incidental take permit must prepare a conservation plan that specifies the impacts of the take, steps the applicant will take to minimize and mitigate the impacts, funding that will be available to implement these steps, alternative actions to the take that the applicant considered, and the reasons why such alternatives are not being utilized.

Section 7 of the ESA may be pertinent to beach managers and landowners in situations that have a Federal nexus. Section 7 requires Federal agencies to consult with the Service (or National Marine Fisheries Service for marine species) prior to authorizing, funding, or carrying out activities that may affect listed species. Section 7 also requires that these agencies use their authorities to further the conservation of listed species. Section 7 obligations have caused Federal land management agencies to implement piping plover protection measures that go beyond those required to avoid take, for example by conducting research on threats to piping plovers. Other examples of Federal activities that may affect piping plovers along the Atlantic Coast, thereby triggering Section 7 consultation, include permits for beach nourishment or disposal of dredged material (U.S. Army Corps of Engineers) and funding of beach restoration projects (Federal Emergency Management Authority).

Piping plovers, as well as other migratory birds such as least terns, common terns, American oystercatchers, laughing gulls, herring gulls, and great black-backed gulls, their nests, and eggs are also protected under the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712). Prohibited acts include pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting such conduct. Violators may be fined up to $5000 and/or imprisoned for up to six months.

Almost all States within the breeding range of the Atlantic Coast piping plover population list the species as State threatened or endangered (Northeast Nongame Technical Committee 1993). Various laws and regulations may protect State-listed species from take, but the Service has not ascertained the adequacy of the guidelines presented in this document to meet the requirements of any State law.

Strauss 1990). Nests are usually found in areas with little or no vegetation although, on occasion, piping plovers will nest under stands of American beachgrass (Ammophila breviligulata) or other vegetation (Patterson 1988, Flemming et al. 1990, MacIvor 1990). Plover nests may be very difficult to detect, especially during the 6-7 day egg-laying phase when the birds generally do not incubate (Goldin 1994).

Plover foods consist of invertebrates such as marine worms, fly larvae, beetles, crustaceans or mollusks (Bent 1929, Cairns 1977, Nicholls 1989). Feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines[4], and shorelines of coastal ponds, lagoons or salt marshes (Gibbs 1986, Coutu et al. 1990, Hoopes et al. 1992, Loegering 1992, Goldin 1993). Studies have shown that the relative importance of various feeding habitat types may vary by site (Gibbs 1986, Coutu et al. 1990, McConnaughey et al. 1990, Loegering 1992, Goldin 1993, Hoopes 1993) and by stage in the breeding cycle (Cross 1990). Adults and chicks on a given site may use different feeding habitats in varying proportion (Goldin et al. 1990). Feeding activities of chicks may be particularly important to their survival. Cairns (1977) found that piping plover chicks typically tripled their weight during the first two weeks post-hatching; chicks that failed to achieve at least 60% of this weight gain by day 12 were unlikely to survive. During courtship, nesting, and brood rearing, feeding territories are generally contiguous to nesting territories (Cairns 1977), although instances where brood-rearing areas are widely separated from nesting territories are not uncommon (see Table 1). Feeding activities of both adults and chicks may occur during all hours of the day and night (Burger 1993) and at all stages in the tidal cycle (Goldin 1993, Hoopes 1993).

THREATS FROM NONMOTORIZED BEACH ACTIVITIES

Sandy beaches that provide nesting habitat for piping plovers are also attractive recreational habitats for people and their pets. Nonmotorized recreational activities can be a source of both direct mortality and harassment of piping plovers. Pedestrians on beaches may crush

[4] Wrack is organic material including seaweed, seashells, driftwood and other materials deposited on beaches by tidal action.

and intertidal zone. These movements place chicks in the paths of vehicles driving along the berm or through the intertidal zone. Chicks stand in, walk, and run along tire ruts, and sometimes have difficulty crossing deep ruts or climbing out of them (Eddings et al. 1990, Strauss 1990, Howard et al. 1993). Chicks sometimes stand motionless or crouch as vehicles pass by, or do not move quickly enough to get out of the way (Tull 1984, Hoopes et al. 1992, Goldin 1993). Wire fencing placed around nests to deter predators (Rimmer and Deblinger 1990, Melvin et al. 1992) is ineffective in protecting chicks from vehicles because chicks typically leave the nest within a day after hatching and move extensively along the beach to feed (see Table 1).

Vehicles may also significantly degrade piping plover habitat or disrupt normal behavior patterns. They may harm or harass plovers by crushing wrack into the sand and making it unavailable as cover or a foraging substrate, by creating ruts that may trap or impede movements of chicks, and by preventing plovers from using habitat that is otherwise suitable (MacIvor 1990, Strauss 1990, Hoopes et al. 1992, Goldin 1993).

III. GUIDELINES FOR PROTECTING PIPING PLOVERS FROM RECREATIONAL DISTURBANCE

The Service recommends the following protection measures to prevent direct mortality or harassment of piping plovers, their eggs, and chicks.

MANAGEMENT OF NONMOTORIZED RECREATIONAL USES

On beaches where pedestrians, joggers, sun-bathers, picnickers, fishermen, boaters, horseback riders, or other recreational users are present in numbers that could harm or disturb incubating plovers, their eggs, or chicks, areas of at least 50 meter-radius around nests above the high tide line should be delineated with warning signs and symbolic fencing[5]. Only persons engaged in rare species monitoring, management, or research activities should enter posted areas. These areas should remain fenced as long as viable eggs or unfledged chicks are present. Fencing is intended to prevent accidental crushing of nests and repeated flushing of

[5] "Symbolic fencing" refers to one or two strands of light-weight string, tied between posts to delineate areas where pedestrians and vehicles should not enter.

Pets should be leashed and under control of their owners at all times from April 1 to August 31 on beaches where piping plovers are present or have traditionally nested. Pets should be prohibited on these beaches from April 1 through August 31 if, based on observations and experience, pet owners fail to keep pets leashed and under control.

Kite flying should be prohibited within 200 meters of nesting or territorial adult or unfledged juvenile piping plovers between April 1 and August 31.

Fireworks should be prohibited on beaches where plovers nest from April 1 until all chicks are fledged.

MOTOR VEHICLE MANAGEMENT

The Service recommends the following minimum protection measures to prevent direct mortality or harassment of piping plovers, their eggs, and chicks on beaches where vehicles are permitted. Since restrictions to protect unfledged chicks often impede vehicle access along a barrier spit, a number of management options affecting the timing and size of vehicle closures are presented here. Some of these options are contingent on implementation of intensive plover monitoring and management plans by qualified biologists. It is recommended that landowners seek concurrence with such monitoring plans from either the Service or the State wildlife agency.

Protection of Nests

All suitable piping plover nesting habitat should be identified by a qualified biologist and delineated with posts and warning signs or symbolic fencing on or before April 1 each year. All vehicular access into or through posted nesting habitat should be prohibited. However, prior to hatching, vehicles may pass by such areas along designated vehicle corridors established along the outside edge of plover nesting habitat. Vehicles may also park outside delineated nesting habitat, if beach width and configuration and tidal conditions allow. Vehicle corridors or parking areas should be moved, constricted, or temporarily closed if territorial, courting, or nesting plovers are disturbed by passing or parked vehicles, or if disturbance is anticipated because of unusual tides or expected increases in vehicle use during weekends, holidays, or special events.

Protection of Chicks

Sections of beaches where unfledged piping plover chicks are present should be temporarily closed to all vehicles not deemed essential. (See the provisions for essential vehicles below.) Areas where vehicles are prohibited should include all dune, beach, and intertidal habitat within the chicks' foraging range, to be determined by either of the following methods:

1. The vehicle free area should extend 1000 meters on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting 2000 meter-wide area of protected habitat for plover chicks should extend from the ocean-side low water line to the bay-side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists. However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation, or other naturally-occurring obstacles.

OR

2. The Service OR a State wildlife agency that is party to an agreement under Section 6 of the ESA provides written concurrence with a plan that:

A. Provides for monitoring of all broods during the chick-rearing phase of the breeding season and specifies the frequency of monitoring.

AND

B. Specifies the minimum size of vehicle-free areas to be established in the vicinity of unfledged broods based on the mobility of broods observed on the site in past years and on the frequency of monitoring. Unless substantial data from past years show that broods on a site stay very close to their nest locations, vehicle-free areas should extend at least 200 meters on each side of the nest site during the first week following hatching. The size and location of the protected area should be adjusted in response to the observed mobility of the brood, but in no case should it be reduced to less than 100 meters on each

OR

2) Without intensive monitoring: Restrictions should begin on May 15 (the earliest probable hatch date). If the nest is discovered after May 15, then restrictions should start immediately.

If hatching occurs earlier than expected, or chicks are discovered from an unreported nest, restrictions on vehicles should begin immediately.

If ruts are present that are deep enough to restrict movements of plover chicks, then restrictions on vehicles should begin at least 5 days prior to the anticipated hatching date of plover nests. If a plover nest is found with a complete clutch, precluding estimation of hatching date, and deep ruts have been created that could reasonably be expected to impede chick movements, then restrictions on vehicles should begin immediately.

Essential Vehicles

Because it is impossible to completely eliminate the possibility that a vehicle will accidently crush an unfledged plover chicks, use of vehicles in the vicinity of broods should be avoided whenever possible. However, the Service recognizes that life-threatening situations on the beach may require emergency vehicle response. Furthermore, some "essential vehicles" may be required to provide for safety of pedestrian recreationists, law enforcement, maintenance of public property, or access to private dwellings not otherwise accessible. On large beaches, maintaining the frequency of plover monitoring required to minimize the size and duration of vehicle closures may necessitate the use of vehicles by plover monitors.

Essential vehicles should only travel on sections of beaches where unfledged plover chicks are present if such travel is absolutely necessary and no other reasonable travel routes are available. All steps should be taken to minimize number of trips by essential vehicles through chick habitat areas. Homeowners should consider other means of access, eg. by foot, water, or shuttle services, during periods when chicks are present.

The following procedures should be followed to minimize the probability that chicks will be crushed by essential (non-emergency) vehicles:

In some unusual circumstances, Service or State biologists may recognize situations where this guidance provides insufficient protection for piping plovers or their nests. In such a case, the Service or the State wildlife agency may provide written notice to the landowner describing additional measures recommended to prevent take of piping plovers on that site.

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APPENDIX E

Guidelines for Managing Fireworks in the Vicinity of Piping Plovers and Seabeach Amaranth on the U.S. Atlantic Coast

GUIDELINES FOR MANAGING FIREWORKS IN THE VICINITY OF PIPING PLOVERS AND SEABEACH AMARANTH ON THE U.S. ATLANTIC COAST

February 4, 1997

The following is provided as guidance to Federal agencies, landowners, commercial fireworks companies, and fireworks event sponsors seeking to avoid adverse effects on piping plovers and seabeach amaranth. They are intended to advise Federal agencies that conduct, fund, or authorize fireworks activities regarding the measures needed to avoid adverse effects on listed species, thereby averting the need for formal consultation under Section 7 of the Endangered Species Act (ESA). These practices also constitute the U.S. Fish and Wildlife Service's (Services's) best professional advice to non-Federal entities on avoiding take of piping plovers under Section 9 of the ESA.

These guidelines supplement information about protection of piping plovers from a variety of recreational activities, provided in the Service's April 15, 1994 *Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act* (appended)[1].

Seabeach amaranth, a threatened plant species protected under the Endangered Species Act (ESA), occurred historically along coastal beaches from southern Massachusetts to South Carolina. At the present time it is found only on Long Island, New York; North Carolina; and South Carolina. Section 7 of the ESA requires Federal agencies to consult with the Service prior to authorizing, funding, or carrying out activities that directly or indirectly affect listed plants; this requirement is applicable to permits related to fireworks events that are issued by the U.S. Coast Guard.

Potential Impacts Related to Fireworks Displays

Direct Impacts

Fireworks are highly disturbing to piping plovers. Fireworks early in the breeding season may cause plovers conducting courtship activities to abandon their territories. Direct injury can be caused by the explosions or debris, and piping plovers and terns (which often nest adjacent to or near plovers) will often abandon their nests and broods during fireworks displays, exposing eggs and chicks to weather and predators. If a flightless chick were to become permanently separated from its parents during the confusion, mortality would be almost certain.

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[1] Copies of the 1994 Guidelines for general recreational activities are also available, on request, from the U.S. Fish and Wildlife Service, Wier Hill Road, Sudbury, MA 01776, Attn: Anne Hecht; telephone 508-443-4325; fax 508-443-2898.

Several situations where fireworks caused severe adverse effects on least terns, colonial nesting birds often found in the vicinity of piping plovers, serve as indicators of the effects that pyrotechnics can exert on beach-nesting birds. An August 1993 fireworks display in New Jersey caused permanent abandonment of a least tern colony located more than 250 m away, and a 1994 New Jersey fireworks display caused temporary abandonment and displays of distress by terns within a colony located more than 3/4 mile away. Incidents in New York where piping plovers were disturbed by fireworks also caused prolonged disturbance to least terns and black skimmers nesting nearby.

Seabeach amaranth can be directly affected by launch activities if they occur in areas where the plants may be crushed or damaged by launch personnel or equipment.

Indirect Impacts

In addition to adverse effects from the noise and lights of the pyrotechnics, commercial fireworks displays often draw large crowds that may pose threats to nearby plovers. These crowds may be situated at some distance from the actual launch site, for example, across an inlet. Potential indirect impacts that may adversely affect piping plovers include: spectators walking through and/or throwing objects (including illegal pyrotechnics) into plover nesting and brood-rearing areas; additional off-road vehicle patrols by public safety personnel; increased boat landings by spectators on relatively remote stretches of beach; low-flying aircraft, including helicopter patrols and personal spectator aircraft; additional trash (which attracts predators). Signs and symbolic fences that are adequate for the purpose of alerting daytime beach users to locations of plover breeding areas are often insufficient to prevent accidental entry by fireworks spectators wandering in the dark.

Potential indirect adverse effects on seabeach amaranth include trampling or crushing of unprotected plants by pedestrian or vehicular traffic on the beach.

Measures for Avoiding and Monitoring Direct and Indirect Impacts of Fireworks Events

Direct Impacts

Fireworks displays including launch areas and debris fallout areas should be located to avoid disturbance of breeding piping plovers. In general, the Service recommends that the launch site be located a minimum of 3/4 mile from the nearest plover nesting and/or foraging area. Access routes for personnel deploying the fireworks and other public safety personnel (including fire prevention/suppression and law enforcement officers) should conform with the vehicle management recommendations contained in the *Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act.* Launch sites should also be located to prevent trampling any seabeach amaranth plants.

Indirect Impacts

Event sponsors should plan and implement measures to assure that spectators will not walk through and/or throw objects into plover nesting and brood-rearing areas. Sufficient law enforcement and other personnel must also be on-site during these events to enforce plover protection measures and prevent use of illegal fireworks in the vicinity of the birds.

1. Plover habitats in the vicinity of where spectators may congregate should be intensively surveyed by qualified biologists[2] for at least four days prior to the event to locate nests, adult plovers, chicks, and/or post-fledged juveniles. For events prior to July 1, surveyors should also search for territorial and/or courting adults that have not yet established nests or may be preparing to re-nest. In New York, potential habitat for seabeach amaranth should be surveyed to locate any seabeach amaranth plants.

2. Plover habitats should be symbolically fenced in accordance with the Service's *Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act* (see pages 7-8). Seabeach amaranth plants should be symbolically fenced to provide a minimum 3 meter buffer zone around individual plants or groups of plants.

3. Additional protection measures recommended to avoid impacts that may occur when the large crowds are drawn to the beach at night include[3]:

   a. Close parking lots and beach access points in the vicinity of breeding plovers.

   b. Increase the size of symbolically fenced areas around plover nesting areas to provide extra buffers between birds and pedestrians that may be on the beach. The size of buffers should be appropriate for the size of the anticipated crowd; for large crowds, buffers should be expanded from the standard 50 meters to a total of 100 meters from established nests.

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[2] State wildlife agencies and private environmental groups often conduct plover monitoring activities and can be consulted for available information about plover breeding locations. However, intensity of surveys needed to avoid adverse effects from fireworks events will often exceed those routinely conducted by these wildlife agencies/organizations. Arrangements and commitments for added surveys for these events are the responsibility of the permitting agencies and/or event sponsors. It is recommended that these arrangements be made well in advance of the potential event, due to limited availability of qualified personnel.

[3] For extremely large fireworks events, additional protection measures may be needed, including: issuing air traffic advisory for all aircraft to remain >1000' above sensitive areas; issuing mariners advisory telling boaters not to land in sensitive areas; boat patrols; extensive advanced publicity advising spectators where they *should* go to watch the fireworks and about closed areas; training about protection needs of rare plants and/or animals for law enforcement personnel.

c. Increase the visibility of fencing using reflectorized tape or by substituting snowfences, plastic orange highway construction fences, or wire mesh fences for string fencing, as string fences are very difficult to see at night. Snowfences and highway construction fences should be removed the next day if there is any chance that they will impede chick movements.

d. Fence and post foraging territories of unfledged chicks, as delineated by a qualified biologist, especially in areas where large crowds are anticipated and/or if the day of the event is especially hot (since heat often deters chick foraging during the daytime, increasing the birds' reliance on evening feeding).

e. Provide adequate numbers (consistent with anticipated numbers of spectators) of monitors and law enforcement personnel in the vicinity of plover breeding areas or seabeach amaranth locations to patrol fenced areas from the time when spectators begin congregating on the beach until the crowd disperses after the event. Assure that monitors and enforcement personnel receive accurate current information about the locations of threatened birds and plants so that they can minimize any disruptions from their own activities.

f. Prohibit all pets on the beach during the event and ensure compliance with this prohibition.

4. Remove any trash or litter from the beach immediately following the event. However, any trash located within fenced areas should be left until daylight and then removed by or under the supervision of plover monitors. Further, vehicles should not be used at night to remove trash within 100 meters of unfledged plover chicks.

5. In order to gauge the effectiveness of the measures 3 and 4, the following data should be collected:

   a. Locations and status of all adult plovers, nests, and chicks within 1/4 mile of spectator viewing areas should be determined by a qualified biologist on the day of the event and again on the following day.

   b. Counts of human and dog tracks that intersect the perimeter of symbolically fenced areas before and after the event.

   c. Counts of any persons actually observed inside symbolically fenced areas during the event.

   d. Counts of any instances of illegal pyrotechnics used on the beach during the event.

e. Counts of trash/litter items inside symbolically fenced areas before and after the event. For very large areas or areas that have substantial amounts of trash before the event, trash counts may be conducted in sample plots.

f. Count of breaks in symbolic fences.

6. Except when responding to an actual emergency situation, all law enforcement, fire department, public works, fireworks deployment, and other vehicles in the vicinity of breeding plovers should only be operated in conformance with the Service's *Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act* (see discussion of Essential Vehicles, pages 13-14).

DRAFT

FISH AND WILDLIFE COORDINATION ACT SECTION 2(b) REPORT

HEREFORD INLET TO CAPE MAY INLET FEASIBILITY STUDY CAPE MAY COUNTY, NEW JERSEY

Prepared by:

U.S. Fish and Wildlife Service
Ecological Services, Region 5
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August 2013

United States Department of the Interior

FISH AND WILDLIFE SERVICE

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LTC Chris Becking
District Engineer, Philadelphia District
U.S. Army Corps of Engineers
Wanamaker Building – 100 Penn Square East
Philadelphia, Pennsylvania 19107 - 3390
Attn: Beth Brandreth

AUG 15 2013

Dear LTC Becking:

Enclosed is a U.S. Fish and Wildlife Service (Service) draft report prepared pursuant to Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) on the U.S. Army Corps of Engineers, Philadelphia District (Corps) Hereford Inlet to Cape May Inlet Feasibility Study, Cape May County, New Jersey. The information presented in this draft FWCA Section 2 (b) report addresses potential beneficial or adverse impacts on fish and wildlife resources from proposed shore protection along the five-mile-long barrier island. This report has been prepared pursuant to the Scope-of-Work and Fiscal Year-2007 and 2008 interagency agreement between the Corps and the Service.

The following comments are provided pursuant to Section 2(b) of the FWCA. Comments are also provided under authority of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C 1531 *et seq.*), and the Migratory Bird Act Treaty of 1918 (40 Stat. 775, as amended; 16 U.S.C. 703-712), and are consistent with the intent of the Service's Mitigation Policy (Federal Register, Vol. 46, No. 15, Jan. 23, 1981).

FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

The federally listed (threatened) piping plover (*Charadrius melodus*) nests on the beaches of Hereford Inlet including (Stone Harbor Point and North Wildwood from Central Avenue to the intersection of John F. Kennedy Beach Drive and 2nd Avenue), on the U.S. Coast Guard's LORAN site, and on Cape May National Wildlife Refuge; and are known to forage along the beaches of Wildwood Crest and Lower Township. Piping plovers are not listed as "historical" within the project area as erroneously stated on page 2.3 of the Corps' draft feasibility report. On the Atlantic coastal beaches within the project area, piping plovers last nested in North Wildwood and Wildwood Crest in the 1990's, and the Service has no current or historical records of nesting in

Wildwood. Piping plovers nest on sandy beaches above high-tide line on mainland coastal beaches, sand flats, and barrier island coastal beaches. The nesting sites are typically located on gently sloping foredunes, blowout areas behind primary dunes, washover areas cut into or between dunes, ends of sandpits, and on sites with deposits of suitable dredged or pumped sand.

Coastal development for residential and commercial uses, and the subsequent stabilization of the once shifting and dynamic ecosystem, have resulted in the degradation and alteration of natural beaches to such an extent along the Atlantic coast that many beaches no longer provide suitable habitat for piping plovers. Disturbance by humans and the direct loss of nests have become major contributing factors to the population decline of the piping plover (U.S. Fish and Wildlife Service 1996a).

Dredged spoil deposition has the potential to create piping plover nesting habitat, although this is sub-optimal, provided the material is deposited prior to nesting (U.S. Fish and Wildlife Service 1996a). As a result, piping plovers could expand their nesting range within the project area after nourishment is completed. This occurred in 1997 as a result of Corps - New York District beach nourishment projects in Monmouth County, New Jersey (U.S. Fish and Wildlife Service 2002). Prior to initial beach nourishment in 1994, piping plovers were not documented in that project area for at least a decade.

The project may also create habitat for seabeach amaranth (*Amaranthus pumilus*), a federally listed (threatened) plant (U.S. Fish and Wildlife Service 1996b). Seabeach amaranth is an annual plant, endemic to Atlantic coastal plain beach, primarily occurring on overwash flats at the accreting ends of barrier beach islands and lower foredunes of non-eroding beaches. The species occasionally establishes small temporary populations in other areas, including bayside beaches, blowouts in foredunes, and sand and shell materials placed as beach replenishment or dredge spoil. Previous occurrences of seabeach amaranth are known within the proposed project area (*i.e.*, the U.S. Coast Guard's LORAN Unit in 2003-2004) and may become naturally reestablished within the project area during the project life. Colonization of seabeach amaranth in New Jersey occurred in July 2000 after a Corps - New York District beach nourishment project in Monmouth County, (U.S. Fish and Wildlife Service 2002). Prior to the 2000 rediscovery, this species had last been documented in New Jersey in 1913 (U.S. Fish and Wildlife Service 1996b).

Other than the piping plover and seabeach amaranth, the federally and State-listed roseate tern (*Sterna dougallii*) (occasional transient) and State-listed peregrine falcon (*Falco peregrinus*) are known to use the project area. In addition, red knots (*Calidris canutus rufa*), a Federal candidate species, are known to stopover in the project area during spring (northward) and fall (southward) migration where they feed mainly on the spat of mussels and other invertebrates to build fat reserves to complete their migration.

The National Marine Fisheries Service (NMFS) must be consulted regarding Essential Fish Habitat, as required under Section 305 (b)(2) of the Magnuson – Stevens Fishery Conservation and Management Act (16 U.S.C. 1801-1882). The NMFS must also be consulted regarding the ESA due to the potential presence of the federally listed (endangered) kemps ridley sea turtle (*Lepidochelys kempii*), hawksbill sea turtle (*Eretmochelys imbricata*) and leatherback sea turtle (*Dermochelys coriacea*), and the federally listed (threatened) loggerhead sea turtle (*Caretta*

caretta) and green sea turtle (*Chelonia mydas*) within the project area and any borrow areas. Appendix A provides a current list of federally listed (endangered and threatened) and candidate species in New Jersey.

The Service appreciates the opportunity to comment on the proposed plan and is pleased to submit this draft FWCA Section 2(b) report as technical input to the *Hereford Inlet to Cape May Inlet Feasibility Study*. Should you have any questions, please contact Ron Popowski at Ron_Popowski@fws.gov.

Sincerely,

Eric Schrading
Acting Field Supervisor

Enclosure
CC: Ralph Tiner, RO
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DRAFT

FISH AND WILDLIFE COORDINATION ACT

SECTION 2(b) REPORT

HEREFORD INLET TO CAPE MAY INLET
FEASIBILITY STUDY
CAPE MAY COUNTY, NEW JERSEY

Prepared for:

U.S. Army Corps of Engineers
Philadelphia District
Philadelphia, Pennsylvania 19107

Prepared by:

U.S. Fish and Wildlife Service
Ecological Services, Region 5
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EXECUTIVE SUMMARY

The Philadelphia District, U.S. Army Corps of Engineers (Corps) was authorized by Congress under the Water Resources Development Act of 1986 (P.L. 99-662), to conduct a feasibility study to investigate storm damage reduction, beach restoration, and water quality improvement alternatives from Hereford Inlet to Cape May Inlet within the municipalities of North Wildwood, Wildwood, Wildwood Crest, and Lower Township, Cape May County, New Jersey (project area). The length of the project area is approximately seven miles long and exhibits several different coastal issues. The North Wildwood portion of the project area is prone to moderate to severe erosion, leaving the surrounding community vulnerable to storm damages. Meanwhile, the beaches of Wildwood and Wildwood Crest have been accreting large quantities of sand resulting in a large, low, flat beach offering little habitat value and resulting in human health and water quality concerns due to clogged outfall pipes on the beach. The preferred alternative currently being considered for the project is "bypassing" sand through hydraulic back passing from Wildwood to North Wildwood and changing the beach configuration in Wildwood by increasing berm height and adding a dune. Within the project area, no work is planned for either the Cape May National Wildlife Refuge or the U.S. Coast Guard's LORAN site, or along Hereford Inlet beyond the jetty at the intersection of Beach Avenue and 2nd Avenue in North Wildwood.

In this draft Section 2(b) report of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. *et. seq*) (FWCA), the U.S. Fish and Wildlife Service (Service) identifies fish and wildlife resources in the vicinity of the 5-mile-long barrier island bordered to the north by Hereford Inlet and to the south by Cape May Inlet (formerly Cold Spring Inlet); discusses potential impacts on those resources from proposed project activities (including federally listed species); identifies opportunities for fish and wildlife habitat improvements; and updates the current state of knowledge concerning the proposed activities.

The federally listed (threatened) piping plover (*Charadrius melodus*) nests on the beaches of Hereford Inlet including (Stone Harbor Point and North Wildwood from Central Avenue to the intersection of John F. Kennedy Beach Drive and 2nd Avenue), on the U.S. Coast Guard's LORAN site, and on Cape May National Wildlife Refuge; and are known to forage along the beaches of Wildwood Crest and Lower Township. On the Atlantic coastal beaches within the project area, piping plovers last nested in North Wildwood and Wildwood Crest in the 1990's, and the Service has no current or historical records of nesting in Wildwood. Piping plovers nest on sandy beaches above high-tide line on mainland coastal beaches, sand flats, and barrier island coastal beaches. The nesting sites are typically located on gently sloping foredunes, blowout areas behind primary dunes, washover areas cut into or between dunes, ends of sandpits, and on sites with deposits of suitable dredged or pumped sand. The Service views this beach nourishment project, specifically at North Wildwood, as an opportunity to enhance nesting habitat for piping plover, shorebirds, and colonial nesting waterbirds; target species for habitat enhancement include the Federal candidate red knot (*Calidris canutus rufa*), and the State-listed (endangered) black skimmer (*Rynchops niger*) and least tern (*Sterna antillarum*).

In addition to piping plover, shorebirds, and colonial nesting waterbirds, the project may also create habitat for seabeach amaranth (*Amaranthus pumilus*), a federally listed (threatened) plant

(U.S. Fish and Wildlife Service 1996b). Seabeach amaranth is an annual plant, endemic to Atlantic coastal plain beaches, primarily occurring on overwash flats at the accreting ends of barrier beach islands and lower foredunes of non-eroding beaches. Occurrences of seabeach amaranth are known from 2003-2004 within the U.S. Coast Guard's LORAN unit. The species has also recently naturally recolonized coastal sites within New York and Maryland; therefore, it is possible that seabeach amaranth may become naturally reestablished within the project area during the life of the project. Colonization of seabeach amaranth occurred in July 2000 after a New York District Corps beach nourishment project in Monmouth County, New Jersey (U.S. Fish and Wildlife Service 2002). Prior to the 2000 rediscovery, this species had last been documented in New Jersey in 1913 (U.S. Fish and Wildlife Service 1996b).

In December 2005, the Service issued a Programmatic Biological Opinion (PBO), in accordance with Section 7 of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended, 16 U.S.C. 1531 *et seq.*), on the effects of beach nourishment, renourishment, stabilization, and restoration projects funded, permitted, or conducted by the Corps along the Atlantic Coast of New Jersey on the federally listed (threatened) species piping plover and seabeach amaranth. The purpose of the PBO is to expedite review of Corps funded and permitted Program activities, and to account for landscape-level causes of incidental take (*e.g.*, from preclusion of natural habitat formation).

In closing, this draft FWCA Section 2(b) report provides recommendations for beach communities, borrow areas, and beach habitat enhancements. In order to avoid and minimize potential adverse impacts on State-listed and federally listed threatened and endangered species within the project area, the Service recommends incorporating five measures into the project. This draft FWCA Section 2(b) report also includes seven recommendations for habitat enhancement and nine recommendations for borrow areas.

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APPENDICES

I. INTRODUCTION

The purpose of this U.S. Army Corps of Engineers (Corps) project, authorized under the Water Resources Development Act 1986 (PL 99-662), is to provide storm damage reduction, beach restoration, and water quality improvements within the Hereford Inlet, North Wildwood, Wildwood, Wildwood Crest Borough, Lower Township to Cape May Inlet, Cape May County, New Jersey (project area) (Figure 1). Although the project area extends from Hereford Inlet to Cape May Inlet, no activities will be conducted within Hereford Inlet north of the jetty, at the Cape May Inlet, on the Cape May National Wildlife Refuge (CMNWR), or on U.S. Coast Guard's LORAN facility. The project area exhibits several different coastal issues. The North Wildwood portion of the project area is prone to moderate to severe erosion, leaving the surrounding community vulnerable to storm damages. The beaches of Wildwood and Wildwood Crest have been accreting large quantities of sand, resulting in human health and water quality concerns due to clogged outfall pipes on the beach. The selected plan being proposed for the project involves "back-passing" sand using mobile hydraulic dredges located in the surf zones from Wildwood to North Wildwood and changing the beach configuration in Wildwood by increasing berm height and adding a dune.

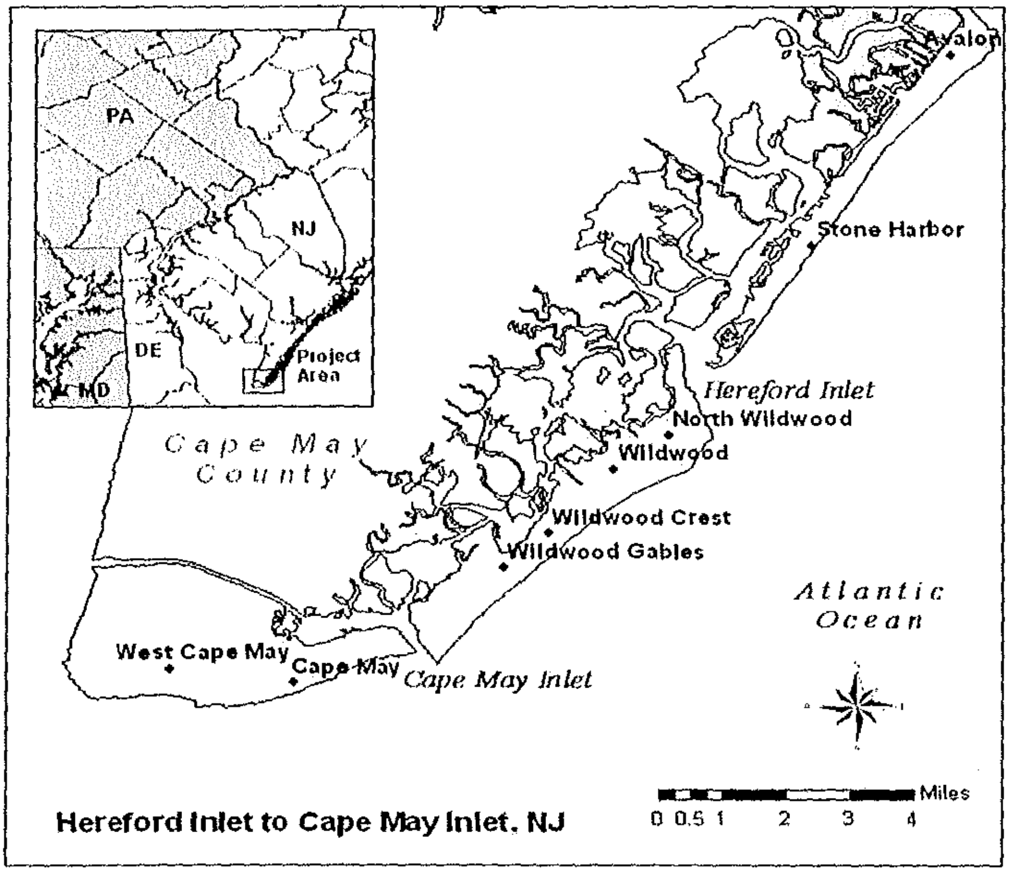

Figure 1: Project Area - Hereford Inlet to Cape May Inlet Cape May County, New Jersey

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This draft FWCA Section 2(b) report, submitted to the Corps by the U.S. Fish and Wildlife Service (Service) identifies fish and wildlife resources in the vicinity of the five-mile-long barrier island bordered to the north by Hereford Inlet and to the south by Cape May Inlet (formerly Cold Spring Inlet); discusses potential impacts on those resources from proposed project activities; identifies opportunities for fish and wildlife habitat improvements; and updates the current state of knowledge concerning the proposed activities.

II. DESCRIPTION OF PROPOSED PLAN

A. SELECTED BEACH NOURISHMENT PLAN

The selected plan consists of a dune and berm constructed using sand obtained from an onshore borrow source located near the southern end of Five Mile Island (the Wildwoods). The project area extends approximately 4.5 miles from Hereford Inlet to Cape May Inlet and encompasses the municipalities of North Wildwood, Wildwood, Wildwood Crest and Lower Township (Appendix B). The southernmost beach section, which is managed by the Service as the CMNWR, is not included in the initial construction. Dimensions of the proposed project are a +16 foot NAVD 88 dune, with a 25 foot crest on a 75 foot-wide berm that is 6.5 feet in elevation from North Wildwood to the northern border of Wildwood. In Wildwood and Wildwood Crest the project will consist of a dune only, constructed to the elevation of +16 feet NAVD 88 on top of the existing berm. Side slopes for the dune will be in a 1 foot vertical: 5 foot horizontal ratio. The plan includes installing approximately 64 acres of dune grass, 28,000 linear feet of sand fence, 44 extended crossovers, 7 new pedestrian crossovers, 7 extended handicap crossovers, 6 new handicap crossovers, 8 existing vehicle crossover extensions and 5 new vehicular crossovers. The Corps proposes to hydraulically pump sand from the Wildwood and Wildwood Crest onshore borrow areas via an 8-inch pipe to the North Wildwood placement area using mobile back-passing technology. The sand quantity is estimated at 1,362,000 cubic yards, which includes a design quantity of 1,057,000 cubic yards and advanced nourishment of 305,000 cubic yards.

Periodic sand nourishment is included in project design to maintain the integrity of the design beach template over the project life and will be conducted in 5 year intervals. Without periodic nourishment, ongoing erosion would compromise the design template and reduce storm protection. Nourishment requirements were determined by considering losses resulting from diffusion of the design beach fill platform and natural background erosion. The diffusion component refers to "spreading out" losses that occur because the design beach is wider than adjacent beach areas. Background erosion refers to the average long-term rate of shoreline erosion that occurs along the project reach. Background erosion rates were determined through an analysis to determine potential longshore sediment; this analysis was done to ascertain possible post-dredging infilling rates of the borrow area along the beaches of Wildwood and Wildwood Crest. Longshore or littoral transport can both supply and remove sand from coastal areas. To determine the balance of sediment losses and gains for an area such as the borrow area, net, rather than gross, transport rates are required. Net longshore transport refers to the difference between volume of material moving in one direction along the coast and that moving in the opposite direction. The time period analyzed using available data was from 1986 to 1998. As part of the investigation, potential longshore transport rates due to waves were computed. Data indicate that generally, there is a net southward transport within the study area that may vary from 370,000 to 440,000 cubic yards per year. The trends in the estimates for the net longshore transport show that southward transport is almost double northward transport. The rates computed can be used as a potential infilling rate for the borrow area along the beaches of Wildwood and Wildwood Crest.

All data gathered should be viewed as representative of average conditions over a span of 12 years from 1986 to 1998. It can be expected that changes in longshore sediment transport could happen in a seasonal manner and could contribute significantly to both the short- and long-term infilling rates of the borrow areas. It would be anticipated that shortly after removing any sand from a borrow area that there would be a short-term accelerated infilling rate of sand coming from the north followed by a period more representative of the long-term average infilling rate. The selected plan recommends that any removal of sand from the borrow area be done over as wide of an area as possible within the borrow area as opposed to removing sand in a small concentrated area; this practice will help maintain the natural coastal processes in the area.

The constructed beach fill template typically varies from the design template because of working limitations of equipment used to place and shape the fill. After placement, sorting of the fill by waves and currents will naturally shape the constructed fill profile to an equilibrium form consistent with the design template. To account for these factors, the construction template is developed based on the "overbuilding method."

The overbuilding method involves placing the required design sand quantity at the proposed berm elevation, but with a berm width greater than the design width. The seaward slope of the construction berm is generally equal to or steeper than the natural existing equilibrium slope. The constructed berm is "overbuilt" in the sense that it is wider than the intended design berm. Coastal processes readjust the profile to a natural equilibrium state. Much of the overbuilt berm sand moves offshore to form the intended design profile. The advanced nourishment quantity (1.3 million cubic yards) is also included in the overbuilt construction berm template.

Beach fill construction using the overbuilding method often leaves the impression that much of the project sand has been lost soon after construction due to rapid readjustment of the construction profile. However, rather than being "lost," this offshore movement of sand is an indication that the construction profile is functioning as intended to naturally form the design template.

The selected project plan incorporates the use of only onshore borrow areas. The Corps also evaluated, but rejected, the use of offshore borrow areas to nourish North Wildwood. Primarily Hereford Inlet was examined as it has been used in past authorized Federal projects. Rejection of Hereford Inlet and other offshore locations was based on several factors, particularly overabundance of sand along beaches in Wildwood and Wildwood Crest. Use of any offshore borrow location that would cause accretion of sand is an issue in the Wildwoods, leading to even wider beaches, and is unacceptable to those municipalities.

As the Service has noted during planning for other Corps projects, the use of Hereford Inlet would impact the Coastal Barrier Resources System (CBRS), and could indirectly affect nearby piping plover nesting beaches by changing the inlet's sediment dynamics. If plans should change and additional borrow sites, specifically offshore locations, are needed, additional coordination with the Service will need to be conducted.

B. SELECTION OF ONSHORE BORROW AREAS

The Corps chose back-passing from a beach borrow source as the preferred method of re-nourishment. There is a surplus of sand in Wildwood and Wildwood Crest that has been accumulating through natural processes and as a result of existing hard stabilization structures. By adding more sand to the island from an offshore source the project would have contributed to a problem that the local communities have been concerned with over the past 10-15 years (*e.g.*, clogging of the storm water outfall system, and excessively large beaches). Back-passing ameliorates both problems.

C. BACK-PASSING

Sediment back-passing involves the removal of sand from a source area to a sink with mechanical means, usually in the opposite direction of long-shore transport. This can be accomplished with scraping and truck hauling the material to the deposition site or with mobile hydraulic back-passing techniques. The latter is being proposed for the Hereford Inlet to Cape May Inlet project. Mobile hydraulic sediment back-passing will involve the use of 1 to 2 crawler cranes deploying a submersible/ centrifugal pump in the surf zone to remove sand from a source area, pump it through an 8-inch wide pipeline to a sink area, and shape the material into a dune and berm for storm damage reduction.

A conceptual layout of a sediment back-pass system for the Hereford Inlet to Cape May Inlet project is shown on pages 5-10 and 5-11 of the Corps Hereford Inlet to Cape May Inlet Feasibility Study (U.S. Army Corps of Engineers 2013). The system would involve a crawler crane mounted with an eductor pump on a 100-foot-long boom excavating material from the beach in Wildwood and Wildwood Crest and be attached to an 8-inch-wide High Density Polyethylene Pipe (HDPE) with a series of boosters that would be transporting the material to the design locations.

Craters are a byproduct of the creation of slurry material that is excavated and pumped to a deposition area on the beach. Craters will be approximately 15 feet in diameter and 5 feet deep. Each crater created from the mobile dredge contains roughly 11 cubic yards of fill material. The distance the sand will have to travels also impacts design considerations, and booster pumps stationed on the beach will likely be required. These pumps are stationed every few thousand feet along the beach depending on the grain size of the material and the distance that material has to be pumped. Based on preliminary estimates, it is likely that 2-3 booster pumps connected by 8-inch-wide HDPE pipelines will be required to move the material from the borrow area.

III. STUDY AREA

The project area includes North Wildwood, Wildwood, Wildwood Crest, and Lower Township (Figure 1). Locations within the study area that no work or dredging will be conducted are the two-mile beach unit of the CMNWR; the U.S. Coast Guard's LORAN site located adjacent to Cape May Inlet within Lower Township at the southern end of the project area; Cape May Inlet; Hereford Inlet; Stone Harbor; and areas north of the groin on 2nd Avenue (Figure 2). Hereford Inlet opens to the Atlantic Ocean and is located between Stone Harbor Point and North Wildwood. The inlet contains a scour hole, located along the southern end of the seawall at Anglesea in North Wildwood. The scour hole possibly resulted from dredging of fill materials for the Townsends Inlet to Hereford Inlet or another beach nourishment projects. At this time, the Service would like to remind the Corps that dredging of Inlets may impact Coastal Barrier Resource Act (CBRA) (96 Stat. 1653, 16 U.S.C. 3504) areas and even though the Corps is not proposing to dredge any inlets for this project, future projects that involve borrowing from Inlets associated with CBRA should be avoided.

IV. METHODS AND PROCEDURES

This draft FWCA report incorporates information compiled from files, reports and personal communications from the Service's New Jersey Field Office, the New Jersey Department of Environmental Protection (NJDEP) database, CMNWR, New Jersey Audubon Society (NJAS), as well as, the Corps' Hereford Inlet to Cape May Inlet Feasibility Study Project Management Plan (U.S. Army Corps of Engineers 2005) and the Corps' Feasibility Study (U.S. Army Corps of Engineers 2013). The database was reviewed for information regarding federally listed species, State-listed species, and other fish and wildlife in the vicinity of Hereford Inlet to Cape May Inlet. In addition, personal communications were conducted with personnel from the CMNWR, New Jersey Division of Fish and Wildlife (NJDFW), New Jersey Bureau of Shellfisheries, New Jersey Bureau of Marine Fisheries, and the National Marine Fisheries Service (NMFS). Representatives of the Corps, the NJDEP, and the Service conducted a site visit of the project area on October 30, 2007. The discussion during the site visit concluded with support to reconfigure the North Wildwood beach to provide storm protection for the proposed project area. The interagency study team determined that beach enhancements such as the creation of gently sloping foredunes within the project area would benefit piping plover and other beach nesting birds.

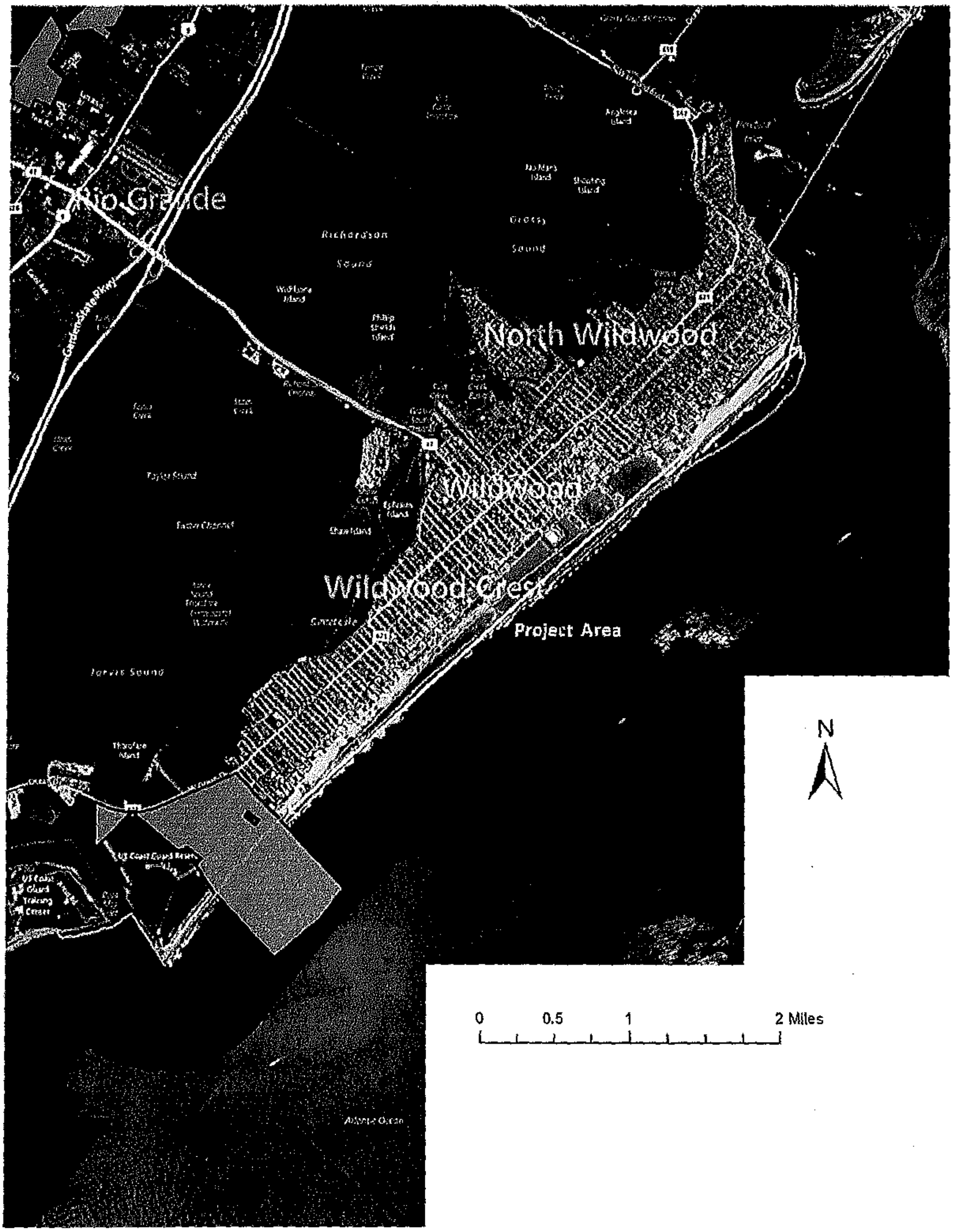

Figure 2: Location of Cape May NWR in relation to project area.

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V. FEDERALLY LISTED AND CANDIDATE SPECIES UNDER SERVICE JURISDICTION

A. PIPING PLOVER

1. Species Description

Piping plovers are small, sandy-colored territorial shorebirds, approximately 7 inches in length (Palmer 1967; U.S. Fish and Wildlife Service 1985; 1996a). The bird's name was derived from its call, which resembles plaintive bell-like whistles that are often heard before the birds are seen. Breeding adults have orange legs, a black ring around the base of the neck and across the forehead, and an orange bill with a black tip. The female's neck band is often incomplete and is usually thinner than the male's neck band. In winter, the black band completely disappears, and adults and juveniles look similar, with pale yellow legs and a solid black bill. Chicks have speckled gray, buff, and brown down feathers, black beaks, orange legs, and a white collar around the neck.

2. Life History

New information confirms inter- and intra-annual fidelity of piping plovers to migration and wintering sites (U.S. Fish and Wildlife 2009). Observations reported that six of 259 banded piping plovers observed more than once per winter moved across boundaries of seven continental 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). Local movements are more common. In South Carolina surveys documented many cross-inlet movements by wintering banded piping plovers as well as occasional movements of up to 18 kilometers by approximately 10% of the banded population; larger movements within South Carolina were seen during fall and spring migration (Maddock *et al.* 2009). 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).

Piping plovers inhabit New Jersey beaches between March and August, arriving at their breeding grounds in late March through early April (U.S. Fish and Wildlife Service 2005a). After choosing mates and establishing territories, piping plovers scrape depressions in the sand to form a nest and lay their eggs (Bent 1929; Burger 1987; Cairns 1982; Patterson 1988; Flemming *et al.* 1990; MacIvor 1990; Strauss 1990). The birds nest above the high tide line, usually on sandy ocean beaches and barrier islands, but also on gently sloping foredunes, blowout areas behind primary dunes, washover areas cut into or between dunes, the ends of sandspits, and deposits of suitable dredged or pumped sand (U.S. Fish and Wildlife Service 1996a; 2005a). The nests are frequently lined with shell fragments and often located near small clumps of vegetation such as beachgrass (*Ammophila breviligulata*) (Patterson 1988; Flemming *et al.* 1990; MacIvor 1990). Plovers will lay their eggs (up to 4) from mid-April through late June or early July and may re-nest during the season if earlier clutches are lost (Wilcox 1959; Cairns 1977; MacIvor 1990). The eggs are well camouflaged and blend extremely well with their surroundings. Both the male and female will incubate the nest for about 30 days. After the eggs hatch, the chicks may be present on the beaches with their parents until the end of August when they are ready to fly (Patterson 1988; Goldin 1990; MacIvor 1990; Howard *et al.* 1993).

Piping plover adults and chicks feed on marine macroinvertebrates such as worms, fly larvae, beetles, crustaceans, and mollusks (Bent 1929; Cairns 1977; Nicholls 1989). Feeding areas include the intertidal zone of ocean beaches, ocean washover areas, mudflats, sand flats, wrack lines (organic ocean material left by high tide), and the shorelines of coastal ponds, lagoons, and salt marshes (Gibbs 1986; Coutu *et al.* 1990; Hoopes *et al.* 1992; Loegering 1992; Goldin 1993; Elias-Gerken 1994).

3. Population Status

One hundred twenty-one (121) pairs of piping plovers nested in New Jersey in 2012, a 9% increase compared to 2011 (111 pairs) (NJENSP 2012). The statewide population trend had been flat over the previous four years (111, 105, 108, and 111 pairs from 2008-2011, respectively). Despite the increase in nesting pairs in 2012, the population remained about average for the years since federal listing (119 pairs) and substantially below the peak of 144 pairs in 2003 (Appendix H). The total number of adults recorded for the entire nesting season (243) was nearly the same as the count during the date-restricted survey conducted June 1-9 (236). However, the number of pairs tallied during the entire nesting season (121) was higher than those counted during the date-restricted census (106), which is a typical survey result in New Jersey. The low percentage of pairs monitored by NJDFW was the result of less suitable habitat conditions. The southern region of the state, which encompasses the project area (Stone Harbor Point to Cape May Point) recorded even lower productivity, just 0.22 fledglings per pair (18 pairs). Flooding was the leading cause of nest failure statewide, accounting for just over a third (35%) of the failed nests. Abandonment and predation each accounted for about a quarter of the nest failures (24% and 23%, respectively). The exact cause of failure could not be determined for 18% of the failed nests. Nest abandonment was relatively high and there was no apparent pattern as to the causes on a statewide basis.

4. Continuing Threats

Continuing threats to Atlantic Coast piping plovers in the breeding portion of their range include habitat loss and degradation, disturbance by humans and pets, increased predation, oil spills, and herbivory. These detailed descriptions of threats are provided in the revised recovery plan (U.S. Fish and Wildlife Service 1996a) and PBO (U.S. Fish and Wildlife Service 2005a). In the project area piping plover are primarily subject to human interference in multiple forms and predation. According to the North Wildwoods BMP, human disturbance amounts to vehicular use, beach management, maintenance, and nourishment, and recreational activities including the use of fireworks and flying of kites. Predation in the area consists of preexisting species and species drawn to the area because of human use or proximity of local residents (New Jersey Department of Environmental Protection and U.S. Fish and Wildlife Service 2009).

One emerging threat to piping plover within the project area is climate change (especially sea-level rise) and is likely to affect Atlantic Coast piping plovers throughout their life cycle. This threat requires further study to ascertain effects on piping plovers and/or their habitat, as well as the need for specific protections to prevent or mitigate impacts that could otherwise increase overall risks to the species.

Habitat loss results from development as well as from beach stabilization, beach nourishment, and other physical alterations to the beach ecosystem (U.S. Fish and Wildlife Service 1996a). Commercial, residential, and recreational development reduce the amount of suitable habitat available for nesting and feeding. Structures such as seawalls, jetties, groins, and bulkheads promote stabilization of the beach and rapidly promote natural succession, decreasing the sandy, sparsely vegetated habitat required for nesting. Predation on chicks and eggs is intensified by development because predators such as foxes (*Vulpes vulpes*), rats (*Rattus norvegicus*), raccoons (*Procyon lotor*); domestic dogs (*Canis familiaris*), domestic cats (*Felis silvestris*) and gulls (*Larus* spp.) thrive in developed areas and are attracted to beaches by food scraps and trash (Riepe 1989; Jenkins and Nichols 1994; Elias-Gerken 1994; Jenkins and Niles 1999; U.S. Fish and Wildlife Service 1996a; Canale 1997). Piping plovers are vulnerable to domestic animals before and after the eggs hatch. Adult plovers will stagger and act as if they have a broken wing to distract predators from their nest or chicks. Flightless chicks are no match for an agile cat or dog that instinctively sees a chick as something to hunt or chase. Camouflaged chicks can also become trapped in tire ruts and be run over by recreational or municipal vehicles.

Human disturbance of nesting birds includes but is not limited to, foot traffic, sunbathing, kite flying, pets, fireworks displays, beach raking, construction, and vehicle use. These disturbances can result in crushing of eggs, failure of eggs to hatch, and death of chicks (Wilcox 1959; Tull 1984; Burger 1987; Patterson *et al.* 1991). Excessive disturbance may cause the parents to desert the nest, exposing eggs or chicks to the summer sun and predators (Welty 1982; Bergstrom 1991). While removal of human-created trash on the beach is desirable to reduce predation threats, the indiscriminate nature of mechanized beach-cleaning adversely affects piping plovers and their habitat. In addition to danger of directly crushing piping plover nests and chicks and the prolonged disturbance from the machine's noise, this method of beach-cleaning removes the birds' natural wrack line feeding habitat (Eddings and Melvin 1991; Howard *et al.* 1993), and shell fragments, a preferred feature of nesting habitat.

Intensive management, including municipal beach management plans (BMP) to protect piping plovers from disturbance by beach recreationists, pets, and beach-cleaning operations have been implemented at many New Jersey plover nesting sites in recent years. The Service and NJDFW are currently working with several coastal municipalities to develop and implement BMPs. Piping plover protection in the New Jersey recovery unit is highly dependent on the efforts of State and local government agencies, conservation organizations, and private landowners.

North Wildwood is actively implementing an approved BMP dated August 2009 that covers red knot, seabeach amaranth, and State-listed species in addition to piping plovers. The Service appreciates the cooperation of North Wildwood in preparing and implementing this plan for the protection of these federally and State-listed species.

B. RED KNOT

1. Species Description

The red knot is a medium-sized shorebird about 9 to 11 inches (23 to 28 centimeters) in length with a proportionately small head, small eyes, short neck, short tibia, and stout tarsus. The black bill tapers steadily from a relatively thick base to a relatively fine tip; bill length is not much longer than head length. Legs are typically dark gray to black, but sometimes greenish in juveniles or older birds in non-breeding plumage (Harrington 2001). During the breeding season, the plumage of the red knot is distinctive and easily recognizable. The face, breast, and upper belly are a rich rufous-red, while the lower belly and under tail-covert region are light-colored with dark flecks. Upperparts are dark brown with white and rufous feather edges; outer primary feathers are dark brown to black (Davis 1983; Harrington 2001). Females are similar to males, though rufous colors are typically less intense, with more buff or light gray on dorsal parts (Niles *et al.* 2005). Non-breeding plumage is dusky gray above and whitish below. Juveniles resemble non-breeding adults, but the feathers of the scapulars and wing coverts are edged with white and have narrow, dark subterminal bands, giving the upperparts a scalloped appearance (Davis 1983). Body mass varies seasonally, with lowest mean mass during early winter (125 grams (gm)) and highest mean values during spring (205 gm) and fall (172 gm) migration (Harrington 2001; New Jersey Department of Environmental Protection 2007).

2. Life History

Each year red knots travel up to 19,000 miles between wintering grounds (in South America and the southern United States) and breeding areas within the central Canadian Arctic. In non-breeding locations (wintering and migration stopover areas), red knots are found principally in intertidal marine habitats, especially near coastal inlets, estuaries, and bays, foraging and roosting along sandy beaches, tidal mudflats, salt marshes, and peat banks. (Harrington 2001)

During migration, red knots undertake long flights that may span thousands of miles without stopping. At some stages of migration, very high proportions of entire populations may use a single migration staging site to prepare for the next long flight (Harrington 2001). During the spring and fall migrations, red knots stop over along the Gulf and Atlantic coasts of the United States to rebuild energy reserves needed to complete the journey. The Delaware Bay supports the largest known spring migration concentration of red knots (50 to 80 percent of the total population) and is the last major stopover area used by red knots during spring migration before departing for Arctic breeding areas (Brown *et al.* 2001). In the southeastern and mid-Atlantic United States, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks.

In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans (Harrington 2001). An exception occurs each May when the majority of red knots arrive in Delaware Bay to feed on the eggs of horseshoe crabs (*Limulus polyphemus*) (Wander and Dunne 1982; Harrington 1996, 2001; Niles *et al.* 2008).

In addition to the large flocks of red knots found in the Delaware Bay, red knots are found in lower densities during the spring and fall migration elsewhere along the Atlantic Coast, including the project area. The NJDEP Landscape Project maps show red knot habitat from Cape May Inlet north to East Washington Avenue in Lower Township, and in North Wildwood from New York Avenue on Hereford Inlet extending to around 23rd Street on the ocean side beach. In this northern area, red knot usage is concentrated along Hereford Inlet and the Atlantic side beach to 13th Avenue; however red knots have been observed using beaches all the way through to 23rd Street. This area is used primarily by fall migrants (August - December). In 2008 several hundred red knots were reported from North Wildwood and Avalon throughout the fall, and small numbers (up to 60 red knots) remained until February (Pitts pers. comm. 2013). Upwards of 1,500 knots used Avalon through at least late November 2011 (U.S. Fish and Wildlife Service 2011).

3. Population Status

In breeding habitats, red knots are thinly distributed across a huge and remote area of the Arctic. Despite some localized survey efforts, (*e.g.*, Niles *et al.* 2008), there are no regional or comprehensive estimates of breeding abundance, density, or productivity (Niles *et al.* 2008). Few regular surveys are conducted in fall because southbound red knots tend to be less concentrated than during winter or spring.

Some survey data are available for most of the red knot's wintering and spring stopover areas. For a few key areas, long-term data sets have been compiled using consistent survey methodology. Because there can be considerable annual fluctuations in red knot counts, these longer-term trends are more meaningful. At several key sites, the best available data show that numbers of red knots declined and remain low relative to counts from the 1980s, although the rate of decline appears to have leveled off since the late 2000s. Among these sites with documented declines are the Tierra del Fuego wintering area in southern Argentina and Chile and the Delaware Bay spring stopover site. At both of these important sites, red knot counts since the mid-2000s have been roughly 75 percent lower than they were during the 1980s (G. Morrison pers. comm. 2012; A. Dey pers. comm. 2012; Clark *et al.* 2009, Kochenberger 1983, Dunne *et al.* 1983, Wander and Dunne, 1982). See also (Appendix E)

4. Continuing Threats

Overharvest of the horseshoe crab, leading to decreasing food supplies (horseshoe crab eggs) in the Delaware Bay, is the best supported explanation for the red knot population declines that occurred in the 2000s (Niles *et al.* 2008). Because the horseshoe crab fishery is now managed, with harvest limits explicitly tied to red not population targets, the current crab harvest is no longer a threat to the red knot. However, horseshoe crab populations have not fully rebounded, and the crab egg food resource is not yet fully secure. The red knot also faces other threats to its food resources from bivalve diseases and parasites, marine invasive species, sediment placement (*e.g.*, beach nourishment, dredge material disposal), ORV use, and climate change (*e.g.*, ocean acidification and warming coastal waters). Climate change also threatens the red knot by potentially disrupting the timing of its annual cycle (causing "asynchronies") relative to favorable food and weather conditions along the migration route and on the Arctic breeding grounds.

In addition, the red knot faces ongoing and emerging threats from habitat loss caused by shoreline stabilization and coastal development, and accelerating sea level rise. Mechanical beach raking and invasive or overly dense beach vegetation can also degrade nonbreeding habitats. In addition, many key nonbreeding habitats are in close proximity to oil extraction or transport operations, and would be impacted by a spill in these areas. Red knots have been killed by red tides along the Gulf coast, and are especially vulnerable to harmful algal blooms due to their shellfish diet. In the Arctic, red knots face habitat loss and potentially increasing predation of eggs and chicks brought about by climate change.

Red knots are exposed to disturbance from recreational and other human activities throughout their nonbreeding range, for example from pedestrians, dogs, vehicles, boats, aircraft, and heavy equipment. Excessive disturbance has been shown to preclude shorebird use of otherwise preferred habitats and can impact energy budgets. Both of these effects are likely to exacerbate other threats to the red knot, such as habitat loss, reduced food availability, and asynchronies in the annual cycle. Finally, red knots are hunted for sport and food in some Caribbean and South American countries. Threats to habitat and from disturbance are the most significant within the project area.

C. SEABEACH AMARANTH

1. Species Description

Seabeach amaranth is an annual species and a member of the Amaranth family (Amaranthaceae). Upon germination, the plant initially forms a small, unbranched sprig, but soon begins to branch profusely, forming a low-growing mat. Seabeach amaranth's fleshy stems are prostrate at the base, erect or somewhat reclining at the tips, and pink, red, or reddish in color. The leaves of seabeach amaranth are small, rounded, and fleshy, spinach-green in color, with a characteristic notch at the rounded tip. Leaves are approximately 1.3 to 2.5 centimeters (cm) in diameter and clustered towards the tip of the stem (Weakley and Bucher 1992). The foliage of seabeach amaranth turns deep red in the fall (Snyder 1996). Plants often grow to 30 cm in diameter consisting of 5 to 20 branches, but occasionally reach 90 cm in diameter, with 100 or more branches. Flowers and fruits are inconspicuous, borne in clusters along the stems. Seeds are 2.5 millimeters (mm) in diameter, dark reddish-brown, and glossy, borne in low-density, fleshy, indehiscent utricles (bladder-like seed capsules or fruits), 4 to 6 mm long (Weakley and Bucher 1992). The seed does not fill the utricle, leaving an air-filled space (U.S. Fish and Wildlife Service 1996b).

2. Life History

Individual plants live only one season, with only a single opportunity to produce seed. The species over-winters entirely as seeds. Germination of seedlings begins in April and continues at least through July. Reproductive maturity is determined by size rather than age, and flowering begins as soon as plants have reached sufficient size. Even very small plants can flower under certain conditions. Flowering typically commences in July and continues until the death of the plant. Seed production begins in July or August and usually peaks in September. Seed production likewise continues until the plant dies. Senescence and death occur in late fall or early winter (U.S. Fish and Wildlife Service 1996b).

Seabeach amaranth seems capable of essentially indeterminate growth (Weakley and Bucher 1992). However, predation and weather events, including rainfall, hurricanes, and temperature extremes, have significant effects on the length of the species reproductive season. As a result of one or more of these influences, the flowering and fruiting period can be terminated as early as June or July (U.S. Fish and Wildlife Service 1993).

Seabeach amaranth is native to Atlantic coast barrier island beaches from Massachusetts to South Carolina. The species' primary habitat consists of overwash flats at accreting ends of barrier islands, and lower foredunes and upper strands of non-eroding beaches. This species occasionally establishes small, temporary, and casual populations in secondary habitats including sound side beaches, blowouts in foredunes, and sand or shell dredge spoil or beach nourishment material (Weakley and Bucher 1992).

Seabeach amaranth occupies a narrow beach zone that lies at elevations from 0.2 to 1.5 m above mean high tide, the lowest elevations at which vascular plants regularly occur. Seaward, the plant grows only above the high tide line, as it is intolerant of even occasional flooding during the growing season. The species is, therefore, dependent on a terrestrial, upper beach habitat that is not flooded during the growing season. This zone is absent on beaches that are experiencing high rates of erosion. Seabeach amaranth is never found on beaches where the foredune is scarped by undermining water at high or storm tides (Weakley and Bucher 1992).

Seabeach amaranth usually occurs on a pure silica sand substrate, occasionally containing shell fragments. The habitat of seabeach amaranth is sparsely vegetated with annual herbs and, less commonly, perennial herbs (mostly grasses) and scattered shrubs. The number and type of seabeach amaranth's vegetative associates have been found to vary with specific habitat type (*i.e.*, overwash flat, accreting barrier island end, or lower foredune) (Chicone undated). The most constant associates of seabeach amaranth, with which the species almost always co-occurs, are sea rocket (*Cakile edentula*) and seabeach spurge (*Chamaesyce polygonifolia*) (Weakley and Bucher 1992).

Seabeach amaranth does not occur on well-vegetated sites, particularly where perennials have become strongly established (Weakley and Bucher 1992). Pauley *et al.* (1999) documented a negative correlation between seabeach amaranth and several dominant foredune species. A particularly strong negative association has been reported between seabeach amaranth and beach grasses (U.S. Fish and Wildlife Service 1996b). However, a positive correlation has been observed between seabeach amaranth and sea rocket, an annual (Hancock 1995).

3. Population Status

Seabeach amaranth is limited by its habitat requirements to a very narrow strip of barrier islands and mainland oceanfront beach strands along the Atlantic coast. The original range of this species extended from Cape Cod in Massachusetts to central South Carolina, a stretch of coast approximately 1,600 km (1,000 miles) long. This stretch correlates with a geographic range of low tidal amplitude. Tidal amplitude and the relative importance of tidal versus wave energy in shaping coastal morphology are thought to limit the geographic range of seabeach amaranth, rather than availability of sandy beach substrates or sea water temperatures. The range of seabeach amaranth is characterized by islands developed by high wave energy, low tidal energy, frequent overwash, and frequent breaching by hurricanes with resulting formation of new inlets (Weakley and Bucher 1992).

Seabeach amaranth is ranked as globally rare (G2) by NatureServe and listed as endangered by the New Jersey Natural Heritage Program (NJNHP) (2010). The current known range of naturally occurring seabeach amaranth is Water Mill Beach on Long Island, New York to Debidue Beach in South Carolina (Young 2001; Hamilton 2000). Historic records of seabeach amaranth are known from nine States. Largely due to human activities, the species was eliminated from seven of these States by the 1980s, remaining only in North and South Carolina. Seabeach amaranth is still considered extirpated from two States: Massachusetts and Rhode Island. Since 1990, the species has re-occupied five States from which it had previously been extirpated. Currently while the seabeach amaranth occurs on many New Jersey beaches there is no evidence of the plant within the project area since 2004 (U.S. Fish and Wildlife 2012).

To date, theories of seabeach amaranth's return to the northern part of its range remain speculative. Sites in New Jersey may have been re-colonized by long-distance transport of seeds by wind or currents. At some sites, seeds may have been long buried in sediments used in beach nourishment projects. This hypothesis requires that seeds can remain viable after prolonged off-shore burial, an unknown factor.

4. Continuing Threats

The primary threats to seabeach amaranth are the adverse alterations of habitat caused by beach erosion and shoreline stabilization. Although seabeach amaranth does not persist on eroding beaches, erosion is not a threat to the continued existence of the species under natural conditions. Erosion in some areas is balanced with habitat formation elsewhere, such as accreting inlets and overwash areas, resulting in an equilibrium that allows the plant to survive by moving around in the landscape. In the geologic past, seabeach amaranth persisted through even relatively rapid episodes of sea level rise and barrier island retreat. A natural barrier island landscape, even a retreating one, contains localized accreting areas, especially in the vicinity of inlets (U.S. Fish and Wildlife Service 1996b).

Even minor structures such as dune stabilization by planting vegetation and vertical sand accretion caused by sand fences appear to be detrimental to seabeach amaranth and contradictory to its life history strategy. Seabeach amaranth only very rarely occurs when sand fences and vegetative stabilization have taken place and, in these situations, is present only as rare, scattered individuals or short-lived populations (Weakley and Bucher 1992).

Beach nourishment can have positive site-specific impacts on seabeach amaranth. Seabeach amaranth has colonized several nourished beaches, and has thrived in some sites through subsequent re-applications of fill material (U.S. Fish and Wildlife Service 1993; 2002). However, on the landscape level, beach nourishment is similar to other beach stabilization efforts in that it stabilizes the shoreline and curtails the natural geophysical processes of barrier islands. These effects are detrimental to the range-wide persistence of the species. In addition, beach nourishment may cause site-specific adverse effects by crushing or burying seeds or plants deeper, or by altering the beach profile or upper beach micro-habitats in ways not conducive to seabeach amaranth colonization or survival.

Intensive recreational use of beaches can threaten seabeach amaranth populations, both through direct damage and mortality of plants, and by impacting habitat. ORV uses on the beach during the growing season can have detrimental effects on the species, as the fleshy stems of this plant are brittle and easily broken. Plants generally do not survive even a single pass by a truck tire (Weakley and Bucher 1992). Light pedestrian traffic, even during the growing season, usually has little effect on seabeach amaranth (U.S. Fish and Wildlife Service 1993). Substantive impacts generally occur only on narrow beaches, or beaches which receive heavy recreational use.

Beach grooming may also have contributed to the previous extirpation of seabeach amaranth from that part of its range. Motorized beach rakes, which remove trash and vegetation from bathing beaches, do not allow seabeach amaranth to colonize long stretches of beach (U.S. Fish and Wildlife Service 1996b). In New Jersey, plants were found along a nearly continuous length of beach, noticeably interrupted by stretches that are routinely raked. Intensive management, including BMPs to protect seabeach amaranth from disturbance by beach recreationists and beach-cleaning operations have been implemented at many New York-New Jersey piping plover and seabeach amaranth sites in recent years.

Predation by webworms (caterpillars of small moths) is another source of mortality and lowered fecundity and may decrease seed production by more than 50% (Weakley and Bucher 1992). Five native species of webworms have been identified to feed on seabeach amaranth. These webworms use of barrier islands has probably been altered by changes in the coastal plain landscape (*i.e.*, extensive agricultural use), the development of barrier islands, and the introduction of weedy plants that can also serve as host plants. All five webworms are "weedy" species, probably much more abundant now than they were in pre-Columbian times. For this reason, the level of predation that seabeach amaranth is experiencing is likely unnaturally high (U.S. Fish and Wildlife Service 1996b). Webworm herbivory is probably a contributing, rather than a leading factor in the decline of seabeach amaranth. However, in combination with extensive habitat alteration, severe herbivory could threaten the existence of the species (Weakley and Bucher 1992).

Several additional herbivores of seabeach amaranth have been observed including deer, eastern cottontail, and migratory song birds (Van Schoik and Antenen 1993). There is also strong circumstantial evidence for seabeach amaranth herbivory by grasshopper (U.S. Fish and Wildlife Service 2002). In addition, a cluster of New Jersey plants appeared to have been damaged by a congregation of loafing gulls (*Larus* spp.), based upon feathers and droppings. As with webworms, the abundance of these newly documented predators on barrier islands is increased by human activities.

Asiatic sand sedge (*Carex kobomugi*) has been suggested as another potential threat to seabeach amaranth. This sedge is strongly rhizomatous and dune-forming (National Park Service and Maryland Natural Heritage Program 2000). Asiatic sand sedge was introduced to the east coast (New Jersey to Virginia) from East Asia in the 1930s for erosion control and as a sand stabilizer. Asiatic sand sedge may be detrimental to seabeach amaranth by direct competition and by reducing habitat suitability through sand stabilization and dune building.

In the project are there are no known occurrences of seabeach amaranth, but should the species again recolonize the area the threats that would most impact it would come from human use both for maintenance and recreational use of the beach, and from climate change which could change the position of the current high tide lines and bring more storms washing away suitable habitat (U.S. Fish and Wildlife 2005b, 2012).

VI. OTHER FISH AND WILDLIFE RESOURCES

A. FEDERALLY LISTED SPECIES UNDER NMFS JURISDICTION

1. Turtles

Several species of federally listed (endangered and threatened) sea turtles including the Kemp's ridley sea turtle (*Lepidochelys kempii*), hawksbill sea turtle (*Eretmochelys* *imbricata*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), and green sea turtle (*Chelonia mydas*) may occur in waters throughout the study area. These turtles feed primarily on mollusks, crustaceans, sponges, and a variety of marine grasses and seaweeds. In addition, the leatherback sea turtle may occupy the coastal waters of New Jersey foraging for jellyfish. These sea turtles may be found in New Jersey waters from late spring to mid-fall.

2. Fish

There are five distinct population segments (DPSs) of Atlantic sturgeon (*Acipenser oxyrinchus*) listed as threatened or endangered. Atlantic sturgeon originating from the New York Bight, Chesapeake Bay, South Atlantic and Carolina DPSs are listed as endangered, while the Gulf of Maine DPS is listed as threatened (77 FR 5880; 77 FR 5914; February 6, 2012). The marine range of all five DPSs extends along the Atlantic coast from Canada to Cape Canaveral, Florida.

Atlantic sturgeon spawn in their natal river, with spawning migrations generally occurring during February-March in southern regions, April-May in Mid-Atlantic regions, and May-July in Canadian regions (Murawski and Pacheco 1977; Smith, 1985; Bain 1997; Smith and Clugston 1997; Caron *et al.* 2002). Young remain in the river/estuary until approximately age 2 and at lengths of 30-36 inches before emigrating to open ocean as subadults (Holland and Yelverton 1973; Dovel and Berggen 1983; Dadswell 2006; ASSRT 2007). After emigration from the natal river/estuary, subadults and adult Atlantic sturgeon travel within the marine environment, typically in waters between 16 to 164 feet in depth, using coastal bays, sounds, and ocean waters (Vladykov and Greeley 1963; Murawski and Pacheco 1977; Dovel and Berggren 1983; Smith 1985; Collins and Smith 1997; Welsh *et al.* 2002; Savoy and Pacileo 2003; Stein *et al.* 2004; Laney *et al.* 2007; Dunton *et al.* 2010; Erickson *et al.* 2011).

The Atlantic sturgeon occurs in the project area and falls under NMFS protection. The Atlantic sturgeon moves into estuary environments during the spring and summer and exits into the open ocean during the fall. There are no known aggregations of the sturgeon in the project area south of Hereford Inlet, and it is unlikely any fish will be impacted by the onshore back-passing of sand (Lynn Lankshen, pers. comm. 2013).

The NMFS must be contacted regarding potential impacts, resulting from the proposed project, on federally listed species under its jurisdiction. The NMFS may be contacted at: 74 Magruder Road, Highlands, New Jersey 07732; (732) 872-3023.

B. STATE LISTED SPECIES

A variety of State-listed endangered and threatened species inhabit or have been known to occur in the coastal and estuarine ecosystem within the study area. The State-listed (endangered) black skimmer and least tern nest in colonies on sandy islands in the bays and on inlet beaches within the project area, and a State-listed (endangered) plant evening primrose (*Oenothera humifusa*) inhabits sandy dune environments along New Jersey beaches.

1. Black Skimmer

The State-listed (endangered) black skimmer nests within the project area. Piping plovers often nest within or in close proximity to skimmer colonies and least tern colonies. As with least terns, seabeach amaranth would also benefit from the presence of black skimmer colonies since restrictions on public access during the nesting season provides protected areas where plants can become established.

The black skimmer nests on open sandy beaches, inlets, sandbars, offshore islands, and dredge disposal islands that are sparsely vegetated and contain shell fragments. The growth of dense vegetation may cause colony relocation. Skimmers also frequently nest on wrack mats (deposits of dead sea grasses and other vegetation) on marsh islands in the back bays; however, these colonies are typically much smaller than the beach colonies. Black skimmers forage in shallow-water tidal creeks, inlets, and ponds. Similar coastal and estuarine habitats are used throughout the year.

In the early 1800s, the black skimmer was a common breeder along the New Jersey coast. Egg collecting and hunting decimated skimmer populations in the state by the early 1900s. Protection afforded by the Migratory Bird Treaty Act of 1918 (MBTA) (40 Stat. 775, as amended; 16 U.S.C. 703-712) enabled skimmer numbers to rebound. By the late 1970s, the black skimmer had declined and concern arose over its status in the state. Consequently, the black skimmer was listed as an endangered species in New Jersey in 1979. The majority of the state's population remains in two to three large colonies that are threatened by habitat loss or human activity. The New Jersey Natural Heritage Program considers the black skimmer to be "demonstrably secure globally," yet "imperiled in New Jersey because of rarity" (New Jersey Department of Environmental Protection 1992). Each year, the New Jersey Endangered and Nongame Species Program (ENSP) monitors the state's black skimmer population. Nesting colonies are enclosed and patrolled by personnel. Counts of adults and young are conducted to monitor population size and productivity. Despite annual fluctuations, the state's breeding population has remained relatively stable since the time of its original listing, although the number of active colonies has declined significantly. Human disturbance, beach raking, tidal flooding, and predation continue to threaten nesting skimmers and their habitat.

All black skimmer nesting sites in New Jersey during an 8-year period were located within the Corps Philadelphia District Program Area. In addition, during the summer of 2007, a total of 1,627 black skimmer adults, 719 peak adults, and 709 fledges were recorded at Champagne Island, just north of the project area (Todd Pover, pers. comm. 2007).

2. Least Tern

New Jersey least tern nest colonies of a few to several hundred pairs are found primarily along barrier island beaches or mainland beach strands. Bare sandy areas or areas sparsely vegetated with such typical beach vegetation as sea rocket, American beach grass (*Ammophila breviligulata*), beach clotbur (*Xanthium echinatum*), and seaside spurge (*Euphorbia polygonifolia*) that are just beyond the reach of normal spring tides are preferred. Nesting colonies are also found on sandy dredge disposal sites, especially after recent deposition before the establishment of dense vegetation. Least terns may also nest near sand and gravel pits where sand piles from mining operations provide suitable nesting habitat. Nesting on gravel rooftops has occurred in Florida, Mississippi and other locations (Fisk 1975, Jackson and Jackson 1985) but has not been documented in New Jersey. The birds typically forage in bays, lagoons, estuaries, rivers and lakes along the coast.

Through most of the 19th Century, the least tern was a common breeder along the New Jersey coast. However, as was true for so many of coastal birds, by the early 20th century, egg collecting and hunting for the millenary trade had decimated least tern populations. Protection afforded by the MBTA of 1918 and changing fashion trends enabled least tern numbers to rebound, but new coastal development and the elevated recreational use of beaches in the 1940's led to another population decline. Populations stabilized in recent decades as management measures were implemented, but recently, populations have begun declining again, due primarily to predation losses and increases in losses to coastal flooding.

Piping plovers often nest in association with State-listed least tern colonies, presumably benefiting from the aggressive behaviors of terns in driving away predators, and have often had higher success than those nesting out of tern colonies (Burger 1987). In addition, seabeach amaranth also benefits from the presence of least tern colonies, since restrictions on public access in the nesting areas provide protected areas where plants can become established (Weakley and Bucher 1992).

3. Evening Primrose

The seabeach evening primrose is a state listed (endangered) plant that inhabits New Jersey beaches and dune areas. The project area is a significant site for seabeach evening primrose, which has been consistently documented in beach surveys of North Wildwood, Wildwood, Wildwood Crest, and Two Mile Beach (Kelly pers. comm. 2013).

4. Coordination with the State

The Service recommends that the Corps consider species of special concern and State-listed species (Appendix C) in project planning. The Service's PBO (U.S. Fish and Wildlife Service 2005a) contains conservation recommendations for least tern and black skimmer. The NJENSP and NJNHP may be contacted for further information regarding State-listed endangered and threatened species.

The NJNHP maintains the most up-to-date information on Federal candidate species and State-listed species in New Jersey and may be contacted at the following address:

Natural Heritage Program
Division of Parks and Forestry
CN 404
Trenton, New Jersey 08625
(609) 984-1339

Additionally, information on New Jersey's State-listed wildlife species may be obtained from the following office:

David Jenkins, Chief
Endangered and Nongame Species Program
New Jersey Division of Fish and Wildlife
CN 400
Trenton, New Jersey 08625
(609) 292-9400

C. AVIAN AND OTHER WILDLIFE RESOURCES

1. Shorebirds and other Colonial Nesting Waterbirds

Migratory shorebirds are protected under the MBTA and are a Federal trust resource responsibility of the Service. Wetland areas in the vicinity of the project area provide high quality habitats for a variety of migratory shorebirds. Shorebirds that use beach areas and associated estuarine wetlands in the vicinity of the proposed project area include the piping plover and red knot, American oystercatcher (*Haematopus palliatus*) (State species of special concern), short-billed dowitcher (*Limnodromus griseus*), black-bellied plover (*Pluvialis squatarola*), semipalmated plover (*Charadrius semipalmatus*), killdeer (*C. vociferous*), ruddy turnstone (*Arenaria interpres*), dunlin (*Calidris alpina*), sanderling (*C. alba*), least sandpiper (*C. minutilla*), pectoral sandpiper (*C. melanotos*), semipalmated sandpiper (*C. pusilla*), stilt sandpiper (*C. himantopus*), western sandpiper (*C. mauri*), spotted sandpiper (*Actitis macularius*), willet (*Tringa semipalmatus*), and greater yellowlegs (*T. melanoleuca*). During the 2007 nesting season, Service biologists observed piping plovers foraging within the intertidal zone of the project area (Egger pers. comm. 2007).

Colonial nesting waterbirds present within the project area include the State-listed (endangered) least tern and black skimmer; State-listed (threatened) little blue heron (*Egretta caerulea*) and yellow-crowned night heron (*Nyctanassa violacea*); State species of special concern common tern (*Sterna hirundo*), tricolored heron (*Egretta tricolor*), great blue heron (*Ardea herodias*), and breeding population threatened black-crowned night heron (*Nycticorax nycticorax*). Other colonial species include double-crested cormorant (*Phalacrocorax auritus*), great egret (*Ardea albus*), snowy egret (*Egretta thula*), great black-backed gull (*Larus marinus*), herring gull (*L. argentatus*), laughing gull (*L. atricilla*), ring-billed gull (*L. delawarensis*), glossy ibis (*Plegadis falcinellus*), Forster's tern (*Sterna forsteri*), gull-billed tern (*S. nilotica*), and royal tern (*S. maxima*).

A list of colonial nesting birds and shorebirds prepared by the NJAS for the Hereford Inlet to Cape May Inlet project area is provided in Appendix D.

2. Waterfowl

Migratory waterfowl are also a Federal trust resource responsibility of the Service and are protected under the MBTA. The project area is within the Atlantic Coast Joint Venture's New Jersey Waterfowl Focus Area (South Coast Atlantic Focus Area) under the North America Waterfowl Management Plan. Areas adjacent to the project area, including CMNWR are important resting and feeding areas for migratory waterfowl on the Atlantic flyway and provide habitat for Atlantic brant (*Branta bernicla*), Canada goose (*B. canadensis*), American black duck (*Anas rubripes*), northern pintail (*A. acuta*), blue-winged teal (*A. discors*), green-winged teal (*A. crecca*), mallard (*A. platyrhynchos*), gadwall (*A. strepera*), American wigeon (*A. americana*), northern shoveler (*A. clypeata*), common goldeneye (*Bucephala clangula*), bufflehead (*B. albeola*), oldsquaw (*Clangula hyemalis*), canvasback (*Aythya valisineria*), greater scaup (*A. marila*), wood duck (*Aix sponsa*), hooded merganser (*Lophodytes cucullatus*), red-breasted merganser (*Mergus serrator*), and tundra swan (*Cygnus columbianus*).

3. Raptors

Raptors that occur in the project area include the State-listed (endangered) peregrine falcon (*Falco peregrinus*); State-listed (endangered) short-eared owl (*Asio flammeus*); State-listed (endangered) red-shouldered hawk (*Buteo lineatus*); State-listed (threatened) osprey (*Pandion haliaetus*), barred owl (*Strix varia*), and Cooper's hawk (*Accipiter cooperii*). The osprey feeds primarily on fish in the back bays and inlets of the project area. The red-shouldered hawk and Cooper's hawk migrate over the study area in the spring and fall; however, these transient visitors rarely stay within the area for any significant length of time.

4. Other Wildlife

The five-mile-long barrier island area also supports numerous other wildlife species. Avifauna include, but are not limited to, the boat-tailed grackle (*Quiscalus major*), sharp-tailed sparrow (*Ammodramus caudacutus*), seaside sparrow (*A. maritimus*), eastern kingbird (*Tyrannus tyrannus*), tree swallow (*Tachycineta bicolor*), northern bobwhite (*Colinus virginianus*), and red-winged blackbird (*Agelaius phoeniceus*). The northern diamondback terrapin (*Malaclemys terrapin terrapin*) is also known to inhabit marshes, tidal flats, and beaches in New Jersey estuaries. The terrapin has been subject to recent population declines due to entrapment in crab pots and a reduction in nesting habitat.

Northern diamondback terrapins occur primarily in emergent wetlands and shallow water habitat and feed on crustaceans, mollusks, and other invertebrates (Palmer and Cordes 1988). During the winter, terrapins burrow into the mud of tidal creeks and ponds to hibernate either individually or in groups. Terrapins mate in the spring and lay their eggs in sandy substrates above the levels of high tides. Predation of eggs and hatchlings represent the major source of natural mortality in most terrapin populations. Eggs and juveniles are preyed upon by raccoons, crows (*Corvus* sp.), and gulls (Palmer and Cordes 1988).

Mammals known to occur within the vicinity of project area include raccoon, gray squirrel (*Sciurus carolinensis*), striped skunk (*Mephitis mephitis*), eastern cottontail (*Sylvilagus floridanus*), Virginia opossum (*Didelphis virginiana*), and white-tailed deer (*Odocoileus virginianus*).

VII. BORROW AREAS

A. BENTHIC RESOURCES

Benthic macroinvertebrates are important food organisms in the marine and estuarine environment, and along with primary producers, perform a crucial role in supporting other forms of fish and wildlife. Approximately 58 species of benthic organisms have been identified from Townsends Inlet to Cape May Inlet (Chaillou and Scott 1996). Benthic organisms of interest in the shallow ocean waters of the project area include Atlantic surf clam (*Spisula solidissima*), hard clam (*Mercenaria mercenaria*), and soft clam (*Mya arenaria*). In 2003, the regions south of Great Egg Harbor Inlet to Cape May Inlet accounted for only 10.2% of the total estimated standing stock of surf clams in New Jersey territorial waters. Preliminary data collected in 2007 indicate that the estimated standing stock in this region is now only 4% (Normant pers. comm. 2007). In 1999, this region had 25% of estimated standing stock in New Jersey territorial waters. In 2003, 60.6% (by weight) of New Jersey molluscan landings were surf clams and 73.9% of the total surf clam east coast harvest was landed in New Jersey. Approximately 246,000 bushels were harvested from New Jersey territorial waters in 2003, with 17.5% of harvest coming from this region. There has been a major decline of surf clams state wide as well as in Federal waters off the Delmarva Peninsula. There has been virtually no harvest of surf clams in New Jersey territorial waters in many years (Normant pers. comm. 2007).

B. COASTAL BARRIER RESOURCE ACT

The purpose of the CBRA is to minimize the loss of human life; wasteful expenditures of Federal revenues; and damage to fish, wildlife, and other natural resources associated with coastal barriers along the Atlantic, Gulf of Mexico, Great Lakes, U.S. Virgin Islands, and Puerto Rico coasts of the United States. To accomplish this purpose, CBRA established the John H. Chafee Coastal Barrier Resources System (CBRS), a system of relatively undeveloped coastal barriers and associated aquatic habitat that is delineated on a set of official maps that are maintained by the Service. Most new Federal expenditures and financial assistance, including Federal funding for dredging and beach nourishment projects, are prohibited within System units of the CBRS.

Please note that Federal agencies are required to consult with the Service prior to committing funds for projects or actions within or affecting the CBRS. The Service developed an online mapper that depicts the approximate boundaries of the CBRS to assist Federal agencies in complying with the provisions of CBRA. The CBRS mapper and additional information on the CBRA consistency consultations process for proposed projects can be found on the Service's CBRA website at: http://www.fws.gov/cbra.

VIII. PROJECT IMPACTS AND RECOMMENDED MITIGATIVE MEASURES

The following is a summary of the potential project impacts and recommended mitigative measures to avoid and/or minimize adverse impacts on fish and wildlife resources.

A. PIPING PLOVER, SEABEACH AMARANTH, AND RED KNOT

In 2005, the Service finalized a PBO for the Corps' funding or authorizing of beach nourishment in Ocean, Atlantic, and Cape May counties. The PBO reflects extensive coordination and cooperation between the Corps and the Service to minimize adverse effects to the piping plover and seabeach amaranth. The Service appreciates the Corps' ongoing cooperation in implementing the PBO to date.

As described in a Streamlined Biological Opinion (SBO) for Cape May City (November 6, 2011), an informal consultation for the Wildwoods (March 30, 2012), and a Biological Opinion for Avalon (December 15, 2011), back-passing (neither hydraulic nor via trucks) was not contemplated in the PBO. Some effects of back-passing (*e.g.*, at the sand placement site) are similar for back-passing and other types of beach nourishment. However, other effects are unique to back-passing, such as long-shore vehicle traffic or pipe placement, and borrow area impacts including creation of temporary pits, vehicle use, and persistent narrowing of the beach. To date, these unique effects have been considered project-by-project concurrent with each SBO (or other type of consultation) involving back-passing. Given the likely trend toward increasing use of back-passing in the Corps' public works and regulatory programs, the Service recommends that our agencies work cooperatively to update and amend the PBO to include this practice. We further recommend that the PBO revision include enhanced coordination with the Federal Emergency Management Authority (FEMA) due to FEMA's increasing role in beach nourishment in New Jersey. Finally, the Service will publish a listing determination for the red knot by September 30, 2013. If the red knot is proposed for listing, we recommend that the revised PBO also address conservation measures, effects, and any anticipated incidental take for this species under the Corps' beach nourishment program.

Specific to the proposed Cape May Inlet to Hereford Inlet project, we do not anticipate adverse effects to piping plovers or seabeach amaranth based on the proposed limits of disturbance, specifically that no work will occur in any of the following locations: in or adjacent to the CMNWR, in the USCG Loran Support Unit, in the Cape May Inlet, along

Hereford Inlet in North Wildwood (past the groin at the intersection of 2nd Avenue and John F. Kennedy Beach Boulevard), in Stone Harbor Borough, or in Hereford Inlet (*i.e.*, no dredging) including Champagne Island (if/when present). If project plans change or if piping plovers or seabeach amaranth colonize the proposed work areas, further assessment of effects and conservation measures will be necessary under the PBO. Even if these species remain absent from the proposed work areas, streamlined consultation will be necessary under the PBO. In addition, we recommend early coordination between the Corps and the Service to develop conservation measures and evaluate effects to the red knot specific to the proposed Hereford Inlet to Cape May Inlet project, even prior to the revision of the PBO. Significant numbers of red knots currently utilize a portion of the proposed work area during the fall migration season, and may be affected by the project including disturbance and changes in habitat.

Finally, we recommend the continued implementation of the North Wildwood BMP, with continued and enhanced coordination among the City of North Wildwood, the NJDFW, and the Service on issues such as enforcement of the City's dog ordinance and vehicle management. We also recommend timely revision of the plan following the schedule agreed upon by all parties.

B. BEACH HABITAT ENHANCEMENT

Regular cycles of beach nourishment along North Wildwood's oceanfront beach have the potential to create and enhance habitat for the red knot, seabeach amaranth, and State-listed plant species. Perpetuation of wider beach in this area may also attract beach nesting birds such as piping plover, least tern, black skimmer, and American oystercatcher.

Planning activities for beach fill and dune creation should include an evaluation of potential habitat enhancement for beach nesting birds. Wide beaches with gentle slopes generally provide good quality habitat for beach-dependent birds (U.S. Fish and Wildlife Service 1996a). Creation of low, wide dunes with washover areas provides suitable foraging and nesting habitat, and dune configurations that are irregular (*e.g.*, staggered and discontinuous) can enhance bird habitat. In addition, native dune grasses should be planted in sufficient quantity to provide stabilization, but also minimal enough not to impair habitat. In addition, only native, non-woody vegetation should be used. Fencing systems to trap sand and create dunes should be open to allow passage of shorebirds between and among the dunes, and to allow for the perpetuation of the dynamic beach conditions favored by listed species. A broken, zig-zag pattern of fencing parallel to the shore or a Y-type fencing pattern perpendicular to shore are two examples of open fencing systems. The Service recommends the Corps coordinate with the Service and the ENSP regarding the potential for habitat enhancements as the project plans continue to be refined. Refer to the Service's 2005 PBO for additional recommendations, including beach habitat enhancement to protect listed species (U.S. Fish and Wildlife Service 2005a) (Appendix F) and (Appendix G).

Additionally, the Service recommends the use of perpetual deed restrictions or conservation easement to protect newly created beach and adjacent beach habitat for listed species (see PBO conservation measure #7).

C. BORROW AREAS

Similar to other dredging, extraction of material from borrow areas has been documented as causing environmental impacts that may adversely affect fish and other marine species populations and the food chains on which they depend. Kantor (1984) provides a review of dredging impacts specific to New Jersey. These impacts can generally be subdivided into those affecting the water column and those affecting the bottom substrate. Adverse water quality impacts from material extraction include increased turbidity, changes in temperature and oxygen demand, and release or resuspension of toxins and bacteria. These factors may cause direct mortality to fish and shellfish, disrupt fish migrations, hamper fish and shellfish spawning, make shellfish unsuitable for human consumption, and reduce primary productivity. Settling of suspended sediment may result in smothering of shellfish and other benthic organisms down current from the project site.

Bottom impacts include removal of existing benthic communities, change in circulation patterns, and modification of patterns of sediment deposition. Extraction from borrow areas may create bottom depressions with reduced flushing. These depressions can accumulate fine-grained sediments and organic material, including contaminants. Reduced flushing, combined with decomposition of organic materials, can lead to low oxygen conditions in such depressions. Originally occurring or different benthic forms may eventually recolonize the area of extraction depending on the water quality and substrate present.

The type of equipment used and the time of year extraction occur may greatly influence the nature and extent of potential adverse impacts in the water column. For example, the use of hydraulic dredging reduces Service concerns regarding short-term adverse impacts on water quality at and near the site of dredging, but hydraulic dredging may impact eggs and young fish or other slow-moving organisms unable to avoid entrainment. The entrainment of sea turtles has also been documented as an adverse impact of hydraulic dredging (U.S. Fish and Wildlife Service 1991). The NMFS has jurisdiction over endangered and threatened sea turtles and should be contacted if hydraulic dredging is proposed. Conversely, mechanical dredging has greater impacts on turbidity and dissolved oxygen at the dredge site, but, if conducted during periods of low seasonal biological productivity, adverse impacts to organisms can be minimized.
According to the official CBRS map for Hereford Inlet (Stone Harbor Unit NJ-09/NJ-09P dated July 12, 1996), proposed sand borrow areas described in the Corps draft feasibility study under the National Economic Development alternative which is the alternative that reasonably maximizes net economic benefits are located within System Unit NJ-09 of the CBRS. Any proposed Federal action designed to nourish beaches located outside the System using beach material taken from within the System does not meet the criteria for a section 6(a)(6)(G) exception of the CBRA.

The preferred alternatives to offshore borrow sites being considered for the project is bypassing sand from Wildwood to North Wildwood by back-passing and changing the beach configuration in Wildwood by increasing berm height or adding a dune described as plan C in the Corps draft feasibility study. This alternative would avoid adverse impacts to finfish and other marine resources and negate the need to borrow from Hereford Inlet.

IX. CONCLUSIONS AND SUMMARY OF RECOMMENDATIONS

A. BEACH COMMUNITIES

In order to avoid and minimize potential adverse impacts on State-listed and federally listed threatened and endangered species within project area, the Service recommends incorporating the following measures into project planning.

1. Work collaboratively with the Service to update and amend the PBO to include back-passing (both hydraulic and vehicle based), enhanced coordination with FEMA, and the red knot.

2. Specific to the proposed Hereford to Cape May Inlet project, we do not anticipate adverse effects to piping plovers or seabeach amaranth based on the proposed limits of disturbance; if project plans change or if piping plovers or seabeach amaranth colonize the proposed work areas, further assessment of effects and conservation measures will be necessary under the PBO. Even if not present in the work areas, streamlined consultation for these species will be necessary under the PBO. (Specifically the PBO calls for initiation of streamlined consultation 6 months prior to the start of work). In addition, we recommend early coordination regarding the red knot.

3. Contact NJDFW's ENSP and NJNHP's in considering State species of special concern and State-listed species in project planning (Appendix C).

4. Implement the North Wildwood BMP, with continued and enhanced coordination among the City of North Wildwood, the NJDFW, and the Service. Revise the plan following the schedule agreed upon by all parties.

5. Refer to the Service's 2005 PBO for additional recommendations, including beach habitat enhancement to protect listed species (U.S. Fish and Wildlife Service 2005a) (Appendix F) and (Appendix G).

B. BEACH HABITAT ENHANCEMENT

Incorporate the following recommendations into project planning to create additional shorebird habitat and protect or enhance any existing habitat.

1. Review and evaluate any proposed beach creation activity in regard to potential effects on other habitats within the project area.

2. Include habitat enhancement for listed species in plans for beach fill and dune creation activities.
3. Coordinate with the Service and NJDEP on planting of any vegetation on dunes for dune stabilization.

4. Avoid the introduction of invasive and non-native plant species and consult with the Service and NJDEP on management of the dune system.

5. Design dune fencing systems that allow passage of juvenile shorebirds between and among the dunes and allow more natural dunes to form with adequate storm protection, and to allow for the perpetuation of natural beach processes.

6. Obtain a perpetual deed restriction or conservation easement for the newly-created beach and adjacent beach areas, as per the PBO.

7. Continue to coordinate with the Service and ENSP for any dune and beach enhancement or restoration activities in listed species habitat.

C. BORROW AREAS

1. Rely primarily on the components of the benthic diversity indices (*i.e.*, species diversity, species richness, and the distribution of the number of individuals among the species), rather than on the diversity indices alone, in evaluating benthic habitat quality.

2. Evaluate any borrow site alternatives that would minimize adverse impacts to surf clam communities through continued coordination with the New Jersey Bureau of Shellfisheries and the Service.

3. Conduct each renourishment phase in a limited section of the borrow area(s) and alternate locations for each subsequent renourishment cycle.

4. Avoid creating excessively deep, poorly flushed (anoxic) pits at the borrow sites.

5. Avoid dredging during shellfish or finfish spawning activities (the typical spawning period and early life stages of winter flounder are between January 1 and May 31).

6. Use hydraulic-pipeline dredging rather than hopper dredging in order to minimize turbidity at the borrow sites and minimize the potential entrainment of federally listed sea turtles.

7. Contact the NMFS regarding potential adverse impacts on federally listed (threatened or endangered) sea turtle and marine mammal species under its jurisdiction.

8. Coordinate with the New Jersey Bureau of Marine Fisheries regarding the selection of borrow sites.

9. Consult with the Service concerning borrow areas pursuant to the CBRA.

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APPENDIX A

Federally Listed Endangered and Threatened Species,
and Candidate Species in New Jersey

FEDERALLY LISTED AND CANDIDATE SPECIES IN NEW JERSEY

	COMMON NAME	SCIENTIFIC NAME	STATUS
FISHES	Shortnose sturgeon*	*Acipenser brevirostrum*	E
	Atlantic sturgeon*	*Acipenser oxyrinchus*	PE
REPTILES	Bog turtle	*Clemmys muhlenbergii*	T
	Loggerhead sea turtle*	*Caretta caretta*	PE
BIRDS	Piping plover	*Charadrius melodus*	T
	Red knot	*Calidris canutus rufa*	C
	Roseate tern	*Sterna dougallii dougallii*	E
	Red-cockaded woodpecker	*Picoides borealis*	E+
MAMMALS	Eastern cougar	*Puma concolor couguar*	E+
	Indiana bat	*Myotis sodalis*	E
	Gray wolf	*Canis lupus*	E+
	Delmarva fox squirrel	*Sciurus niger cinereus*	E+
INVERTEBRATES	Dwarf wedgemussel	*Alasmidonta heterodon*	E
	Northeastern beach tiger beetle	*Cicindela dorsalis dorsalis*	T
	Karner blue butterfly	*Lycaeides melissa samuelis*	E+
	Mitchell's satyr butterfly	*Neonympha m. mitchellii*	E+
	American burying beetle	*Nicrophorus americanus*	E+
PLANTS	Small whorled pogonia	*Isotria medeoloides*	T
	Swamp pink	*Helonias bullata*	T
	Knieskern's beaked-rush	*Rhynchospora knieskernii*	T

	Hirsts' panic grass	*Dichanthelium hirstii*	C
	American chaffseed	*Schwalbea americana*	E
	Sensitive joint-vetch	*Aeschynomene virginica*	T
	Seabeach amaranth	*Amaranthus pumilus*	T

STATUS:		
E	Endangered Species	Any species that is in danger of extinction throughout all or a significant portion of its range.
T	Threatened Species	Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
C	Candidate Species	Species that appear to warrant listing. Although these species receive no substantive or procedural protection under the Endangered Species Act, Federal agencies and other planners are encouraged to consider these species in environmental planning.
P	Proposed Species	A species for which a proposed rule to list as endangered or threatened has been published in the Federal Register.
*	Except for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service.	
+	Presumed extirpated from New Jersey.	

Note: For a complete listing of Endangered and Threatened Wildlife and Plants, refer to 50 CFR 17.11 and 17.12. For a complete listing of taxa under review as candidate species, refer to http://www.fws.gov/endangered/

For further information, please visit our website at:
http://www.fws.gov/northeast/njfieldoffice/endangered/

U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main Street, Building D
Pleasantville, New Jersey 08232
Phone: (609) 646-9310
Fax: (609) 646-0352

Revised 1/2/2013

FEDERAL CANDIDATE SPECIES IN NEW JERSEY

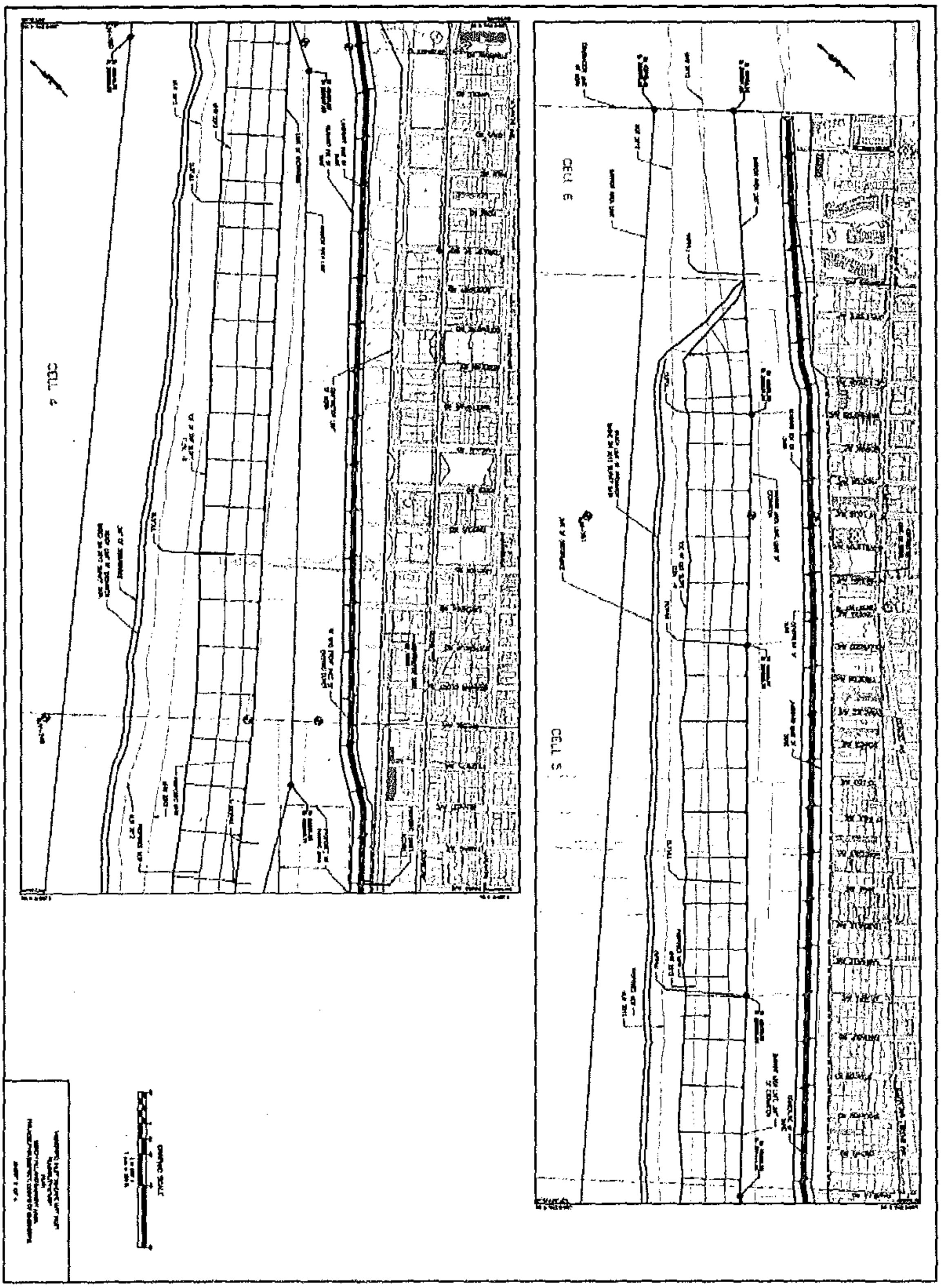
CANDIDATE SPECIES are species that appear to warrant consideration for addition to the federal List of Endangered and Threatened Wildlife and Plants. Although these species receive no substantive or procedural protection under the Endangered Species Act, the U.S. Fish and Wildlife Service encourages federal agencies and other planners to give consideration to these species in the environmental planning process.

SPECIES	SCIENTIFIC NAME
Red Knot	*Calidris canutus rufa*
Hirsts' panic grass	*Dichanthelium hirstii*

Revised January 18, 2013

APPENDIX B

Project Plans showing Project Area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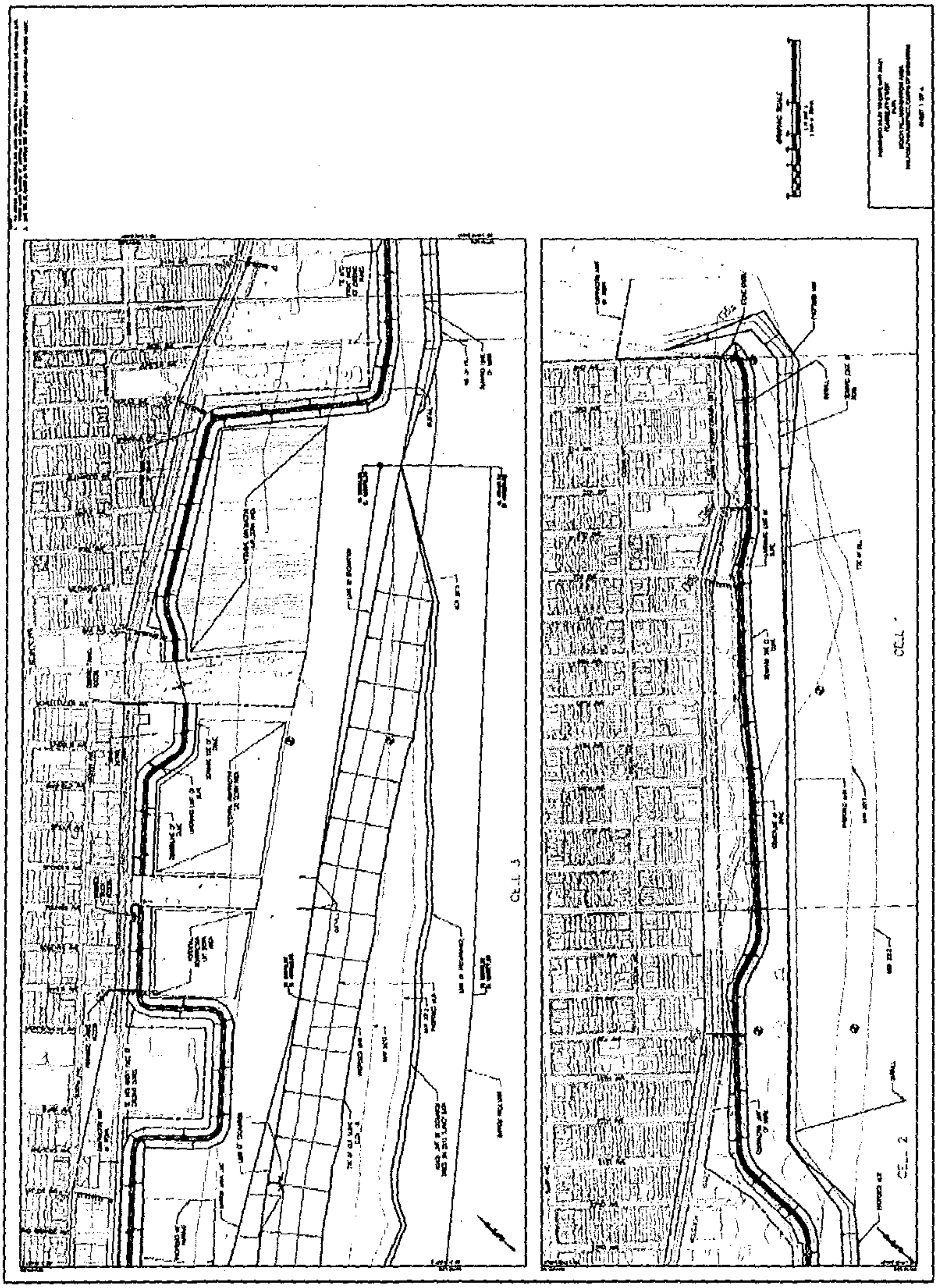
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APPENDIX C

State-Listed Endangered and Threatened Species
in New Jersey

Conserve Wildlife

New Jersey Department of Environmental Protection
Division of Fish & Wildlife
Endangered & Nongame Species Program

New Jersey's Endangered and Threatened Wildlife

DEP Adopts Updated Threatened and Endangered Species List, Revises Species Listings Based on Latest Science - DEP News Release, 2/23/12

Endangered Species are those whose prospects for survival in New Jersey are in immediate danger because of a loss or change in habitat, over-exploitation, predation, competition, disease, disturbance or contamination. Assistance is needed to prevent future extinction in New Jersey.

Threatened Species are those who may become endangered if conditions surrounding them begin to or continue to deteriorate.

There are other classifications for wildlife as well, including Stable, Species of Special Concern and Undetermined.

Species names in the below tables link to PDF documents containing identification, habitat and status and conservation information. For more detailed descriptions, photographs, and range maps of New Jersey's endangered, threatened, and special concern species, please refer to the Conserve Wildlife Foundation of NJ's on-line field guide.

BIRDS			
Endangered		**Threatened**	
Bittern, American BR	*Botaurus lentiginosos* BR	Bobolink BR	*Dolichonyx oryzivorus* BR
Eagle, bald BR	*Haliaeetus leucocephalus* BR	Eagle, bald NB	*Haliaeetus leucocephalus* NB
Falcon, peregrine BR	*Falco peregrinus* BR	Egret, cattle BR	*Bubulcus ibis* BR
Goshawk, northern BR	*Accipiter gentilis* BR	Kestrel, American	*Falco sparverius*
Grebe, pied-billed BR	*Podilymbus podiceps* BR	Lark, horned BR	*Eremophila alpestris* BR
Harrier, northern BR	*Circus cyaneus* BR	Night-heron, black-crowned BR	*Nycticorax nycticorax* BR
Hawk, red-shouldered BR	*Buteo lineatus* BR	Night-heron, yellow-crowned	*Nyctanassa violacea*

Knot, red NB	*Calidris canutus* NB	Osprey BR	*Pandion haliaetus* BR
Owl, short-eared BR	*Asio flammeus* BR	Owl, barred	*Strix varia*
Plover, piping**	*Charadrius melodus***	Owl, long-eared	*Asio otus*
Rail, black BR	*Laterallus jamaicensis* BR	Rail, black NB	*Laterallus jamaicensis* NB
Sandpiper, upland	*Batramia longicauda*	Sparrow, grasshopper BR	*Ammodramus savannarum* BR
Shrike, loggerhead NB	*Lanius ludovicianus* NB	Sparrow, Savannah BR	*Passerculus sandwichensis* BR
Skimmer, black	*Rynchops niger*	Woodpecker, red-headed	*Melanerpes erythrocephalus*
Sparrow, Henslow's	*Ammodramus henslowii*		
Sparrow, vesper BR	*Pooecetes gramineus* BR		
Tern, least	*Sternula antillarum*		
Tern, roseate**	*Sterna dougallii***		
Warbler, golden-winged BR	*Vermivora chrysoptera* BR		
Wren, sedge	*Cistothorus platensis*		
**Federally endangered or threatened			
BR - Breeding population only; NB - non-breeding population only			

REPTILES			
Endangered		**Threatened**	
Rattlesnake, timber	*Crotalus h. horridus*	Snake, northern pine	*Pituophis m. melanoleucus*
Snake, corn	*Elaphe g. guttata*	Turtle, Atlantic green**	*Chelonia mydas***
Snake, queen	*Regina septemvittata*	Turtle, wood	*Glyptemys insculpta*
Turtle, bog**	*Glyptemys muhlenbergii***		
Hawksbill, Atlantic**	*Eretmochelys imbricata***		
Leatherback, Atlantic	*Dermochelys*		

**	*coriacea***
Loggerhead, Atlantic **	*Caretta caretta***
Ridley, Atlantic **	*Lepidochelys kempii***
**Federally endangered or threatened	

AMPHIBIANS			
Endangered		**Threatened**	
Salamander, blue-spotted	*Ambystoma laterale*	Salamander, eastern mud	*Pseudotriton montanus*
Salamander, eastern tiger	*Ambystoma tigrinum*	Salamander, long-tailed	*Eurycea longicauda*
Treefrog, southern gray	*Hyla chrysocelis*	Treefrog, pine barrens	*Hyla andersonii*

INVERTEBRATES			
Endangered		**Threatened**	
Beetle, American burying**	*Nicrophorus americanus***	Baskettail, robust(dragonfly)	*Epitheca spinosa*
Beetle, northeastern beach tiger**	*Cincindela d. dorsalis***	Clubtail, banner (dragonfly)	*Gomphus apomyius*
Copper, bronze	*Lycaena hyllus*	Clubtail, harpoon (dragonfly)	*Gomphus descriptus*
Floater, brook (mussel)	*Alasmidonta varicosa*	Elfin, frosted (butterfly)	*Callophrys irus*
Floater, green (mussel)	*Lasmigona subviridis*	Emerald, Kennedy's (dragonfly)	*Somatochlora kennedyi*
Petaltail, gray (dragonfly)	*Tachopteryx thoreyi*	Floater, triangle (mussel)	*Alasmidonta undulata*
Satyr, Mitchell's (butterfly)**	*Neonympha m. mitchellii***	Fritillary, silver-bordered (butterfly)	*Bolaria selene myrina*
Skipper, arogos (butterfly)	*Atrytone arogos arogos*	Jewelwing, superb (dragonfly)	*Calopteryx amata*
Skipper, Appalachian grizzled (butterfly)	*Pyrgus wyandot*	Lampmussel, eastern (mussel)	*Lampsilis radiata*

Wedgemussel, dwarf**	*Alasmidonta heterodon***	Lampmussel, yellow (mussel)	*Lampsilis cariosa*
		Mucket, tidewater (mussel)	*Leptodea ochracea*
		Pondmussel, eastern (mussel)	*Ligumia nasuta*
		Snaketail, brook, (dragonfly)	*Ophiogomphus asperses*
		White, checkered (butterfly)	*Pontia protodice*
**Federally endangered or threatened			

MAMMALS	
Endangered	
Bat, Indiana**	*Myotis sodalis***
Bobcat	*Lynx rufus*
Whale, North Atlantic right**	*Eubalaena glacialis***
Whale, blue**	*Balaenoptera musculus***
Whale, fin**	*Balaenoptera physalus***
Whale, humpback**	*Megaptera novaeangliae***
Whale, sei**	*Balaenoptera borealis***
Whale,sperm**	*Physeter macrocephalus***
Woodrat, Allegheny	*Neotoma magister*
**Federally Endangered	

FISH	
Endangered	
Sturgeon, Atlantic**	*Acipenser oxyrinchus oxyrinchus***
Sturgeon, shortnose**	*Acipenser brevirostrum***
**Federally Endangered	

List updated 4/2/12

APPENDIX D

Colonial Nesting Birds and Shorebirds within
Hereford Inlet to Cape May Inlet Project Area
(prepared by New Jersey Audubon Society)

Colonial Nesting Birds and Shorebirds - Hereford Inlet to Cape May Inlet
Estuary and nearshore coastal waters, including associated beach, dune, salt marsh, mudflats and coastal forest/scrub
Compiled by Don Freiday
Very rare species (occuring less than annually) are excluded from this list

Nests - Y means known to currently nest

C - common: always seen, more than 20 individuals per day
F - fairly common: usually seen, 5 to 20 individuals per day
U - uncommon: seen in limited numbers, 1-4 per day
S - scarce: usually present, but not seen daily
R - rare: seen only a few times a season

Species	Common Name	Nests	Winter	Spring	Summer	Early fall	Late fall
PHALACROCORACIDAE (Cormorants)							
Phalacrocorax auritus	Double-crested Cormorant		U	C	C	C	C
Phalacrocorax carbo	Great Cormorant		U	U			U
ARDEIDAE (Herons, Egrets and Bitterns)							
Botaurus lentiginosus	American Bittern		S	S		U	U
Ixobrychus exilis	Least Bittern			R		R	R
Ardea herodias	Great Blue Heron		F	F	S	F	F
Ardea alba	Great Egret	Y	R	F	F	F	S
Egretta thula	Snowy Egret	Y		F	F	F	S
Egretta caerulea	Little Blue Heron	Y		U	U	U	S
Egretta tricolor	Tricolored Heron	Y		U	U	U	S
Bubulcus ibis	Cattle Egret			R	R	R	

Nycticorax nycticorax	Black-crowned Night-Heron	Y	U	F	F	F	F
Nyctanassa violacea	Yellow-crowned Night-Heron	Y		U	U	U	U
THRESKIORNITHIDAE (Ibis and Spoonbills)							
Threskiornithinae							
Plegadis falcinellus	Glossy Ibis	Y		F	F	F	U
Species	**Common Name**	**Nests**	**Winter**	**Spring**	**Summer**	**Early Fall**	**Late Fall**
CHARADRIIDAE (Plovers and Lapwings)							
Charadriinae							
Pluvialis squatarola	Black-bellied Plover		F	C	U	C	C
Pluvialis dominica	American Golden-Plover					S	S
Charadrius semipalmatus	Semipalmated Plover			C	U	C	C
Charadrius melodus	Piping Plover	Y		U	U	U	S
Charadrius vociferous	Killdeer	Y	U	F	F	F	F
HAEMATOPODIDAE (Oystercatchers)							
Haematopus palliatus	American Oystercatcher	Y	F	F	F	F	F
RECURVIROSTRIDAE (Avocets and Stilts)							
Recurvirostra americana	American Avocet				R	R	
SCOLOPACIDAE (Sandpipers and Allies)							
Scolopacinae							
Actitis macularius	Spotted Sandpiper	?		F	U	F	U
Tringa solitaria	Solitary Sandpiper			U	S	U	
Tringa melanoleuca	Greater Yellowlegs		F	C	U	C	C
Tringa semipalmata	Willet	Y	R	C	C	F	R
Tringa flavipes	Lesser Yellowlegs		S	F	U	C	C
Bartramia longicauda	Upland Sandpiper				R		

Numenius phaeopus	Whimbrel			U	S	F	U
Limosa haemastica	Hudsonian Godwit				R	R	
Limosa fedoa	Marbled Godwit		R	R	R	S	S
Arenaria interpres	Ruddy Turnstone		C	C	U	F	C
Calidris canutus	Red Knot		S	C	F	U	U
Calidris alba	Sanderling		C	C	F	C	C
Calidris pusilla	Semipalmated Sandpiper			C	C	C	C
Calidris mauri	Western Sandpiper				F	F	F
Calidris minutilla	Least Sandpiper		R	C	U	C	F
Calidris fuscicollis	White-rumped Sandpiper			U	U	U	U
Calidris bairdii	Baird's Sandpiper				R	R	R
Calidris melanotos	Pectoral Sandpiper			U	S	F	F
Calidris maritime	Purple Sandpiper		U	U			U
Calidris alpina	Dunlin		C	C	R	U	C
Species	**Common Name**	**Nests**	**Winter**	**Spring**	**Summer**	**Early Fall**	**Late Fall**
Calidris ferruginea	Curlew Sandpiper						
Calidris himantopus	Stilt Sandpiper			R	S	F	U
Tryngites subruficollis	Buff-breasted Sandpiper				R	R	
Limnodromus griseus	Short-billed Dowitcher		R	C	F	C	U
Limnodromus scolopaceus	Long-billed Dowitcher		R		R	U	U
Gallinago delicate	Wilson's Snipe		R	U		U	U
Scolopax minor	American Woodcock		R	U		U	U
Phalaropodinae							
Phalaropus tricolor	Wilson's Phalarope			R	R	R	R
LARIDAE (Gulls)							
Larus atricilla	Laughing Gull	Y	R	C	C	C	C
Larus Philadelphia	Bonaparte's Gull		U	U		R	U
Larus delawarensis	Ring-billed Gull		C	C	S	F	C
Larus argentatus	Herring Gull	Y	C	C	C	C	C

Larus glaucoides	Iceland Gull		R				
Larus fuscus	Lesser Black-backed Gull		R	R			R
Larus hyperboreus	Glaucous Gull		R				
Larus marinus	Great Black-backed Gull	Y	C	C	C	C	C
Rissa tridactyla	Black-legged Kittiwake		R				R
STERNIDAE (Terns)							
Sternula antillarum	Least Tern	Y		F	F	F	
Gelochelidon nilotica	Gull-billed Tern	Y		U	U	U	
Hydroprogne caspia	Caspian Tern			R		U	U
Chlidonias niger	Black Tern			R	S	U	
Sterna dougallii	Roseate Tern			R	R	R	
Sterna hirundo	Common Tern	Y		C	C	C	F
Sterna forsteri	Forster's Tern	Y	S	C	C	C	C
Thalasseus maximus	Royal Tern	Y		F	U	C	C
Thalasseus sandvicensis	Sandwich Tern				R	S	
RYNCHOPIDAE (Skimmers)							
Rynchops niger	Black Skimmer	Y		F	F	C	F

APPENDIX E

Status of the Red Knot (*Calidris canutus rufa*) in the Western Heimsphere.

STATUS OF THE RED KNOT (*CALIDRIS CANUTUS RUFA*) IN THE WESTERN HEMISPHERE

LAWRENCE J. NILES, HUMPHREY P. SITTERS, AMANDA D. DEY, PHILIP W. ATKINSON, ALLAN J. BAKER, KAREN A. BENNETT, ROBERTO CARMONA, KATHLEEN E. CLARK, NIGEL A. CLARK, CARMEN ESPOZ, PATRICIA M. GONZÁLEZ, BRIAN A. HARRINGTON, DANIEL E. HERNÁNDEZ, KEVIN S. KALASZ, RICHARD G. LATHROP, RICARDO N. MATUS, CLIVE D. T. MINTON, R. I. GUY MORRISON, MARK K. PECK, WILLIAM PITTS, ROBERT A. ROBINSON, AND INÊS L. SERRANO

Abstract. The population of the *rufa* subspecies of the Red Knot (*Calidris canutus*), which breeds in the central Canadian Arctic and mainly winters in Tierra del Fuego, has declined dramatically over the past 20 yr. Previously estimated at 100,000–150,000, the population now numbers 18,000–33,000 (18,000 if just the Tierra del Fuego birds are *C. c. rufa*, more if the Red Knots of uncertain subspecific status that winter in northern Brazil (7,500) or Florida (7,500) are also *C. c. rufa*). Counts show that the main Tierra del Fuego wintering population dropped from 67,546 in 1985 to 51,255 in 2000, 29,271 in 2002, 31,568 in 2004, but only 17,653 in 2005 and 17,211 in 2006.

Demographic studies covering 1994–2002 showed that the population decline over that period was related to a drop in annual adult survival from 85% during 1994–1998 to 56% during 1999–2001. Population models showed that if adult survival remained low, *C. c. rufa* would go extinct within about 10 yr. After 2002, the population held up in 2003–2004, but plunged again by nearly 50% in 2005 increasing the likelihood of extinction within the next decade. Despite intensive studies, the reasons for the population decline and reduced adult survival are imperfectly known.

During northward migration, most *C. c. rufa* stopover in Delaware Bay where they feed mainly on the eggs of horseshoe crabs (*Limulus polyphemus*) and lay down fat and protein reserves both to fuel the 3,000 km fl ight to the arctic breeding grounds and ensure their survival after they arrive at a time when food availability is often low. The crucial importance of Delaware Bay is demonstrated by studies that show that Red Knots with lower mass in Delaware Bay have lower survival than heavier birds and that from 1998–2002 the proportion of birds there at the end of May weighing more than the estimated departure mass of 180 g declined by >60%. This might be the result of the progressive failure of the food supply in Delaware Bay and/or a trend for birds to arrive there later and/or in poorer condition. In years when Red Knots experience reduced food availability and arrive late, the result may be an exacerbation of the effects of each of these deleterious factors. The main identified threat to the *C. c. rufa* population is the reduced availability of horseshoe crabs eggs in Delaware Bay arising from elevated harvest of adult crabs for bait in the conch and eel fishing industries. Since 1990 the crab population has declined substantially. Although significant uncertainty regarding the extent of the decline of the horseshoe crab population remains, there is general agreement that horseshoe crab stocks have declined to a level where increased management of the fishery is necessary and appropriate. The decline in crabs has led to a decrease in the density of eggs available to shorebirds. Because of the crab's delayed maturity, demographic models indicate that even if further exploitation of

crabs ceases immediately, it will be some years before the horseshoe crab population recovers to its former level. Although clear evidence, as in 2003 and 2005, shows that the reduced availability of eggs is already having an impact in some years on the Red Knots ability to gain mass in Delaware Bay, it is likely that other threats to *C. c. rufa* exist and that these are the cause of some birds arriving in the bay late and/or in poor condition. It is not known what these are, but they could be related to Bahia Lomas, the main wintering site in Tierra del Fuego (because the largest reduction in recent years has occurred there and because northward migration from Bahia Lomas along the Atlantic coast of Argentina has taken place 1–2 wk later since year 2000). If it is proved that something leads Red Knots to arrive late in Delaware Bay and/or in poor condition, this does not diminish the importance of the Delaware Bay food resource. If anything, it is increased because it is of critical importance in enabling the birds to recover quickly and reach the breeding grounds on time and in good reproductive condition. Actions being taken to improve feeding conditions for Red Knots and other shorebirds in Delaware Bay include beach closures to prevent disturbance and exclosures to reduce competition from gulls. However, although these measures help, they are no substitute for a recovered horseshoe crab population. Actions to conserve horseshoe crabs have included reduced harvest quotas, more efficient use of crabs as bait, closure of the harvest in certain seasons and places and the designation of a sanctuary off the mouth of Delaware Bay. The latest information indicates that the crab population may have stabilized, but there is no evidence of recovery.

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Another Red Knot subspecies, *C. c. roselaari*, breeds in Alaska and is presumed to include those Red Knots that winter on the Pacifi c coast of the United States and Mexico. Two other Red Knot wintering populations are of uncertain subspecifi c status—one in the southeastern U.S. (mainly Florida) of about 7,500 and one on the north coast of Brazil also of about 7,500. These populations have not been the subject of regular systematic surveys, but it is not thought that either has suffered the same catastrophic decline as the *C. c. rufa* that winter in Tierra del Fuego. Substantial proportions of both pass through Delaware Bay during northward migration, but banding shows that these are distinct populations without interchange with the Tierra del Fuego birds. Moreover, genetic studies show that no exchange of genes has occurred between the southeastern U.S. and the Tierra del Fuego birds for at least 1,200 yr. Some progress has been made toward understanding why the Tierra del Fuego population has suffered a major decline, but the northern wintering birds have apparently remained more stable. It appears that physiological constraints mean that the southern birds, which mostly make a long, non-stop fl ight to Delaware Bay from at least northern Brazil, are more reliant on soft, easily-digested horseshoe crab eggs in Delaware Bay than the northern winterers, many of which feed on blue mussel (*Mytilus edulis*) spat or surf clams (*Donax variablis*) on the Atlantic coast of New Jersey. Evidence from Patagonia suggests that, for a reason that remains obscure, northward migration of Tierra del Fuego birds has become 1–2 wk later since the year 2000 and this has probably led to more Red Knots arriving late in Delaware Bay. Late arriving birds have been shown to have the ability to make up lost time by increasing their mass at a higher rate than usual provided they have suffi cient food resources. However, late-arriving Red Knots failed to do this in 2003 and 2005 when egg availability was low. Although *C. c. rufa* Red Knots are spread thinly across a large area of the Canadian Arctic during the breeding season, for the rest of the year they occur mainly in large fl ocks at a limited number of key coastal wintering and staging sites. This review describes each of these sites and the threats the birds face ranging from oil pollution to disturbance and reclamation for development.

Overall the goal of conservation activities throughout the flyway should be to increase the *C. c. rufa* population to at least the number of 25 yr ago—100,000–150,000 by 2015. Given the uncertain genetic relationships between the three main wintering populations we suggest the following population increases: (1) Tierra del Fuego wintering population to 70,000–80,000 birds, (2) Brazilian wintering population to 20,000–25,000, (3) Florida wintering population to 20,000–25,000, and (4) other sites to 15,000–20,000. The means whereby such population increases might be achieved include: (1) recovery and maintenance of Delaware Bay horseshoe crab egg densities to levels suffi cient to sustain stopover populations of all shorebirds including 100,000 Red Knots, (2) control impact of disturbance at all stopovers and wintering areas, particularly in high-importance, high-disturbance areas like Delaware Bay and the west coast of Florida, (3) by 2008, develop a system for the yearly determination of population demographic status based on counts, capture data, and resightings of banded individuals, (4) by 2008, determine the genetic and breeding status of the three main wintering populations (Tierra del Fuego, Maranhão, and Florida), (5) by 2008, identify all important breeding locations in Canada and recommend protection needs and designations for the most important sites, (6) by 2009, complete site assessments and management plans for all important wintering areas and stopovers in the flyway, (7) by 2009, delineate and propose protection measures for key habitats within the main wintering areas of Maranhão, Tierra del Fuego, and Florida, and develop management plans to guide protection, (8) by 2009, determine key southbound and northbound stopovers that account for at least 80% of stopover areas supporting at least 100 Red Knots, and develop coast-wide surveillance of birds as they migrate, and (9) by 2011, create a hemisphere-wide system of protected areas for each signifi cant wintering, stopover, and breeding area. Also crucial to *C. c. rufa*'s recovery is adequate funding to support the conservation actions and research needed. Despite the fact that much of the research, survey, monitoring, and conservation work has been carried out by volunteers and has been supported fi nancially by state, federal government and non-government agencies, present funding levels are inadequate to sustain the work required.

APPENDIX F

Guidelines for Managing Recreational Activities in
Piping Plover Breeding Habitat on the
U.S. Atlantic Coast to
Avoid Take Under Section 9 of the
Endangered Species Act

GUIDELINES FOR MANAGING RECREATIONAL ACTIVITIES
IN PIPING PLOVER BREEDING HABITAT ON THE U.S. ATLANTIC COAST
TO AVOID TAKE UNDER SECTION 9 OF THE ENDANGERED SPECIES ACT
Northeast Region, U.S. Fish and Wildlife Service
April 15, 1994

The following information is provided as guidance to beach managers and property owners seeking to avoid potential violations of Section 9 of the Endangered Species Act (16 U.S.C. 1538) and its implementing regulations (50 CFR Part 17) that could occur as the result of recreational activities on beaches used by breeding piping plovers along the Atlantic Coast. These guidelines were developed by the Northeast Region, U.S. Fish and Wildlife Service (Service), with assistance from the U.S. Atlantic Coast Piping Plover Recovery Team. The guidelines are advisory, and failure to implement them does not, of itself, constitute a violation of the law. Rather, they represent the Service's best professional advice to beach managers and landowners regarding the management options that will prevent direct mortality, harm, or harassment of piping plovers and their eggs due to recreational activities.

Some land managers have endangered species protection obligations under Section 7 of the Endangered Species Act (see section I below) or under Executive Orders 11644 and 119891 that go beyond adherence to these guidelines. Nothing in this document should be construed as lack of endorsement of additional piping plover protection measures implemented by these land managers or those who are voluntarily undertaking stronger plover protection measures.

This document contains four sections: (I) a brief synopsis of the legal requirements that afford protection to nesting piping plovers; (II) a brief summary of the life history of piping plovers and potential threats due to recreational activities during the breeding cycle; (III) guidelines for protecting piping plovers from recreational activities on Atlantic Coast beaches; and (IV) literature cited.

I. LEGAL CONSIDERATIONS

Section 9 of the Endangered Species Act (ESA) prohibits any person subject to the jurisdiction of the United States from harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting listed wildlife species. It is also unlawful to attempt such acts, solicit another to commit such acts, or cause such acts to be committed. A "person" is defined in Section 3 to mean "an individual, corporation, partnership, trust, association, or any other private entity; or any officer, employee, agent, department, or instrumentality of the Federal Government, of any State, municipality, or political subdivision of a State, or of any foreign government; any State, municipality, or political subdivision of a State; or any other entity subject to the jurisdiction of the United States." Regulations implementing the ESA (50 CFR 17.3) further define "harm" to include significant habitat modification or degradation that results in the killing or injury of wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. "Harass" means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Penalties for violations of Section 9 are provided in Section 11 of the ESA; for threatened species, these penalties include fines of up to $25,000, imprisonment for not more than six months, or both.

Section 10 of the ESA and related regulations provide for permits that may be granted to authorize acts prohibited under Section 9, for scientific purposes or to enhance the propagation or survival of a listed species. States that have Cooperative Agreements under Section 6 of the ESA, may provide written authorization for take that occurs in the course of implementing conservation programs. For example, State agencies have authorized certain biologists to construct predator exclosures for piping plovers. It is also legal for employees or designated agents of certain Federal or State agencies to take listed species without a permit, if the action is necessary to aid sick, injured, or orphaned animals or to salvage or dispose of a dead specimen.

Section 10 also allows permits to be issued for take that is "incidental to, and not the purpose of, carrying out an otherwise lawful activity" if the Service determines that certain conditions have been met. An applicant for an incidental take permit must prepare a conservation plan that specifies the impacts of the take, steps the applicant will take to minimize and mitigate the impacts, funding that will be available to implement these steps, alternative actions to the take that the applicant considered, and the reasons why such alternatives are not being utilized. Section 7 of the ESA may be pertinent to beach managers and landowners in situations that have a Federal nexus. Section 7 requires Federal agencies to consult with the Service (or National Marine Fisheries Service for marine species) prior to authorizing, funding, or carrying out activities that may affect listed species. Section 7 also requires that these agencies use their authorities to further the conservation of listed species. Section 7 obligations have caused Federal land management agencies to implement piping plover protection measures that go beyond those required to avoid take, for example by conducting research on threats to piping plovers. Other examples of Federal activities that may affect piping plovers along the Atlantic Coast, thereby triggering Section 7 consultation, include permits for beach nourishment or disposal of dredged material (U.S. Army Corps of Engineers) and funding of beach restoration projects (Federal Emergency Management Authority).

Piping plovers, as well as other migratory birds such as least terns, common terns, American oystercatchers, laughing gulls, herring gulls, and great black-blacked gulls, their nests, and eggs are also protected under the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712). Prohibited acts include pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting such conduct. Violators may be fined up to $5000 and/or imprisoned for up to six months.

Almost all States within the breeding range of the Atlantic Coast piping plover population list the species as State threatened or endangered (Northeast Nongame Technical Committee 1993). Various laws and regulations may protect State-listed species from take, but the Service has not ascertained the adequacy of the guidelines presented in this document to meet the requirements of any State law.

II. LIFE HISTORY AND THREATS FROM HUMAN DISTURBANCE

Piping plovers are small, sand-colored shorebirds that nest on sandy, coastal beaches from South Carolina to Newfoundland. Since 1986, the Atlantic Coast population has been protected as a threatened species under provisions of the U.S. Endangered Species Act of 1973 (U.S. Fish and Wildlife Service 1985). The U.S. portion of the population was estimated at 875 pairs in 1993 (U.S. Fish and Wildlife Service 1993). Many characteristics of piping plovers contribute to their susceptibility to take due to human beach activities.

LIFE HISTORY

Piping plovers begin returning to their Atlantic Coast nesting beaches in mid-March (Coutu *et al.* 1990, Cross 1990, Goldin 1990, MacIvor 1990, Hake 1993). Males establish and defend territories and court females (Cairns 1982). Eggs may be present on the beach from mid-April through late July. Clutch size is generally four eggs, and the incubation period2 usually lasts for 27-28 days. Piping plovers fledge only a single brood per season, but may renest several times if previous nests are lost. Chicks are precocial3 (Wilcox 1959, Cairns 1982). They may move hundreds of yards from the nest site during their first week of life (see Table 1, Summary of Chick Mobility Data). Chicks remain together with one or both parents until they fledge (are able to fly) at 25 to 35 days of age. Depending on date of hatching, flightless chicks may be present from mid-May until late August, although most fledge by the end of July (Patterson 1988, Goldin 1990, MacIvor 1990, Howard *et al.* 1993).

Piping plover nests are situated above the high tide line on coastal beaches, sand flats at the ends of sandspits and barrier islands, gently sloping foredunes, blowout areas behind primary dunes, and washover areas cut into or between dunes. They may also nest on areas where suitable dredge material has been deposited. Nest sites are shallow scraped depressions in substrates ranging from fine grained sand to mixtures of sand and pebbles, shells or cobble (Bent 1929, Burger 1987a, Cairns 1982, Patterson 1988, Flemming *et al.* 1990, MacIvor 1990, Strauss 1990).

Nests are usually found in areas with little or no vegetation although, on occasion, piping plovers will nest under stands of American beachgrass (Ammophila breviligulata) or other vegetation (Patterson 1988, Flemming *et al.* 1990, MacIvor 1990). Plover nests may be very difficult to detect, especially during the 6-7 day egg-laying phase when the birds generally do not incubate (Goldin 1994).

Plover foods consist of invertebrates such as marine worms, fly larvae, beetles, crustaceans or mollusks (Bent 1929, Cairns 1977, Nicholls 1989). Feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines4, and shorelines of coastal ponds, lagoons or salt marshes (Gibbs 1986, Coutu *et al.* 1990, Hoopes *et al.* 1992, Loegering 1992, Goldin 1993). Studies have shown that the relative importance of various feeding habitat types may vary by site (Gibbs 1986, Coutu *et al.* 1990, McConnaughey *et al.* 1990, Loegering 1992, Goldin 1993, Hoopes 1993) and by stage in the breeding cycle (Cross 1990). Adults and chicks on a given site may use different feeding habitats in varying proportion (Goldin *et al.* 1990). Feeding activities of chicks may be particularly important to their survival. Cairns (1977) found that piping plover chicks typically tripled their weight during the first two weeks post-hatching; chicks that failed to achieve at least 60% of this weight gain by day 12 were unlikely to survive. During courtship, nesting, and brood rearing, feeding territories are generally contiguous to nesting territories (Cairns 1977), although instances where brood-rearing areas are widely separated from nesting territories are not uncommon . Feeding activities of both adults and chicks may occur during all hours of the day and night (Burger 1993) and at all stages in the tidal cycle (Goldin 1993, Hoopes 1993).

THREATS FROM NONMOTORIZED BEACH ACTIVITIES

Sandy beaches that provide nesting habitat for piping plovers are also attractive recreational habitats for people and their pets. Nonmotorized recreational activities can be a source of both direct mortality and harassment of piping plovers. Pedestrians on beaches may crush eggs (Burger 1987b, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo *et al.* 1994). Unleashed dogs may chase plovers (McConnaughey *et al.* 1990), destroy nests (Hoopes *et al.* 1992), and kill chicks (Cairns and McLaren 1980).

Pedestrians may flush incubating plovers from nests exposing eggs to avian predators or causing excessive cooling or heating of eggs. Repeated exposure of shorebird eggs on hot days may cause overheating, killing the embryos (Bergstrom 1991). Excessive cooling may kill embryos or retard their development, delaying hatching dates (Welty 1982). Pedestrians can also displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes *et al.* 1992, Loegering 1992, Goldin 1993). Fireworks are highly disturbing to piping plovers (Howard *et al.* 1993). Plovers are particularly intolerant of kites, compared with pedestrians, dogs, and vehicles; biologists believe this may be because plovers perceive kites as potential avian predators (Hoopes *et al.* 1992).

THREATS FROM MOTOR VEHICLES

Unrestricted use of motorized vehicles on beaches is a serious threat to piping plovers and their habitats. Vehicles can crush eggs (Wilcox 1959; Tull 1984; Burger 1987b; Patterson *et al.* 1991; United States of America v. Breezy Point Cooperative, Inc., U.S. District Court, Eastern District of New York, Civil Action No. CV-90-2542, 1991; Shaffer and Laporte 1992), adults, and chicks. In Massachusetts and New York, biologists documented 14 incidents in which 18 chicks and 2 adults were killed by vehicles between 1989 and 1993 (Melvin *et al.* 1994). Goldin (1993) compiled records of 34 chick mortalities (30 on the Atlantic Coast and 4 on the Northern Great Plains) due to vehicles. Many biologists that monitor and manage piping plovers believe that many more chicks are killed by vehicles than are found and reported (Melvin *et al.* 1994). Beaches used by vehicles during nesting and brood-rearing periods generally have fewer breeding plovers than available nesting and feeding habitat can support. In contrast, plover abundance and productivity has increased on beaches where vehicle restrictions during chickrearing periods have been combined with protection of nests from predators (Goldin 1993; S.Melvin, pers. comm., 1993).

Typical behaviors of piping plover chicks increase their vulnerability to vehicles. Chicks frequently move between the upper berm or foredune and feeding habitats in the wrack line and intertidal zone. These movements place chicks in the paths of vehicles driving along the berm or through the intertidal zone. Chicks stand in, walk, and run along tire ruts, and sometimes have difficulty crossing deep ruts or climbing out of them (Eddings *et al.* 1990, Strauss 1990, Howard *et al.* 1993). Chicks sometimes stand motionless or crouch as vehicles pass by, or do not move quickly enough to get out of the way (Tull 1984, Hoopes *et al.* 1992, Goldin 1993). Wire fencing placed around nests to deter predators (Rimmer and Deblinger 1990, Melvin *et al.* 1992) is ineffective in protecting chicks from vehicles because chicks typically leave the nest within a day after hatching and move extensively along the beach to feed.

Vehicles may also significantly degrade piping plover habitat or disrupt normal behavior patterns. They may harm or harass plovers by crushing wrack into the sand and making it unavailable as cover or a foraging substrate, by creating ruts that may trap or impede movements of chicks, and by preventing plovers from using habitat that is otherwise suitable (MacIvor 1990, Strauss 1990, Hoopes *et al.* 1992, Goldin 1993).

III. GUIDELINES FOR PROTECTING PIPING PLOVERS FROM RECREATIONAL DISTURBANCE

The Service recommends the following protection measures to prevent direct mortality or harassment of piping plovers, their eggs, and chicks.

MANAGEMENT OF NONMOTORIZED RECREATIONAL USES

On beaches where pedestrians, joggers, sun-bathers, picnickers, fishermen, boaters, horseback riders, or other recreational users are present in numbers that could harm or disturb incubating plovers, their eggs, or chicks, areas of at least 50 meter-radius around nests above the high tide line should be delineated with warning signs and symbolic fencing. Only persons engaged in rare species monitoring, management, or research activities should enter posted areas. These areas should remain fenced as long as viable eggs or unfledged chicks are present. Fencing is intended to prevent accidental crushing of nests and repeated flushing of incubating adults, and to provide an area where chicks can rest and seek shelter when large numbers of people are on the beach.

Available data indicate that a 50 meter buffer distance around nests will be adequate to prevent harassment of the majority of incubating piping plovers. However, fencing around nests should be expanded in cases where the standard 50 meter-radius is inadequate to protect incubating adults or unfledged chicks from harm or disturbance. Data from various sites distributed across the plover's Atlantic Coast range indicates that larger buffers may be needed in some locations. This may include situations where plovers are especially intolerant of human presence, or where a 50 meter-radius area provides insufficient escape cover or alternative foraging opportunities for plover chicks.

In cases where the nest is located less than 50 meters above the high tide line, fencing should be situated at the high tide line, and a qualified biologist should monitor responses of the birds to passersby, documenting his/her observations in clearly recorded field notes. Providing that birds are not exhibiting signs of disturbance, this smaller buffer may be maintained in such cases. On portions of beaches that receive heavy human use, areas where territorial plovers are observed should be symbolically fenced to prevent disruption of territorial displays and courtship. Since nests can be difficult to locate, especially during egg-laying, this will also prevent accidental crushing of undetected nests. If nests are discovered outside fenced areas, fencing should be extended to create a sufficient buffer to prevent disturbance to incubating adults, eggs, or unfledged chicks.

Pets should be leashed and under control of their owners at all times from April 1 to August 31 on beaches where piping plovers are present or have traditionally nested. Pets should be prohibited on these beaches from April 1 through August 31 if, based on observations and experience, pet owners fail to keep pets leashed and under control.

Kite flying should be prohibited within 200 meters of nesting or territorial adult or unfledged juvenile piping plovers between April 1 and August 31. Fireworks should be prohibited on beaches where plovers nest from April 1 until all chicks are fledged. (See the Service's February 4, 1997 Guidelines for Managing Fireworks in the Vicinity of Piping Plovers and Seabeach Amaranth on the U.S. Atlantic Coast.)

MOTOR VEHICLE MANAGEMENT

The Service recommends the following minimum protection measures to prevent direct mortality or harassment of piping plovers, their eggs, and chicks on beaches where vehicles are permitted. Since restrictions to protect unfledged chicks often impede vehicle access along a barrier spit, a number of management options affecting the timing and size of vehicle closures are presented here. Some of these options are contingent on implementation of intensive plover monitoring and management plans by qualified biologists. It is recommended that landowners seek concurrence with such monitoring plans from either the Service or the State wildlife agency.

Protection of Nests

All suitable piping plover nesting habitat should be identified by a qualified biologist and delineated with posts and warning signs or symbolic fencing on or before April 1 each year. All vehicular access into or through posted nesting habitat should be prohibited. However, prior to hatching, vehicles may pass by such areas along designated vehicle corridors established along the outside edge of plover nesting habitat. Vehicles may also park outside delineated nesting habitat, if beach width and configuration and tidal conditions allow. Vehicle corridors or parking areas should be moved, constricted, or temporarily closed if territorial, courting, or nesting plovers are disturbed by passing or parked vehicles, or if disturbance is anticipated because of unusual tides or expected increases in vehicle use during weekends, holidays, or special events.

If data from several years of plover monitoring suggests that significantly more habitat is available than the local plover population can occupy, some suitable habitat may be left unposted if the following conditions are met:

1. The Service OR a State wildlife agency that is party to an agreement under Section 6 of the ESA provides written concurrence with a plan that:
A. Estimates the number of pairs likely to nest on the site based on the past monitoring and regional population trends.

AND

B. Delineates the habitat that will be posted or fenced prior to April 1 to assure a high probability that territorial plovers will select protected areas in which to court and nest. Sites where nesting or courting plovers were observed during the last three seasons as well as other habitat deemed most likely to be pioneered by plovers should be included in the posted and/or fenced area.

AND

C. Provides for monitoring of piping plovers on the beach by a qualified biologist(s). Generally, the frequency of monitoring should be not less than twice per week prior to May 1 and not less than three times per week thereafter. Monitoring should occur daily whenever moderate to large numbers of vehicles are on the beach. Monitors should document locations of territorial or courting plovers, nest locations, and observations of any reactions of incubating birds to pedestrian or vehicular disturbance.

AND

2. All unposted sites are posted immediately upon detection of territorial plovers.

Protection of Chicks

Sections of beaches where unfledged piping plover chicks are present should be temporarily closed to all vehicles not deemed essential. (See the provisions for essential vehicles below.) Areas where vehicles are prohibited should include all dune, beach, and intertidal habitat within the chicks' foraging range, to be determined by either of the following methods:

1. The vehicle free area should extend 1000 meters on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting 2000 meterwide area of protected habitat for plover chicks should extend from the ocean-side low water line to the bay-side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists. However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation, or other naturally-occurring obstacles.

OR

2. The Service OR a State wildlife agency that is party to an agreement under Section 6 of the ESA provides written concurrence with a plan that:

A. Provides for monitoring of all broods during the chick-rearing phase of the breeding season and specifies the frequency of monitoring.

AND

B. Specifies the minimum size of vehicle-free areas to be established in the vicinity of unfledged broods based on the mobility of broods observed on the site in past years and on the frequency of monitoring. Unless substantial data from past years show that broods on a site stay very close to their nest locations, vehicle-free areas should extend at least 200 meters on each side of the nest site during the first week following hatching. The size and location of the protected area should be adjusted in response to the observed mobility of the brood, but in no case should it be reduced to less than 100 meters on each side of the brood. In some cases, highly mobile broods may require protected areas up to 1000 meters, even where they are intensively monitored. Protected areas should extend from the ocean-side low water line to the bay-side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists. However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation, or other naturally-occurring obstacles. In a few cases, where several years of data documents that piping plovers on a particular site feed in only certain habitat types, the Service or the State wildlife management agency may provide written concurrence that vehicles pose no danger to plovers in other specified habitats on that site.

Timing of Vehicle Restrictions in Chick Habitat

Restrictions on use of vehicles in areas where unfledged plover chicks are present should begin on or before the date that hatching begins and continue until chicks have fledged. For purposes of vehicle management, plover chicks are considered fledged at 35 days of age or when observed in sustained flight for at least 15 meters, whichever occurs first.

When piping plover nests are found before the last egg is laid, restrictions on vehicles should begin on the 26th day after the last egg is laid. This assumes an average incubation period of 27 days, and provides a 1 day margin of error.

When plover nests are found after the last egg has been laid, making it impossible to predict hatch date, restrictions on vehicles should begin on a date determined by one of the following scenarios:

1) With intensive monitoring: If the nest is monitored at least twice per day, at dawn and dusk (before 0600 hrs and after 1900 hrs) by a qualified biologist, vehicle use may continue until hatching begins. Nests should be monitored at dawn and dusk to minimize the time that hatching may go undetected if it occurs after dark. Whenever possible, nests should be monitored from a distance with spotting scope or binoculars to minimize disturbance to incubating plovers.
OR

2) Without intensive monitoring: Restrictions should begin on May 15 (the earliest probable hatch date). If the nest is discovered after May 15, then restrictions should start immediately.

If hatching occurs earlier than expected, or chicks are discovered from an unreported nest, restrictions on vehicles should begin immediately.

If ruts are present that are deep enough to restrict movements of plover chicks, then restrictions on vehicles should begin at least 5 days prior to the anticipated hatching date of plover nests. If a plover nest is found with a complete clutch, precluding estimation of hatching date, and deep ruts have been created that could reasonably be expected to impede chick movements, then restrictions on vehicles should begin immediately.

Essential Vehicles

Because it is impossible to completely eliminate the possibility that a vehicle will accidently crush an unfledged plover chicks, use of vehicles in the vicinity of broods should be avoided whenever possible. However, the Service recognizes that life-threatening situations on the beach may require emergency vehicle response. Furthermore, some "essential vehicles" may be required to provide for safety of pedestrian recreationists, law enforcement, maintenance of public property, or access to private dwellings not otherwise accessible. On large beaches, maintaining the frequency of plover monitoring required to minimize the size and duration of vehicle closures may necessitate the use of vehicles by plover monitors.

Essential vehicles should only travel on sections of beaches where unfledged plover chicks are present if such travel is absolutely necessary and no other reasonable travel routes are available. All steps should be taken to minimize number of trips by essential vehicles through chick habitat areas. Homeowners should consider other means of access, eg. by foot, water, or shuttle services, during periods when chicks are present.

The following procedures should be followed to minimize the probability that chicks will be crushed by essential (non-emergency) vehicles:

1. Essential vehicles should travel through chick habitat areas only during daylight hours, and should be guided by a qualified monitor who has first determined the location of all unfledged plover chicks.

2. Speed of vehicles should not exceed five miles per hour.

3. Use of open 4-wheel motorized all-terrain vehicles (ATVs) or non-motorized allterrain bicycles is recommended whenever possible for monitoring and law enforcement because of the improved visibility afforded operators.

4. A log should be maintained by the beach manager of the date, time, vehicle number and operator, and purpose of each trip through areas where unfledged chicks are present. Personnel monitoring plovers should maintain and regularly update a log of the numbers and locations of unfledged plover chicks on each beach. Drivers of essential vehicles should review the log each day to determine the most recent number and location of unfledged chicks.

Essential vehicles should avoid driving on the wrack line, and travel should be infrequent enough to avoid creating deep ruts that could impede chick movements. If essential vehicles are creating ruts that could impede chick movements, use of essential vehicles should be further reduced and, if necessary, restricted to emergency vehicles only.

SITE-SPECIFIC MANAGEMENT GUIDANCE

The guidelines provided in this document are based on an extensive review of the scientific literature and are intended to cover the vast majority of situations likely to be encountered on piping plover nesting sites along the U.S. Atlantic Coast. However, the Service recognizes that site-specific conditions may lead to anomalous situations in which departures from this guidance may be safely implemented. The Service recommends that landowners who believe such situations exist on their lands contact either the Service or the State wildlife agency and, if appropriate, arrange for an on-site review. Written documentation of agreements regarding departures from this guidance is recommended.

In some unusual circumstances, Service or State biologists may recognize situations where this guidance provides insufficient protection for piping plovers or their nests. In such a case, the Service or the State wildlife agency may provide written notice to the landowner describing additional measures recommended to prevent take of piping plovers on that site.

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APPENDIX G

Guidelines for Managing Fireworks in the Vicinity of
Piping Plovers and Seabeach Amaranth
on the U.S. Atlantic Coast

GUIDELINES FOR MANAGING FIREWORKS IN THE VICINITY OF PIPING PLOVERS AND SEABEACH AMARANTH ON THE U.S. ATLANTIC COAST

February 4, 1997

The following is provided as guidance to Federal agencies, landowners, commercial fireworks companies, and fireworks event sponsors seeking to avoid adverse effects on piping plovers and seabeach amaranth. They are intended to advise Federal agencies that conduct, fund, or authorize fireworks activities regarding the measures needed to avoid adverse effects on listed species, thereby averting the need for formal consultation under Section 7 of the Endangered Species Act (ESA). These practices also constitute the U.S. Fish and Wildlife Service's (Services's) best professional advice to non-Federal entities on avoiding take of piping plovers under Section 9 of the ESA.

These guidelines supplement information about protection of piping plovers from a variety of recreational activities, provided in the Service's April 15, 1994 *Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act* (appended)[1].

Seabeach amaranth, a threatened plant species protected under the Endangered Species Act (ESA), occurred historically along coastal beaches from southern Massachusetts to South Carolina. At the present time it is found only on Long Island, New York; North Carolina; and South Carolina. Section 7 of the ESA requires Federal agencies to consult with the Service prior to authorizing, funding, or carrying out activities that directly or indirectly affect listed plants; this requirement is applicable to permits related to fireworks events that are issued by the U.S. Coast Guard.

Potential Impacts Related to Fireworks Displays

Direct Impacts

Fireworks are highly disturbing to piping plovers. Fireworks early in the breeding season may cause plovers conducting courtship activities to abandon their territories. Direct injury can be caused by the explosions or debris, and piping plovers and terns (which often nest adjacent to or near plovers) will often abandon their nests and broods during fireworks displays, exposing eggs and chicks to weather and predators. If a flightless chick were to become permanently separated from its parents during the confusion, mortality would be almost certain.

Several situations where fireworks caused severe adverse effects on least terns, colonial nesting birds often found in the vicinity of piping plovers, serve as indicators of the effects that pyrotechnics can exert on beach-nesting birds. An August 1993 fireworks display in New Jersey

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[1] Copies of the 1994 Guidelines for general recreational activities are also available, on request, from the U.S. Fish and Wildlife Service, Wier Hill Road, Sudbury, MA 01776, Attn: Anne Hecht; telephone 508-443-4325; fax 508-443-2898.

caused permanent abandonment of a least tern colony located more than 250 m away, and a 1994 New Jersey fireworks display caused temporary abandonment and displays of distress by terns within a colony located more than 3/4 mile away. Incidents in New York where piping plovers were disturbed by fireworks also caused prolonged disturbance to least terns and black skimmers nesting nearby.

Seabeach amaranth can be directly affected by launch activities if they occur in areas where the plants may be crushed or damaged by launch personnel or equipment.

Indirect Impacts

In addition to adverse effects from the noise and lights of the pyrotechnics, commercial fireworks displays often draw large crowds that may pose threats to nearby plovers. These crowds may be situated at some distance from the actual launch site, for example, across an inlet. Potential indirect impacts that may adversely affect piping plovers include: spectators walking through and/or throwing objects (including illegal pyrotechnics) into plover nesting and brood-rearing areas; additional off-road vehicle patrols by public safety personnel; increased boat landings by spectators on relatively remote stretches of beach; low-flying aircraft, including helicopter patrols and personal spectator aircraft; additional trash (which attracts predators). Signs and symbolic fences that are adequate for the purpose of alerting daytime beach users to locations of plover breeding areas are often insufficient to prevent accidental entry by fireworks spectators wandering in the dark.

Potential indirect adverse effects on seabeach amaranth include trampling or crushing of unprotected plants by pedestrian or vehicular traffic on the beach.

Measures for Avoiding and Monitoring Direct and Indirect Impacts of Fireworks Events

Direct Impacts

Fireworks displays including launch areas and debris fallout areas should be located to avoid disturbance of breeding piping plovers. In general, the Service recommends that the launch site be located a minimum of 3/4 mile from the nearest plover nesting and/or foraging area. Access routes for personnel deploying the fireworks and other public safety personnel (including fire prevention/suppression and law enforcement officers) should conform with the vehicle management recommendations contained in the *Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act.* Launch sites should also be located to prevent trampling any seabeach amaranth plants.

Indirect Impacts

Event sponsors should plan and implement measures to assure that spectators will not walk through and/or throw objects into plover nesting and brood-rearing areas. Sufficient law enforcement and other personnel must also be on-site during these events to enforce plover protection measures and prevent use of illegal fireworks in the vicinity of the birds.

1. Plover habitats in the vicinity of where spectators may congregate should be intensively surveyed by qualified biologists[2] for at least four days prior to the event to locate nests, adult plovers, chicks, and/or post-fledged juveniles. For events prior to July 1, surveyors should also search for territorial and/or courting adults that have not yet established nests or may be preparing to re-nest. In New York, potential habitat for seabeach amaranth should be surveyed to locate any seabeach amaranth plants.

2. Plover habitats should be symbolically fenced in accordance with the Service's *Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act* (see pages 7-8). Seabeach amaranth plants should be symbolically fenced to provide a minimum 3 meter buffer zone around individual plants or groups of plants.

3. Additional protection measures recommended to avoid impacts that may occur when the large crowds are drawn to the beach at night include[3]:

    a. Close parking lots and beach access points in the vicinity of breeding plovers.

    b. Increase the size of symbolically fenced areas around plover nesting areas to provide extra buffers between birds and pedestrians that may be on the beach. The size of buffers should be appropriate for the size of the anticipated crowd; for large crowds, buffers should be expanded from the standard 50 meters to a total of 100 meters from established nests.

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[2] State wildlife agencies and private environmental groups often conduct plover monitoring activities and can be consulted for available information about plover breeding locations. However, intensity of surveys needed to avoid adverse effects from fireworks events will often exceed those routinely conducted by these wildlife agencies/organizations. Arrangements and commitments for added surveys for these events are the responsibility of the permitting agencies and/or event sponsors. It is recommended that these arrangements be made well in advance of the potential event, due to limited availability of qualified personnel.

[3] For extremely large fireworks events, additional protection measures may be needed, including: issuing air traffic advisory for all aircraft to remain >1000' above sensitive areas; issuing mariners advisory telling boaters not to land in sensitive areas; boat patrols; extensive advanced publicity advising spectators where they *should* go to watch the fireworks and about closed areas; training about protection needs of rare plants and/or animals for law enforcement personnel.

c. Increase the visibility of fencing using reflectorized tape or by substituting snowfences, plastic orange highway construction fences, or wire mesh fences for string fencing, as string fences are very difficult to see at night. Snowfences and highway construction fences should be removed the next day if there is any chance that they will impede chick movements.

d. Fence and post foraging territories of unfledged chicks, as delineated by a qualified biologist, especially in areas where large crowds are anticipated and/or if the day of the event is especially hot (since heat often deters chick foraging during the daytime, increasing the birds' reliance on evening feeding).

e. Provide adequate numbers (consistent with anticipated numbers of spectators) of monitors and law enforcement personnel in the vicinity of plover breeding areas or seabeach amaranth locations to patrol fenced areas from the time when spectators begin congregating on the beach until the crowd disperses after the event. Assure that monitors and enforcement personnel receive accurate current information about the locations of threatened birds and plants so that they can minimize any disruptions from their own activities.

f. Prohibit all pets on the beach during the event and ensure compliance with this prohibition.

4. Remove any trash or litter from the beach immediately following the event. However, any trash located within fenced areas should be left until daylight and then removed by or under the supervision of plover monitors. Further, vehicles should not be used at night to remove trash within 100 meters of unfledged plover chicks.

5. In order to gauge the effectiveness of the measures 3 and 4, the following data should be collected:

   a. Locations and status of all adult plovers, nests, and chicks within 1/4 mile of spectator viewing areas should be determined by a qualified biologist on the day of the event and again on the following day.

   b. Counts of human and dog tracks that intersect the perimeter of symbolically fenced areas before and after the event.

   c. Counts of any persons actually observed inside symbolically fenced areas during the event.

   d. Counts of any instances of illegal pyrotechnics used on the beach during the event.

e. Counts of trash/litter items inside symbolically fenced areas before and after the event. For very large areas or areas that have substantial amounts of trash before the event, trash counts may be conducted in sample plots.

f. Count of breaks in symbolic fences.

6. Except when responding to an actual emergency situation, all law enforcement, fire department, public works, fireworks deployment, and other vehicles in the vicinity of breeding plovers should only be operated in conformance with the Service's *Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act* (see discussion of Essential Vehicles, pages 13-14).

APPENDIX H

Piping Plover Nesting Results in New Jersey: 2012
(Prepared by the New Jersey Endangered and Nongame Species Program)

Table 1. Number of pairs of piping plovers at New Jersey nesting sites: 2003-2012.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Sandy Hook NRA	*38*	*32*	*22*	*22*	*30*	*32*[1]	*35*	*45*	*49*	*50*
Coast Guard	*8*	*7*	*3*	*4*	*4*	*4*	*4*	*5*	*4*	*4*
North Beach	*9*	*10*	*6*	*4*	*8*	*8*	*9*	*13*	*14*	*14*
North Gunnison	*5*	*3*	*2*	*3*	*4*	*7*	*9*	*9*	*9*	*13*
South Gunnsion	*1*	*1*	*0*	*0*	*1*	*2*	*5*	*5*	*4*	*5*
D-Lot	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*
Skeleton Hill Island	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*
Critical Zone	*4*	*3*	*3*	*3*	*4*	*4*	*2*	*6*	*5*	*6*
Hidden Beach	*4*	*3*	*3*	*3*	*4*	*2*	*3*	*3*	*5*	*4*
Fee Beach	*6*	*4*	*4*	*4*	*4*	*5*[1]	*3*	*3*	*5*	*3*
South Fee Beach	*1*	*1*	*1*	*1*	*1*	*2*[1]	*0*	*1*	*1*	*1*
Sea Bright North	7	5	7	7	8	8	6	3	2	2
Monmouth Beach North	2	4	3	3	1	1	1	2	0	0
Seven Presidents Park	1	1	1	2	3	3	2	2	2	0
Long Branch	1	0	0	0	0	0	0	0	0	0
Region 2 subtotal	**49**	**42**	**33**	**34**	**42**	**44**	**44**	**52**	**53**	**52**
Sea Girt - Wreck Pond	1	1	1	0	1	0	1	0	0	1
Sea Girt - NGTC	0	0	0	0	1	0	0	0	0	0
Island Beach SP - Dike	2	3	2	0	0	0	0	0	0	0
Barnegat Light	3	3	4	3	4	3	1	3	3	1
Region 3 subtotal	**6**	**7**	**7**	**3**	**6**	**3**	**2**	**3**	**3**	**2**
Holgate	*13*	*16*	*13*	*16*	*14*	*11*	*7*	*10*	*6*	*14*
Little Beach	*19*	*19*	*11*	*12*	*17*	*12*	*10*	*13*	*17*	*18*
North Brigantine NA	17	8	8	8	8	8	6	3	5	8
Region 4 subtotal	**49**	**43**	**32**	**36**	**39**	**31**	**23**	**26**	**28**	**40**
Seaview Harbor Marina	0	0	1[1]	0	0	0	0	0	1	1
Ocean City - North	2	1	1[1]	0	0	0	0	0	0	0
Ocean City - Center	8	8	5	7	4	3	1	0	1	0
Region 5 subtotal	**10**	**9**	**6**	**7**	**4**	**3**	**1**	**0**	**2**	**1**
Corson's Inlet SP	2	3	2	2	2	1	2	0	0	0
Strathmere NA	0	0	1	1	0	0	0	1	1	1
Strathmere (Upper Twp.)	1	1	1	0	0	0	0	1	2	2
Townsend's Inlet	1	1	1	0	0	0	0	0	0	0
Avalon - Dunes	8	8	5	4	5	4	4	5	5	5
Region 6 subtotal	**12**	**13**	**10**	**7**	**7**	**5**	**6**	**7**	**8**	**8**
Stone Harbor Point	6	9	10	17	17	11	15	9	10	9
Champagne Island	0	1	1	2	1	0	0	0	0	0
N. Wildwood - Hereford	3	4	3	3	2	1	2	2	1	1
Two-Mile Beach	*2*	*1*	*1*	*1*	*2*	*0*	*0*	*1*	*0*	*0*
Cape May NWR	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*
Coast Guard - LSU	*2*	*1*	*1*	*1*	*1*	*0*	*0*	*1*	*0*	*0*
Coast Guard - TRACEN	4	1	3	0	2	1	0	0	0	2
Cape May City	0	1	0	0	0	1	1	0	0	0
Cape May Meadows	3	4	5	6	7	11	11	8	6	6
The Nature Conservancy	*2*	*1*	*4*[1]	*3*	*4*	*7*	*7*	*5*	*4*	*3*
Cape May Point SP[1]	1	3	2[1]	3	3	4	4	3	2	3
Region 7 subtotal	**18**	**21**	**23**	**29**	**31**	**25**	**29**	**20**	**17**	**18**
Total Pairs	**144**	**135**	**111**	**116**	**129**	**111**	**105**	**108**	**111**	**121**
Pairs at NJDFW sites	**70**	**66**	**61**	**62**	**62**	**49**	**46**	**34**	**35**	**36**

[1] The same pair nested at two nearby sites. Therefore "subtotals" and "totals" will be less than sum of individual sites.
Note: Sites in italics were monitored by agencies other than NJDFW: Sandy Hook NRA by the National Park Service, Holgate and Little Beach by USFWS - Edwin B. Forsythe NWR, Two-Mile Beach by USFWS - Cape May NWR, Cape May Meadows-TNC by The Nature Conservancy - Delaware Bayshores Office.

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Appendix E.

Cultural Resources

Cultural Resources

The USACE has determined that the Area of Potential Effect (APE) for the selected plan includes the beaches and intertidal areas from Hereford Inlet to Cape May inlet, marking the northern and southern limits, and from the existing dunes to the intertidal area marking the eastern and western limits. The limits of construction disturbance for the selected plan are located within the APE.

Although there are several recorded historic properties eligible for or listed on the National Register of Historic Places (NRHP) within the vicinity of the APE for the selected plan, the USACE has determined that dune and berm construction along approximately 4.5 miles from Hereford Inlet to Cape May Inlet using recently accreted sand from the intertidal zone from the southern end of Five Mile Island will have *No Effect*.

A cultural resource assessment of the proposed intertidal sand source was conducted by FEMA as part of the Section 106 review for post-Hurricane Irene beach restoration of North Wildwood. An assessment of the beach in the adjacent communities of Wildwood Crest in the south to North Wildwood was conducted to determine the sensitivity of below ground archaeological resources. Several aspects were analyzed including the project's proximity to know archaeological resources, waterways and historic properties as well as the site's environmental characteristics such as spoil analysis and previous ground disturbing activities within the project APE, which is roughly the APE of the selected plan.

Remnants of the *Nancy*, a revolutionary war brig set afire by troops at Turtle Gut Inlet (Site 28CM0013) are located southwest of the APE and site 28CM0008 is currently underneath the existing Wildwood Boardwalk. There are no structures within the project APE; however the Chateau Blue Motes, the Hereford Inlet Lighthouse and the J. Thompson Baker House are all listed on the NRHP, but will not be affected. Also, the Wildwood Shore Resort Historic District runs parallel to the beach and is within the project viewshed but will also not be affected.

The APE is a previously disturbed, engineered beaches. The proposed project will collect, transport and place sand entirely within the previously disturbed areas. No part of the proposed undertaking is located within an archaeologically sensitive area, and no historic properties are within the APE. Therefore, per 36 CFR 800.3(a)(1), no historic properties eligible for or listed on the NRHP will be affected by the selected plan activities.

Appendix F.

Real Estate Plan

US Army Corps of Engineers
Philadelphia District

Hereford Inlet to Cape May Inlet

Cape May County,
New Jersey

New Jersey Shore Protection
Study

Real Estate Plan

Prepared by:

Heather Sachs, Baltimore

District

APRIL 2014

U.S. ARMY CORPS OF ENGINEERS,
North Atlantic Division

REAL ESTATE PLAN
FOR THE
New Jersey Shore Protection Study
Hereford to Cape May Inlet Feasibility Study
Cape May County, New Jersey

Abstract of Project Data:

Project Name: Hereford Inlet to Cape May Inlet Shore Protection Study

Location: Cape May County, New Jersey

Project Purpose: Storm Damage Reduction

Acreage:	Perpetual Storm Damage Reduction Easement	606.42
	Borrow Easement	245.00

Gross Appraisal Estimate $1,018,972

Estimate with (25%) Contingency: $1,273,511

Project Non-Federal Sponsor (NFS): New Jersey Department of Environmental Protection

1. GENERAL:

This Real Estate Plan is in support of the Hereford Inlet to Cape May Inlet Feasibility Study Report Decision. The New Jersey Shore Protection Study was completed under authority of resolutions adopted by the Committee on Public Works and Transportation, U.S. House of Representatives, and the Committee on Environment and Public Works, U.S. Senate, dated December 1987. The resulting Report of Limited Reconnaissance, completed in September 1990, asserted that the situation between the Hereford Inlet and Cape May Inlet was not critical and recommended that other areas along the New Jersey Coast required immediate attention.

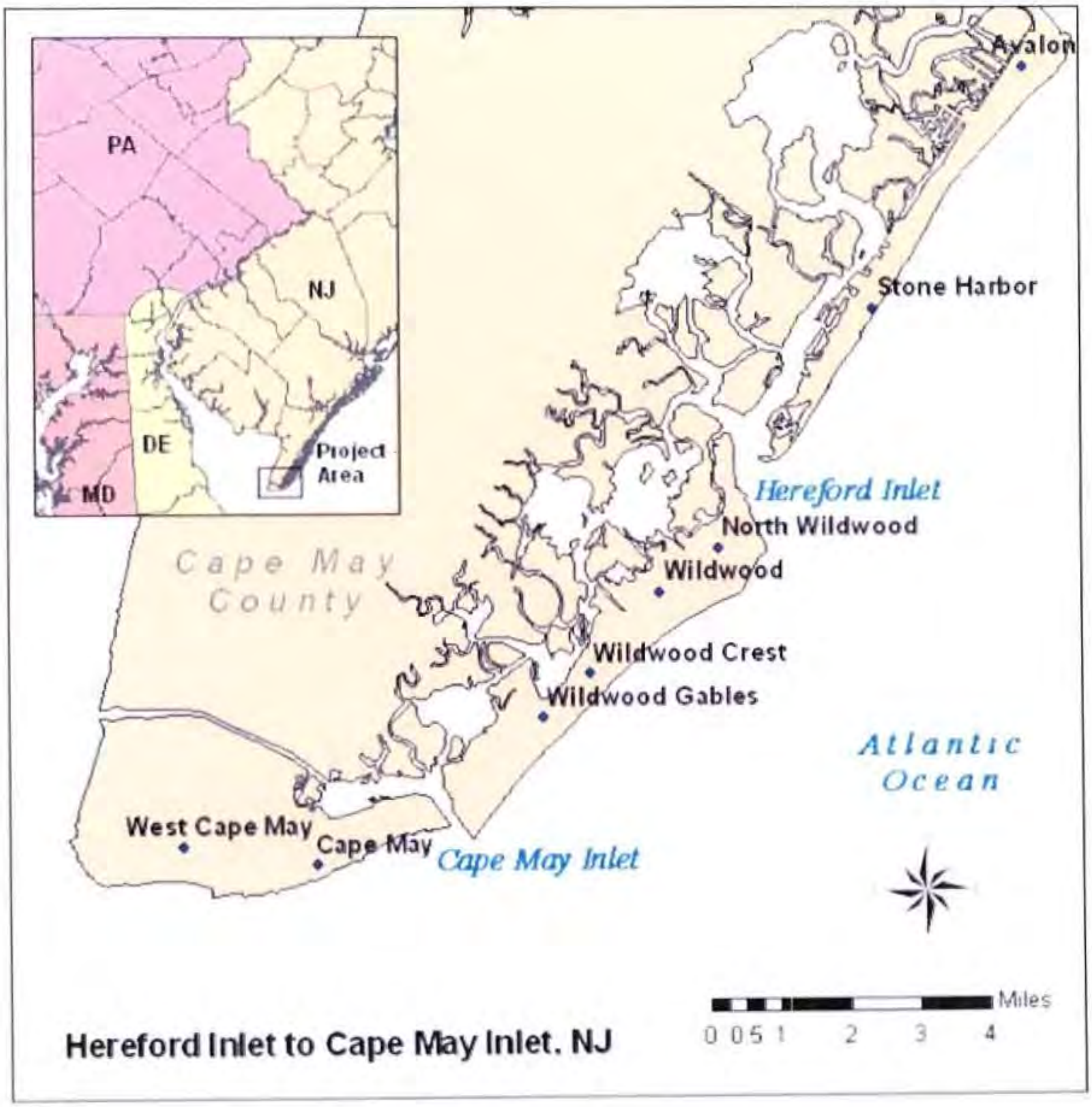
A subsequent increase in shoreline problems developing in the Hereford-Cape May Inlet area in the 1990's generated a letter of urgency in 2002 from the current Non-Federal Sponsor for this project, the New Jersey Department of Environmental Protection (NJDEP). The resulting 2002 Hereford Inlet to Cape May Inlet Reconnaissance Study/Preliminary Financial Analysis was completed in January 2002 and approved by North Atlantic Division by letter dated January 28, 2002. The Feasibility Cost-Sharing Agreement was signed between the Philadelphia District and the NJDEP on September 30, 2002. The damage and destruction caused to the barrier island communities of the New Jersey shore by Hurricane Sandy in October 2012 prompted Congressional passage of the Disaster Relief Appropriations Act of 2013, as signed into law on January 29, 2013, to address outstanding shoreline issues. The passage of additional available funding for shoreline protection projects accelerated the timeline for the completion of in-process feasibility reports.

The study area is a barrier island located in Cape May County, New Jersey, bordered to the north by Hereford Inlet and to the south by Cape May Inlet (Figure 1). Known locally as "Five Mile Island," municipalities on the island include North Wildwood, Wildwood, Wildwood Crest and a portion of Lower Township. The study area is a popular resort community with the majority of vacationers to the island visiting Wildwood. The southern end of the island is comprised of the Cape May National Wildlife Refuge (managed by the U.S. Fish and Wildlife Service) and the former U.S. Coast Guard Electronics Center (managed jointly by the U.S. Coast Guard and the U.S. Fish and Wildlife Service). No federal lands are included in the project.

Description of Recommended Plan: The primary purpose of this project is to provide hurricane and storm damage protection. The selected plan for this project extends approximately 4.5 miles from Hereford Inlet to Cape May Inlet and will include the towns of North Wildwood, Wildwood, Wildwood Crest and Lower. The project will include the creation of a 16' North American Vertical Datum (NAVD) 88 dune with a 25' wide crest and 75' wide berm base, including a 30' offset for maintenance access and dune taper, at an elevation of 6.5' NAVD using sand back-passed from a beach borrow source on a four-year nourishment cycle. The sand for the dune and berm will be pumped from the southern borrow area using mobile backpassing technology to hydraulically pump the sand from the Wildwood and Wildwood Crest borrow source to the placement area on a four-year nourishment cycle. The dune and berm restoration and maintenance are designed to provide a high level of storm protection, conform to and enhance the existing environs and provide an adaptive and productive use for the excess sand currently clogging beach outfalls by shaping it into a dune and berm for storm reduction benefits.

Therefore, this Real Estate Plan supports the currently-available design drawings. Due to the accelerated timeline, certain items in this plan will require additional investigation. These items are noted in the report below as applicable. The information contained herein is tentative in nature for planning purposes only.

Figure 1. Hereford Inlet to Cape May Inlet



2. REAL ESTATE REQUIREMENTS

Application of sound real estate principles including blocking out along regular and definable boundaries; minimizing severance; and maintaining usable and economic remainders outside the project footprint have designated the project footprint. The project footprint is deemed sufficient to accommodate the construction, operation, maintenance, repair and replacement of the proposed project.

a. Description of Land, Easements, Rights-of-Way and Access Road Requirements for Project

The selected plan will require two (2) types of standard easements for the project. All project activities, including mobilization and construction, lay down and storage of contractor materials and equipment, planting of dune grass and placement of sand fences, as well as crossover areas, are located within the project area Limit of Construction within the acreages listed below. Therefore, no Temporary Work Area or Road/Access Easements are required for these areas.

A standard Perpetual Beach Storm Damage Reduction Easement (Standard Estate No. 26) is required for the construction of the beach berm and dune system on the beachfront properties that are above the MHWL or that include riparian grants below MHWL, including those owned by the local municipalities. The total numbers of properties requiring easement acquisition are 43 township-owned properties and 48 privately-owned properties above MHWL. The total acreage amounts for acquisition are 540.42 acres for municipally-owned properties, 66.00 acres for privately-owned properties. For the State-owned borrow area below MHWL, a standard Perpetual Borrow Easement would be the minimum estate required if not owned by the State. This 245 acres will be valued as a borrow easement for LERRD crediting purposes, but since the property is owned by the Non-Federal Sponsor, the State will provide access to the property through a Right-of-Entry to the Government. The number of parcels requiring easement acquisition of the entire parcel and those requiring acquisition over part of the entire parcel for each municipality:

	Publicly-Owned		Privately-Owned	
Municipality	Partial Coverage	Full Coverage	Partial Coverage	Full Coverage
North Wildwood	4	4	2	N/A
Wildwood	2	6	7	34
Wildwood Crest	2	25	N/A	N/A
Lower	N/A	N/A	1	4

State of NJ (Borrow Area)	1	N/A	N/A	N/A

Some of the properties listed above include parcels located below the MHWL currently subject to riparian grants. Easements will either have to be subordinated to the State of New Jersey through a legal determination of the State under the State public trust doctrine, or must be acquired over the areas below the MHWL covered by riparian grants for construction, operation and maintenance required by the Non-Federal Sponsor and the Government over the life of the project. The State is currently making a determination as which approach it will take in addressing riparian grants. The same easement acquisition criteria applies to areas below the MHWL required for beach-shaping and activities related to the dredging of material to be placed on this site. A Perpetual Borrow Easement is also required for properties below the mean high water line not covered by riparian grants, since said properties are not subject to navigation servitude. See Section 6 entitled "Navigational Servitude" for further explanation of this easement acquisition requirement.

b. Standard Estates

A standard Perpetual Beach Storm Damage Reduction Easement (Standard Estate No. 26, EC 405-1-11, Exhibit 5-29) and Perpetual Borrow Area Easement (Standard Estate No. 14, EC 405-1-11, Exhibit 5-29) are required for the construction of the beach berm and dune for upland beachfront properties above the MHWL and those covered by riparian grants, plus the borrow areas below MHWL. As noted on the project drawing included as Exhibit A, the City of Wildwood has proposed the inclusion of a Camper/RV Parking Lot within the project construction limit. Although generally not allowed under the standard beach storm damage reduction easement below, an exception to the easement has been determined to be acceptable since the planned parking area will be a location of public access and accommodation and will be owned and operated by the City of Wildwood. The inclusion of this parking area was reviewed by the project design team and has been determined to not interfere with the selected plan design. The City of Wildwood is the underlying owner of the fee estate of this property. Therefore, no modified standard easement is required for the inclusion of the proposed Camper/RV Parking Lot, or any other part of the project.

<u>PERPETUAL BEACH STORM DAMAGE REDUCTION EASEMENT</u>
(Standard Estate No. 26)

A perpetual and assignable easement and right-of-way in, on, over and across (the land described in Schedule A) (Tract No. __) for use by the (Project Sponsor), its representatives, agents, contractors, and assigns, to construct; preserve; patrol; operate; maintain; repair; rehabilitate; and replace; a public beach [a dune system] and other erosion control and storm damage reduction measures together with appurtenances thereto, including the right to deposit sand; to accomplish any alterations of contours on said land; to construct berms [and dunes]; to nourish and renourish periodically; to move, store and remove equipment and supplies; to erect and remove temporary structures; and to perform any other work necessary and incident to the construction, periodic renourishment and maintenance of the (Project Name), together with the right of public use and access; [to plant vegetation on said dunes and berms; to erect, maintain and remove silt screens and sand fences; to facilitate preservation of dunes and vegetation through the limitation of access to dune areas;] to trim, cut, fell, and remove from said land all trees, underbrush, debris, obstructions, and any other vegetation, structures and obstacles within the limits of the easement (except_____); [reserving, however, to the grantor(s), (his) (her) (its) (their) (heirs), successors and assigns, the right to construct dune overwalk structures in accordance with any applicable Federal, State or local laws or regulations, provided that such structures shall not violate the integrity of the dune in shape, dimension or function, and that prior approval of the plans and specifications for such structures is obtained from the (designated representative of the Project Sponsor) and provided further that such structures are subordinate to the construction, operation, maintenance, repair, rehabilitation and replacement of the project; and further] reserving to the grantor(s), (his) (her) (its) (their) (heirs), successors and assigns all such rights and privileges as may be used and enjoyed without interfering with or abridging the rights and easements hereby acquired; subject however to existing easements for public roads and highways, public utilities, railroads and pipelines.

PERPETUAL BORROW EASEMENT

(Standard Estate No. 14)

A perpetual and assignable right and easement to clear, borrow, excavate and remove soil, dirt, and other materials from (the land described in Schedule A) (Tracts Nos. _____, _____ and _____); [1] subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges in said land as may be used without interfering with or abridging the rights and easement hereby acquired.

c. Non-Standard Estates

There are no non-standard estates required for this project. However, there are five (5) entertainment pier structures, one (1) fishing pier structure and two (2) private beaches included in the project area. The Non-Federal Sponsor provided draft deeds for both situations, which were submitted to HQUSACE for review as non-standard estates. Upon further review, HQUSACE determined that these deeds do not have any changes to the standard estate language that would be considered non-standard, but language is added to the deeds to address site specific issues pertaining to this project and existing or new piers or private beaches as follows:

i. Entertainment and Fishing Piers: Currently, the existing standard Perpetual Storm Damage Reduction Easement language is used for parcels currently situated under such structures. However, changes to the other areas of the required easement have been required for the continued operation of these structures within the project area. It is in the best interest of the local communities, the Non-Federal Sponsor and the United States for these structures to remain, and protection of these structures is included in project formulation.

ii. Private Beach Clubs: Although current regulations preclude the continued existence of private beach clubs in a federal project area, HQUSACE is currently reviewing State of New Jersey guidelines and requirements for public use of and charges at privately-owned beach clubs. Current "open beach" regulations and recent court rulings have allowed the State of New Jersey broader authorities to regulate and require public availability of beach badges at reasonable expense at private beach clubs, as monitored by the New Jersey Department of Community Affairs. As currently explained by the Non-Federal Sponsor, the beach badge system in certain areas is open to the entire public on equal terms and proceeds from the sale of badges are utilized to cover custodial maintenance of the beach area. Any changes required to the easements used for private beach clubs are anticipated to be outside of the Standard Grant of Easement language in the current standard Perpetual Storm Damage Reduction Easement.

Crediting will follow standard procedures as set out in a model Project Partnership Agreement (PPA). No Credit will be afforded to any lands or interests previously acquired and credited for any applicable Corps of Engineers Project.

Credit will only be applied to the acreage within the "project footprint", namely the lands or corridor required for the Recommended Plan of improvements. Lands outside of the project requirements and lands that may be acquired for the sponsor's own purposes would not be creditable LERRD's. Only lands deemed necessary to be included in the project have been included.

Corps policy prescribes that credit will not afforded for lands purchased with Federal funds or grants where the granting of such credit is not permissible, either as prescribed by statute, or as determined by the head of the Federal agency administering such grants or programs. The Federal Emergency Management Agency's (FEMA's) floodplain hazard mitigation and elimination grants are examples of such Federal grant programs were credit would not be allocated.

d. Current Ownership

A tax data list of all project required parcels for the construction and operation and maintenance of the proposed project is attached to the report as Exhibit A. This list provides the owner names for all parcels as provided in 2.a. above, identified by block and lot number, as currently recorded in County and Municipal tax property records. A table of the real estate or Lands, Easements, Rights-of-way, Relocations, and Disposal (LERRD) requirements in summary fashion is presented as follows:

Land Category	Number of Parcels	Acreage	Gross Appraisal Est.
Municipalities	43	Included below	$ 0
Private Parcels	48	540.42	$
State of New Jersey	1	245	$ 0
TOTALS	92	606.42	$

e. Real Estate Mapping

Real Estate Maps, Plates R-1 to R-5, dated 22 April 2014 are attached as Exhibit B. The maps include delineation of the lands to be acquired, bulk acreage data for each estate, off-beach borrow areas identified and indicated parcels impacted by the project as listed in Exhibit A above.

3. EXISTING FEDERAL PROJECTS

There are currently no active federal shoreline protection projects in the project area. Existing active Federal navigation projects within the study area currently include the following: In 1964, the Federal Government constructed four 639-foot long timber groins east of the east jetty at Cape May Point under an earlier shoreline erosion control project. The 400-foot wide Cape May Inlet is currently maintained as a Federal navigation project. Initially constructed in 1908-1911, the navigation portion is maintained by two parallel stone jetties and is dredged to maintain its authorized depth of 25 feet at low tide.

4. EXISTING FEDERALLY OWNED LANDS

The project area contains no lands owned or managed by the federal government. Although there is property adjacent to the project at the southern end of the island managed by the United States Fish and Wildlife Service and the United States Coast Guard, along the Cape May Inlet. None of the lands are federally owned that lie within this proposed project alignment. Specifically, neither the Cape May Wildlife Refuge or U.S, Coast Guard's LORAN sites are included in this project. Coordination with FWS has occurred and will continue as appropriate.

5. LANDS OWNED BY THE NON-FEDERAL SPONSOR

There are currently no upland areas owned by the State of New Jersey in the project area, which are either privately owned or owned by local municipalities. Submerged lands below the MHWL of the Atlantic Ocean are owned by the State of New Jersey and managed by the NJDEP Bureau of Tidelands Management. These areas will be addressed by the Non-Federal Sponsor as discussed in 2.a. above.

6. NAVIGATIONAL SERVITUDE

Navigational servitude is the right of the federal Government (under the Commerce Clause of the U.S. Constitution) to use, control, and regulate the navigable waters of the United States and the submerged lands thereunder for various commerce-related purposes including navigation and flood control. In tidal areas, the servitude extends to all lands below the mean high water mark. In non-tidal areas, the servitude extends to all within the bed and banks of a navigable stream that lie below the ordinary high water. As this project is for storm damage reduction purposes, not navigational purposes, the Government will not exercise its rights under the doctrine of Navigational Servitude for this project on areas below MHWL because a nexus to maintaining or improving navigation has not been established.

The State of New Jersey also has the right of navigational servitude over submerged lands within its borders, it is not as encompassing as that of the United States. Therefore, the Non-Federal Sponsor must acquire some form easement or rights over lands covered by riparian grants below MHWL as discussed in 2.a. above.

7. INDUCED FLOODING

Although the entire project area is prone to storm-induced flooding from both the ocean front and back bay, there is nothing in the main feasibility report to indicate that the constructed project features will induce flooding in new areas or increase flooding in existing flood prone areas. Overall, the project is designed to decrease storm-induced flooding and damage. Appropriate measures will be taken for the care and diversion of water, if any, during construction. There should be no construction induced flooding.

8. BASELINE COST ESTIMATE FOR REAL ESTATE

The detailed Real Estate Cost Estimate in MCACES format is included in Exhibit C. The Perpetual Beach Storm Damage Reduction Easement (approximately 606.42 acres) and Perpetual Borrow Area Easement (approximately 245 acres) value is considered to be of minimal value ($1.00 per parcel) due to the application of offsetting project benefits, also known as special benefits. The appraisal approach assumes that there proposed project will create a special benefit to the properties that otherwise would not exist due to erosion. The total estimated cost for real estate is $1,273,511, which is less than 6 % of total project costs. Because real estate costs did not exceed 10% of total project costs, a gross appraisal was not prepared for this project (refer to Real Estate Policy Guidance Letter No. 31-Real Estate Support to Civil Works Planning Paradigm (3x3x3) dated January 10, 2013). LER costs are based on a cost estimate prepared by the Appraisal Branch. It is noted that while most of the private and public properties are of nominal value, commercial properties are of substantial value and make up the most of the LER estimated value. These are major commercial pier properties of the area, so command substantial value.

Private land holdings subject to shore erosion and required for project purposes must be appraised considering special benefits in accordance with the relevant statutes. The Uniform Appraisal Standards for Federal Land Acquisition guidelines regarding the use of special benefits when appraising partial acquisitions taking special benefits into account were used to develop the appraisal estimate required for this Real Estate Plan. Although the consideration of special benefits is required by Federal policy and process, the courts of the State of New Jersey recently ruled that no special benefits exists as a result of a similar shore protection project. Therefore, the court held that the special benefits could not be used to offset damages to the remainder when determining just compensation for an easement similar to the easements required for this project (*Borough of Harvey Cedars v. Karan, Docket No. OCN-L-3797-08, Appellate No. A-4555-10T3, Supreme Court Docket 070512*). However, the case was accepted by the New Jersey State Supreme Court for review and was argued May 13, 2013. In their July 8, 2013 decision, the

New Jersey Supreme Court held that a property's fair market value should be used as the benchmark in computing "just compensation" in a partial-takings case, but non-speculative, reasonably calculable benefits that increase the property's value at the time of the taking should be considered in determining just compensation regardless of whether those benefits are enjoyed to a lesser or greater degree by others in the community (Borough of Harvey Cedars v. Karan, A-120, September term 2011, 070512).

The Karan's have since settled with Borough of Harvey Cedars for $1, plus litigation costs of $24,260. In order to complete the cost estimate for this HSLRR at this time, the number of and the amount of funding required for possible condemnation actions for this project have been increased in the Baseline Cost Estimate based on prior court awards.

Recent legislation introduced by the New Jersey legislature would require that any settlement for an easement for shore protection projects must include the application of special benefits to the remainder. Either passage of this legislation or a favorable ruling by the State Supreme Court would reduce the funding amount estimated for condemnations on the attached MCACES report. The Baseline Cost Estimate for Real Estate will be reviewed as the project progresses to reflect and changes in the law as a result of the above litigation or legislation.

In the limited time available for real estate investigation, additional complex relationships between non-beachfront landowners and private beachfront clubs have come to light, which raises issues as to the definition of what has traditionally been considered free "public" access to the beaches that have been replenished with federal funds. Some owners have been granted perpetual easements for access, egress and recreational use of beachfront property within the limits of construction, provided they pay an annual maintenance fee to the underlying fee owner. If the project progresses, the procurement of title information and additional research may produce additional parties with private rights to the beachfront. These privately-owned rights must either be subordinated to the State of New Jersey through a legal determination of the State under the State public trust doctrine or acquired for the subject project. Since it is impossible to determine the extent of these interests without a title search, a higher than usual contingency of 20% has been included. This estimate of potential project costs was primarily for project feasibility and the total project cost estimates. It is not a representation of actual credit that may be approved should the project be approved and proceed toward implementation. Actual crediting shall follow the crediting and appraisal procedures set forth in a signed Project Partnership Agreement.

Based on all of the factors discussed in this section, the total Baseline Cost for Real Estate for the project is $1,273,511, summarized as follows:

Acquisition/Administrative Costs:	$ 345,200.00
Condemnation Costs: 3 Estimated Properties	$ 71,000.00
Appraisals	$ 196,000.00
P.L. 91-646 Assistance:	0.00

Real Estate Payments:

Privately-Owned	36 Properties	$	18,864.00
Commercial	12 Properties	$	364,852.00
Publically-Owned	44 Properties	$	23,056.00
Contingency:		$	254,539.00
	TOTAL:		$1,273,511.00

9. PUBLIC LAW 91-646 RELOCATIONS

No P.L. 91-646 relocations are anticipated for this project. Any structures within the project footprint are in the form of piers, which will remain in place as amenities to the beach. There are no other structures or improvements within the project bounds requiring relocation.

10. MINERAL ACTIVITY

There is no present or anticipated mining and drilling activity in the vicinity of the project that may affect the operation thereof.

11. TIMBER RIGHTS

There are no trees in this coastal beach area. No positive or negative impacts to project purposes.

12. ASSESSMENT OF NON-FEDERAL SPONSOR ACQUISITION CAPABILITY

The Non-Federal Sponsor, the NJDEP, is vested with sufficient power to acquire and hold title, and to condemn lands as needed for public purposes. The sponsor has previously participated in other Corps of Engineers' Local Cooperation Projects such as the Flood Control and Bank Stabilization Project and has demonstrated their capabilities in acquiring real estate and performing the related obligations of a Non-Federal Sponsor. The Assessment of the Non-Federal Sponsor's Real Estate Acquisition Capability is attached at the end of this report as Exhibit D.

13. ZONING

The enactment of zoning ordinances is not proposed to facilitate acquisition. So far, beach municipalities in the State of New Jersey have not zoned beach properties in such a way as to impact the proposed project. The Non-Federal Sponsor is not using any zoning ordinances in lieu of acquisitions of lands or easements within the project take areas and the proposed project is consistent with current planning and zoning.

14. ACQUISITION SCHEDULE

The Non-Federal Sponsor will officially initiate real estate acquisition activities after final execution of the Project Partnership Agreement (PPA). Due to there not yet being a date specific schedule for this project, the following estimated LERRD acquisition schedule indicates the length of time required for each step in the standard acquisition process. As there is currently no estimated PPA signing date, the following is a generic, worst-case scenario real estate timeline. Once an anticipated signing date for the PPA is identified, a more specific schedule will be prepared.

a. PPA Execution	Start Date
b. Forward Maps to Sponsor	Within 1 week of Start Date
c. Survey and Title Work	Within 14 weeks of sponsor map receipt
d. Appraisals receipt	Within 10 weeks of survey and title
e. Review Appraisals	Within 4 weeks of appraisal receipt
f. Negotiations	Within 9 weeks after appraisal review
g. Closings	Within 6 weeks of completion of negotiations
h. Possession	Within 1 day of closings
i. Certification of Real Estate	Within 1 week of possession; requires The transmittal of the Non-Federal Sponsor's Authorization for Entry for Construction and Certificate of Authority.
Approximate Total	1 year

Condemnations are anticipated for two properties required for this project. Condemnations may take up to six total months from initiation of negotiation to possession, adding approximately three months to the entire acquisition process. However, the State may exercise it's Disaster Control Act, allowing immediate possession, while condemnation subsequently proceeds.

15. UTILITY AND FACILITY RELOCATIONS

No detailed information has been provided to date by April 22, 2014 or identified by the Project Delivery Team (PDT), regarding the necessity for any facility/utility relocations in the project area. Further engineering and design work will refine requirements for facility relocations during subsequent phases and Pre-Construction Engineering and Design (PED). Given the objectives of this project the current strategy is to leave utilities, piers, boardwalks, and limited infrastructure in place, and that the engineering and design team will "work around" and consider the constraints of all existing infrastructure and work to avoid or minimize unneeded expenditures to replace or relocate existing utility infrastructure. The Non-Federal Sponsor is currently investigation what, if any, surbordination rights may be required on such property under State law.

Note: The following policy statement and disclaimer concerning any potential facility relocations prevails over any other statement, description or presentation in this report:

Any conclusion or categorization contained in this report that an item is a utility or facility relocation to be performed by the Non Federal Sponsor as part of its LERRD responsibilities is preliminary only. The Government will make a final determination of the relocations necessary for the construction, operation and maintenance of the project after further analysis. An Attorney's Opinion of Compensability will be generated for each facility/utility relocation that is required for the project and which will be performed by, and credited to, the Non-Federal Sponsor under the definitions and terms of the PPA.

There are no relocations of utilities or facilities anticipated for this project at this time. The most common type of utility relocation for shoreline protection projects is stormwater pipeline drainage structures, which often have to be extended farther out with the newly created beach. However, this project does not require such outfall extension or relocation of any other type of utility lines. Any crossovers or boardwalks removed to construct the project are the responsibility of the owner or municipality to replace, if needed. Therefore, no Attorney's Reports of Compensability are required.

16. ENVIRONMENTAL CONCERNS

The sponsor fully understands its responsibilities for assessing the properties for any potential or presence of hazardous waste materials as defined and regulated under CERCLA. There is no known "Superfund" sites or sites presently under CERCLA remediation or response orders identified in the project area. There are no known presences of any substances in the project area that are regulated under CERCLA or other environmental statutes or regulations. The LERRD estimate is predicated on the assumption that all lands and properties are clean and require no remediation. The model PCA conditions contain specific terms and conditions governing the sponsor's responsibility for environmental cleanup for CERCLA regulated substances. Hazardous Waste Assessments are covered as a project cost under the model PPA.

There are no known or suspected project areas contaminated by HTRW, either CERCLA or non-CERCLA) There is no known or suspected on-site contamination and the real estate cost estimates contained in this Real Estate Plan do not reflect the presence of contamination. The discharge material from the borrow area is not expected to introduce, relocate, or increase contaminant levels at either the borrow or placement sites. This is assumed based on the characteristics of the sediment, the proximity of the borrow site to sources of contamination, the area's hydrodynamic regime, and existing water quality.

17. ATTITUDES OF THE LANDOWNERS

Per discussion with the Non-Federal Sponsor, the municipalities of North Wildwood, Wildwood Crest and Wildwood consider the project essential to the continued growth of the communities and the safety of both residents and resort-goers alike.

There is no focused or organized landowner opposition to the project. The sponsor will be conducting landowner and public information meetings to promote understanding of the project and how the landowners will be affected. A large percentage, 30%, of the land needed for the project is already owned by the municipal governments. Given the benefits of the project to landowners and recent New Jersey Supreme Court case, we anticipate public support, but have planned for a couple of condemnation actions as a contingency. While there is currently no strong opposition to the proposed project, the general response has ranged from support to ambivalence. Due to the recent turnover in township administration, the Non-Federal Sponsor is unaware of the Township of Lower's views on the proposed project. However, the Township of Lower only has two properties located in the study area.

18. NOTIFICATION TO NON-FEDERAL SPONSOR

The Non-Federal Sponsor, the New Jersey Department of Environmental Protection, will be notified in writing regarding the risks associated with the acquisition of land prior to execution of the PPA once the Feasibility Study is approved and the project is funded.

19. RISK ANALYSIS

Currently, there are no known significant risks associated with this project involving real estate. The Non-Federal Sponsor has been meeting LER acquisition schedules on similar and much larger projects. More recently, since Hurricane Sandy, the State of New Jersey has enacted the Disaster Control Act, which allows the State to take quick possession of property for project construction in anticipation of following up and acquiring these properties by normal means.

EXHIBIT A

Project: Hereford to Cape May
Cape May County, New Jersey

Property Summary

Township	# of Properties
North Wildwood	10
Wildwood	49
Wildwood Crest	27
Lower	5
TOTAL:	**91**

EXHIBIT A

Feasibility Report Property List														
Hereford to Cape May														
NORTH WILDWOOD														
Address	Township	Owner	Municipality	APN	Block	Lot	Perpetual Storm	TWAE	Private	Public	Commercial	Vacant	Mailing Address	
2501 Boardwalk	Wildwood	The Morey Org	North Wildwood	07-00288-0002-00001	288.02	1	X		X		X		3501 Boardwalk, Wildwood, NJ 08260-5427	*
Beach	North Wildwood	City of North Wildwood (per tax map)	North Wildwood	07-00289-0003-00001	289.03	1	X			X		X	901 Atlantic Avenue, North Wildwood, NJ 08260-5778	
2301 Boardwalk	Wildwood	Sportland Investments	North Wildwood	07-00290-0001-00001	290.01	1	X		X		X		1922 Harold Ave, Lancaster, PA 17601	
2201 Boardwalk	North Wildwood	City of North Wildwood	North Wildwood	07-00291-0001-00001	291.01	1	X			X		X	901 Atlantic Avenue, North Wildwood, NJ 08260-5778	*
Beach	North Wildwood	City of North Wildwood	North Wildwood	07-00317-0003-00001	317.03	1	X			X			901 Atlantic Avenue, North Wildwood, NJ 08260-5778	
Riparian Grant	North Wildwood	City of North Wildwood	North Wildwood	07-00317-0003-00001-001	317.03	1.01	X			X			901 Atlantic Avenue, North Wildwood, NJ 08260-5778	
1801 Boardwalk	Wildwood	City of North Wildwood	North Wildwood	07-00315-0002-00001	315.02	1	X			X		X	901 Atlantic Avenue, North Wildwood, NJ 08260-5778	
1701 Beach	Wildwood	City of North Wildwood	North Wildwood	07-00316-0002-00001	316.02	1	X			X		X	901 Atlantic Avenue, North Wildwood, NJ 08260-5778	
1600 Beach	Wildwood	City of North Wildwood	North Wildwood	07-00317-0002-00001	317.02	1	X			X		X	901 Atlantic Avenue, North Wildwood, NJ 08260-5778	
1601 Boardwalk	Wildwood	City of North Wildwood	North Wildwood	07-00317-0002-00002	317.02	2	X			X		X	901 Atlantic Avenue, North Wildwood, NJ 08260-5778	
Total # of Properties:	10													

EXHIBIT A

Property Acquisition List - NFS													
Hereford to Cape May													
WILDWOOD													
Address	Township	Owner	Municipality	APN	Block	Lot	Perpetual Storm	TWAE	Private	Public	Commercial	Vacant	Mailing Address
Beach Cresse & Baker Ave	Wildwood	City of Wildwood	Wildwood	14-00267-0000-00001	267	1	X			X		X	4400 New Jersey Avenue, Wildwood, NJ 08260-1729
Beach Cresse & Baker Ave	Wildwood	City of Wildwood	Wildwood	14-00267-0000-00001-0002	267	1.02	X			X		X	4400 New Jersey Avenue, Wildwood, NJ 08260-1729
Beach Cresse & Baker Ave	Wildwood	City of Wildwood	Wildwood	14-00267-0000-00001-0003	267	1.03	X			X		X	4400 New Jersey Avenue, Wildwood, NJ 08260-1729
4001 Boardwalk	Wildwood	Morey Org, The	Wildwood	14-00140-0000-00001-0001 & 0002	140	1.01 & 1.02	X		X		X	X	3501 Boardwalk, Wildwood, NJ 08260-5427
Spencer & Schellenger Beach	Wildwood	City of Wildwood	Wildwood	14-00268-0000-00001	268	1	X			X		X	4400 New Jersey Avenue, Wildwood, NJ 08260-1729
Spencer & Schellenger Beach	Wildwood	City of Wildwood	Wildwood	14-00268-0000-00001-0002	268	1.02	X			X		X	4400 New Jersey Avenue, Wildwood, NJ 08260-1729
3501 Boardwalk	Wildwood	Morey Org, The	Wildwood	14-00180-0000-00001	180	1.01/1.02 2.01/2.02	X		X		X	X	3501 Boardwalk, Wildwood, NJ 08260-5427
3401 Boardwalk	Wildwood	Scwartz, Martin L. & Phyllis J.	Wildwood	14-00188-0000-00001-0001	188	1.01	X		X		X		1901 N Ocean Blvd #12C, Fort Lauderdale, FL 33305-3703
3420 Beach	Wildwood	Mariners Landing, Inc	Wildwood	14-00269-0000-00001-0001	269	1.01	X		X				P.O. Box 269, Wildwood, NJ 08260-0269
3320 Beach	Wildwood	Morey Org, The	Wildwood	14-00270-0000-00001-0001	270	1.01	X		X		X	X	3501 Boardwalk, Wildwood, NJ 08260-5427
3318 Beach	Wildwood	Mole, Robert & B. Prentiss & Holly B Go	Wildwood	14-00270-0000-00002-0001	270	2.01	X		X		X	X	105 E. Rambler Road, Wildwood Crest, NJ 08260-3819
3316 Beach	Wildwood	Karvounis, Jr., Daniel H,	Wildwood	14-00270-0000-00003-0001	270	3.01	X		X			X	311 McDaniel Ave, Wilmington, DE 19803-2533
3314 Beach	Wildwood	Carol Daniel Elaine LLC	Wildwood	14-00270-0000-00004-0001	270	4.01	X		X			X	2 Murphy Lane, Cape May, NJ 08204-4706
3312 Beach	Wildwood	Golamis, Peter J	Wildwood	14-00270-0000-00005-0001	270	5.01	X		X			X	P.O. Box 635, Wildwood, NJ 08260-0635
3310 Beach	Wildwood	Arrow, Berle & Arlene	Wildwood	14-00270-0000-00006-0001	270	6.01	X		X			X	1922 Haroldson Ave, Lancaster, PA 17601-3624
3308 Beach	Wildwood	Tsokas, Vasilios & Constantinos	Wildwood	14-00270-0000-00007-0001	270	7.01	X		X			X	38 Highland Ave, Belmont Hills, PA 19004-1839
3306 Beach	Wildwood	Schwartz, Martin & Lewis	Wildwood	14-00270-0000-00008-0001	270	8.01	X		X			X	1901 N. Ocean Blvd #12C, Fort Lauderdale, FL 33305-3703
3301 Boardwalk	Wildwood	Douglass Candy Corporation	Wildwood	14-00270-0000-00009-0001	270	9.01	X		X		X		P.O. Box 264, Wildwood, NJ 08260-0264
3222 Beach	Wildwood	Morey Org, The	Wildwood	14-00271-0000-00001-0001	271	1.01	X		X			X	3501 Boardwalk, Wildwood, NJ 08260-5427
3220 Beach	Wildwood	City of Wildwood	Wildwood	14-00271-0000-00002-0001	271	2.01	X			X		X	4400 New Jersey Avenue, Wildwood, NJ 08260-1729
3218 Beach	Wildwood	Joe & Duke Ralty, Inc.	Wildwood	14-00271-0000-00003-0001	271	3.01	X		X			X	1416 Morris Ave, Union, NJ 07083-3335
3214-3216 Beach	Wildwood	Nickels Midway Pier LLC	Wildwood	14-00271-0000-00004-0001	271	4.01	X		X			X	3500 Boardwalk, Wildwood, NJ 08260-5464
3212 Beach	Wildwood	Pawlus, Claudio & Fabio	Wildwood	14-00271-0000-00005-0001	271	5.01	X		X			X	P.O. Box 185, Wildwood, NJ 08260-0185
3210 Beach	Wildwood	Artns Associates LLC	Wildwood	14-00271-0000-00006-0001	271	6.01	X		X			X	43 Kings Highway W, Haddonfield, NH 08033-2128
3208 Beach	Wildwood	Snyder, Lillian	Wildwood	14-00271-0000-00007-0001	271	7.01	X		X			X	3206 Boardwalk, Wildwood, NJ 08260-5422
3200 Beach	Wildwood	Sabbagh Brothers LLC	Wildwood	14-00271-0000-00008-0001	271	8.01	X		X			X	384 Avenue T, Brooklyn, NY 11223-3936
3120 Beach	Wildwood	Morey Org, The	Wildwood	14-00272-0000-00001-0001	272	1.01	X		X			X	3501 Boardwalk, Wildwood, NJ 08260-5427
3105 Boardwalk	Wildwood	Levin, Miriam	Wildwood	14-00272-0000-00002-0001	272	2.01	X		X		X		6 Simtat Aviviam #22, Kafir Saba, Israel
3020 Beach	Wildwood	Morey Org, The	Wildwood	14-00273-0000-00001-0001	273	1.01	X		X			X	3501 Boardwalk, Wildwood, NJ 08260-5427
2920 Beach	Wildwood	Morey Org, The	Wildwood	14-00274-0000-00001-0001	274	1.01	X		X			X	3501 Boardwalk, Wildwood, NJ 08260-5427
2918 Beach	Wildwood	Weiner, Bernard & Marvin	Wildwood	14-00274-0000-00002-0001	274	2.01	X		X			X	P.O. Box 1649, Wildwood, NJ 08260-7649
2914 Beach	Wildwood	Je-Rob Inc, a NJ Corporation	Wildwood	14-00274-0000-00003-0001	274	3.01	X		X			X	4 Hatteras Dr, Cape May, NJ 08304-4262
2910 Beach	Wildwood	Meridians 3 LLC	Wildwood	14-00274-0000-00004-0001	274	4.01	X		X			X	2 Murphy Lane, Cape May, NJ 08204-4706
2908 Beach	Wildwood	Rosenthal, G	Wildwood	14-00274-0000-00005-0001	274	5.01	X		X			X	1 Yukon Terrace, Morganville, NJ 07751-1317
2906 Beach	Wildwood	City of Wildwood	Wildwood	14-00274-0000-00006-0001	274	6.01	X			X		X	4400 New Jersey Avenue, Wildwood, NJ 08260-1729
2900 Beach	Wildwood	Arrow, Berle & Arlene and Snyder, Theo	Wildwood	14-00274-0000-00007-0001	274	7.01	X		X			X	1922 Haroldson Ave, Lancaster, PA 17601-3624
2820 Beach	Wildwood	Morey Org, The	Wildwood	14-00275-0000-00001-0001	275	1.01	X		X			X	3501 Boardwalk, Wildwood, NJ 08260-5427
2812-20 Beach	Wildwood	Arrow, Berle & Arlene	Wildwood	14-00275-0000-00002-0001	275	2.01	X		X			X	1922 Haroldson Ave, Lancaster, PA 17601-3624
2806 Boardwalk	Wildwood	Snyder, Herman & Lillian	Wildwood	14-00275-0000-00003-0001	275	3.01	X		X			X	2806 Boardwalk, Wildwood, NJ 08260-5418
2804 Beach	Wildwood	Pardos Family, Kitty Matchica	Wildwood	14-00275-0000-00004-0001	275	4.01	X		X			X	118 Ferguson Avenuem Broomall, PA 19008-3013
2802 Beach	Wildwood	Kenis, Helen	Wildwood	14-00275-0000-00005-0001	275	5.01	X		X			X	1 Bel Aire Dr, Yardley, PA 19067-2805
2800 Boardwalk	Wildwood	Snyder, Theodore	Wildwood	14-00275-0000-00006-0001	275	6.01	X		X			X	2800 Boardwalk, Wildwood, NJ 08260
2720 Beach	Wildwood	2701 Associates LLC	Wildwood	14-00276-0000-00001-0001	276	1.01	X		X			X	3501 Boardwalk, Wildwood, NJ 08260-5427
2701 Boardwalk	Wildwood	2701 Associates LLC	Wildwood	14-00248-0000-00001-0001	248	1/1.01/1.02	X		X		X		3501 Boardwalk, Wildwood, NJ 08260-5427
2620 Beach	Wildwood	The Morey Org	Wildwood	14-00277-0000-00001-0001	277	1.01	X		X			X	3501 Boardwalk, Wildwood, NJ 08260-5427
2600 Beach	Wildwood	The Morey Org	Wildwood	14-00277-0000-00002-0001	277	2.01	X		X			X	3501 Boardwalk, Wildwood, NJ 08260-5427
2600 Boardwalk	Wildwood	Samax, Inc	Wildwood	14-00277-0000-00002-0002	277	2.02	X		X			X	2600 Boardwalk, Wildwood, NJ 08260
3501 Boardwalk	Wildwood	Morey Org, The	Wildwood	14-00278-0000-00001-0001 & -0002	278	1.01 & 1.02	X		X		X	X	3501 Boardwalk, Wildwood, NJ 08260-5427
1st Ward Beach	Wildwood	City of Wildwood	Wildwood	14-00280-0000-00001	280	1	X			X		X	4400 New Jersey Avenue, Wildwood, NJ 08260-1729
		Total # of Properties:	49										

EXHIBIT A

Property Acquisition List - NFS
Hereford to Cape May
WILDWOOD CREST

Address	Township	Owner	Municipality	APN	Block	Lot	Perpetual Storm	TWAE	Private	Public	Commercial	Vacant	Mailing Address
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00001-0005-00001	1.05	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach (riparian grant)	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00001-0005-00001-0001	1.05	1.01	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00006-0005-00001	6.05	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach at Lavendar Rd	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00016-0005-00001-0001	16.05	1.01	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach at Heather Rd	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00016-0005-00001-0002	16.05	1.02	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00021-0005-00001	21.05	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach Ave	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00038-0005-00001-0001	38.05	1.01	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach Ave	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00038-0005-00001-0002	38.05	1.02	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00042-0005-00001	42.05	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach & Rosemary Rd	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00050-0005-00001	50.05	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00068-0006-00001	68.06	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00100-0003-00001	100.03	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00117-0003-00001	117.03	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach (riparian grant)	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00117-0003-00001-0001	117.03	1.01	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00117-0004-00001	117.04	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach (riparian grant)	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00117-0004-00001-0001	117.04	1.01	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00118-0003-00001	118.03	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach (riparian grant)	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00118-0003-00001-0001	118.03	1.01	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00118-0004-00001	118.04	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach (riparian grant)	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00118-0004-00001-0001	118.04	1.01	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00125-0003-00001	125.03	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach (riparian grant)	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00125-0003-00001-0001	125.03	1.01	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00126-0003-00001	126.03	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach (riparian grant)	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00126-0003-00001-0001	126.03	1.01	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	15-00133-0003-00001	133.03	1	X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach Ave (2 segments)*	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	None			X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Beach Ave (1 segments)*	Wildwood Crest	Borough of Wildwood Crest	Wildwood Crest	None			X			X		X	6101 Pacific Avenue, Wildwood Crest, NJ 08260
Total # of Properties:	27												

Beach Avenue Segments: Between Hollywood and Monterey/Street End of Miami Avenue and Between Louisville and Farragut

EXHIBIT A

Feasibility Report Property List
Hereford to Cape May
LOWER

Address	Township	Owner	Municipality	APN	Block	Lot	Perpetual Storm	TWAE	Private	Public	Commercial	Vacant	Mailing Address
9601 Atlantic Avenue	Lower	Diamond Beach LP	Lower Township	05-00700-0002-00001-0004	700.02	1.04	X		X			X	2501 Seaport Drive, Suite 400, Chester, PA 19013-2249
9601 Atlantic Avenue	Lower	Diamond Beach LP	Lower Township	05-00700-0002-00001-0005	700.02	1.05	X		X			X	2501 Seaport Drive, Suite 400, Chester, PA 19013-2249
Atlantic & Rochester	Lower	Achristavest Pier 6600 LLC	Lower Township	05-00710-0002-00001-01/02/03	710.02	1.03	X		X			X	2501 Seaport Drive, Suite 400, Chester, PA 19013-2249
9902 Seapointe Blvd	Lower	Seapointe Village Master Association	Lower Township	05-00719-0000-00003-01	719	3.01	X		X			X	9901 Seapointe Blvd, Wildwood Crest, NJ 08260-6203
Beach South Station Tomadison	Lower	Club at Diamond Beach LLC, The	Lower Township	05-00730-0002-00001-02	730.02	1.02 & 1.03	X		X		X	X	1136 Springfield Ave, Mountainside, NJ 07092-2906

Total # of Properties: 5

Feasibility Study Cost Estimate-MCACES Format
Real Estate Acquisition Requirements
Hereford Inlet to Capy May Inlet
Cape May County, New Jersey

		Private			Commercial			Public			Requirement		
		#	$ each	req	#	$ each	req	#	$ each	req	Base	Contingency	Total
0102-------	ACQUISITIONS												
010201---	By Government												
010202---	By Non-Federal Sponsor (NFS)												
01020201	Survey and Legal Descriptions	36	750	27,000	12	750	9,000	44	750	33,000	69,000	10,350	79,350
01020102	Title Evidence	36	900	32,400	12	900	10,800	44	900	39,600	82,800	12,420	95,220
01020203	Negotiations	36	1,200	43,200	12	2,000	24,000	44	1,200	52,800	120,000	18,000	138,000
010203---	By Government on Behalf of NFS												
010204---	Review of NFS												
01020401	Survey and Legal Descriptions	36	150	5,400	12	150	1,800	44	150	6,600	13,800	2,070	15,870
01020402	Title Evidence	36	150	5,400	12	150	1,800	44	150	6,600	13,800	2,070	15,870
01020403	Negotiations	36	150	5,400	12	150	1,800	44	150	6,600	13,800	2,070	15,870
	SUBTOTAL										313,200	46,980	360,180
0103-------	CONDEMNATIONS												
010301---	By Government												
010302---	By Non-Federal Sponsor (NFS)	2	20,000	40,000	1	25,000	25,000	0		0	65,000	9,750	74,750
010303---	By Government on Behalf of NFS												
010304---	Review of NFS	2	2,000	4,000	1	2,000	2,000	0		0	6,000	900	6,900
	SUBTOTAL										71,000	10,650	81,650
0105-------	APPRAISALS												
010501---	By Government												
010502---	By Non-Federal Sponsor (NFS)	36	1,500	54,000	12	2,500	30,000	44	1,500	66,000	150,000	22,500	172,500
010503---	By Government on Behalf of NFS												
010504---	Review of NFS	36	500	18,000	12	500	6,000	44	500	22,000	46,000	6,900	52,900
	SUBTOTAL										196,000	29,400	225,400
0106-------	PL 91-646 ASSISTANCE												
010601---	By Government												
010602---	By Non-Federal Sponsor (NFS)	0		0	0	5,000	0	0		0	0	0	0
010603---	By Government on Behalf of NFS												
010604---	Review of NFS	0		0	0	1,500	0	0		0	0	0	0
	SUBTOTAL										0	0	0
0107-------	TEMPORARY PERMITS/LICENSES/RIGHTS-OF-WAY												
010701---	By Government			0			0			0	0	0	0
010702---	By Non-Federal Sponsor (NFS)			0			0			0	0	0	0
010703---	By Government on Behalf of NFS			0			0			0	0	0	0
010704---	Review of NFS	0		0	0		0	0		0	0	0	0
010705---	Other			0			0			0	0	0	0
010706---	Damage Claims			0			0			0	0	0	0
	SUBTOTAL										0	0	0
0115------	**REAL ESTATE PAYMENTS**												
011501---	Land Payments												
01150101	By Government										0	0	0
01150102	By Non-Federal Sponsor (NFS)	36	524	18,864	12	30,404	364,852	44	524	23,056	406,772	162,709	569,481
01150103	By Government on Behalf of NFS										0	0	0
01150104	Review of NFS	36	250	9,000	12	1,000	12,000	44	250	11,000	32,000	4,800	36,800
011502---	PL 91-646 Assistance Payments										0	0	0
01150201	By Government										0	0	0
01150202	By Non-Federal Sponsor (NFS)				0	0	0				0	0	0
01150203	By Government on Behalf of NFS										0	0	0
01150204	Review of NFS				0	0	0				0	0	0
011503---	Damage Payments										0	0	0
01150301	By Government										0	0	0
01150302	By Non-Federal Sponsor (NFS)										0	0	0
01150303	By Government on Behalf of NFS										0	0	0
01150304	Review of NFS										0	0	0
	SUBTOTAL										438,772	167,509	606,281
Account 02 Facility/Utility Relocations (Construction cost only)												0	0
	REAL ESTATE ACQUISITION TOTAL										**$1,018,972**	**$254,539**	**$1,273,511**

EXHIBIT C

ASSESSMENT OF NON-FEDERAL SPONSOR'S
REAL ESTATE ACQUISITION CAPABILITY

Project: Hereford Inlet to Cape May Inlet Feasibility Report, Cape May County, New Jersey

Non-Federal Sponsor: New Jersey Department of Environmental Protection (NJDEP)

I. Legal Authority:

a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes?

Yes. The non-Federal sponsor (NFS), the NJDEP, has acquisition authority in the project area.

b. Does the sponsor have the power of eminent domain for this project?

No. Although the State of New Jersey does have the power of eminent domain, the delegated authority to the NFS' department was rescinded more than 10 years ago. Nevertheless, the NFS has indicated that assistance would be contracted from the local municipalities involved, through a State Aid Agreement, to acquire the necessary real estate interests. The local municipalities do have the power of eminent domain.

c. Does the sponsor have "quick-take" authority for this project?

No. The NFS does not have "quick-take" authority for this project. If a local municipality were to acquire the real estate, they would file a Declaration of Taking and deposit the estimated just compensation with the court. Possession would be granted within a period of 72 hours to 45 days, depending on whether preliminary objection resolution is required.

d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary?

No.

e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn?

The NFS does not have condemnation authority for this project, but there are no lands/interests that may not be condemned by the local municipalities.

II. Human Resource Requirements:

a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of Federal projects including P.L. 91-646, as amended?

No. The NFS is familiar with the requirements of P.L. 91-646.

b. If the answer to II.a. is "yes", has a reasonable plan been developed to provide such training?

N/A

c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project?

Yes.

d. Is the sponsor's projected in-house staffing level sufficient considering its other work load, if any, and the project schedule?

Yes. The NFS has indicated that assistance would be requested from the local municipalities to acquire the necessary real estate interests. The NFS will utilize State Aid agreements as necessary to enlist the assistance of local townships.

e. Can the sponsor obtain contractor support, if required, in a timely fashion?

Yes.

f. Will the sponsor likely request USACE assistance in acquiring real estate?

No.

III. Other Project Variables:

a. Will the sponsor's staff be located within reasonable proximity to the project site?

Yes.

b. Has the sponsor approved the project/real estate schedule/milestones?

Yes.

IV. Overall Assessment:

a. Has the sponsor performed satisfactorily on other USACE projects?

Yes.

b. With regard to this project, the sponsor is anticipated to be fully capable.

V. Coordination:

a. Has this assessment been coordinated with the sponsor? Yes

b. Does the sponsor concur with this assessment? Yes

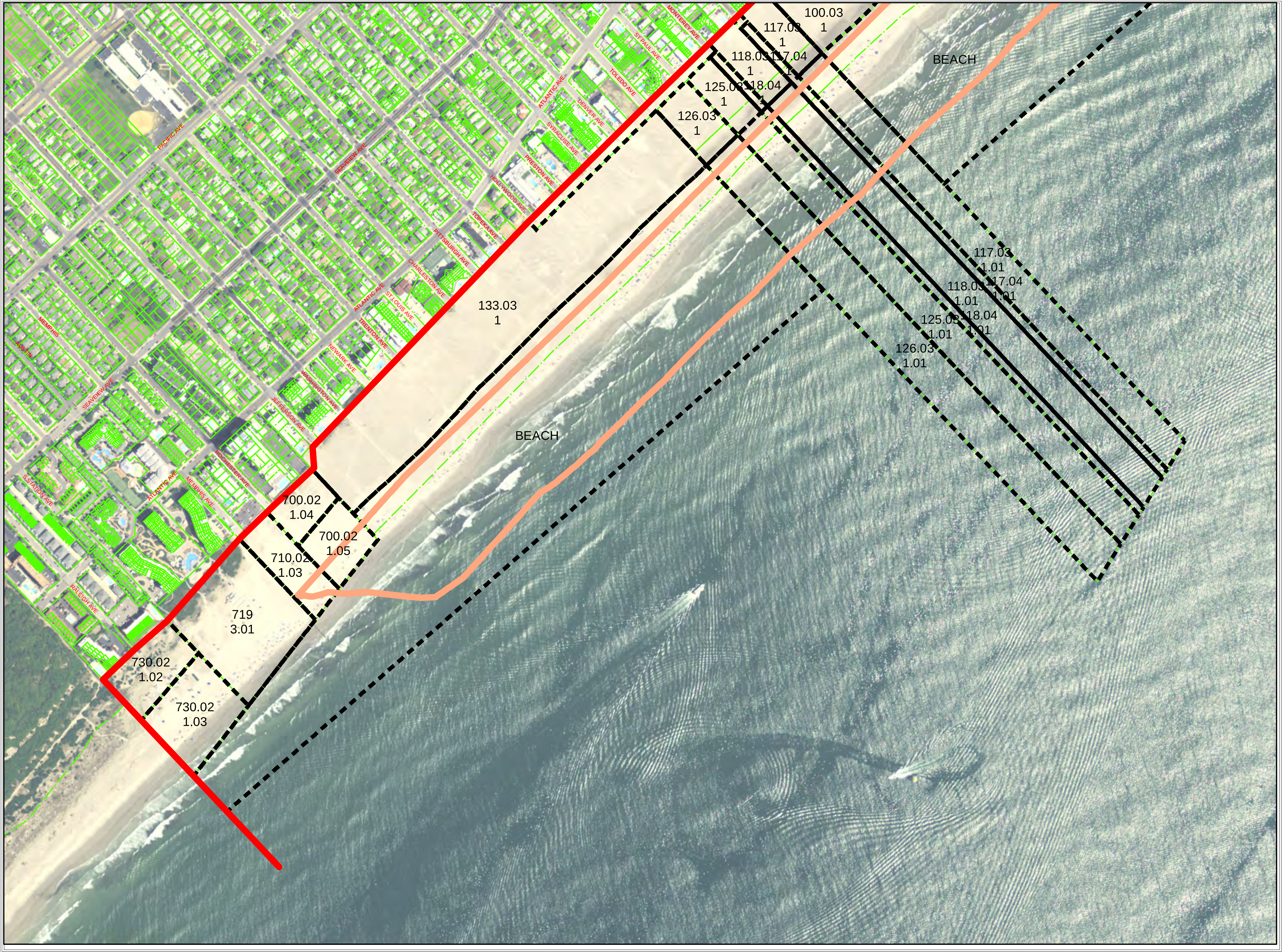
Prepared by:

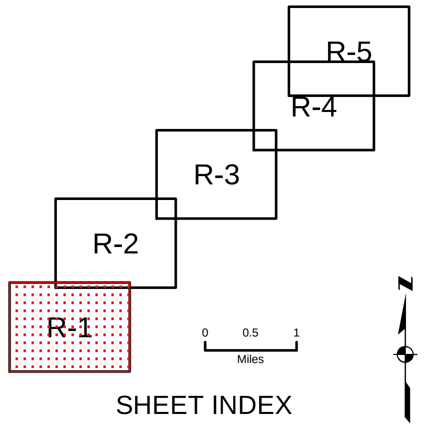
HEATHER M. SACHS
Realty Specialist

Approved by:

Craig R. Homesley

CRAIG R. HOMESLEY
Chief, Civil/IIS Projects Support Branch
Real Estate Division





SHEET INDEX

REAL ESTATE PROJECT PLANNING MAP

HEREFORD TO CAPE MAY

SHORELINE RESTORATION

PROJECT

ESTATES REQUIRED

PERPETUAL STORM DAMAGE REDUCTION

PUBLIC	540.42 AC
PRIVATE	66.00 AC
TOTAL	606.42 AC

PERPETUAL BORROW EASEMENT 245 AC

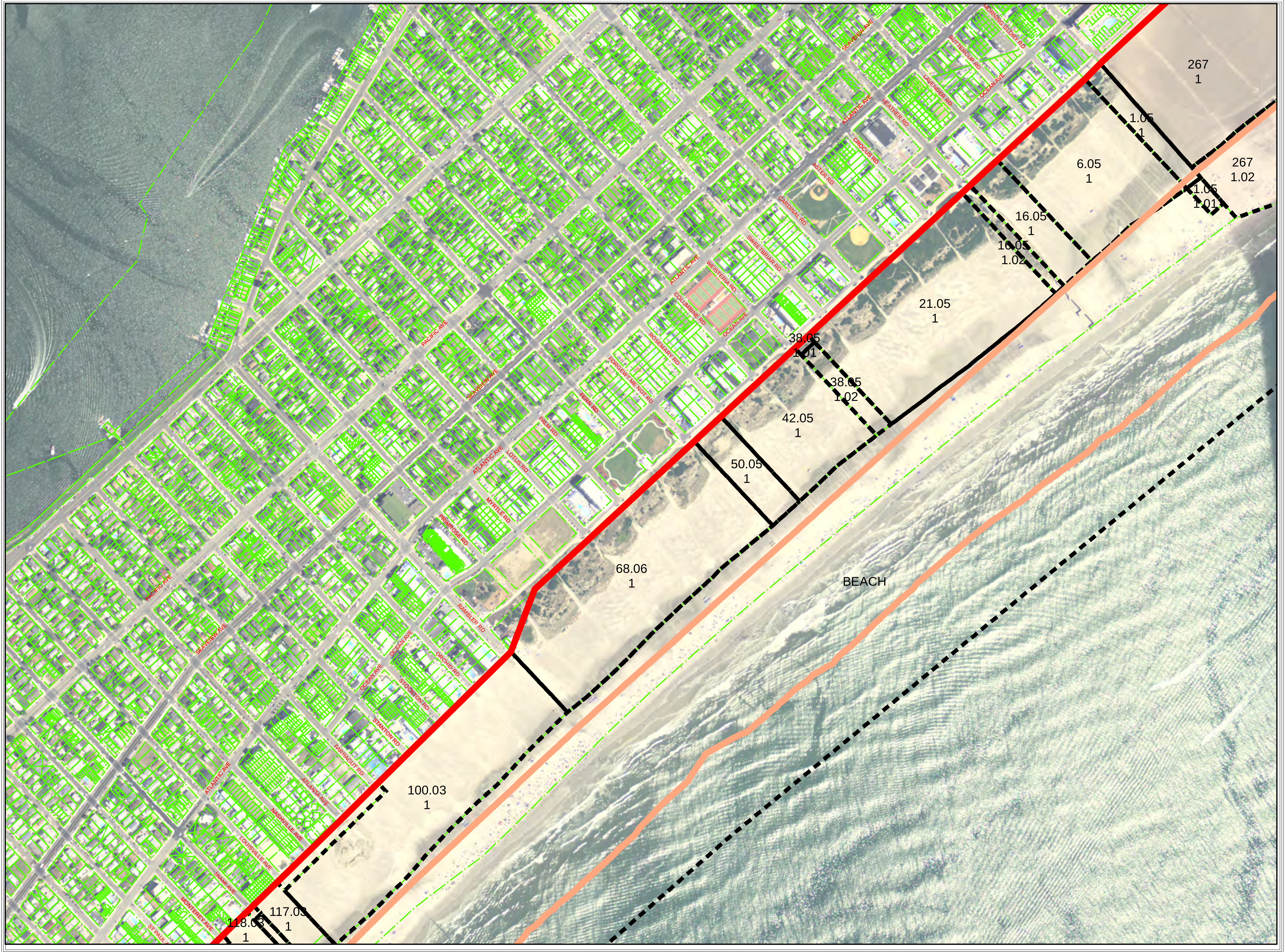
BORROW AREA LINE

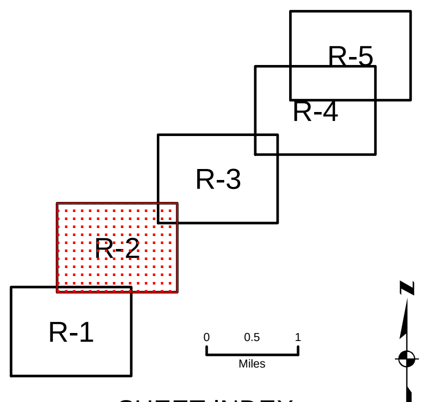
0 250 500 1,000
Feet

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
REAL ESTATE DIVISION
BALTIMORE, MARYLAND

PROJECT FILE: REP_Map_APR2014
CREATED BY: rts
DATE: 22 APRIL 2014
SCALE: AS SHOWN

PLATE: **R-1**





SHEET INDEX

REAL ESTATE PROJECT PLANNING MAP

HEREFORD TO CAPE MAY

SHORELINE RESTORATION

PROJECT

N

ESTATES REQUIRED

PERPETUAL STORM DAMAGE REDUCTION

PUBLIC	540.42 AC
PRIVATE	66.00 AC
TOTAL	606.42 AC

PERPETUAL BORROW EASEMENT 245 AC

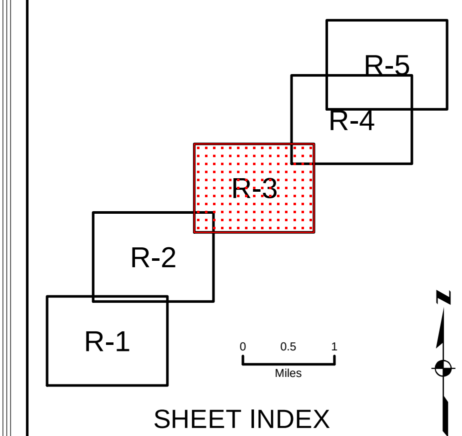
BORROW AREA LINE

0 250 500 1,000
Feet

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
REAL ESTATE DIVISION
BALTIMORE, MARYLAND

PROJECT FILE: REP_Map_APR2014
CREATED BY: rts
DATE: 22 APRIL 2014
SCALE: AS SHOWN

PLATE: **R-2**



SHEET INDEX

REAL ESTATE PROJECT PLANNING MAP

HEREFORD TO CAPE MAY

SHORELINE RESTORATION

PROJECT

ESTATES REQUIRED

PERPETUAL STORM DAMAGE REDUCTION

PUBLIC	540.42 AC
PRIVATE	66.00 AC
TOTAL	606.42 AC

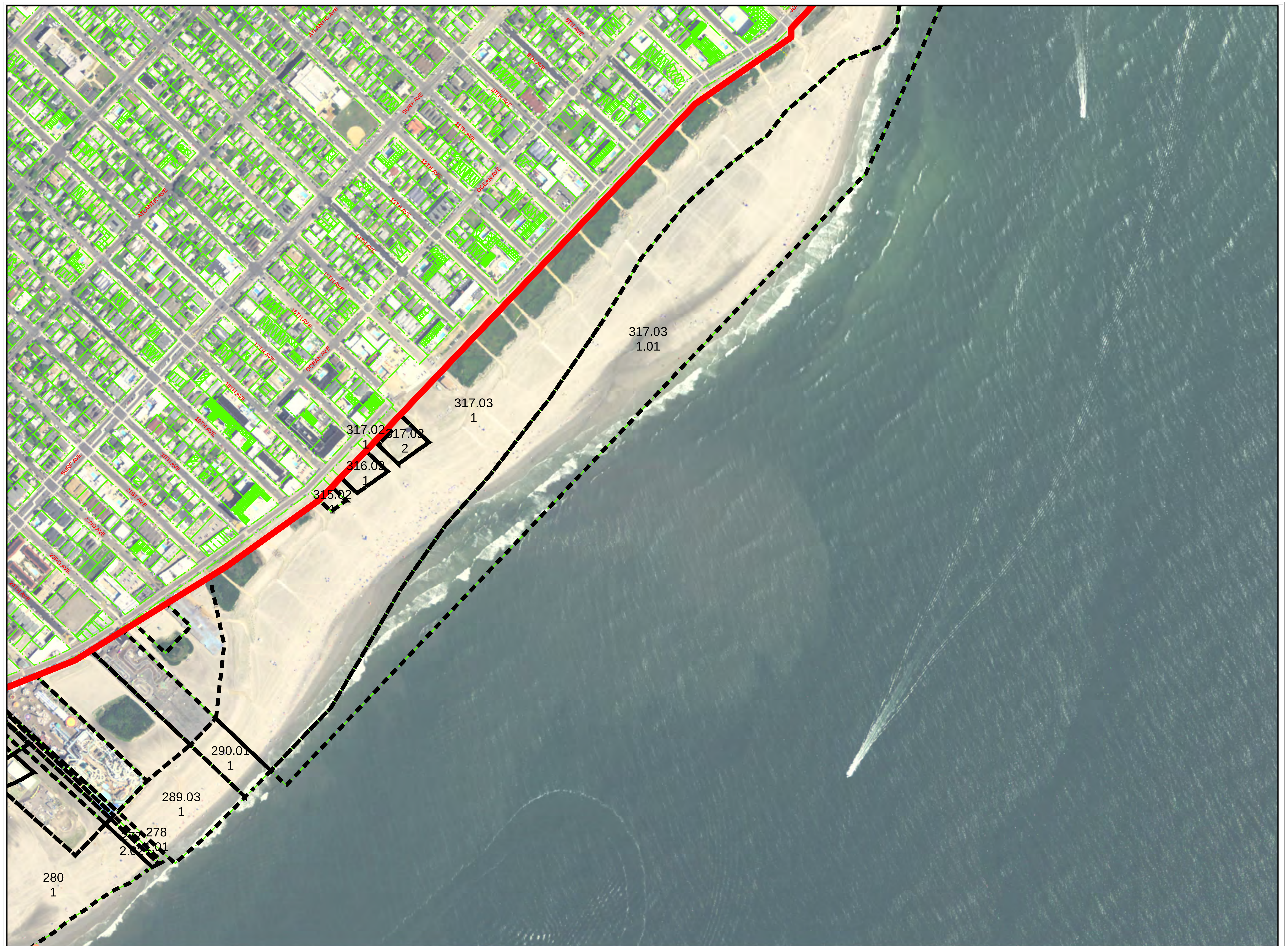
PERPETUAL BORROW EASEMENT 245 AC

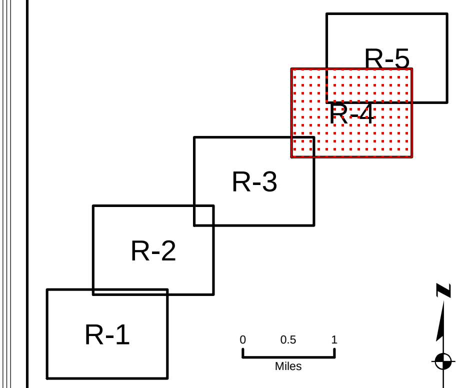
BORROW AREA LINE

0 250 500 1,000
Feet

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
REAL ESTATE DIVISION
BALTIMORE, MARYLAND

PROJECT FILE: REP_Map_APR2014
CREATED BY: rts
DATE: 22 APRIL 2014
SCALE: AS SHOWN
PLATE: **R-3**





SHEET INDEX

REAL ESTATE PROJECT PLANNING MAP

HEREFORD TO CAPE MAY

SHORELINE RESTORATION

PROJECT

ESTATES REQUIRED

PERPETUAL STORM DAMAGE REDUCTION

PUBLIC	540.42 AC
PRIVATE	66.00 AC
TOTAL	606.42 AC

PERPETUAL BORROW EASEMENT 245 AC

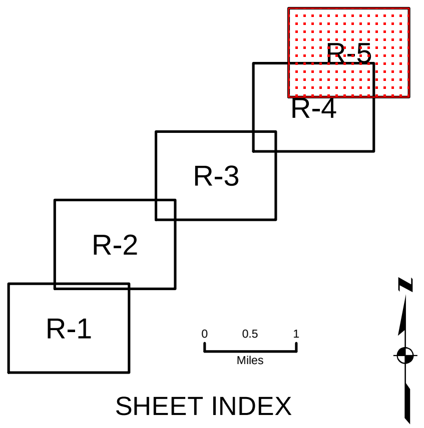
BORROW AREA LINE

0 250 500 1,000
Feet

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
REAL ESTATE DIVISION
BALTIMORE, MARYLAND

PROJECT FILE: REP_Map_APR2014
CREATED BY: rts
DATE: 22 APRIL 2014
SCALE: AS SHOWN

PLATE: **R-4**



SHEET INDEX

REAL ESTATE PROJECT PLANNING MAP

HEREFORD TO CAPE MAY

SHORELINE RESTORATION

PROJECT

ESTATES REQUIRED

PERPETUAL STORM DAMAGE REDUCTION

PUBLIC	540.42 AC
PRIVATE	66.00 AC
TOTAL	606.42 AC

PERPETUAL BORROW EASEMENT 245 AC

BORROW AREA LINE

0 250 500 1,000
Feet

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
REAL ESTATE DIVISION
BALTIMORE, MARYLAND

PROJECT FILE: REP_Map_APR2014
CREATED BY: rts
DATE: 22 APRIL 2014
SCALE: AS SHOWN
PLATE: **R-5**

Appendix G
Pertinent Correspondence

Section –1 General Correspondence

State of New Jersey

James E. McGreevey
Governor

Department of Environmental Protection
Natural and Historic Resources
Division of Engineering and Construction

Bradley M. Campbell
Acting Commissioner

January 17, 2002

Mr. Robert Callegari, Chief
Planning Division
Phila. Dist. Corps of Engineers
100 Penn Square East, Wanamaker Bldg.
Philadelphia, PA 19107

Dear Mr. Callegari:

Per our recent discussions, now that we have addressed portions of the coast with critical existing or imminent needs, we look forward in continuing toward completion of the New Jersey Shore Protection Study.

Since the completion of the Reconnaissance Phase, the situation at Wildwood in the Hereford Inlet area has worsened and now requires being addressed immediately. In addition we are in a position to analyze the entire coast as a system in order to maximize the efficiency of the New Jersey Shore Protection Program. The goal is to analyze and maximize the projects into a complete coastal system and to make changes to reduce renourishment requirements, environmental impacts and life-cycle cost.

The State of New Jersey, therefore, wishes to express its support for the following Feasibility studies:

1) Alternative Long Term Nourishment, New Jersey (NJ Regional Sediment and Coastal Processes Study)

2) Hereford Inlet to Cape May Inlet, NJ

Recognizing the importance of efficiently managing our sand resource in the Hereford Inlet area, as well as along the entire coast, we fully intend to sign the Feasibility Cost Sharing Agreements (FCSA) for these two studies.

Sincerely,

Bernard Moore
Administrator

mm

1510 Hooper Avenue, Toms River, NJ 08753

Phone
(732) 255-0770

Fax
(732) 255-0774

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

17 JAN 2002

CENAP-PL

MEMORANDUM FOR Commander, CECW ATTN: CECW-PM (Montvai)

THRU Commander, CENAD ATTN: CENAD-ET-P (Arabatzis)

SUBJECT: Request for Approval of Preliminary Analyses for Hereford Inlet to Cape May Inlet and the Regional Sediment Management – Long-term Nourishment Projects

1. Request. Attached for your review and subsequent approval are the Preliminary Analyses of the Hereford Inlet to Cape May Inlet and the Regional Sediment Management – Long-term Nourishment Projects. These Preliminary Analyses are the basis for developing the PMP, executing the Feasibility Cost Sharing Agreement (FCSA) with the non-Federal sponsor, and proceeding to the feasibility phase of the study.

2. Letter of Support. Attached is a copy of the non-Federal Letter of Support for the referenced projects.

3. Point of Contact. Our point of contact is Ms. Susan S. Lucas, CENAP-PL-PC, (215) 656-6573.

FOR THE COMMANDER:

ROBERT L. CALLEGARI
Chief, Planning Division

Enclosures (3)

Copy Furnished:
CENAD-ET-P

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

28 JAN 2002

CECW-PM

MEMORANDUM FOR Commander, North Atlantic Division (CENAD-ET-P)

SUBJECT: Hereford Inlet to Cape May Inlet and the New Jersey Shoreline Sediment Management Study

1. Reference CENAP-PL memorandum dated 17 January 2002, transmitting Preliminary Analysis of the Hereford Inlet to Cape May Inlet and the Regional Sediment Management – Long- term Nourishment Projects and letter of intent for these studies from the Sate of New Jersey, to Headquarters for review and approval.

2. The Hereford Inlet to Cape May Inlet and the New Jersey Shoreline Sediment Management Study and letter of intent are approved for proceeding into the feasibility phase of planning. The district should plan to convene an in-progress-review meeting early in the study to ensure the study is focused and tailored to meet the specific objectives. Based on results of the in-progress-review, the project management plan may need to be revised to better define the depth of analysis required and/or refine study constraints.

3. Submission of the model feasibility cost sharing agreement is not required, provided no deviations are requested.

FOR THE COMMANDER:

JAMES F. JOHNSON
Chief, Planning and Policy Division
Directorate of Civil Works

DEPARTMENT OF THE ARMY
Philadelphia District, Corps of Engineers
Wanamaker Building, 100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

08 MAY 2002

Planning Division

SUBJECT: Hereford Inlet to Cape May Inlet, NJ Feasibility Cost Sharing Agreement

Mr. Bernard J. Moore
Administrator
New Jersey Department of Environmental Protection
Division of Engineering and Construction
1510 Hooper Avenue
Toms River, New Jersey 08753

Dear Mr. Moore:

Enclosed are six (6) copies of the Hereford Inlet to Cape May Inlet, New Jersey Feasibility Cost Sharing Agreement (FCSA). Please obtain signatures and dates on all six copies of the FCSA. Upon obtaining the signatures, return all six signed copies to the District Office. Please do not fill in the date in the first paragraph of the FCSA. Signature authority has been delegated to the Philadelphia District Commander. Upon the Commander's signature, the Hereford Inlet to Cape May Inlet FCSA shall be executed. Copies of the executed agreement will be forwarded to you.

We look forward to working with you on this project. If you have questions please contact Ms. Colleen Rourke at (215) 656-6585.

Sincerely,

Paul Gaudini, P.E.
Acting Chief, Planning Division

Enclosures (6)

CITY OF NORTH WILDWOOD

901 ATLANTIC AVENUE
P. O. BOX 499
NORTH WILDWOOD, NEW JERSEY 08260

(609) 522-5411
FAX (609) 523-8502

JOHN J. HOLMAN
CITY ADMINISTRATOR

November 6, 2002

Dear Resident,

The City of North Wildwood has scheduled a presentation to provide information on the North Wildwood Seawall Project. This Seawall will stretch from Angelsea to 2nd Avenue.

The Army Corps of Engineers will be presenting an update on the plans and specifications and respond to any questions you may have regarding this project.

The meeting is scheduled for Saturday, November 16, 2002 at 11:00 a.m. in the North Wildwood Community Center Building located at 9th and Central Avenue.

All are invited to attend.

Should you be unable to attend this meeting, please do not hesitate to contact me at my office (609-522-2030) or forward any questions you may have so that the City may obtain an answer.

Very truly yours,

John J. Holman
City Administrator

JJH/mel

Cc: Mayor and City Council
Mr. Jeffrey Gebert, Chief of Coastal Planning, Army Corps of Engineers
Janet Harkins, City Clerk

CITY OF NORTH WILDWOOD

901 ATLANTIC AVENUE
P. O. BOX 499
NORTH WILDWOOD, NEW JERSEY 08260

(609) 522-5411
FAX (609) 523-8502

JOHN J. HOLMAN
CITY ADMINISTRATOR

June 3, 2003

Mr. Brian Bogel, Project Manager
U.S. Army Corps of Engineers, Philadelphia District
Wanamaker Building
100 Penn Square East
Philadelphia, PA. 19107-3390

Re: ~~**TOWNSEND INLET – CAPE MAY INLET PROJECT**~~
Public Presentation, Seawall Project

Dear Mr. Bogel,

The City of North Wildwood is requesting that the U.S. Army Corps of Engineers attend a public meeting to present updates on the North Wildwood Seawall Project. This seawall is a part of the Townsend Inlet to Cape May Inlet project.

The City has preliminarily scheduled this public presentation for Saturday, July 19, 2003 at 10:00 a.m. in the North Wildwood Community Center. Please advise if this time and date is convenient for you and your staff.

Please contact my office for any audiovisual requirements you may need with regard to the presentation.

The City is looking forward to continue working with the Corps towards the successful completion of this project.

If you need any further information please do not hesitate to contact me.

Very truly yours,

John J. Holman
City Administrator
/jjh

cc: Mayor and City Council
Senator Corzine
Representative Lobiondo
Senator Cafiero
Assemblyman Van Drew
Mayor and Council
Mike Preston, Construction Official
Lew Ostrander, City Safety Officer

File: Townsend to Hereford Inlet Project

[illegible]ANK A. LoBIONDO
2ND DISTRICT, NEW JERSEY

REPLY TO:
☐ 225 CANNON HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–3002
202–225–6572
FAX 202–225–3318

☑ 5914 MAIN STREET
MAYS LANDING, NJ 08330
609–625–5008
FAX 609–625–5071

1–800–471–4450

Congress of the United States
House of Representatives
Washington, DC 20515–3002

COMMITTEES:
TRANSPORTATION AND INFRASTRUCTURE
SUBCOMMITTEES:
CHAIRMAN
COAST GUARD AND MARITIME TRANSPORTATION
AVIATION
HIGHWAYS AND TRANSIT
ARMED SERVICES
SUBCOMMITTEES:
TERRORISM, UNCONVENTIONAL THREATS AND CAPABILITIES
TACTICAL AIR AND LAND FORCES

January 5, 2004

Mr. Jim Rausch
Director
Army Corps of Engineers
Office of Congressional Affairs
441 G Street NW
Washington, D.C. 20314-1000

Dear Mr. Rausch:

I have received the enclosed information from Barbara Waterman of Wildwood, New Jersey, regarding jetties along Hereford Inlet in North Wildwood.

I would appreciate your assistance in reviewing this matter, and your providing me with any information that will enable me to respond to Ms. Waterman. If you have any questions, or need further information, please contact my staff assistant, Pat Poole, in my Mays Landing district office.

Thank you for your help, and I look forward to hearing from you soon.

Sincerely,

Frank A. LoBiondo

Frank A. LoBiondo
Member of Congress

FAL/pmp
enc

DEPARTMENT OF THE ARMY
PHILA. DISTRICT, CORPS OF ENGINEERS
WANAMAKER BLDG., 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

Planning Division

MAR 1 4 2005

Mr. John Garofalo, Manager
Bureau of Coastal Engineering
New Jersey Department of Environmental Protection
1510 Hooper Avenue
Toms River, New Jersey 08753

Dear Mr. Garofalo:

This letter is in regard to the on-going Corps of Engineers Hereford Inlet to Cape May Inlet General Investigation. The Feasibility Cost-Sharing Agreement (FCSA) for this study was executed in September 2002, and stipulated a non-Federal cost-share of $1,250,000. Through Fiscal Year 2004 the New Jersey Department of Environmental Protection (NJDEP) has provided $307,500, leaving a $942,500 balance for the study. In order to meet the terms of the FCSA and match the Federal funds allocated for FY05, we request the NJDEP to submit $242,500 by March 30, 2005. This funding will be used to determine the existing hydrologic and hydraulic conditions, examine existing environmental and cultural resources, perform economic analyses, geotechnical investigations, identify project alternatives, conduct public outreach and project management.

Thank you for your attention to this matter. If you have any questions, please contact Brian Bogle, Project Manager, at (215) 656-6585.

Sincerely,

Minas M. Arabatzis
Chief, Planning Division

Copy Furnished:
David Rosenblatt, Administrator
Office of Engineering and Construction
New Jersey Department of Environmental Protection
1510 Hooper Avenue
Toms River, New Jersey 08753

U.S. Department of Homeland Security
United States Coast Guard

Commander
Coast Guard Atlantic Area

431 Crawford St.
Portsmouth, Va. 23704-5004
Staff Symbol: Aow
Phone: (757) 398 6230
Fax: (757) 398 6303
Email: jwalters@lantd5.uscg.mil

3170
17 Feb 2005

MEMORANDUM

From: VADM VIVIAN S. CREA
CG LANTAREA

Reply to Attn of: Aow
Walters
757 398 6230

To: Brigadier General Meredith W.B. Temple
U.S. Army Corps of Engineers
North Atlantic Division
302 General Lee Avenue
Brooklyn, New York 11252

Subj: MAINTENANCE DREDGING OF CAPE MAY INLET AND CAPE MAY HARBOR

1. For almost two decades Cape May Inlet has proven to be a perennial challenge for the Coast Guard to operate its ships in and out of Cape May. In previous fiscal years, when the Corps received funding for two annual dredging cycles, the level of dredging activity proved to be barely adequate to ensure our ships could safely enter and leave Cape May on any state of tide. As you are aware, this year's funding included funding to perform one maintenance event and that event occurred in January. For the remainder of this fiscal year, there is no scheduled maintenance and this scenario presents an untenable situation. I also understand that the President's FY06 budget includes dredging maintenance funding for two dredging events for Cape May Inlet. The Coast Guard is now at the juncture when either funding is provided to maintain the inlet continuously to -20 feet, or the two-210 foot medium endurance cutters will depart permanently and seek a safer, more reliable homeport. In January, the Philadelphia District provided superlative service to our fleet in removing a shoal that impeded the return of a deployed cutter and the dispatch of a second cutter. However, without immediate funding relief and implementation of a more aggressive dredging maintenance and hydrographic surveys program, Cape May will cease to be a homeport for the support of deep-water Coast Guard operations.

2. If these ships are relocated, the impact to the Coast Guard and the Nation will be increased costs associated with relocating the cutters and potentially decreased availability of these cutters to perform their primary missions: providing homeland security, providing offshore deep water search and rescue response and enforcement of laws and treaties throughout the eastern seaboard, including living marine resources, counter-drug and anti-migrant operations. Our ability to keep these two cutters homeported in Cape May, and their ability to prosecute Coast Guard missions is directly linked to the water depths provided through the Corps of Engineers dredging maintenance program. The most immediate economic impact to the local community, at a minimum, will be a loss of approximately $4 million.

3. The dredging maintenance situation at Cape May cannot be deferred. To ensure a viable presence for Coast Guard medium endurance cutters, immediate steps must be taken to maintain this waterway. I eagerly await your plan to alleviate the dredging quandary and stand ready to assist you in your efforts to secure funding.

#

Subj: MAINTENANCE DREDGING OF CAPE MAY INLET AND CAPE MAY HARBOR

3170

17 Feb 2005

Dist: U.S. Senator Frank R. Lautenburg
U.S. Senator Jon S. Corzine
U.S. Congressman Frank Lobiondo
Governor Richard J Codey
COMDT (G-C), (G-CI), (G-O)

Copy: CG TRACEN Cape May
CG GP Atlantic City
CG MSO/GP Philadelphia

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

MAY 0 2 2005

REPLY TO
ATTENTION OF

Attention: North Wildwood, Wildwood and Wildwood Crest Residents

This is to inform you that members of the Philadelphia District of the U.S. Army Corps of Engineers will be collecting information/data for the on-going Hereford Inlet to Cape May Inlet, feasibility study. This activity will take place from May 9, 2005 through July 31, 2005.

The purpose of the feasibility study is to evaluate methods to reduce storm damage as well as erosion in North Wildwood and consider reshaping the beach in Wildwood and Wildwood Crest.

The information that will be collected will be used to assist us in developing a plan to provide storm damage protection. During the period of our data collection, Corps of Engineers employees will carry work identification cards and will be provided upon request. The information that will be collected will consist of:

1. Residential and commercial structure inventories including recording the address, property size and type of construction.
2. Residential and commercial first floor elevations to determine the properties' location and vulnerability to storm damage.
3. Photographs of residential and commercial structures.
4. Recording elevations at various locations on the island.

We have established the Point of Contacts for the above data collection as listed below:

- **Mr. Ray Townsend, Administrator**
  North Wildwood
  1-609-522-6464
- **Mr. Ernie Triano, Mayor**
  Wildwood
  1-609-522-2444
- **Mr. Kevin Yecco, Borough Clerk**
  Wildwood Crest
  1-609-522-5176

If you have further questions, please contact the Project Manager, Brian Bogle at 1-215-656-6585, or email: brian.p.bogle@usace.army.mil

Sincerely,

Minas M. Arabatzis
Chief, Planning Division

North Wildwood Public Works
World's Best Beach
Tim O'Leary, Superintendent
511 West Oak Avenue
North Wildwood,N.J.08260
Phone (609)522-4646
Fax (609)522-1141

DATE: November 2, 2005

TO: Brian Bogle, Corps of Engineers

FROM: Tim O'Leary, Supt. N.W.P.W.

RE:Damages to Beach and Outfall Lines

Dear Sir,

Pursuant to your phone call, I have enclosed pictures of said Lines and some of the Beach loss.

Over the past two years at that area shown, the Beach loss amounts to 250 to 300 feet and wiping out all of the remaining dunes. The Outfall Line suffered with the loss of two manholes and approximately 750 feet of pipe. We are in desperate need of Outfall and Beach restoration.

We have seen towns North and South of us receive massive amounts of sand that did not take an impact as we have and we still have not received any help.

The dunes built by me more than thirty years ago with good elevations and stable cape variety dune grass, as well as bayberry bushes, have disappeared. If something is not done about the Outfall Lines, I expect to see the Eastside of town underwater.

Thank you for your attention in this matter.

Tim O'Leary, Supt.
North Wildwood Public Works

Encls (3)
Cc: Mayor and Council
TO:LM

van note - harvey
associates, pc
211 North Main Street, Suite 203
Cape May Court House, New Jersey 08210
609-465-2600 Fax: 609-465-8028
vannoteharvey.com

van note - harvey associates

Since 1894

File: 22034-999-21

November 15, 2005

Hand Delivered

Mr. Kevin Yecco
Municipal Clerk
Borough of Wildwood Crest
6101 Pacific Avenue
Wildwood Crest, NJ 08260

rec'd 11/15/05
11:15 AM
KMY
CC: W/MAP = BRIAN BOGLE, US ARMY CORPS OF ENGINEERS

RE: Storm Sewer Infrastructure
Borough of Wildwood Crest, Cape May County, NJ

Dear Kevin:

Enclosed please find two (2) copies of Storm Sewer Infrastructure Map of the Borough of Wildwood Crest dated January 7, 1994, latest revision September 1996. Please note various storm sewer improvements have been completed in the Borough since the preparation of the enclosed map. In particular the ocean outfall at Cresse Avenue has been abandoned, there are no longer openings in the bay front street end bulkheads at the street surface between Myrtle Road and Cresse Avenue (each street end is now equipped with a single subsurface outfall, 18" – 24" diameter through the bulkhead with a tideflex valve) and the ocean outfalls have been significantly extended as necessitated by accretion. The ocean outfalls have been extended with 24" diameter ductile iron storm sewer main the following approximate lengths:

- Washington Avenue 363 linear feet
- Hollywood Avenue 357 linear feet
- Miami Avenue 449 linear feet
- Atlanta Avenue 450 linear feet
- Fern Road 642 linear feet
- Heather Road 788 linear feet

In addition to the above, various storm sewer improvements have been completed within the Borough roadways. A new infrastructure map will be prepared in accordance with the recently adopted NJDEP stormwater regulations within the next three (3) years.

Feel free to contact me should you have any questions or if I can be of further assistance.

Sincerely,

James W. Verna III, EIT
Van Note – Harvey Associates

enclosure
cc: Ralph Petrella Jr., Borough Engineer

X:\20000 Projects\22034-WWC General Engineering\22034-Yecco storm sewer infrastructure letter 11-15-05.doc

ENGINEERS • ENVIRONMENTAL CONSULTANTS • SURVEYORS
OFFICES IN: NEW JERSEY • PENNSYLVANIA • NEW YORK CITY

State of New Jersey

Department of Environmental Protection

Richard J. Codey
Acting Governor

Bradley M. Campbell
Commissioner

Division of Budget and Finance
P.O. Box 420
Trenton, New Jersey 08625-0420
Telephone #: (609) 292-9230
Fax #: (609) 633-3727

January 6, 2006

Brian Bogle
Project Manager
Coastal Planning Section
US Army Corps of Engineers
100 Penn Square East
Philadelphia, PA 19107-3390

RE: Project 6040 – Hereford Inlet to Cape May Inlet

Dear Mr. Bogle:

Enclosed are two checks, each in the amount of $100,000.00 for a total of $200,000.00, in payment of NJDEP's cost share for the above-referenced project for the first and second quarters of 2006.

If you have any questions, please contact me at (609) 984-7740.

Sincerely,

Elaine L. Temple

Elaine L. Temple
Office of Trust Fund Management

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

Planning Division

0 5 APR 2006

Ed Kaminski
420 Route 9 North
Cape May Courthouse, New Jersey 08210

Dear Mr. Kaminski:

This letter is a follow up to a telephone conversation with Mr. Brian Bogle of my staff regarding the location of utilities within your service area.

The Philadelphia District of the Army Corps of Engineers is conducting a Feasibility study from Hereford Inlet to Cape May Inlet, New Jersey. As part of the study, we need to identify locations of the various utilities that your company owns. Specifically, we are requesting the location of underground and above ground electric utility lines within North Wildwood, Wildwood, Wildwood Crest and Lower Township, New Jersey. If possible please provide the locations electronically as an AutoCAD file or GIS layer (.dwg, .shp). This information will be used to quantify damages to these lines if they are subject to future erosion and wave damage. We have received similar information from utility providers for studies in Cape May City, Avalon, Stone Harbor and Ocean City.

The Philadelphia District understands the need to keep this information confidential and will not publish the location of the utility lines upon request. We appreciate your time and effort in providing this information. If you have any questions please call Mr. Brian Bogle (215)-656-6585, or e-mail: brian.p.bogle@usace.army.mil.

Sincerely,

for Stan Lisley

Minas M. Arabatzis
Chief, Planning Division

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Planning Division

MAY 03 2006

Mr. John Garofalo, Manager
Bureau of Coastal Engineering
New Jersey Department of Environmental Protection
1510 Hooper Avenue
Toms River, New Jersey 08753

Dear Mr. Garofalo:

This letter is in regard to the Corps of Engineers ongoing Hereford Inlet to Cape May Inlet Feasibility Study.

The Feasibility Cost-Sharing Agreement (FCSA) for this study was executed in September 2002, and stipulated a non-Federal cost-share of $1,250,000. Through Fiscal Year 2006 the New Jersey Department of Environmental Protection (NJDEP) has provided $750,000, leaving a $500,000 balance for the study. In order to meet the terms of the FCSA and match the Federal funds allocated up to and including fiscal year 2006, we request the NJDEP provide $200,000 by June 30, 2006. This funding will be used to conduct the without project hydraulic and economic analyses, perform geotechnical investigations, identify project alternatives, conduct public outreach and project management.

Thank you for your attention to this matter. If you have any questions, please contact Mr. Brian Bogle, Project Manager, at (215) 656-6585.

Sincerely,

for Stan Lile

Minas M. Arabatzis
Chief, Planning Division

Copy Furnished:

David Rosenblatt, Administrator
Office of Engineering and Construction
New Jersey Department of Environmental Protection
1510 Hooper Avenue
Toms River, New Jersey 08753

William Dixon, Project Engineer
Bureau of Coastal Engineering
New Jersey Department of Environmental Protection
1510 Hooper Avenue
Toms River, New Jersey 08753

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING-100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Planning Division

06 FEB 2007

Mr. Dave Rosenblatt, Administrator
Office of Engineering and Construction
New Jersey Department of Environmental Protection
1510 Hooper Avenue
Toms River, New Jersey 08753

Dear Mr. Rosenblatt:

This letter is in regard to the on going Corps' Hereford Inlet to Cape May Inlet General Investigation. The Feasibility Cost-Sharing Agreement (FCSA) for this study was executed in September 2002, and stipulated a non-Federal cost-share of $1,250,000. Through Fiscal Year 2006 the New Jersey Department of Environmental Protection (NJDEP) has provided $950,000, leaving a $300,000 balance for the study. In order to meet the terms of the FCSA and the Federal funds allocated for FY07, we request the NJDEP submit $200,000 by March 2007. These funds will be spent in the 3rd and 4th quarter of this FY on project formulation, plan selection, public outreach and project management.

Thank you for your attention to this matter. If you have questions contact Brian Bogle, Project Manager, at (215) 656-6585.

Sincerely,

for C. MacIntosh
Minas M. Arabatzis
Chief, Planning Division

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING-100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF
CENAP-PL-PC

MEMORANDUM FOR Commander, North Atlantic Division, ATTN: CENAD-ET-P

SUBJECT: Herford Inlet to Cape May Inlet Feasibility Study

1. Authorization. The Hereford Inlet to Cape May Inlet General Investigation was undertaken by authority of the New Jersey Shore Protection Study by resolutions adopted within the committee on Public Works and Transportation of the U.S. House of Representatives in December of 1987.

2. Project Area. The study area is located along the Atlantic coast of New Jersey between Hereford Inlet and Cape May Inlet. It is a heavily developed barrier island that is vulnerable to storm damage and serves as a major tourist destination for the region.

3. Project History. The Reconnaissance phase was completed in January of 2002. The Feasibility Cost-Sharing Agreement was executed on 30 September 2002. The Feasibility phase is scheduled for completion in September of 2008.

4. Project Status. Preliminary discussions with local officials indicate that the original borrow area may not be acceptable. This may necessitate additional investigations and outreach to identify source material. CENAP estimates that additional funds of $304,000 will be needed to complete this effort as well as the completion of the Feasibility study phase.

5. Funding Request. CENAP-PL requests that additional Federal funds of $152,000 be provided.

6. Federal Funding Schedule. An increase to the Federal portion of the Feasibility phase cost estimate from $1,250,000 to $1,402,000 is requested.

7. Point of Contact. Questions should be directed to Brian Bogle, Project Manager, Coastal Planning Section, at (215) 656-6585.

FOR THE COMMANDER:

Richard J Maraldo

RICHARD J. MARALDO, P.E.
Deputy District Engineer
for Programs and Project Management

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, US ARMY CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
BROOKLYN, NEW YORK 11252-6700

REPLY TO ATTENTION OF

JAN 11 2008

CENAD-PSD-P

MEMORANDUM FOR Commander, Philadelphia District, ATTN: CENAP-PL

SUBJECT: Review Plan Approval for Hereford Inlet to Cape May Inlet Feasibility Study

1. Reference:

a. EC 1105-2-408, Peer Review of Decision Documents, 31 May 2005.

b. Memorandum, CECW-CP, 30 March 2007, subject: Peer Review Process.

2. The enclosed Review Plan for the Hereford Inlet to Cape May Inlet Feasibility Study has been prepared in accordance with the referenced guidance.

3. The Plan has been made available for public comment, and any comments received have been incorporated. It has been coordinated with the Planning Center of Expertise for Coastal Storm Damage Reduction. The Plan currently does not include external peer review.

4. I hereby approve this Plan, which is subject to change as study circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Plan or its execution will require new written approval from this office.

Encl

Joseph R. Vietri
Chief, Planning & Policy Community of Practice
Program Support Division
Programs Directorate

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING-100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

AUG 0 6 2008

REPLY TO
ATTENTION OF

CENAP-PL-PC

MEMORANDUM FOR Commander, CENAD ATTN: CENAD-PSD-P (Mr. Doukas)

SUBJECT: Hereford Inlet to Cape May Inlet Feasibility Scoping/In Progress Review (IPR) Meeting

1. References.

(a.) 14 March 2008 meeting between Mr. Doukas (CENAD), Mr. Bogle (CENAP) and Ms. Harrington (CENAP), SAB.

(b.) 5 Jun 2008 phone conversation between Doukas and Bogle, SAB.

(c.) Guidance contained in ER 1105-2-100, Appendix H, dated 20 November 2007.

2. Request. Enclosed are nine copies of the read ahead material as described in Reference 1 (c.) for the subject meeting.

3. Background. The Hereford Inlet to Cape May Inlet Feasibility study was authorized under the New Jersey Shore Protection program to investigate hurricane and storm damage reduction within New Jersey's coastal communities. The enclosed material is designed to facilitate the upcoming study milestones including the Feasibility Scoping Meeting, plan selection and feasibility report submittal. The Hereford Inlet to Cape May Inlet Feasibility study is scheduled for completion in fiscal year 2009.

4. Proposed Meeting Date. The District is requesting a meeting between the appropriate parties to be coordinated by NAD, at Philadelphia District Office, within 30 days of the receipt of this memorandum.

5. Point of Contact. The point of contact for this study is Mr. Brian Bogle, CENAP-PL-PC, (215)-656-6585.

FOR THE COMMMANDER:

MINAS M. ARABATZIS
Chief, Planning Division

Enclosures (9)

Copy Furnished: (1)
Cynthia Jester CEMP-NAD

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
GENERAL LEE AVENUE
BROOKLYN, NY 11252-6700

REPLY TO
ATTENTION OF

CENAD-PDS 14 August 2008

MEMORANDUM FOR: Chief, CENAD-PDC (Mr. Lawrence Petrosino)

SUBJECT: SUBJECT: New Jersey Shore Protection Study, Hereford Inlet to Cape May , New Jersey - Feasibility Scoping Meeting (FSM)

1. References:

a. CENAP-PL-PC memorandum, dated 6 August 2008, transmitting read-ahead material.

b. ER 1105-2-100, Appendix. G, Amendment #2, dated 31 July 2007 and Appendix H, dated 20 November 2007, provides guidance with regard to FSM briefing materials.

2. Enclosed are eight copies of the read ahead material. As described in reference 1(a), the Hereford Inlet to Cape May Feasibility study was authorized under the New Jersey Shore Protection Program to investigate hurricane an storm damage reduction within New Jersey coastal communities. The enclosed information is intended to facilitate discussion and documentation for the proposed vertical team meeting and assist the district with its remaining tasks in finalizing the draft feasibility report.

3. The Division staff has preliminarily reviewed the Philadelphia District read-ahead information and has no significant comments or concerns at this time. This office requests a meeting between our appropriate staffs at the NAP district Offices within 30 days of receipt of this memorandum.

4. Please contact, Mr. Peter Doukas of my staff at 718.765.7068 should you have any questions or require additional information.

Encl
as

for

JOSEPH R. VIETRI
Chief, Policy and Planning Formulation
Programs Directorate

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
GENERAL LEE AVENUE
BROOKLYN, NY 11252-6700

REPLY TO
ATTENTION OF

CENAD-PD-CID

28 August 2008

MEMORANDUM FOR: Regional Integration Team, U. S. Army Corps of Engineers 441 G Street NW, Washington D.C. 20314-1000 ATTN: Ms Cynthia Jester (CEMP-NAD)

SUBJECT: SUBJECT: New Jersey Shore Protection Study, Hereford Inlet to Cape May, New Jersey - Feasibility Scoping Meeting (FSM)

1. References:

a. CENAD-PDS memorandum, dated 14 August 2008, requesting a FSM meeting

b. CENAP-PL-PC memorandum, dated 6 August 2008, transmitting read-ahead material.

c. ER 1105-2-100, Appendix. G, Amendment #2, dated 31 July 2007 and Appendix H, dated 20 November 2007, provides guidance with regard to FSM briefing materials.

2. Enclosed are eight copies of the read ahead material. As described in reference 1(b), the Hereford Inlet to Cape May Feasibility study was authorized under the New Jersey Shore Protection Program to investigate hurricane and storm damage reduction within New Jersey coastal communities. The enclosed information is intended to facilitate discussion and documentation for the proposed vertical team meeting and assist the district with its remaining tasks in finalizing the draft feasibility report.

3. The Division staff has preliminarily reviewed the Philadelphia District read-ahead information and has no significant comments or concerns at this time. This office requests a meeting between our appropriate staffs at the NAP district Offices within 30 days of receipt of this memorandum. A call in phone number will be available for the meeting.

4. Please contact, Mr. Patricia Donohue of my staff at 718.765.7080 should you have any questions or require additional information.

Lawrence Petrosino

Encl
as

LAWRENCE PETROSINO
Chief, Civil Works Integration Division
Programs Directorate

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
WASHINGTON, D.C. 20314-1000

CEMP-NAD

OCT 2 2008

MEMORANDUM FOR COMMANDER, NORTH ATLANTIC DIVISION (NAD-PD-CID-S)

SUBJECT: New Jersey Shore Protection Study, Hereford Inlet to Cape May, New Jersey – Feasibility Scoping Meeting (FSM) Package

1. Reference CENAD-PD-CID-S memorandum, dated 28 August 2008, Subject: New Jersey Shore Protection Study, Hereford Inlet to Cape May, New Jersey – Feasibility Scoping Meeting (FSM)

2. Enclosed are the consolidated HQUSACE comments on the subject FSM package for your response. In general the submission lacks some of the information specified in Exhibit H-3 of ER 1105-2-100, such as an outline of the feasibility report and draft report text relative to existing and future without-project conditions. Once responses have been generated, please contact the RIT to schedule a FSM.

3. If you have any questions please contact Ms. Cynthia Jester at 202-761-1379.

Encl

Wesley E Coleman
for MOHAN SINGH, P.E.
Chief, North Atlantic Division
Regional Integration Team
Directorate of Military Programs

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

CENAP-PL-PC

DEC 12 2008

MEMORANDUM FOR Commander, CENAD ATTN: CENAD-PD-CID-S (Mr. Joseph Forcina)

SUBJECT: Hereford Inlet to Cape May Inlet Feasibility Scoping/ In Progress Review (IPR) Meeting

1. **References.**

(a.) 2 October 2008 CEMP-NAD Memorandum.

(b.) 14 March 2008 meeting between Mr. Doukas (CENAD), Mr. Bogle (CENAP) and Ms. Harrington (CENAP), SAB.

(c.) 5 June 2008 phone conversation between Doukas and Bogle, SAB.

(d.) Guidance within ER 1105-2-100, Appendix H, dated 20 November 2007.

(e.) 9 December 2008 phone conversation between Doukas and Bogle, SAB.

2. **Request.** Enclosed are four copies of the 2 October 2008 Memorandum (Reference 1. (a)), and responses to the comments within the October Memorandum.

3. **Background.** The Hereford Inlet to Cape May Inlet feasibility study was authorized under the New Jersey Shore Protection program to investigate hurricane and storm damage reduction within New Jersey's coastal communities. The enclosed contains the District's responses to the review team comments on the read ahead material that were contained within the October Memorandum. The draft report text relative to the introduction, existing conditions and without project conditions sections of the feasibility study will be provided prior to the Feasibility Scoping/In Progress Review Meeting, as agreed to during reference 1 e.

4. **Proposed Meeting Date.** The District is requesting a meeting between the appropriate parties to be coordinated by NAD at the location of their preference upon the review of this material.

CENAP-PL-PC
SUBJECT: Hereford Inlet to Cape May Inlet Feasibility Scoping/ In Progress Review (IPR) Meeting

5. Point of Contact. The point of contact for this study is Mr. Brian Bogle, CENAP-PL-PC, (215)-656-6585.

FOR THE COMMMANDER:

for MINAS M. ARABATZIS
Chief, Planning Division

Enclosures (4)

Copy Furnished: (8)
Cynthia Jester
CEMP-NAD
441 G Street
Washington, DC 20314

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Planning Division

FEB 0 6 2009

Mr. David Rosenblatt, Administrator
Office of Engineering and Construction
New Jersey Department of Environmental Protection
1510 Hooper Avenue
Toms River, New Jersey 08753

Dear Mr. Rosenblatt:

This letter is in regard to the Hereford Inlet to Cape May Inlet Feasibility Study. The Feasibility Cost-Sharing Agreement for this study was executed in September of 2002.

In order to maintain study development, facilitate the technical review and meet study milestones the District is requesting $154,000 from NJDEP for FY09.

If you have any questions, please contact Brian Bogle, Project Manager, at (215) 656-6585.

Sincerely,

for Minas M. Arabatzis
Chief, Planning Division

Copy Furnished:

Benjamin Keiser, Project Engineer
Bureau of Coastal Engineering
New Jersey Department of Environmental Protection
1510 Hooper Avenue
Toms River, New Jersey 08753

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

Attention: North Wildwood, Wildwood and Wildwood Crest Residents

This is to inform you that the Philadelphia District of the Army Corps of Engineers will be collecting information / data for the ongoing Hereford Inlet to Cape May Inlet feasibility study in your area. This activity will take place during April and May 2010.

The information we collect will be used to develop a plan to prevent storm damage within the study area between Hereford Inlet and Cape May Inlet. During the data collection period consultants from the firm of Michael Baker Jr., Inc., under contract to the Corps of Engineers, will be conducting field surveys of properties within the study area.

The information collected will consist of:

1. Residential & commercial structure inventories including recording the address, property size and type of construction.
2. Residential & commercial first floor elevations to determine the properties' location & vulnerability to storm damage.
3. Photographs of residential & commercial structures.
4. Recording elevations at various locations on the island.

If you have questions, please contact the Project Economist, Robert Selsor, at (215) 656-6569.

Sincerely,

for C. MacIntosh
Minas M. Arabatzis
Chief, Planning Division

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

APR 30 2010

Mr. Dave Rosenblatt, Administrator
New Jersey Department of Environmental Protection
Bureau of Dam Safety and Flood Control
501 East State Street
P.O. Box 419
Trenton, NJ 08625-0419

Dear Mr. Rosenblatt:

The Feasibility Cost Sharing Agreement (FCSA) for the Hereford Inlet to Cape May Inlet feasibility study was signed on 9/30/2002. The cost estimate for the study was $2,500,000. Since the signing of the FCSA the costs of the study have increased due to additional requirements for Federal Water Resource projects. These new requirements include an Agency Technical Review and an Independent External Peer Review (EC 1165-2-209), a Value Engineering study (ER 11-1-321), new requirements within Planning Models and Improvement Program (EC 1105-2-407) and the requirement for a Civil Works Review Board meeting (EC 1105-2-406). Based on these additional requirements the updated cost estimate for the Hereford Inlet to Cape May Inlet Feasibility Study is $3,700,000.

To date, the New Jersey Department of Environmental Protection has provided $1,552,000 and the Federal Government has provided $1,584,142 in study funds. Based on the funds allocated, and the new feasibility estimate, the total amount required to complete the feasibility study is approximately $563,858. Some of the new requirements discussed above are not cost shared at 50% Federal, 50% non-Federal, as in the original FCSA, but are a 100% Federal responsibility. Therefore, the updated non-Federal funding amount necessary to complete the feasibility study is $131,929.

As you indicate that you have budgeted $32,000 this year for the Hereford study, a check in the amount of **$32,000** is requested, and should be made payable to, "**FAO, USAED Philadelphia**". The Funds should be sent to the following address:

Mr. Minas Arabatzis, Chief
Planning Division (CENAP-PL)
U. S. Army Corps of Engineers, Philadelphia District
Wanamaker Building, 100 Penn Square East
Philadelphia, PA 19107-3390

If additional information is required, please contact Mr. Brian Bogle, Project Manager, at (215) 656-6585.

Sincerely,

for C. MacIntosh

Minas Arabatzis
Chief, Planning Division

CF:
Mr. Ben Keiser, Manager
Bureau of Coastal Engineering
New Jersey Department of Environmental Protection
1510 Hooper Avenue
Toms River, NJ 08753

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

JUN 17 2010

CENAP-PL-PC

MEMORANDUM FOR Commander, CENAD ATTN: (CENAD-PSD-P) (Peter Blum)

SUBJECT: Transmittal of Risk and Uncertainty (R&U) plan for Hereford Inlet to Cape May Inlet.

1. BACKGROUND. The Philadelphia District held a Feasibility Scoping Meeting (FSM) for the Hereford Inlet to Cape May Inlet feasibility study on 23 July 2009. Attendees at the FSM included the Office of Water Policy Review (OWPR), the North Atlantic Division Regional Integration Team (NAD-RIT), North Atlantic Division (NAD), New Jersey Department of Environmental Protection (NJDEP), the non-Federal Sponsor, and key members of the Philadelphia District Project Development Team. One of the recommendations at the meeting from the OWPR, the NAD-RIT and NAD was for the District to pursue one of two paths in order to adequately address Risk and Uncertainty (R&U) inherent in storm damage reduction projects. The first path was to reanalyze the storm damage reduction effort using the recently approved coastal storm damage reduction model, Beach-*fx*. The second path was for the District to enhance its existing modeling effort in order to better address Risk and Uncertainty. The decision on which path to pursue would be based upon the confidence the District has in their 20 years experience in planning, designing and constructing shore protection projects using its current storm damage reduction model, compared to the costs and time delays of executing the new Beach-*fx* model and the needs of the non-Federal sponsor. Based on these criteria, the District decided to pursue an enhanced version of its current model in order to better address Risk and Uncertainty (Enclosure). Subsequent guidance from NAD, provided during the 18 February 2010 In-Progress Review (IPR) meeting, instructed the District to develop their Risk and Uncertainty plan with the current model. NAD also indicated that they would prepare a letter exempting the District from use of Beach-*fx* contingent upon satisfactory review of the District's Risk and Uncertainty analysis.

2. REQUEST. The District is transmitting a draft of its Risk and Uncertainty plan to NAD for review and approval prior to coordinating with the Jacksonville District ATR team. Upon approval by NAD the District will coordinate the Risk and Uncertainty Plan with the ATR team in order to execute the plan outlined in the draft.

Sincerely,

for C. MacIntosh
Mike Arabatzis
Chief, Planning Division

Enclosure

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
BROOKLYN, NY 11252-6700

REPLY TO
ATTENTION OF

CENAD-PL 17 November 2010

MEMORANDUM FOR: Chief, CENAD-CID

SUBJECT: Hereford Inlet to Cape May Inlet, Draft Risk and Uncertainty Plan

1. The NAD Planning and Policy Division has reviewed the Draft Risk and Uncertainty Plan for Hereford Inlet to Cape May Inlet. The draft plan is approved and the District should proceed as recommended while addressing the following comments:

   a. The District should update their Review Plan to describe the risk and uncertainty Agency Technical Review (ATR) and provide to the Planning Center of Expertise - Coastal and Storm Damage Reduction (c/o Larry Cocchieri) for approval.

   b. The District should also undertake ATR of the Draft Risk and Uncertainty Plan for Hereford Inlet to Cape May Inlet. Comments should be provided in DrChecks and a memo provided by the ATR team indicating their concerns or concurrence with this approach. The District should provide this memo to NAD.

   c. Pending ATR team concurrence, the District can complete the updated analysis, to include risk and uncertainty and economic risk considerations. The analysis and results would undergo ATR and the Planning Center of Expertise - Coastal and Storm Damage Reduction will determine if an "approved for one time use" model request to HQUSACE, Office of Water Project Review is warranted and will submit the required materials, as appropriate.

   d. NAD has prepared the enclosed transmittal memo to be forwarded to the HQUSACE NAD RIT stating that this approach is the required follow up to the June 2010 Feasibility Scoping Meeting. NAD and the District will proceed with implementing this approach.

2. Please direct any questions to Ms. Amy Guise (NAB Planning Manager) at 410-962-6138.

Peter R Blum

Encl

for JOSEPH R. VIETRI
Chief, Planning and Policy Division
Programs Directorate

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
BROOKLYN, NY 11252-6700

REPLY TO
ATTENTION OF

CENAD-PL 17 November 2010

MEMORANDUM FOR: Chief, CENAD-CID

SUBJECT: Hereford Inlet to Cape May Inlet, NJ, Draft Risk and Uncertainty Plan

1. This memorandum is provided for information regarding issues raised at the Feasibility Scoping Meeting for the subject study. In follow-up, CENAP has outlined an approach to incorporate risk and uncertainty and economic risk considerations into their modeling efforts.

2. The NAD Planning Division / Planning Center of Expertise - Coastal Storm Damage Reduction, has reviewed and approved the Draft Risk and Uncertainty Plan for Hereford Inlet to Cape May Inlet. The draft plan is currently undergoing Agency Technical Review via Jacksonville District. Pending resolution of any Agency Technical Review (ATR) comments, the MSC and District will proceed with implementing the proposed approach to incorporate risk and uncertainty and economic risk considerations into their modeling efforts.

3. Once the analyses are completed, they would undergo ATR and the Planning Center of Expertise - Coastal and Storm Damage Reduction will determine if an "approved for one time use" model request to HQUSACE is warranted and will submit the required materials, as appropriate.

4. The District has updated their Review Plan to describe the risk and uncertainty ATR.

5. Request you furnish this memorandum to HQUSACE and request that any questions or comments be directed to Ms. Amy Guise (NAB Planning Manager) at 410-962-6138.

for JOSEPH R. VIETRI
Chief, Planning and Policy Division
Director, Planning Center of Expertise for
Coastal Storm Damage Reduction

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

MAY 19 2011

CENAP-PL-PC

MEMORANDUM FOR: Commander, CENAD, ATTN: CENAD-PD-CID-S (Mr. Lawrence Petrosino).

SUBJECT: Documentation of Feasibility Scoping Meeting (FSM) for the Hereford Inlet to Cape May Inlet, NJ Feasibility study.

1. References.

a. Memorandum, CENAP-PL-PC, 12 December 2008, District response to HQUSACE comments regarding Feasibility Scoping Meeting materials.

b. Memorandum, CEMP-NAD, 2 October 2008, Transmittal of HQ comments to CENAD-PD-CID-S.

c. Memorandum, CENAD-PD-CID, 28 August 2008, Transmittal of Feasibility Scoping meeting materials to CEMP-NAD.

d. Memorandum, CENAD-PDS, 14 August 2008, Transmission of Feasibility Scoping Meeting read ahead materials to CENAD-PDC.

e. Memorandum, CENAP-PL-PC, 6 August 2008, Transmittal of Feasibility Scoping Meeting materials to CENAD-PDS.

2. Background.

The FSM read ahead materials were transmitted to North Atlantic Division (NAD) from the District on 6 August 2008, Reference 1.e. The District's August transmittal was then routed through NAD in a memorandum dated 14 August 2008, Reference 1.d, and then on to Headquarters in a memorandum dated 28 August 2008, Reference 1.c. Headquarters then provided comments on the pre-FSM submittal package to NAD in a Memorandum dated 2 October 2008, Reference 1.b., Enclosure 1. The District responded to Headquarters comments in their 12 December 2008 memorandum, Reference 1.a, Enclosure 2, and the FSM was scheduled.

All of the pre- FSM materials submitted to NAD and to the OWPR underwent an Agency Technical Review (ATR) by the Jacksonville District of the Army Corps of Engineers and all comments from the ATR team were input into the Design Review and Checking System (Dr. Checks), Enclosure 3. These materials included the Draft Feasibility report containing the Introduction, Existing Conditions, Without Project Conditions and With Project Conditions up to and including the preliminary selected plan. Comments from the Jacksonville District were entered into the Projnet/Dr. Checks tracking system and closed prior to the FSM.

The FSM was held at the Philadelphia District on 23 July 2009. Opening comments were given by Peter Doukas, of NAD, Wesley Coleman, Chief of the Office of Water Policy Review (OWPR) and Minas Arabatzis, the Chief of Planning Division, Philadelphia District. The Project Manager, Brian Bogle, provided a project overview of the study using the attached Microsoft Power Point slides (Enclosure 4). These slides reviewed the study background, authority, location, problems, opportunities, objectives, constraints, without project damages, plan formulation and identified a preliminary selected plan and documented the study findings to date.

Enclosure 5 contains the District's Memorandum For Record (MFR) of the FSM meeting. This MFR documented the meeting and contains a list of all FSM attendees. All attendees of the meeting received a copy of the District's MFR.

3. District Memorandum For Record (MFR).

The District MFR documented the main discussion points of the FSM meeting. The three main points of discussion at the FSM concerned the Future Without Project Conditions, the status of the Independent External Peer Review, and Model Certification. The Future Without Project Conditions will be examined more closely and presented in the final Feasibility Report. The Independent External Peer Review is being anticipated as a future requirement and is currently being included in the project schedule.

The model certification discussion was based on the fact that a combination of SBEACH and COSTDAM were used for this study instead of Beach-*fx*. Beach-*fx* was certified for USACE storm damage reduction studies on 1 April 2009 and is the only certified corporate model for storm damage assessment, although certification of a model is not a requirement for its use. All modeling for this study were conducted in 2005, 2006, and 2007 with SBEACH/COSTDAM, before Beach-*fx* was available for use as a certified model. Two alternatives were discussed at the FSM in order to incorporate the use of a certified model: (1) even though all modeling is complete for this study, the PDT could run all necessary modeling using Beach-*fx* or (2) the PDT could enhance the existing modeling effort in order to address risk and uncertainty (R&U). The team also will clearly explain the 20+ years of experience with storm damage modeling in this region and describe how the analyses were performed and how the projects, based upon these models, have performed. It was agreed that this explanation would be included in a white-paper that outlined the timeline for the Hereford study versus the development of Beach-*fx* and be presented to FSM attendees and reviewers. This paper would also explain the history of the use of the current SBEACH/COSTDAM model and the resources required to reanalyze this study using Beach-*fx* (Enclosure 6).

4. Path Forward

Alternative (2), enhancing the existing model to incorporate R&U was chosen as the most reasonable and efficient path forward. The R&U plan that was developed by the PDT was forwarded to North Atlantic Division (NAD) on 17 June 2010 (Enclosure 7). NAD approved the R&U plan in an internal memo dated 17 November 2010. The NAD memo required the Jacksonville ATR team to review the District R&U model.

The charge to the Jacksonville ATR team was as follows;

> *"Is the proposed analysis, if added to the current storm damage reduction model process, reasonable enough to incorporate the variability associated with economic and hydraulic systems in order to meet the requirement identified at the Feasibility Scoping Meeting of enhancing the existing effort in order to address risk and uncertainty"*

All comments from the ATR team on the R&U analysis were input into the Projnet/Dr. Checks tracking system and addressed by the PDT. The ATR for the R&U plan was certified on 2 February 2011 (Enclosure 8). A District Quality Control report was certified on the post ATR reviewed final R&U document on 1 March 2011. NAD also required the review of the R&U model by the Planning Center of Expertise for Economics, Norfolk District. Norfolk District is currently reviewing the District Model and will enter all comments into the Projnet/Dr. Checks tracking system. The PCX will also review and certify all model results upon completion of the District's analysis. The results of the R&U analysis will be added to the existing draft feasibility report and be presented at the Alternative Formulation Briefing (AFB).

4. Required Action. It is requested that this memorandum document the completion of the Feasibility Scoping Meeting (FSM) milestone for the subject study and serve as the path forward for the District in lieu of a Program Guidance Memorandum.

FOR THE COMMANDER:

for C. MacIntosh

Minas M. Arabatzis
Chief, Planning Division

Enclosure 1. Pre-FSM submittal (Draft Report)
Enclosure 2. Response to HQ/OWPR comments
Enclosure 3. Jacksonville pre-FSM ATR Comments
Enclosure 4. Microsoft Power Point slides
Enclosure 5. District MFR
Enclosure 6. District white paper
Enclosure 7. District R&U approach
Enclosure 8. ATR comments and Certification of R&U approach

THE BOROUGH OF WILDWOOD CREST

6101 Pacific Avenue, Wildwood Crest, NJ 08260
www.wildwoodcrest.org

CARL GROON
Mayor -
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609-523-0202

TAX ASSESSOR
609-522-3891

TAX COLLECTOR
SEWER COLLECTION
609-522-3843
FAX 609-522-6692

TREASURER
609-522-0401
FAX 609-522-6692

October 6, 2011

Brian P. Bogle, Project Manager
Coastal Planning Section
Planning Division
United States Army Corps of Engineers
100 Penn Square East
Philadelphia, PA 19107-3390

Dear Mr. Bogle:

I wanted to take this opportunity to thank you for your participation at the recent discussion regarding beach accretion in Wildwood Crest. Although no final resolution of the Borough's problems was reached, I certainly appreciate the time and effort provided by everyone involved.

I look forward to further discussions and an alternative to the burden being placed on the taxpayers of the Borough of Wildwood Crest.

Very truly yours,

Carl H. Groon, Mayor

the LOMAX Consulting group

P. O. Box 9 (MAILING)
1435 Route 9 North (DELIVERY)
Cape May Court House, NJ 08210, USA

609-465-9857 (P)
609-465-2449 (F)
WWW.LOMAXCONSULTING.COM

MEETING AGENDA
Wednesday, September 28, 2011

PROJECT: Wildwood Crest Oceanfront
Borough of Wildwood Crest, Cape May County, NJ
TLCG File No.: 09-662

ATTENDEES:
Carl Groon, Borough Mayor
Doreen Corino, Esq., Borough Solicitor
James W. Verna III, PE, Borough Engineers Office
Richard Hluchan, Esq.
Richard Weggel, P.E.
Joseph Lomax – The Lomax Consulting Group
Ben Keiser, Bill Dixon, Chris Constantino – NJDEP
Jeff Gebert and Brian Bogle – USACE

---

1. Introduction
2. Purpose of the Meeting:
   A. Statement of Borough issues, i.e. economic impact of beach accretion on stormwater management and tourism
   B. Seek near-term and long-term solutions
3. USACE – Coastal sand budget studies and beach management feasibility – Hereford Inlet to Cape May Area
4. NJDEP – Coastal Engineering role in beach management (State program sponsor)
5. Opportunities/approaches to addressing the Borough's beach management issues
6. Next Steps

PROJECTS\Active\09-662\ Correspondence\MEETING AGENDA 9_28_11.doc

Over 30 years of environmental excellence

CESAJ-PD-PW February 2, 2011

MEMORANDUM FOR THE RECORD

SUBJECT: Hereford Inlet to Cape May Inlet Feasibility Study, Summary of Agency Technical Review of the Proposed Risk and Uncertainty Plan

1. Agency Technical Review (ATR) of the subject Risk and Uncertainty Plan, prepared by Philadelphia District (NAP), was managed by the Coastal Storm Damage Reduction Planning Center of Expertise (PCX-CSDR) in NAD. The ATR was performed by a team composed of staff of the Jacksonville District, in SAD.

2. It is the understanding of the ATR Team that the purpose of the Risk and Uncertainty Plan is to provide methods sufficient to evaluate risk and uncertainty, in lieu of addressing risk and uncertainty by employment of Beach-fx. It was reviewed within that context.

3. The team was composed of a subset of the original team, appropriate for the scope of review of the Risk and Uncertainty Plan, including: economics, plan formulation and coastal engineering. The Charge to Reviewers was as follows: Is the proposed analysis, if added to the current storm damage reduction model process, reasonable enough to incorporate the variability associated with economic and hydraulic systems in order to meet the requirement identified at the Feasibility Scoping Meeting of enhancing the existing effort in order to address risk and uncertainty?

4. Review of the document resulted in a total of 12 comments, with significant comments from all reviewers. The PDT concurred with and resolved all comments. Resolution of comments was based upon the PDT responses provided in DrChecks and by review of draft report revisions. DrChecks reports that provide detailed documentation of the ATR comments and PDT responses are provided in Attachment 1 to this memorandum.

5. The ATR team found that the proposed analysis, if added to the current storm damage reduction model process employing COSTDAM, may be reasonable enough to incorporate the variability associated with economic and hydraulic systems in order to meet the requirement identified at the Feasibility Scoping Meeting of enhancing the existing effort in order to address risk and uncertainty. However, there is an inherent disadvantage adapting a probabilistic model versus employing a life cycle model, such as Beach-fx: the erosion damage function to pile structures is hard-wired in COSTDAM i.e., percentage damage is programmed to be always directly proportional to percent of the eroded footprint (regardless of the depth of the piles) and therefore, this damage function cannot be subject to variability, nor risk and uncertainty.

James M. Baker, Jacksonville District
Agency Technical Review Lead

CESAJ-PD-PW December 7, 2011

MEMORANDUM FOR THE RECORD

SUBJECT: Hereford Inlet to Cape May Inlet Feasibility Study, Summary of Agency Technical Review of the Risk and Uncertainty Economics Model Application

1. Agency Technical Review (ATR) of the subject risk and uncertainty economics model application, prepared by Philadelphia District (NAP), was managed by the Coastal Storm Damage Reduction Planning Center of Expertise (PCX-CSDR) in NAD. The ATR was performed by Dan Abecassis, the ATR team economics reviewer, Jacksonville District, in SAD.

2. There were six economics-related comments and one H&H-related comment. All issues were resolved and all comments closed in DrChecks. A report listing all comments and associated resolutions is enclosed, herein. The review resulted in two specific recommendations that are provided in paragraphs 3 and 4, below.

3. Recommendation 1: The model review documentation for one-time-approval-for-use: needs to be completed to comply with EC 1105-2-412, Quality Assurance of Planning Models, in accordance with the process established by the Coastal PCX. Philadelphia District will need to work with the PCX for the procedural protocols.

4. Recommendation 2: Include Regarding a qualitative assessment addressing the reasonableness of the proportional erosion damage function to pile structures, in the draft report, in response to comment 4293973, relating to damages incurred to structures on pile foundations. The PDT economist has indicated that the depth of the piles to structures on pile foundations is not information readily obtainable, not even from a sampling perspective. It is recognized that one of the limitations of the COSTDAM model is that the calculation for erosion damage to pile structures is hardcoded to compute damages proportional to the footprint (i.e., 10% erosion of footprint equates to 10% damage, 20% erosion, 20% damage, etc.) arriving at 100% damage when the full footprint has been subjected to erosion by the model. The economist has indicated that a qualitative assessment addressing the reasonableness of the proportional erosion damage function to pile structures will be further coordinated with the engineering discipline and provided in the feasibility report. (The limitation of the COSTDAM model for the computation of erosion damages to pile structures should also be documented in the model review appendix). The qualitative assessment will be reviewed during the next ATR.

Enclosure

James M. Baker, Jacksonville District
Agency Technical Review Lead

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET NW
WASHINGTON, D.C. 20314-1000

CEMP-NAD-RIT

3 June 2011

MEMORANDUM FOR THE RECORD

SUBJECT: Hereford Inlet to Cape May Inlet, New Jersey – Feasibility Scoping Meeting Documentation

1. Reference CENAB-PL-P Memorandum for the Record dated 23 July 2009, subject as above.

2. Documentation of the Hereford to Cape May Inlet, New Jersey Feasibility Scoping Meeting (FSM) was completed in July of 2009. Policy compliance review comments were discussed and subsequently resolved during the FSM

3. HQ, the MSC and District have concurred on the outcome of the FSM and understand the following actions will be required prior commencement of the Alternative Formulation Briefing:

a. Certification for one-time use of the SBEACH–COSTDAM methodology for the storm damage and damage reduction benefits analysis.

b. Update the Peer Review Plan to include IEPR.

c. Initiation of IEPR process.

4. Questions regarding this matter should be directed to Catherine Shuman, NAD-RIT Planning Program Manager, (202) 761-1379.

PETE LUISA
Deputy Chief, Civil Works
NAD Regional Integration Team
Directorate of Military Programs

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
BROOKLYN, NY 11252-6700

REPLY TO
ATTENTION OF

CEPCX-CSDR

MAR 13 2012

MEMORANDUM FOR: CEMP-NAD, Attention: Ms. Catherine Shuman

SUBJECT: Model Review Plan for the Hereford Inlet to Cape May Inlet, NJ Feasibility Study

1. The National Planning Center of Expertise for Coastal Storm Damage Reduction (PCX-CSDR) has reviewed the Model Review Plan (MRP) for the subject study, which was prepared in accordance with EC 1105-2-412, entitled "Assuring Quality of Planning Models". The subject MRP for an approved model is enclosed for your concurrence.

2. While PCX-CSDR led a model review to ascertain its validity, we are proposing the subject MRP at this time and would be available to discuss any additions or enhancements to it, in which we would carry out, as necessary.

3. For further information, please contact Mr. Larry Cocchieri at 347-370-4571.

Encl

for Larry Cocchieri
JOSEPH R. VIETRI
Director, National Planning Center of
Expertise for Coastal Storm Damage
Reduction

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

MAR 15 2012

Regulatory Branch
Application Section II

SUBJECT: CENAP-OP-R-2012-79-24
NJDEP #: 0500-07-0006.1, CAF 070001
0515-09-0003.1, CAF100001
WILDWOOD CREST TO NORTH WILDWOOD BEACH SAND BACKPASSING

Mr. Louis J. Belasco, Administrator
City of North Wildwood
901 Atlantic Avenue
North Wildwood, New Jersey 08280

Dear Mr. Belasco:

This is in regard to your application for a Department of the Army permit to perform beach nourishment between 2nd and 7th Avenues in North Wildwood by means of "backpassing" sand from the beach at Wildwood Crest, in Cape May County, New Jersey. The permit application was submitted on your behalf by the Coastal Research Center of Richard Stockton College.

A copy of a public notice of your application is enclosed for your information. You are reminded of your responsibility to obtain State approval from the New Jersey Department of Environmental Protection (NJDEP), including a Section 401 Water Quality Certificate and concurrence that the proposed project is consistent with their approved Coastal Zone Management Program. You should contact the NJDEP Land Use Regulation Program, P.O. Box 439, Trenton, New Jersey 08625-0439, or (609) 292-0060, for additional information. When you receive your State authorization(s), it is requested that copies be furnished to this office.

If you should have any questions regarding this matter, please contact James Boyer of my office by calling (215) 656-5826, by electronic mail to James.N.Boyer@usace.army.mil or by writing to the above address.

Sincerely,

Samuel J. Reynolds

for Frank J. Cianfrani
Chief, Regulatory Branch

Enclosure

Copies Furnished:

NJDEP, Bureau of Coastal Regulation (LURP – Chris Dolphin)
NJDEP, Bureau of Coastal Regulation (LURP – Janet Stewart)
NJDEP, Bureau of Coastal Regulation (LURP – Gail Moore)
NJDEP, Historic Preservation Office (Jesse West-Rosenthal)
USFWS, Pleasantville (Wendy Walsh)
NMFS, Sandy Hook
NMFS, Gloucester, MA
USEPA, Region II
USCG, Fifth District
CENAP-DP-CW (Keith Watson)
CENAP-PL-E (Beth Brandreth)
CENAP-PL-E (Nikki Minnichbach)
CENAP-PL-PC (Jeff Gebert)
CENAP-PL-PC (Brian Bogle)
CENAP-EC-EH (Robert Lowinski)

Mr. Christopher Constantino
NJDEP, Bureau of Coastal Engineering
1510 Hooper Avenue, Suite 140
Toms River, New Jersey 08753

FEMA:	Ms. Megan Jadrosich. U.S. Department of Homeland Security Mitigation Division 26 Federal Plaza, 13th Floor New York, New York 10278-0002
Agent for North Wildwood:	Dr. Stewart Farrell Coastal Research Center 30 Wilson Avenue Port Republic, New Jersey 08241
Agent for Wildwood Crest:	Mr. Ralph Petrella, Jr. Van Note-Harvey Associates 211 North Main Street, Suite 203 Cape May Court House, New Jersey 08210
City of Wildwood:	Honorable Ernie Troiano, Jr. Mayor, City of Wildwood 4400 New Jersey Avenue Wildwood, New Jersey 08262

US Army Corps of Engineers
Philadelphia District
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390
ATTN: CENAP-OP-R

Public Notice

Public Notice No.	Date
CENAP-OP-R-2012-79-24	MAR 1[illegible] 2012
Application No.	File No.

In Reply Refer to:
REGULATORY BRANCH

This District has received an application for a Department of the Army permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) and Section 404 of the Clean Water Act (33 U.S.C. 1344).

The purpose of this notice is to solicit comments and recommendations from the public concerning issuance of a Department of the Army permit for the work described below.

APPLICANT: City of North Wildwood

ADDRESS: 901 Atlantic Avenue
North Wildwood, New Jersey 08280

AGENT: The Coastal Research Center
The Richard Stockton College of New Jersey
30 Wilson Avenue
Port Republic, New Jersey 08241

WATERWAY: Atlantic Ocean

LOCATION: The proposed fill or deposition area is situated on the ocean-front beach, immediately southwest of Hereford Inlet, between the jetty at 2nd Avenue and 7th Avenue in the City of North Wildwood, Cape May County, New Jersey. The proposed excavation or borrow area is situated on the ocean-front beach within the Borough of Wildwood Crest, between the southwest municipal boundary adjacent to Jefferson Avenue and the northeast municipal boundary at Cresse Avenue. The truck haul route would be on the ocean-front beach within the Cities of Wildwood and North Wildwood, from Wildwood Crest northeast to the fill area beginning at 7th Avenue. The point of access to the beach area for equipment in North Wildwood would be at 15th Avenue, with staging at the lifeguard parking lot. The point of access to the beach area for equipment in Wildwood Crest would be at Washington and Cresse Avenues, with staging at the Department of Public Works complex on Washington Avenue (west side of the Borough).

ACTIVITY: The applicant is seeking authorization to nourish a portion of their ocean-front beach by removing excess sand from the beach within Wildwood Crest, and transporting that sand by trucks travelling on the intervening beach to the proposed fill site. They propose to carry out a "back-passing" operation, in which they would "harvest" or excavate up to 96,000 cubic yards of sand from the ocean-front beach within Wildwood Crest, and move the sand by truck through Wildwood to the fill site in North Wildwood. The excavation area would encompass 68.08 acres of beach, which would stretch approximately 2 miles from one municipal limit to the other, approximately 300 feet wide. The excavation would occur in the higher portion of the beach, above the mean higher high water line; only 10.87 acres of it would be below (waterward of) the high tide line (HTL). With a truck capacity of 20-25 cubic yards each, it would take 3,840 to 4,800 round trips to supply the sand to the discharge site. The trucks would travel on the beach above the HTL. Construction access for trucks and equipment in Wildwood Crest would be limited to Washington and Cresse Avenues, with a designated staging area at the Department of Public Works complex on Washington Avenue on the western side of the Borough.

The proposed fill area in North Wildwood would encompass 20.15 acres, with 8.13 acres of fill below the HTL. Of this 8.13 acres, 4.81 would be between the HTL and mean low water line (MLWL), and 3.32 would be placed below the MLWL. A final berm crest elevation of 6.75 feet (NAVD 88) is proposed. The access point for construction vehicles in North Wildwood would be at the lifeguard station at 15th Avenue. Vehicles would be parked at that parking lot overnight, and they would be serviced and fueled there.

There is no specific start date indicated for the proposed project, although it is anticipated that 6 weeks would be required to accomplish the work. Their goal is to complete the work by mid-May. The applicant seeks authorization to maintain the project by means of the indicated borrow, transport and fill activities for a period of 10 years.

The applicant has stated that they are not proposing any compensatory mitigation for the proposed work. It is their position that aquatic impacts would be minimal, with recycling of sand back to where it originated from previous beach nourishment.

The Federal Emergency Management Agency (FEMA), as a federal funding agency for the proposed work, is the lead federal agency for this project.

PURPOSE: The applicant's stated purpose is: a) to restore loss of sand from previous nourishment, specifically from Hurricane Irene as it impacted a 2009 beach fill of 1.4 million cubic yards dredged from Hereford Inlet and pumped onto the beach in North Wildwood; and b) to allow Wildwood Crest to reduce the excess sand accumulation problem on its beach.

A preliminary review of this application indicates that the proposed work is not likely to adversely affect the following federally listed (threatened) species, or their critical habitat pursuant to Section 7 of the Endangered Species Act as amended: the piping plover (Charadrius melodus) and seabeach amaranth (Amaranthus pumilius). As the evaluation of this application continues, additional information may become available which could modify this preliminary determination. Since FEMA is providing federal funding for this project, they are the lead federal agency responsible for compliance with Section 7 of the ESA. That agency has not provided the Corps of Engineers with their determination in this regard.

The decision whether to issue (or modify) a permit will be based on an evaluation of the activity's probable impact including its cumulative impacts on the public interest. The decision will reflect the national concern for both protection and utilization of important resources. The benefits which reasonably may be expected to accrue from the work must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the work will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs and welfare of the people. A Department of the Army permit (or modification) will be granted unless the District Engineer determines that it would be contrary to the public interest.

The Corps of Engineers is soliciting comments from the public; Federal, State, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

Comments on the proposed work should be submitted, in writing, within 15 days to the District Engineer, U.S. Army Corps of Engineers, Philadelphia District, Wanamaker Building, 100 Penn Square East, Philadelphia, Pennsylvania 19107-3390.

The permit area is likely to yield resources eligible for inclusion in the National Register of Historic Places. An investigation for the presence of potentially eligible historic properties may be required by the lead federal agency. FEMA, as the lead federal agency, is responsible for completion of the Section 106 process. The Corps of Engineers will consult with FEMA and other agencies regarding potential impacts to cultural resources within the permit area.

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act 1996 (Public Law 104-267), requires all Federal agencies to consult with the National Marine Fisheries Service on all actions, or proposed actions, permitted, funded, or undertaken by the agency that may adversely effect Essential Fish Habitat (EFH). A preliminary assessment of the species listed in the "Guide to Essential Fish Habitat Designations in the Northeastern United States, Volume IV: New Jersey and Delaware", dated March 1999, specifically pages 63 and 73, indicates that the proposed work would not have a substantial adverse effect on any managed species, including winter flounder eggs and larvae (Pseudoleuronectes americanus), since the proposed discharge (fill) area, as well as the proposed borrow area, are highly dynamic and subject to waves and sand movement. Adults and juveniles could move away from the construction equipment. FEMA is the lead federal agency for compliance with this act. That agency has not provided the Corps of Engineers with their determination in this regard.

In accordance with Section 307(c) of the Coastal Zone Management Act of 1972, applicants for Federal Licenses or Permits to conduct an activity affecting land or water uses in a State's coastal zone must provide certification that the activity complies with the State's Coastal Zone Management Program. The applicant has stated that the proposed activity complies with and will be conducted in a manner that is consistent with the approved State Coastal Zone Management (CZM) Program. No permit will be issued until the State has concurred with the applicant's certification or has waived its right to do so. Comments concerning the impact of the proposed and/or existing activity on the State's coastal zone should be sent to this office, with a copy to the State's Office of Coastal Zone Management.

In accordance with Section 401 of the Clean Water Act, a Water Quality Certificate is necessary from the State government in which the work is located. Any comments concerning the work described above which relate to Water Quality considerations should be sent to this office with a copy to the State.

The evaluation of the impact of the work described above on the public interest will include application of the guidelines promulgated by the Administrator, U.S. Environmental Protection Agency, under authority of Section 404(b) of the Clean Water Act.

Any person may request, in writing, to the District Engineer, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for a public hearing shall state in writing, with particularity, the reasons for holding a public hearing.

Additional information concerning this permit application may be obtained by calling James Boyer at (215) 656-5826, by electronic mail to James.N.Boyer@usace.army.mil, or by writing to this office at the above address.

Samuel L. Reynolds
Frank J. Cianfrani
Chief, Regulatory Branch

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

REPLY TO
ATTENTION OF

CECW-P

13 April 2012

MEMORANDUM FOR Director, National Planning Center of Expertise for Coastal Storm Damage Reduction (PCX-CSDR)

SUBJECT: Hereford Inlet to Cape May Inlet, New Jersey Feasibility Study; Approval of the Model Review Plan

1. The purpose of the Coastal Storm Damage Assessment Model (COSTDAM) is to quantify damages experienced as a result of costal storms within the Hereford Inlet to Cape May Inlet study area, including storm erosion, wave attack and innundation damages. COSTDAM is a FORTRAN legacy model that was originally developed by the Wilmington District of the Army Corps of Engineers and has had extensive application by the Philadelphia District. The program calculates the damages for each structure on a year by year basis for the life of the project, that are then used to determine without project damages and with-project damages reduced in order to help inform the identification and justification of the National Economic Development (NED) Plan.

2. The Hereford Inlet to Cape May Inlet, New Jersey model review plan is approved. The National Planning Center of Expertise for Coastal Storm Damage Reduction is to implement the review process as described in the plan and in EC 1105-2-412 and submit its recommendation to HQUSACE for coordination with the HQUSACE Model Certification Panel. Given that Beach-fx is the Nationally Certified Economic Model for Coastal and Storm Damage Projects, the PCX-CSDR's recommendation should include a comparison of the outputs of the COSTDAM with what could reasonably considered the results if the feasibility study had used Beach-fx.

APPLICABILITY: This model will be applicable for use on the Hereford Inlet to Cape May Inlet, New Jersey Feasibility Study.

Harry E. Kitch

HARRY E. KITCH, P.E.
Deputy Chief, Planning and Policy Division
Directorate of Civil Works

REMINGTON & VERNICK ENGINEERS AND AFFILIATES

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262 Chapman Road, Suite 105
Newark, DE 19702
(302) 266-0212
(302) 266-6208 (fax)

Remington, Vernick & Arango Engineers
The Presidential Center
Lincoln Building, Suite 600
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Cinnaminson, NJ 08077
(856) 303-1245
(856) 303-1249 (fax)

300 Penhorn Avenue, 3rd Floor
Secaucus, NJ 07094
(201) 624-2137
(201) 624-2136 (fax)

April 13, 2012

Mr. Brian P. Bogle, P.M.P.
Coastal Planning Section
USACE, Philadelphia District
100 Penn Square East
Philadelphia, PA 19107-3390

Re: City of Wildwood, Cape May County, NJ
Beach Programming and Public Access Improvements
Various Blocks & Lots
CAFRA Individual Permit Submittal
Our File: 05-14-T-200

Dear Mr. Bogle:

As a follow up to our March 19, 2012 meeting, please find enclosed the following for a CAFRA Permit for the above-referenced project:

1. One (1) complete copy of Beach Programming and Public Access Improvements Plans.

2. One (1) CD-ROM containing the electronic version of the plans.

If you have any questions or require further information, feel free to contact me at our Wildwood office at our Wildwood at 609-522-5150.

Very truly yours,

REMINGTON, VERNICK & WALBERG ENGINEERS

Marc DeBlasio

Marc DeBlasio, P.E., P.P., C.M.E.

MD:eb

Enclosure

cc: Mayor & Commissioners, City of Wildwood (via email)
Kim Schalek, Salmon Ventures Limited (via email)

S:\Wildwood\05-14-T-\0514T200 Wildwood Transition & Beach Individual Permit\CAFRA\0514T200 12April 13 Ltr. to ACOE.doc

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BRANDRETH

PASQUALE

MACINTOSH

Environmental Resources Branch

FEB 13 2013

Mr. J. Eric Davis, Supervisor
U.S. Fish and Wildlife Service
Pleasantville Field Office
927 North Main Street (Bldg. D1)
Pleasantville, New Jersey 08232

Dear Mr. Davis:

In accordance with the Fish and Wildlife Coordination Act (FWCA), enclosed is preliminary project information for your use in the preparation of a draft Section 2(b) report for the Hereford Inlet to Cape May Inlet Feasibility Study in Cape May County, New Jersey. The information provided includes details on the project area, problem identification and the proposed selected plan for this project. This is still a working document in draft form but we believe it provides the project details you will need in order to complete your draft Section 2(b) report.

This work was previously negotiated, agreed to and paid for under the enclosed SOW. Coordination with Ron Popowski of your staff has indicated that the existing SOW is still valid and no additional funding is required to complete the remaining tasks.

Please review the enclosed information and provide us with your draft Section 2(b) report for inclusion in our Draft Feasibility Report and Environmental Assessment. If you have any questions regarding the enclosed information or need additional details, please contact Ms. Beth Brandreth of the Environmental Resources Branch at (215) 656-6558.

Sincerely,

Charles MacIntosh
Acting Chief, Planning Division

Enclosures

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO ATTENTION OF

13-1482-1 JWR
HPO-H2013-034

CENAP-PL-E

JUL 0 2 2013

Daniel Saunders
Deputy State Historic Preservation Officer
Mail Code 501-04B
State of New Jersey
Department of Environmental Protection
Historic Preservation Office
PO Box 420
Trenton, NJ 08625-0420

RECEIVED

JUL 11 2013

HISTORIC PRESERVATION OFFICE

Dear Mr. Saunders,

The US Army Corps of Engineers, Philadelphia District (USACE) is currently preparing a draft Feasibility report and Environmental Assessment for a New Jersey Shore protection study between Hereford Inlet and Cape May Inlet, New Jersey. The *Herford Inlet to Cape May Feasibility Study* is being conducted to address hurricane and storm damage reduction capabilities and environmental restoration initiatives under the General Investigations Program utilizing the New Jersey Shore Protection Study authority.

The study area is a barrier island located in Cape May County, New Jersey. Municipalities on the island include: North Wildwood, Wildwood, Wildwood Crest, West Wildwood and Lower Township. A natural area managed by the US Fish and Wildlife Service and the US Coast Guard Electronics Center are located at the northern boundary of Cape May inlet, within Lower Township. In the early 20th century the study area was two separate island segments consisting of "Five Mile Beach and "Two mile Beach". These two island sections were bisected by Turtle Gut Inlet until the 1920s. At that time Turtle Gut Inlet was closed and a bulkhead was constructed by local interests at the entrance to what was then referred to as Sunset Bay in Wildwood Crest. A marker identifying the approximate location of Turtle Gut Inlet currently stands at Toledo Avenue in Wildwood Crest.

The study area is located between two existing Federal Shore protection projects; Townsend's Inlet to Cape May Inlet and Cape May Inlet to Lower Township. Both projects are in partnership with the State of New Jersey Shore Protection Authority.

The selected plan for this study consists of dune and berm construction using sand obtained from an onshore borrow source located at the southern end of the study area. The plan extends approximately 4.5 miles from Hereford Inlet to Cape May inlet and will encompass the towns of North Wildwood, Wildwood, Wildwood Crest and Diamond Beach. The southernmost beach section which contains the US Fish and Wildlife Property is not included in the plan.

Dimensions of the project area include a +16' NAVD 88 dune, with a 25' crest on a 75' berm that is + 6.5 feet NAVD 88 in elevation from North Wildwood to the northern tip of Wildwood. In Wildwood and Wildwood Crest the project will be a dune only plan with a dune elevation of +16' NAVD 88 on top of the existing berm. Side slopes for the dune will be 1V:5H. The plan includes approximately 64 acres of dune grass, 28,000 linear feet of sand fence, 44 extended crossovers, seven new pedestrian crossovers, seven extended handicap crossovers, six new handicap crossovers, eight existing vehicle crossover extension and five new vehicular crossovers. The sand will be pumped from the southern borrow area using mobile back-passing technology from the Wildwood and Wildwood Crest borrow source to the placement area. Proposed project plans are Enclosure 1.

The USACE has determined that the Area of Potential Effect (APE) for the selected plan includes the beaches and intertidal areas from Hereford Inlet to Cape May inlet, marking the northern and southern limits, and from the existing dunes to the intertidal area marking the eastern and western limits. The limits of construction disturbance for the selected plan are located within the APE (Enclosure 2).

Although there are several recorded historic properties eligible for or listed on the National Register of Historic Places (NRHP) within the vicinity of the APE for the selected plan, the USACE has determined that dune and berm construction along approximately 4.5 miles from Hereford Inlet to Cape May Inlet using recently accreted sand from the intertidal zone from the southern end of Five Mile Island will have *No Effect*.

A cultural resource assessment of the proposed intertidal sand source was conducted by FEMA as part of the Section 106 review for post-Hurricane Irene beach restoration of North Wildwood. An assessment of the beach in the adjacent communities of Wildwood Crest in the south to North Wildwood was conducted to determine the sensitivity of below ground archaeological resources. Several aspects were analyzed including the project's proximity to know archaeological resources, waterways and historic properties as well as the site's environmental characteristics such as spoil analysis and previous ground disturbing activities within the project APE, which is roughly the APE of the selected plan.

Remnants of the *Nancy*, a revolutionary war brig set afire by troops at Turtle Gut Inlet (Site 28CM0013) are located southwest of the APE and site 28CM0008 is currently underneath the existing Wildwood Boardwalk. There are no structures within the project APE; however the Chateau Blue Motes, the Hereford Inlet Lighthouse and the J. Thompson Baker House are all listed on the NRHP, but will not be affected. Also, the Wildwood Shore Resort Historic District runs parallel to the beach and is within the project viewshed but will also not be affected.

The APE is a previously disturbed, engineered beaches. The proposed project will collect, transport and place sand entirely within the previously disturbed areas. No part of the proposed undertaking is located within an archaeologically sensitive area, and no historic properties are within the APE.

We request your concurrence with our conclusion that no historic properties will be affected by the selected plan, pursuant to 36 CFR 800.3(a)(1). Thank you for your cooperation in this review process. If you have any questions concerning our review or if we can be of further assistance, please contact our Cultural Resource Specialist and Tribal Liaison via email at nicole.c.minnichbach@usace.army.mil, or phone (215) 656-6556, or fax (215) 656-6543.

Sincerely,

Peter R Blum

Peter R. Blum, P.E.
Chief, Planning Division

CONCUR

/km

8/6/2013

Daniel D. Saunders
DEPUTY STATE HISTORIC PRESERVATION OFFICER

DATE

3

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/383 3938
Fax: 609/646 0352
http://www.fws.gov/northeast/njfieldoffice/

LTC Chris Becking
District Engineer, Philadelphia District
U.S. Army Corps of Engineers
Wanamaker Building – 100 Penn Square East
Philadelphia, Pennsylvania 19107 - 3390
Attn: Beth Brandreth

AUG 15 2013

Dear LTC Becking:

Enclosed is a U.S. Fish and Wildlife Service (Service) draft report prepared pursuant to Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) on the U.S. Army Corps of Engineers, Philadelphia District (Corps) Hereford Inlet to Cape May Inlet Feasibility Study, Cape May County, New Jersey. The information presented in this draft FWCA Section 2 (b) report addresses potential beneficial or adverse impacts on fish and wildlife resources from proposed shore protection along the five-mile-long barrier island. This report has been prepared pursuant to the Scope-of-Work and Fiscal Year-2007 and 2008 interagency agreement between the Corps and the Service.

The following comments are provided pursuant to Section 2(b) of the FWCA. Comments are also provided under authority of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C 1531 *et seq.*), and the Migratory Bird Act Treaty of 1918 (40 Stat. 775, as amended; 16 U.S.C. 703-712), and are consistent with the intent of the Service's Mitigation Policy (Federal Register, Vol. 46, No. 15, Jan. 23, 1981).

FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

The federally listed (threatened) piping plover (*Charadrius melodus*) nests on the beaches of Hereford Inlet including (Stone Harbor Point and North Wildwood from Central Avenue to the intersection of John F. Kennedy Beach Drive and 2nd Avenue), on the U.S. Coast Guard's LORAN site, and on Cape May National Wildlife Refuge; and are known to forage along the beaches of Wildwood Crest and Lower Township. Piping plovers are not listed as "historical" within the project area as erroneously stated on page 2.3 of the Corps' draft feasibility report. On the Atlantic coastal beaches within the project area, piping plovers last nested in North Wildwood and Wildwood Crest in the 1990's, and the Service has no current or historical records of nesting in

Wildwood. Piping plovers nest on sandy beaches above high-tide line on mainland coastal beaches, sand flats, and barrier island coastal beaches. The nesting sites are typically located on gently sloping foredunes, blowout areas behind primary dunes, washover areas cut into or between dunes, ends of sandpits, and on sites with deposits of suitable dredged or pumped sand.

Coastal development for residential and commercial uses, and the subsequent stabilization of the once shifting and dynamic ecosystem, have resulted in the degradation and alteration of natural beaches to such an extent along the Atlantic coast that many beaches no longer provide suitable habitat for piping plovers. Disturbance by humans and the direct loss of nests have become major contributing factors to the population decline of the piping plover (U.S. Fish and Wildlife Service 1996a).

Dredged spoil deposition has the potential to create piping plover nesting habitat, although this is sub-optimal, provided the material is deposited prior to nesting (U.S. Fish and Wildlife Service 1996a). As a result, piping plovers could expand their nesting range within the project area after nourishment is completed. This occurred in 1997 as a result of Corps - New York District beach nourishment projects in Monmouth County, New Jersey (U.S. Fish and Wildlife Service 2002). Prior to initial beach nourishment in 1994, piping plovers were not documented in that project area for at least a decade.

The project may also create habitat for seabeach amaranth (*Amaranthus pumilus*), a federally listed (threatened) plant (U.S. Fish and Wildlife Service 1996b). Seabeach amaranth is an annual plant, endemic to Atlantic coastal plain beach, primarily occurring on overwash flats at the accreting ends of barrier beach islands and lower foredunes of non-eroding beaches. The species occasionally establishes small temporary populations in other areas, including bayside beaches, blowouts in foredunes, and sand and shell materials placed as beach replenishment or dredge spoil. Previous occurrences of seabeach amaranth are known within the proposed project area (*i.e.*, the U.S. Coast Guard's LORAN Unit in 2003-2004) and may become naturally reestablished within the project area during the project life. Colonization of seabeach amaranth in New Jersey occurred in July 2000 after a Corps - New York District beach nourishment project in Monmouth County, (U.S. Fish and Wildlife Service 2002). Prior to the 2000 rediscovery, this species had last been documented in New Jersey in 1913 (U.S. Fish and Wildlife Service 1996b).

Other than the piping plover and seabeach amaranth, the federally and State-listed roseate tern (*Sterna dougallii*) (occasional transient) and State-listed peregrine falcon (*Falco peregrinus*) are known to use the project area. In addition, red knots (*Calidris canutus rufa*), a Federal candidate species, are known to stopover in the project area during spring (northward) and fall (southward) migration where they feed mainly on the spat of mussels and other invertebrates to build fat reserves to complete their migration.

The National Marine Fisheries Service (NMFS) must be consulted regarding Essential Fish Habitat, as required under Section 305 (b)(2) of the Magnuson – Stevens Fishery Conservation and Management Act (16 U.S.C. 1801-1882). The NMFS must also be consulted regarding the ESA due to the potential presence of the federally listed (endangered) kemps ridley sea turtle (*Lepidochelys kempii*), hawksbill sea turtle (*Eretmochelys imbricata*) and leatherback sea turtle (*Dermochelys coriacea*), and the federally listed (threatened) loggerhead sea turtle (*Caretta*

caretta) and green sea turtle (*Chelonia mydas*) within the project area and any borrow areas. Appendix A provides a current list of federally listed (endangered and threatened) and candidate species in New Jersey.

The Service appreciates the opportunity to comment on the proposed plan and is pleased to submit this draft FWCA Section 2(b) report as technical input to the *Hereford Inlet to Cape May Inlet Feasibility Study*. Should you have any questions, please contact Ron Popowski at Ron_Popowski@fws.gov.

Sincerely,

Eric Schrading
Acting Field Supervisor

Enclosure
CC: Ralph Tiner, RO
Karen Green, NMFS
Todd Pover, NJCWF
Dave Jenkins, ENSP
Bill Dixon, NJDEP Bureau of Coastal Engineering

LITERATURE CITED

U.S. Fish and Wildlife Service. 1996a. Piping plover (*Charadrius melodus*), Atlantic Coast population, revised recovery plan. U.S. Department of the Interior, Fish and Wildlife Service, Region 5, Hadley, MA. 245 pp.

______. 1996b. Recovery plan for seabeach amaranth (*Amaranthus pumilus*) Rafinesque. U.S. Department of the Interior, Fish and Wildlife Service, Region 4, Atlanta, GA. 70 pp.

______. 2002. Biological opinion on the effects of completion of sections I and II of the Atlantic Coast of New Jersey beach erosion control project Sea Bright to Manasquan, Monmouth County, New Jersey on the piping plover (*Charadrius melodus*) and seabeach amaranth (*Amaranthus pumilus*). U.S. Department of the Interior, Fish and Wildlife Service, Region 5, New Jersey Field Office, Pleasantville, NJ. 124 pp.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS, NORTH ATLANTIC DIVISION
FORT HAMILTON MILITARY COMMUNITY
302 GENERAL LEE AVENUE
BROOKLYN NY 11252-6700

CEPCX-CSRM

15 May 2014

MEMORANDUM FOR Commander, HQUSACE, US Army Corps of Engineers, (CECW-NAD-RIT/Laura Cameron) 441 G Street, N.W. Washington, D.C. 20314-1000

SUBJECT: Request for Model Approval for Hereford Inlet to Cape May, NJ Feasibility Study

1. Reference is made to:
   a. EC 1105-2-412 Assuring Quality of Planning Models, dated 31 March 2011.
   b. EC 1165-2-214 Civil Works Review dated 15 December 2012.
   c. CECW-P memorandum dated 13 April 2012, Subject: Hereford Inlet to Cape May Inlet, New Jersey Feasibility study, Approval of Model Review Plan.
   d. CEPCX-CSDR memorandum dated 13 March 2012, Subject: Model Review Plan for the Hereford Inlet to Cape May Inlet, NJ Feasibility Study

2. The National Planning Center of Expertise for Coastal Storm Risk Management (PCX-CSRM) previously prepared a model review plan (MRP, reference 1d) for the Hereford Inlet to Cape May, NJ study for Philadelphia District (NAP), which was approved as in reference 1c. The MRP detailed the review of the application of the Coastal Storm Damage Assessment Model (COSTDAM and S-BEACH) and applied to the Hereford Inlet to Cape May Inlet, NJ Feasibility Study.

3. The basis of PCX-CSRM proceeding with the review of the model was due to the fact that outputs of the model would seem to be reasonable based upon its previous application to studies of adjacent areas in the State of New Jersey which were constructed and performed as designed.

4. The purpose of this model is to quantify the damages experienced as a result of coastal storms within the Hereford Inlet to Cape May Inlet study area. This is accomplished through detailed surveying of the study area's housing inventory and coastline and subjecting those parameters to a suite of coastal storms with varying wave heights, durations etc.., and measuring the damage in relation to the position, elevation and construction type from the housing inventory. Variation of the model parameters was accomplished through a risk and uncertainty component of the existing COSTDAM and S-BEACH model linkage. The benefits and costs of alternatives formulated to reduce coastal storm damages in the communities of North Wildwood, Wildwood, Wildwood Crest and Diamond Beach, NJ were documented during the study with ranges of potential Average Annual Damages (AAD) and Average Annual Benefits (AAB) rather than point values.

5. NAP was instructed to determine a way to incorporate Risk and Uncertainty into the COSTDAM model which is linked to the engineering model SBEACH. Both models are described in the MRP. NAP proposed varying the model in order to incorporate Risk and Uncertainty which was addressed in the MRP. Use of the COSTDAM and SBEACH linkage is referred to as "the model." It is being considered for approval for use solely on the Hereford Inlet to Cape May Inlet, NJ Feasibility Study. The model proponent is NAP.

6. COSTDAM was developed by CESAW and applied to many studies over the years which were constructed . A guide for using COSTDAM was included on the MRP. S-BEACH is a geomorphic-based two-dimensional engineering model that simulates beach profile change, including the formulation and movement of major morphologic features such as longshore bars, troughs and berms, under varying storm waves and water levels. S-BEACH was developed by the U.S. Army Corps of Engineers Engineering Research and Development Center (ERDC). It has also been applied to many studies over the years which were constructed. A user's manual for S-BEACH is readily available from ERDC. S-BEACH is an approved engineering model. The application of "the model" to the Hereford Inlet to Cape May, NJ Feasibility study has been reviewed by PCX-CSRM and its application to the study as documented in the feasibility report has undergone additional reviews by Agency Technical Review (ATR), an IEPR panel, as well as HQUSACE.

7. Enclosure 1 contains model review comments from team members of PCX-CSRM and the responses by NAP. The model review also included the risk and uncertainty analysis. Two model reviews had been conducted, with the first, early-on before the model was applied. The first review was conducted by a team from SAJ concluding in February 2011. The second was conducted following approval of the MRP by CECW-P. This review was conducted by Mr. Jeffery Strahan, then an economist from NAO. The second review was concluded in August 2011. All DrChecks comments have been closed out. No opposition to the model resulted from the model review. The final Risk and Uncertainty Analysis is provided as Enclosure 2.

8. The model approval memo also included a requirement in paragraph 2 that "a comparison of the outputs of the COSTDAM with what could reasonably considered the results if the feasibility study had used Beach-fx". A paper on this directive was prepared by NAP and is included as Enclosure 3. Note that the MRP had presented a preliminary comparison of COSTDAM to Beach-fx.

9. The ATR of the Draft and Final Feasibility Reports has been completed in accord with reference 1b, with the most recent review having concluded in May 2014. The ATR team included SAJ members from the model review ATR. No opposition to the

application of the model to the Hereford Inlet to Cape May, NJ study resulted from the ATR.

10. A Type I IEPR of the Hereford Inlet to Cape May, NJ study was completed by the Battelle Organization with the final report dated 2 December 2013. No comment on objection to the model was received.

11. Therefore, PCX-CSRM is recommending approval of the application of the model to the Hereford Inlet to Cape May, NJ study, based upon reviews completed to date. As this is a Hurricane Sandy-affected study tracking for a Civil Works Review Board in the third quarter of FY14, we are requesting an expedited processing of this request.

12. For further information, please contact me at 917-613-3873, or Mr. Larry Cocchieri, PCX-CSRM Deputy at (347)370-4571.

JOSEPH R. VIETRI
Director, National Planning Center of
Expertise for Coastal Storm Risk
Management

Encl

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

REPLY TO
ATTENTION OF

CECW-P 27 May 2014

MEMORANDUM FOR Director, National Planning Center of Expertise for Coastal Storm Damage Reduction

SUBJECT: Hereford Inlet to Cape May, New Jersey, COSTDAM Model Approval

1. The purpose of the Coastal Storm Damage Assessment Model (COSTDAM) is to quantify damages experienced as a result of costal storms within the Hereford Inlet to Cape May Inlet study area, including storm erosion, wave attack and innundation damages. COSTDAM is a FORTRAN legacy model that was originally developed by the Wilmington District of the Army Corps of Engineers and has had extensive application by the Philadelphia District. The program calculates the damages for each structure on a year by year basis for the life of the project, that are then used to determine without project damages and with-project damages reduced in order to help inform the identification and justification of the National Economic Development (NED) Plan.

2. The use of the COSTDAM model for the Hereford Inlet to Cape May, New Jersey analysis is approved for a single use rather than certified. This approval comes after the feasibility analysis is complete but prior to the Civil Works Review Board. The model review plan was approved in April of 2012 and was on track for approval of the model when Hurricane Sandy impacted the area. This resulted in delays to the study that impacted the submission of the model approval request. The district has implemented the review plan as directed. These reviews have show that the model meets the certification criteria contained in EC 1105-2-412. This approval is based on the decision of the HQUSACE Model Certification Panel which considered the National Planning Center of Expertise for Coastal Storm Damage Reduction assessment of the model. There are no unresolved issues at this time.

APPLICABILITY: This model approval for use is limited to the subject feasibility study.

HARRY E. KITCH, P.E.
Deputy Chief, Planning and Policy Division
Directorate of Civil Works

Section –2 Comments and Responses

TOWNSHIP OF LOWER

2600 Bayshore Road
Villas, New Jersey 08251

Incorporated 1798

(609) 886-2005

MEMORANDUM

TO: William Dixon, Supervising Environmental Specialist &
Christopher Constantino, Environmental Services Specialist

FROM: William Galestok, PP, AICP
Director of Planning

DATE: January 27, 2014

RE: Herford Inlet to Cape May Inlet
Draft Feasibility Study ACOE

Lower Township has the following comments/concerns in regard to the above referenced report:

1. As the MHWL is to be moved landward, the Public Trust Doctrine Rights of the general public are affected. Conflicts between landowners and the general public may result.

2. Considering the overall "sediment budget", will any beach losses, in excess of the newly established MHWL occur. What is the time frame for the new equilibrium to be established in the system.

3. What will be Lower Township's share of the total cost of the project and how will it be calculated?

4. Will ACOE or New Jersey State DEP be notifying individual homeowners along the ocean front?

5. What is the date of the scheduled <u>Public Hearing</u>; and how will the public receive notification?

WJG:las

cc: Mike Beck, Twp. Mayor
Mike Voll, Twp. Manager
Ron Gelzunas, Twp. Solicitor
George Curvan, Twp. Engineer.
Jay Dilworth, Planning Board Chairman
Beth Brandreth, project biologist

Letter from Lower Township, dated 27 January 2014.

1. We are still working out these details with the non-Federal sponsor and the District Real Estate Division, but landward movement of the MHW line may impact private property owners if the MHW intersects their private property line. Public Trust rights are critical to the State of New Jersey and public access to the MHW is required for participation in federally funded beach nourishment project.

2. The amount of material to be excavated from Lower Township is low compared to other portions of the project in Wildwood Crest and Wildwood. We anticipate a short term landward migration of the shoreline after excavation, and infilling of the excavated area in between the 4 year nourishment cycles.

3. Traditionally, the share of the local costs will be based on; the volume of material placed in each municipality, the number of crossovers, the number of handicapped access ramps and vehicular crossovers. For the New Jersey shore protection program the costs are split between the federal government and the state government 65% Federal and 35% State for the initial construction and 50% for each periodic nourishment cycle. The local municipality usually pays for 25% of the State's portion for each nourishment cycle and the initial construction.

4. The homeowners along the oceanfront were notified by Lower Township prior to the Public Hearing.

5. The Public Hearing was held in North Wildwood on February 21, 2014.

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF PERMIT COORDINATION AND ENVIRONMENTAL REVIEW
P.O. Box 420 Mail Code 401-07J Trenton, New Jersey 08625-0420
Telephone Number (609) 292-3600
FAX NUMBER (609) 633-2102

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

January 30, 2014

Mr. Peter R. Blum
Chief, Planning Division
Philadelphia District, Corps of Engineers
Wanamaker Building, 100 Penn Square East
Philadelphia, PA 19107-3390

RE: **Hereford to Cape May Inlet Coastal Storm Damage Reduction Project**
North Wildwood, Wildwood, Wildwood Crest, and Lower Township, Cape May County

Comments on Draft Environmental Assessment

Dear Mr. Blum:

The New Jersey Department of Environmental Protection's (NJDEP) Office of Permit Coordination and Environmental Review (PCER) distributed, for review and comment, the Draft Environmental Assessment (EA) for the proposed **Hereford Inlet to Cape May Inlet** Coastal Storm Damage Reduction Project. We received this EA, prepared by the Army Corp of Engineers (ACOE) on December 30, 2013. Based on the information received, we offer the following comments for your consideration.

Cultural Resources

HPO-A2014-170
HPO Project #14-1189-2

1. Thank you for providing the Historic Preservation Office (HPO) with the opportunity to review and comment on the potential for the above-referenced project to affect historic and archaeological resources. The HPO has previously had the opportunity to comment on the proposed undertaking through consultation with the United States Department of the Army, Corps of Engineers (Corps) under their obligations pursuant to Section 106 of the National Historic Preservation Act, as amended. In a response dated January 15, 2014 (14-1078-1/A2014-168), the HPO concurred with the Corps determination that, as proposed, the undertaking will have no effect on historic properties within the project's area of potential effects. As a result, no further cultural resource consideration is necessary prior to permit issuance. However, if project plans change or additional resources are discovered during project implementation, pursuant to 800.13 of the National Historic Preservation Act, further review by the Historic Preservation Office will be necessary.

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If additional consultation with the HPO is needed for this undertaking, please reference the HPO project number 14-1189 in any future calls, emails, submissions or written correspondence to help expedite your review and response. If you have any questions, please feel free to contact Jesse West-Rosenthal at (609) 984-0176.

Natural Resources

Endangered and Non-game Species Program:

1. Work should take place outside the nesting area of endangered and non-game species of birds including the piping plover. If work must continue into the nesting season, a biological monitor will be required (under protocol established by USFWS and ENSP). ENSP already monitors this area as part of our regular responsibilities, so an additional monitor might only be needed if nesting activity is detected by ENSP. USFWS may prefer a separate monitor for ANY work done inside the nesting season, beach nesting bird activity or not. Our recommendation, though, is that ENSP handle initial surveys and if activity detected, the USACE/contractor would hire a monitor and coordinate closely with USFWS and ENSP to ensure adequate protective measures are taken for piping plover, least tern and/or black skimmer.

2. To ENSP knowledge, Wildwood and Wildwood Crest do not currently have beach management plans, which are a requirement for projects of this nature. Each town will need to coordinate with ENSP and USFWS to develop and implement a Beach MP.

3. The project notes that it will taper 200' into Hereford Inlet area (where there is current beach nesting bird activity). If there are any plans for snow fence, dune planting or dunes to come into that area, the USACE/contractor must coordinate with ENSP and USFWS to determine the appropriate methods to ensure beach nesting bird habitat is not impacted/impacts are reduced.

4. Section 2.4.12 of the EA discusses potential offshore borrow areas. It is ENSP understanding that this project does not require *any* offshore borrowing areas and is just a back-pass. This section does discuss the possibility of borrowing for a nourishment in North Wildwood "in the near future" and that the borrow area might be the one in Hereford Inlet (pg 102). ENSP would like to be 100% sure that the currently proposed project does not involve borrowing from this site. It seems this EA has been in progress for awhile, so ENSP thinks there is a chance that the fill they are referencing actually already happened, but in any case, ENSP wants to be clear that the comments above are intended to reflect a project that is back-pass in the areas they denote and does not include any borrowing from offshore. If any offshore borrowing is considered, DFW needs to know so that we can address that.

Shellfisheries:
The Bureau is glad to see an alternative method to using offshore borrow areas that adversely affect prime shellfish and marine fish habitat. Shellfisheries doesn't believe that there will be significant impacts to shellfish (surf clams) or to marine fish from the proposed technique, but does not rule out potential impacts to these intertidal/sub-tidal areas that will be used as a sand source.

If you have any additional questions, please contact Kelly Davis at (908) 236-2118.

Bureau of Air Quality Planning (BAQP)

The Bureau of Air Quality Planning (BAQP) has reviewed the Draft Feasibility Report and Integrated Environmental Assessment for the Hereford Inlet to Cape May Inlet and has the following comments:

1) Appendix C – Clean Air Act Calculations
General Conformity Review and Emission Inventory Hereford Inlet to Cape May Inlet Feasibility Study – Table 2 Emission Estimates, this table indicates that NOx emissions are 191.1 tons.

Comment # 1
Please report air emissions on a calendar year basis in accordance with the requirements of the Federal General Conformity regulation (40 CFR Part 90, (Subpart B)).

Comment #2
The BAQP contacted the Army Corps on 1-16-14 regarding an inconsistency in the horsepower hours for the project. Table 1: Project Emission Sources and Estimated Power provides horsepower hours for each piece of equipment and provides the total horsepower hours for the project. The Herford to Cape May Feasibility Study Project Worksheet provides horsepower hours for each piece of equipment and the total horsepower hours for the project, but it is not consistent with the horsepower hours in Table 1. The Army Corps indicated that the horsepower hours in Table 1 are accurate and that the horsepower hours in the Herford to Cape May Feasibility Study Project Worksheet didn't account for the load factors. The Army Corps indicated that this inconsistency would be addressed in the Final Environmental Assessment

If you have additional air quality planning questions, please contact Angela Skowronek at (609) 984-0337

Land Use

1. The NJDEP Division of Land Use Regulation is currently reviewing a Federal Consistency Determination and expects to complete their review within 60 days of receipt of the application and by approximately February 24, 2014. This determination will include comments from the US Fish and Wildlife Service representatives Todd Pover (609-628-0401) and Carlo Popolizio (609-646-9310). For additional information, please contact Gail Moore at (609) 633-9310.

Thank you for giving the New Jersey Department of Environmental Protection the opportunity to comment on the Draft Environmental Assessment for the proposed **Hereford Inlet to Cape May Inlet** Coastal Storm Damage Reduction Project.

Sincerely,

Ruth Foster, PhD., Section Chief
Office of Permit Coordination
and Environmental Review

C: John Gray, NJDEP-PCER
Jesse West-Rosenthal, NJDEP- HPO
Kelly Davis, NJDEP – DFW
Angela Skowronek, NJDEP – BAQP
Pete DeMeo, NJDEP – Land Use
Gail Moore, NJDEP - Land Use
Dave Rosenblatt, Bureau of Coastal Engineering

Letter from NJDEP-Office of Permit Coordination and Environmental Review dated 30 January 2014.

Cultural Resources

1. The District gave the Historic Preservation Office the opportunity to comment on the draft report and they concurred with the findings that this project would have no effect on historic properties within the projects Area of Potential Effect (APE).

Natural Resources

1. All construction activities are expected to take place outside of the nesting area of any endangered and non-game species of birds including the piping plover. The project does include small taper sections into the Hereford Inlet area and to the border of the USFWS Refuge at Cape May Inlet. Any activities that take place during the nesting season, that has the potential to impact nesting birds or their habitat, will be coordinated under the protocols established by the Endangered and Non-game Species Program (ENSP) and the United States Fish and Wildlife Service (USFWS).
2. All towns that are participating in a federally funded beach nourishment project will be required to have beach management plans, including Wildwood, Wildwood Crest, and Lower Township. North Wildwood currently has a beach management plan.
3. Taper sections will be coordinated with ENSP and USFWS to avoid impacts from dune placement, grass planting and sand fencing.
4. There are no offshore borrow sites proposed for this project as it is currently planned. No offshore borrow areas were considered past the initial stages of plan formulation and the selected plan does not contain an offshore borrow area. The inlet borrow areas were considered at the beginning of the study, but not considered as part of the selected plan. Full coordination will take place with ENSP if offshore sources need to be considered for future re-nourishment cycles. The selected plan contains no offshore sources and all of the material for the dunes and berm will be obtained from the beaches in Wildwood, Wildwood Crest and Lower Township.
5. Concur.

Bureau of Air Quality Planning

1. This number was an error and has been corrected. Based on additional information, the NOx emissions have been revised in the final report and are 86 tons, which is below the critical threshold for the Clean Air Act.

Comment #1. Emissions are reported on a calendar year basis in the final report.

Comment #2. The worksheet has been corrected and load factors were included in the final report's Clean Air Act section.

Land Use

1. The NJDEP requested an extension of the review timeframe. The review timeframe was extended to March 10, 2014.

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

DEC 2 0 2013

REPLY TO
ATTENTION OF

Environmental Resources Branch

Daniel Saunders, Deputy State Historic Preservation Officer
Mail Code 501-04B
State of New Jersey
Department of Environmental Protection
Historic Preservation Office
PO Box 420
Trenton, NJ 08625-0420

14-1189-1 JWR
HPO-A2014-168

Dear Mr. Saunders:

The US Army Corps of Engineers, Philadelphia District (USACE) in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, are requesting your review and comment on the Hereford Inlet to Cape May Inlet Draft Feasibility Report and Integrated Environmental Assessment (EA). The report addresses hurricane and storm damage reduction alternatives for the coastal communities located between Hereford Inlet and Cape May Inlet, Cape May County, New Jersey. The feasibility study is being cost-shared equally by the Federal government and the New Jersey Department of Environmental Protection (NJDEP), the non-Federal sponsor.

The proposed project site is located along the Atlantic Coast shoreline of New Jersey from Hereford Inlet to Cape May Inlet and includes the communities of North Wildwood, Wildwood, Wildwood Crest and a portion of Lower Township. Dune placement activity will take place from 2nd Avenue and John F. Kennedy Boulevard in North Wildwood to the southern border of Lower Township at Raleigh Avenue. The project's northern terminus at 2nd and JFK will have a small tapered berm section that will extend approximately 200 feet northwestward into the Hereford Inlet area. There is no tapered section into the U.S. Fish and Wildlife Service property at the southern border below Lower Township.

The recommended plan in the feasibility report was determined to be berm and dune restoration utilizing sand hydraulically back-passed from the beaches of Wildwood, Wildwood Crest and Lower Township. This plan was developed after evaluating structural and non-structural alternatives to protect property within the study area. The beaches in these areas have historically accreted large quantities of sand, and sand can be dredged from the beach in Wildwood, Wildwood Crest and Lower Township to provide beach nourishment material to reduce storm damage to the entire island in the form of a storm protective berm and dune.

Specifically, the plan includes a dune with a crest elevation of +16ft NAVD 88, fronted by a 75-ft wide berm at elevation +6.5-ft NAVD 88 in North Wildwood. Wildwood, Wildwood Crest and Lower Township will receive a dune only plan at an elevation +16 ft NAVD 88. The design template for both dune configurations includes a 25-ft dune crest width, 1V:5H dune side slopes. The design template extends seaward from the berm crest down to mean low water (MLW) at a slope of 1V:30H, and extends further down to a closure depth of -26 ft following the average existing beach profile shape. The initial sand quantity is approximately 1.3 million cubic yards, which includes overfill factors and advanced nourishment. Periodic nourishment of approximately 305,000 cubic yards is scheduled to occur every 4 years for the fifty year length of the project.

Information on this project was previously sent to your office July 2, 2013.
Your office concurred with our *No Effect* determination on August 6, 2013. There
have been no significant changes to the project since your previous review. Thank
1. you for your cooperation in this review process. Please provide any additional
comments you may have on the project by February 6, 2014. If you have any
questions concerning our review or if we can be of further assistance, please contact
Nicole Cooper Minnichbach via email at nicole.c.minnichbach@usace.army.mil, or
phone (215) 656-6556, or fax (215) 656-6543.

Sincerely,

For

Peter R. Blum, P.E
Chief, Planning Division

CONCUR

1/15/14
DATE

Daniel D. Saunders
DEPUTY STATE HISTORIC PRESERVATION OFFICER

Concurrence Letter from the State Historic Preservation office on the No Effect Determination dated 15 January 2014.

1. No response required.

CITY OF NORTH WILDWOOD

Cape May County, New Jersey

RESOLUTION

ENDORSING RESPONSE BY THE CITY OF NORTH WILDWOOD TO THE DRAFT FEASIBILITY REPORT FOR HEREFORD INLET TO CAPE MAY INLET PREPARED BY THE UNITED STATES ARMY CORPS OF ENGINEERS, PHILADELPHIA DISTRICT, 2013

WHEREAS, in the later part of 2013, the United States Army Corps of Engineers, Philadelphia District, released its "Draft Feasibility Report and Integrated Environmental Assessment" (the "Study") for the New Jersey Coastal Reach between Hereford Inlet and Cape May Inlet as part of its long-term coastal protection initiative; and

WHEREAS, a request was made by the Army Corps of Engineers to the impacted communities to prepare a response to the Study on or before February 6, 2014; and

WHEREAS, North Wildwood officials have reviewed the Study on an in-house basis and in a pair of meeting with officials from the City of Wildwood, the Borough of Wildwood Crest and the Township of Lower; and

WHEREAS, as a result of those review meetings, the Mayor, in consultation with the City's Engineering professionals and in consultation with the City's retained professionals from the Coastal Research Center of The Richard Stockton College of New Jersey, has prepared North Wildwood's draft response to the Study, a copy of which is annexed hereto as Exhibit "A;" and

WHEREAS, Council has reviewed the Mayor's draft response and finds that it accurately states North Wildwood's position relative to the Study and, therefore, endorses it and finds further that it should be finalized and forwarded to the Army Corps of Engineers.

NOW, THEREFORE, BE IT RESOLVED, by the Members of Council of the City of North Wildwood, in the County of Cape May and State of New Jersey, as follows:

1) All of the statements of the preamble are incorporated herein by this reference thereto as though the same were set forth at length.

2) The Mayor be, and he hereby is, authorized to finalize the draft response by the City of North Wildwood to the Draft Feasibility Report and Integrated Environment Assessment for Hereford Inlet to Cape May Inlet by the United States Army Corps of Engineers, Philadelphia District, 2013, annexed as Exhibit "A" and to forward same to the Army Corps of Engineers, Philadelphia District, with copies to the Mayor and governing bodies of the City of Wildwood, the Borough of Wildwood Crest and the Township of Lower.

OFFERED BY: RULLO SECONDED BY: BISHOP

****

I, W. Scott Jett, City Clerk of the City of North Wildwood, in the County of Cape May, State of New Jersey, do hereby certify that the foregoing is a correct and true copy of a Resolution adopted by the Mayor and Council of the City of North Wildwood at a meeting duly held on the 4th day of February, 2014.

Dated: February 4, 2014

Signed: W. Scott Jett, City Clerk

APPROVED: Patrick T. Rosenello, Mayor

	Aye	Naye	Abstain	Absent		Aye	Naye	Abstain	Absent
Tolomeo	X				Koehler				X
Rullo	X				Bishop	X			
Kane	X				Zampirri	X			
Del Conte	X								

59-14

CITY OF NORTH WILDWOOD
901 Atlantic Avenue
North Wildwood, NJ 08260-5778
(609) 522-2030

Patrick T. Rosenello
Mayor

Kevin Yecco
City Administrator

RESPONSE by the CITY OF NORTH WILDWOOD, CAPE MAY COUNTY, NJ
To the
DRAFT FEASIBILITY REPORT for HEREFORD INLET TO CAPE MAY INLET, NJ
By the
US ARMY CORPS OF ENGINEERS, PHILADELPHIA DISTRICT, 2013

Introduction:

As part of the long term national coastal protection initiative by the US Army Corps of Engineers (ACOE), the Philadelphia District released its "Draft Feasibility Report and Integrated Environmental Assessment" for the NJ coastal reach between Hereford and Cape May Inlets in Cape May County, NJ in late 2013. A request was made to the impacted communities to prepare a response on or before February 6, 2014 to this study. The City of North Wildwood has prepared its response individually following several in-house municipal meetings and a pair of joint meetings with the other three municipal entities located on the barrier island positioned between the two inlets mentioned above.

This project was authorized by the US Congress in 1987, and undertaken following the execution of a 50-50 cost sharing agreement between the ACOE and the State of New Jersey in September 2002. The completed document spells out a multitude of potential impacts and presents solutions to a pair of significant problems unique to this particular barrier island. The ACOE notes that this is the only NJ barrier shoreline with both an erosion and an excess sand accumulation problem. An unusual set of coastal processes combined with the timing of development have generated a wide area where the sand supply is far greater than needed for either recreation or storm protection.

Shore Protection Problems in North Wildwood:

Inlet changes beginning in the late 1990's at Hereford Inlet have generated a sand deficiency for the northern 8-10 blocks of the City of North Wildwood's oceanfront, while allowing large volumes of sand to move south along the shoreline increasing the beach width south of 18th Avenue in North Wildwood, south into Lower Township. Between 1993 and 2004 the North Wildwood beach at 15th Avenue lost 579 cubic yards of sand for each foot of shoreline (CRC 25-year report to NJDEP). The shoreline's zero elevation position retreated 829 feet removing 80% of the beach width. This sand moved into Hereford Inlet creating a significant inlet beach where there had been no sand at the rocks for many years. This was about half the lost volume, with the remainder moving south into Wildwood where the Cresse Avenue cross section's shoreline advanced 411 feet seaward with a 190 cubic yard per foot sand volume increase. Since Cresse Avenue is the boundary between Wildwood and Wildwood Crest, this represents a vast amount of material moved south in 11 years.

As a result of the cumulative changes impacting the City, a large scale plan was executed in 2009 placing 1.45 million cubic yards of sand along the North Wildwood shoreline as a joint NJ State and locally funded project. Storm damage in 2009 and 2010 was restored using FEMA funding as reimbursement to the City for 464,000 cubic yards in 2011. Hurricane Irene was followed a year later by Hurricane Sandy. The Irene losses were satisfied by hauling 94,000 cubic yards of sand from the Borough of Wildwood Crest, north to the zone of erosion using large-capacity trucks. Following Sandy, the City cooperated with restoration work proceeding on the Stone Harbor shoreline using sand derived from the designated borrow area within the ebb-tidal shoals of Hereford Inlet. This amounted to 155,000 cubic yards of new sand.

Sand Backpassing in 2012:

The City of North Wildwood succeeded in modifying NJ State and Federal ACOE dredging permits issued in 2009 to allow an alternative sand source (the Wildwood Crest berm) and an alternative means of delivering the material to the zone of worst erosion (trucks hauling to between 2nd and 8th Avenues). The Borough of Wildwood Crest already had obtained permits to move sand accumulating excessively on its shoreline landward to enhance the dunes and fill the back beach zone subject to fresh and salt water ponding during rains or spring tides. The berm crest was the alignment for the excavation of up to 2.0 feet of material decreasing both seaward and landward to zero depth, but extending the length of the Borough shoreline. An agreement was reached with the City of Wildwood to allow the large-capacity trucks to haul the sand north along the high tide wet-dry line present each day on the beach.

This methodology was successfully completed between April and mid-May of 2012 where 13 vehicles working one shift, 5 days per week hauled 3,879 loads totaling 94,362 cubic yards placed between 2nd and 7th Avenue and spread to form a new berm with dune restoration north of 3rd Avenue. The entire methodology was prepared following a 2006 pilot study in the Borough of Avalon where sand was harvested from the berm crest in a zone of accumulation and truck hauled to the north end of the island where erosion was a continuing problem. This pilot study was repeated in Avalon under ACOE management in 2012.

Review by the City of North Wildwood on the Proposals within the 2013 Draft Feasibility Study:

First and foremost, the City of North Wildwood endorses the ACOE proposal to undertake a 50-year responsibility to maintain a substantial level of shore protection for the municipality and its citizens. The continued success of this coastal resort town depends on a stable, sand beach and dune system for its very existence and financial viability. The City also endorses the utilization of sand harvesting from the southern segment of the barrier island to either augment the project's goals or be the sole source for sand supplies for the North Wildwood beaches going forward.

The specific points are:

1. The use of "Back Passing" from more southerly beaches to supply sand to zones of erosion in North Wildwood is endorsed unequivocally.
2. The design berm width and elevation are completely acceptable, with the caveat that the ACOE recognize that due to work between 2009 and 2012, the beach width south of 10th Avenue may already be at the ACOE design template limits (except for berm elevation, 6.75 feet).
3. The 2009 project dune elevation was established at 14.75 feet NAVD88 and has been maintained except for where the dune was built seaward of the three piers found in the southern City shoreline. The City also concurs with the ACOE plans to have the dune pass under the two northern piers and marry to a steel bulkhead protecting the Morey's Pier structure at the very south end of the City beach.
4. Raising the dune elevation to 16.0 feet is an option if the ACOE has documented model evidence that raising the entire dune by 1.25 feet is worth the cost and effort for a significant increase in protection. Hurricane Sandy did not breach the dunes between 3rd Avenue and 21st Avenue and only broke through dune south of 21st Avenue because they were placed too far seaward and in harms way (NJDEP permit condition required at the time). Dune loss in the single city block north of 3rd Avenue was due to the complete loss of the berm elevation during the 2009 and 2010 northeast storms. Subsequent replacement proved futile.
5. The City would like a degree of focus on this rapid decrease in shoreline width seen presently north of 3rd Avenue and Hereford Inlet. The 2nd Avenue rock jetty is very short and cannot maintain any beach width on either side of the structure. The 2009 project completely buried the jetty, but inlet tidal

currents and waves quickly stripped sand away. Part of the problem is that the inlet side of the shoreline is utilized by endangered species nesting (piping plovers) so augmentation of the inlet beach would be restricted to the eastern 500-600 feet near the jetty.

6. Public access and emergency vehicle access is already established and needs to be maintained, especially if the dune elevation is increased to 16.0 feet.

Conclusion:

The 2013 Hereford Inlet to Cape May Inlet draft feasibility study presented by the ACOE has a series of solutions proposed that utilize and exploit the unique nature of the Wildwoods barrier island's coastal geomorphology. Recycling a vast sand supply makes economic and practical good sense because repetitively extracting sand from Hereford Inlet ebb-tidal shoals destined for erosion issues in North Wildwood will inevitably acerbate the excess accumulation of sand in Wildwood, Wildwood Crest and Lower Township shoreline segments. North Wildwood endorses this project and will work to assist the ACOE in its implementation.

History has shown that the erosion cycle at the Hereford Inlet segment of North Wildwood lasts about 30 years between maximum excursions of erosion. Keep in mind that in 1986 the beach was over 1,500 feet wide at the NJ Beach Profiles Network 15th Avenue survey site. Therefore history suggests that re-using the sand already available may substitute well for moving material onto the beaches from outside the island beach/dune system.

Respectfully submitted this 4th day of February, 2014

Patrick T. Rosenello, Mayor
City of North Wildwood

City of North Wildwood, Resolution and letter of support dated 4 February 2014.

1. No response required.

2. New surveys will be performed prior to the initial construction to determine areas of need for berm and dune repair in order to construct the beach to the design template.

3. The two northern most piers in North Wildwood can likely fit a +16’ NAVD 88 dune underneath them and all efforts will be made to tie into existing shore protection structures.

4. The modeling efforts indicated that the optimum dune elevation is +16’ NAVD 88 for the dune in North Wildwood.

5. The District is acutely aware of the rapid erosion of the shoreline in North Wildwood as it was the primary driver for the project early on in the feasibility study. Careful attention will be paid to that section of shoreline and the adjacent inlet, while taking into account the presence or piping plovers and red knots. Terminal structures at the inlet were screened out of the analysis due to their costs and the potential to disrupt natural landward migration of ebb shoal material to the shoreline.

6. Public Access points will be maintained at street ends with pedestrian and vehicular access points over the +16’ NAVD 88 dune. Handicapped access points will also be created throughout the length of the project. The exact location of the proposed handicapped and vehicular access points are shown on the current plans and will be further coordinated during the Planning Engineering and Design (PED) and construction phases of the project.

[redacted]
Sent: Monday, January 27, 2014 8:08 AM
To: 'philly@usace.army.mil'
Subject: ACE Report - Hereford Inlet to Cape May Inlet Draft Feasibility Report - Public Comment

Re: Hereford Inlet to Cape May Inlet Draft Feasibility Report and Integrated Environmental Assessment Dated December 17, 2013

Public Comment

Dear Sir:

1. Due to the problems with drainage in the City of Wildwood it does not take much rain for the storm drains on Ocean Avenue to overflow resulting in damage to the surrounding property. The City of Wildwood has been unable to adequately address this problem.

2. I support the plan outlined in the subject report which addresses the flooding problem by eliminating the impact from the clogged outfalls due to continued expansion of the Wildwood beach. In addition the plan for the dunes will contain the ocean during future storms which will also reduce the street flooding and subsequent damage.

Sincerely,

[redacted]

RTER

Email from Wildwood Citizen dated 27 January 2014.

1. We agree that the City of Wildwood has an interior drainage problem and that reducing the amount of sand from in front of the outfall will likely reduce the flooding in the interior sections of the island.

2. We also agree that the construction of a dune and berm will reduce future flooding from oceanfront storms.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

FEB - 6 2014

Peter R. Blum, P.E.
Chief, Planning Division
Philadelphia District, Corps of Engineers
Wanamaker Building, 100 Penn Square East
Philadelphia, Pennsylvania 19107-3391

Dear Mr. Blum:

This letter is in response to the Hereford Inlet to Cape May Inlet Draft Feasibility Report and Integrated Environmental Assessment (draft EA). The document addressed hurricane and storm damage reduction alternatives for the coastal communities located between Hereford Inlet and Cape May Inlet, in Cape May County, New Jersey.

The selected plan for the project is a dune and berm constructed using sand obtained from an onshore borrow source located at the southern end of Five Mile Island. The plan extends approximately 4.5 miles from Hereford Inlet to Cape May Inlet and will encompass the towns of North Wildwood, Wildwood, Wildwood Crest and Diamond Beach. The sand for the dune and berm will be pumped from the southern borrow area using mobile back-passing technology to hydraulically pump the sand from the Wildwood and Wildwood Crest borrow source to the placement area on a four year nourishment cycle. The initial sand quantity is estimated at 1,362,000 cubic yards, which includes a design quantity of 1,057,000 and advanced nourishment of 305,000 cubic yards.

1. The integrated approach of combining the draft feasibility report with the draft Environmental Assessment resulted in a detailed and thorough analysis of the historical context, existing conditions, and comparative evaluation of the storm damage reduction alternatives. The feasibility report provided an enhanced context for our review of the Environmental Assessment components of the document.

2. The draft EA did not include a discussion of entry points/access paths along the dune. Though access paths are often created perpendicular to the shore, these paths can result in significant dune erosion during intense storms. High force waves gain power as they push through the narrow passages causing increase erosion and flooding. Reduced flooding was seen after Super

Storm Sandy behind dunes that had paths at a 45 degree angle rather than perpendicular to the shoreline. A discussion of dune access paths should be included in the final EA and/or made mention of in your decision document.

Thank you for the opportunity to comment. Should you have any questions concerning this letter please feel free to contact Stephanie Lamster of my staff at 212-637-3465.

Sincerely,

Grace Musumeci

Grace Musumeci, Chief
Environmental Review Section

Correspondence from the Environmental Protection Agency dated 2 February 2014

1. Concur that the integrated Environmental Assessment resulted in a detailed and through analysis of the historical context, existing conditions and plan formulation.

2. A description of the access paths and locations are contained in the plans, but special consideration will be given to the comments in the letter you provided to construct paths at a 45 degree angle.

In Reply Refer To:
14-CPA-0088

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609/646 9310
Fax: 609/646 0352
http://www.fws.gov/northeast/njfieldoffice

Peter R. Blum, Chief
Planning Division
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

FEB 0 6 2014

Dear Mr. Blum:

The U.S. Fish and Wildlife Service (Service), New Jersey Field Office has reviewed the *Hereford Inlet to Cape May Inlet Draft Feasibility Report and Integrated Environmental Assessment* addressing storm damage reduction for the communities of North Wildwood, Wildwood, Wildwood Crest, and portion of Lower Township. Specifically, dune placement activity is proposed from 2nd and John F. Kennedy Boulevard in North Wildwood south to Raleigh Avenue in Lower Township.

The U.S. Army Corps of Engineers (Corps) proposes to create a 75-foot-wide beach berm at elevation +6.5 North American Vertical Datum (NAVD) and a dune at an elevation of +16 feet NAVD in Northern Wildwood. The remainder of the project would only receive a dune at +16 feet NAVD. For initial construction of the project, the Corps proposes to obtain approximately 1.3 million cubic yards utilizing sand hydraulically back-passed from the beaches of Wildwood, Wildwood Crest, and Lower Township. About 305,000 cubic yards of sand may be required for periodic re-nourishment at 4-year intervals for a period of 50 years.

AUTHORITY

The following comments are provided pursuant to the National Environmental Policy Act (83 Stat. 852; 42 U.S.C. 4321 *et seq.*), the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*), Section 7 of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), and the Migratory Bird Treaty Act of 1918 (40 Stat.755; 16 U.S.C. 703-712, as amended), ensuring the protection of federally listed endangered and threatened species, and migratory birds. Additional comments are provided pursuant to the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 *et seq.*).

FEDERALLY LISTED SPECIES

Piping Plover

1. The federally listed (threatened) piping plover (*Charadrius melodus*) was documented nesting on the Hereford Inlet shoreline of North Wildwood during the last 10 years and within the Cape May National Wildlife Refuge (Two-Mile Beach) in 2010. Both nesting areas are in the vicinity of the project area. The likelihood of nesting activity within the project area is very low. However, we cannot entirely rule out possible nesting within the project area, if construction activity occurs during the breeding season (March 15-August 31). Also, because of the proximity of the Hereford Inlet shoreline of North Wildwood to the project area, the Service may require that the Corps hire a biological construction monitor for any work during the breeding season under the protocol established by the Service and the New Jersey Endangered and Nongame Species Program (ENSP) for the protection of nesting piping plovers. Finally, if any nesting activity is detected by the ENSP within the project area, the Corps shall coordinate/consult with the Service and ENSP to ensure adequate protection of piping plovers.

Individual Tier 2 consultation with the Corps remains required prior to construction and for each periodic nourishment cycle. The Corps shall not rely on Service Tier 2 letters for any nourishment cycle that is later cancelled, delayed, or otherwise modified, but shall rather re-submit updated project information to the Service for further individual Tier 2 consultation.

Seabeach Amaranth

2. There are no records of the federally listed (threatened) seabeach amaranth (*Amaranthus pumilus*) occurring within the project area. It is very unlikely that seabeach amaranth will occur in the project area during the initial nourishment but, if detected, we request that the Corps contact this office to coordinate protective measures for this species.

SPECIES PROPOSED FOR LISTING

3. The red knot (*Calidris canutus rufa*) is being proposed for Federal listing under the ESA. The listing process may be completed as early as September 2014. The proposed critical habitat rule may be issued by March-April 2014. Protective measures for the red knot need to be appended or included in the Programmatic Biological Opinion.

Small numbers of red knots may occur in New Jersey year-round, while large numbers of birds rely on Atlantic and Delaware Bay stopover habitats during the spring (mid-May through early June) and fall (late-July through October – sometimes extending into November 15) migration periods. Red knots are generally faithful to their stopover sites. Threats to the red knot include disturbance, reduced food availability at staging areas, and loss of stopover habitat.

During fall migration, red knots have been documented roosting and foraging on North Wildwood beaches from Hereford Inlet south to 26th Street. On the southern end of the project area, red knots have been documented roosting and foraging from Richmond Avenue south to the U.S. Coast Guard boundary. The Service may requests that, from July 15 to November 15, if a large number of red knots forage at or in the vicinity of the project site, project activities be suspended and an avian biologist be hired to monitor the red knots until they leave. The avian biologist shall determine when project activities may resume in coordination with this office and the Corps. More specific recommendations may be provided in our Tier 2 letter.

COASTAL BARRIER RESOURCE ACT

4. Section 2.4.16 of the Report (page 104) proposes Hereford Inlet as a borrow area for future re-nourishment events and mentions the past use of vibracores to evaluate sand resources within the inlet. According to the official Coastal Barrier Resource System (CBRS) map for Hereford Inlet, proposed sand borrow areas commonly referred as "H" are located within Unit NJ-09 of the CBRS. If the Corps proposes to make Federal expenditures or financial assistance (as defined by Section 3(3) of the CBRA) available for any purpose relating to a future action or project within the CBRS (including funding for the use of vibracores), the Corps is responsible for submitting a formal consultation request to the Service in writing, with an explanation of how the proposed Federal expenditures or financial assistance comply with the provisions of the CBRA and which Section 6 exception the action or project meets. If the activity qualifies for an exception under Section 6 of the CBRA, "the appropriate Federal officer, after consultation with the Secretary, may make Federal expenditures and may make financial assistance available" within the CBRS.

OTHER COMMENTS AND RECOMMENDATIONS

As a condition for receiving Federal assistance for beach nourishment, all municipalities are required to develop a Beach Management Plan approved by the Service and the New Jersey Division of Fish and Wildlife. At the moment, North Wildwood is the only municipality within the project area to have such plan.

The Corps shall require all municipalities within the study area to coordinate with the Service and ENSP prior to placing sand fencing and planting dune-stabilizing native vegetation following each re-nourishment event.

Please contact Carlo Popolizio at (609) 383-3938, extension 32, if you have any questions pertaining to this correspondence.

Sincerely,

Eric Schrading
Field Supervisor

Correspondence from the United State Fish and Wildlife Service dated 6 February 2014.

Federally Listed Species

1. Piping Plover- Although the District agrees that the likelihood of nesting activity within the project area is low, an individual tier 2 consultation will occur prior to initial construction and before each nourishment cycle. If any nesting activity is detected the Corps will consult with the Service and ENSP to ensure adequate protection of the piping plovers.

2. Sea Beach Amaranth- The District agrees that it is unlikely that sea beach amaranth will occur in the project area. If detected, the Corps will contact the USFWS office to determine protective measures for the species.

Species Proposed for Listing

3. Red Knot - The Corps will continue to coordinate with the USFWS with regard to the presence and potential impacts of the project on the red knot. If the species becomes listed under the Endangered Species Act, further consultation will be initiated which may include the adoption of protection measures into the project plans.**Coastal Barrier Resources Act**

4. Borrow Areas-The Corps does not currently have any plan to borrow from Hereford Inlet for this project. If the Corps develops any future plans for borrowing within this inlet the Corps will submit a formalwritten consultation request to the Service.

Other Comments and Recommendations

The Corps currently requires all municipalities to prepare a Beach Management Plan that is approved by the USFWS and the New Jersey Division of Fish and Wildlife for all Federal beach nourishment projects. Since North Wildwood is the only Municipality that currently has a plan in place, the Corps will require Wildwood, Wildwood Crest and Lower Township to draft a beach management plan.

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF LAND USE REGULATION
Mail Code 501-02A, P.O. Box 420, Trenton, NJ 08625-0420
TEL: # (609) 777-0454
FAX # (609) 777-3656

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

February 11, 2014

Peter R. Blum, Chief
Planning Division
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

RE: Federal Consistency
File No.: 0500-03-0001.1 CDT 130001
Hereford Inlet to Cape May Inlet - Coastal Storm Damage Reduction Project
North Wildwood, Wildwood, Wildwood Crest, and Lower Township
Cape May County

Dear Mr. Blum:

1. Pursuant to section 15 CFR 930.41 of the Federal Consistency Regulations, this office hereby requests that the review period to determine consistency with the New Jersey Coastal Management Program-Bay and Ocean Shore Segment for the above project, be extended 15 days, to March 8, 2014, in order for the DEP-OCZM to complete its review.

If you have any questions regarding the above please contact me in writing at the above address or by phone at (609) 984-6216.

Sincerely,

Gail J. Moore
Project Manager
Bureau of Coastal Regulation

Cc: Chris Constantino, Bureau of Coastal Engineering, Toms River

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Correspondence from the NJDEP dated 11 February 2014

1. The extension was granted to 10 March 2014.

Dear Mayor Groon, Commissioner Cabrera, and Commissioner Gould,

I do not support the proposed dune project by the Army Corps of Engineers.

1. Not all barrier islands are created equally. Wildwood Crest is very unique compared to other barrier island towns. We are blessed with a wide and growing beach. Our beach is as wide as some entire towns. Surely the width of our beach alone offers more storm protection compared to other more narrow islands. A wider beach must help dissipate wave energy associated with storms and keep the waves further away from the dunes and the town. It doesn't make sense to shorten our beach and bring that wave energy closer. We also have a dune system that the town is consistently improving. How much storm protection is really gained by shortening our beach and raising the dune as opposed to keeping our wider beach with the existing dunes? Because our beach is so unique, we don't necessarily need the same storm protection as other towns.

2. During Hurricane Sandy the majority of Wildwood Crest's flood damage was caused by water coming from the back bay, not from the ocean side of the island. Our wide beach and existing sand dunes helped prevent ocean water encroachment. A sand dune of any height will not stop flood water coming in from the bay. If flood prevention is the concern, then put resources towards solutions to lessen bay-side flooding.

3. One feature of Wildwood Crest that attracts many visitors to our beach is the safe and family-friendly nature of our waters. The gentle gradient of our beach and accompanying sandbars allow for safe bathing conditions. This gradual slope causes more gentle, weaker-breaking waves thus creating safer swimming conditions. Other beaches in New Jersey have a steep drop-off at the water's edge. This creates a stronger shore-break wave that crashes more forcefully into shallow sand, increasing the potential for accidents. The amount of sand needed for the sand dune project must be enormous. Removing a vast amount of sand from the low tide line could severely impact the current gradient of our near-shore waters. Our natural sandbars could be damaged, leaving steep drop-offs and creating dangerous swimming conditions. I'm sure it's assumed that the sand will fill back in as it was, but this can't be guaranteed. No one can predict with certainty how Mother Nature will respond when drastically altered. I don't believe this project is worth the risk of irreparably changing the nature of our beach.

4. Also of concern to me are the access points to the beach. As it now stands, many of the street ends in the Crest have ADA accessible ramps and walkways. Should a

16 foot high dune be built, all of these walkways would have to be replaced. Who would pay for this? And would they still be ADA accessible?

5. One of the selling points to the Army Corps' project is that shortening the beach will abate the outfall pipe problem. Shortening the beach is not a permanent solution to the outfall pipe problem. Assuming that the beach would resume its growth, this would only be a temporary fix. Our town would be better served by investing in a more creative solution to our outfall line situation .

6. I know that Governor Christie and the Army Corps had made it perfectly clear that the aesthetics of a project like this do not matter to them. However, it can't be overlooked that a project of this magnitude will dramatically change our landscape. A shorter beach with a giant sand dune will significantly decrease the recreational area of our current beach. Views of the water and beach from the bike path and street ends will be completely obscured.

7. Wildwood Crest has been blessed with a very wide beach. Other towns struggle annually with beach replenishment. I can't find the logic in voluntarily removing half of our beach, potentially altering the bottom conditions of our waters, drastically altering the landscape of our town all to construct a wall of sand that may or may not protect the island any better than it already is.

Please don't support this project either.

Thank you.

Sincerely,

[redacted]

[redacted]

Wildwood Crest, NJ

Email from Concerned Citizen no date.

1. The large width of the beach in Wildwood is not capable of mitigating for the elevated storm water levels experienced during hurricane and nor'easters. As our modeling has shown in the feasibility phase and feasibility documents, the low nature of the beach and lack of a dune system make North Wildwood, Wildwood & Wildwood Crest susceptible to storm damage at moderately elevated water levels.

2. Damages from hurricane Sandy were reported from ocean and bay sources in the Wildwoods. Hurricane Sandy was approximately a 30 year event in Cape May County. The storm damage models we evaluate for our studies run 7 storm sequences that range from the 5 year event to the 500 year event. These storms have water elevations that exceed the elevations experienced by hurricane Sandy, and overtop the beach and cause damages to houses and infrastructure if our plan is not in place. The project, as authorized, focused on beachfront protection. Additional studies that were authorized as a result of back-bay flooding during hurricane Sandy are currently evaluating how to deal with that flooding issue.

3. The steep drop off at any beach is a function of the sand grain size and the angle at which the sand can be shaped. As sand grain size increases, the angle of the beach increases. The Wildwoods have very fine grained sand, and the material that we will be mobilizing within the project area will all come from the beaches in the Wildwoods, therefore the project should not increase the slope of the beach since the sand grain size will remain similar. Excavating sand from the beach may cause a temporary increase in slope, but this slope will likely not hold that shape and the profile will re-adjust to its normal shape over time.

4. Americans with Disabilities Act (ADA) compliant walkways, pedestrian walkways and vehicular walkways are all part of the construction project and will provide access over the +16 NAVD 88 dune. These costs are factored into the total project cost which is shared 65% Federal and 35% non Federal between the Army Corp of Engineers and the New Jersey Department of Environmental Protection (NJDEP). The local community may have to provide a portion of the NJDEP costs.

5. The project area will likely experience erosion at it's northern end and accretion at the southern end of the project area, similar to what happens now. In order to combat the continued cycle of erosion/accretion, which is a natural part of a coastal system, we plan on excavating sand from in front of the outfalls on a 4 year basis, and placing the material where it eroded from to maintain the shore protection component, and reduce the outfall clogging. All of the projects within the NJ shore protection system in Avalon, Stone Harbor, Ocean City, Atlantic City, Brigantine etc.have a periodic nourishment component that spans 4-6 years to mitigate for the natural erosion that takes place along all coastal shorelines.

6. We do not concur that aesthetics of the project do not matter. Our projects are constructed to mimic natural dune systems.In some locations, the existing dunes within Wildwood Crest are at or exceeded the proposed +16 NAVD 88 design. The Corps dunes are also constructed with native beachgrass that are common to all New Jersey beach communities. Some locations in Wildwood Crest currently have obstructed ocean views due to the wide beach and height of the dunes.

7. The presence of the dune in your community will reduce storm damages from oceanfront waves and storm surge.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

FEB 19 2014

Peter Blum, Chief
Planning Division
Philadelphia District
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

ATTN: Beth Brandreth, Project Biologist
RE: Draft Environmental Assessment, Hereford Inlet to Cape May Inlet, Draft Feasibility Report and Integrated Environmental Assessment

Dear Mr. Blum:

We have reviewed the Hereford Inlet to Cape May Inlet Draft Feasibility Report and Integrated Environmental Assessment (DEA) dated December 17, 2013. The DEA presents the findings of the Corps of Engineers' study to determine a hurricane and storm damage reduction plan for coastal communities located between Hereford Inlet and Cape May Inlet in Cape May County, New Jersey. The communities in the project area include North Wildwood, West Wildwood, Wildwood, Wildwood Crest and Lower Township. The selected plan includes the use of a mobile sand back passing system to hydraulically pump sand from the accreting areas of Wildwood and Wildwood Crest in order to construct a dune and berm system in North Wildwood and a dune only system in Wildwood Crest and Lower Township. The initial sand quantity estimate is 1,362,000 cubic yards. A four-year renourishment cycle is anticipated.

As you are aware, the Magnuson Stevens Act (MSA) and the Fish and Wildlife Coordination Act (FWCA) require Federal agencies to consult with one another on projects such as this. Because this project involves essential fish habitat (EFH), this process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure. We offer the following comments and recommendations on this project pursuant to the above referenced regulatory process.

Essential Fish Habitat/Fish and Wildlife Coordination Act
The project area has been designated as EFH for a number of federal managed species including summer flounder, winter flounder, bluefish, skates and others. The near shore habitat also supports benthic organism that are prey species for a wide range of NOAA resources including those that are federally managed and those that fall under our FWCA authorities.

The EFH assessment included in the DEA adequately the potential effects of the project on EFH and federally managed species. Adverse impacts to EFH and to other NOAA species may occur as a result of this project, but due to the location of the borrow area within the intertidal and near shore zone, and the dynamic nature of this area, impacts are expected to be temporary and minor.

However, over the 50-year life of this project, changes on project conditions, changes to EFH, to federally managed species or the status of other NOAA resources may occur. Pursuant to 50 CRF 600.920 (j), if new information becomes available, or if the project is revised in such a manner that affects the basis our EFH determination, the EFH consultation must be reinitiated. To ensure that our agencies comply with the requirements of this section of the EFH regulations, we recommend that the Corps contact us prior to the commencement of each renourishment cycle so that we may confirm the basis for the EFH determination remains unchanged. This notification should include the approximate date of the start and duration of the construction and the area affected.

Essential Fish Habitat Conservation Recommendations

Pursuant to Section 305 (b) (4) (A) of the MSA, we recommend the following EFH conservation recommendations be incorporated into the project:

1. Notification should be provided to our office prior to commencement of each renourishment cycle.

Please note that Section 305 (b)(4)(B) of the MSA requires you to provide us with a detailed written response to these EFH conservation recommendations, including the measures adopted by you for avoiding, mitigating, or offsetting the impact of the project on EFH. In the case of a response that is inconsistent with our recommendations, Section 305 (b) (4) (B) of the MSA also indicates that you must explain its reasons for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate or offset such effect pursuant to 50 CFR 600.920 (k).

Endangered Species Act

As noted in the DEA, several species listed as threatened or endangered by NMFS occur
1. seasonally off the coast of New Jersey. The proposed sand bypass will take place in the intertidal zone where water depths are very shallow. Sea turtles, Atlantic sturgeon and listed whales are not present in that area. Therefore, none of these species will be exposed to any direct or indirect effects of the proposed project. Based on this, we do not believe a consultation in accordance with section 7 of the ESA is necessary. As such, NMFS Protected Resources Division does not intend to offer additional comments on this proposal. Should project plans change or new information become available that changes the basis for this determination, further coordination should be pursued. If you have any questions regarding these comments, please contact Julie Crocker of my staff (978-282-8480 or Julie.Crocker@noaa.gov).

We look forward to continued coordination with your office on this project as it moves forward. If you have any questions or need additional information, please do not hesitate to contact Karen Greene at karen.greene@noaa.gov or (732) 872-3023.

Sincerely,

Louis A. Chiarella,
Assistant Regional Administrator
for Habitat Conservation

cc: NJDEP – Land Use -

FWS- Pleasantville- C.Popolizio
EPA – Region II – D. Montella

Correspondence from the United States Department of Commerce dated 19 February 2014

Essential Fish Habitat Recommendations

1. Concur. NMFS will be notified prior to all construction and nourishment activities.

Endangered Species Act

1. Concur. Further consultation in accordance with section 7 of the Endangered Species Act is not necessary.

-----Original Message-----
[redacted]
Sent: Thursday, February 20, 2014 2:35 PM
To: Voigt, Edward C NAP
Subject: [EXTERNAL] Beach Project Concerns

Good Morning,

My name is [redacted] I decided to contact the you because of the recent news about the new beach project currently being discussed on the Wildwood's. First I wanted to take a moment and say how much I commend your hard work and efforts on the island as a whole I have always vacationed in Wildwood 29 years this year and hopefully one day will be able to live and work down there.

On to the reason I decided to write this and maybe this will give some points to bring up during the discussion I wish I could attend the meeting but I am sure it is for residents only. First I understand why the project is needed to a degree. North Wildwood has had problems with erosion near the inlet starting in the early 90's from understanding the yearly coastal research project from Richard Stockton Research Center. This process takes sand from the beachfront of North Wildwood and deposits it onto Wildwood, Wildwood Crest and North Wildwood inlet beaches. From understanding it is a cycle that goes back and forth every few years or so. This process helped cause the flooding issues in Wildwood and some of the Crest because of blocked outfall pipes. I could go on but you already know about these issues. Let me get back to my concerns.

1. · While North Wildwood needs to be protected I don't feel they should take sand from the neighbors. Pump it from the inlet like other beach towns already do. Grow the dunes more and build a bigger berm.

2. · Wildwood floods because of outfall pipes being buried extend them I agree a dune should be built also but don't take away the wide beach which the town has adapted and now many activities are using the wide beach which is helping the revenue source.

3. · If they take away some beach what will protect the piers? Those piers grew as the beach did take away the beach how can they expand and or be protected? How much beach will be a buffer from end of pier to water's edge?

4. • Wildwood Crest has started to already build an impressive dune system which I commend them as well for keeping up with that. Also extend the outfall pipes like Wildwood.

5. • Also on page 48 of the report figure 18 shows Wildwood Crest in the 70s that picture is not correct as the Great White and Great NorEaster roller coasters were built in the 90's and from that picture it looks like it was from 2000/2001 as you can see the outline for the new convention center to be built.

I feel that there are other ways you can handle this but coming from a person who comes to The Wildwoods all the time I do so because of the beach. There is no beach like yours I do not want to have a shorter beach I like having room and space to spread out If I wanted a narrow beach I would go to Ocean City or LBI. They again need to think of how you adapted to the situation of a growing beach and they should not put the piers at risk by making the beach shorter.

Thank you for your time,

cid:image002.jpg@01CEBEB6.38EDD8C0

[redacted]

Correspondence from Concerned Citizen dated 20 February 2014

1. The inlet bordering North Wildwood is already identified as a sediment source for the Avalon and Stone Harbor project, contains numerous shipwrecks, has environmentally sensitive finfish/shellfish and bird habitat and was screen out of the planning process. Pumping sand from the inlet will be more costly than our current backpassing operation and adding more sediment from the inlet may exacerbate the situation in the Wildwood by clogging their outfalls with the additional sand. By using the excess and within the system we can solve the outfall situation and the storm damage situation in the study area.

2. It is against Corps of Engineers policy to maintain or extend outfall pipers for local interior drainage, that is a non-Federal responsibility.

3. The borrow area can be adjusted to reduce the impacts to the piers by shifting the location of the area southward and focusing the harvesting of sand to Wildwood Crest and the southern portion of Wildwood.

4. The dune system in Wildwood Crest is not adequate as a storm damage reduction feature based on the results of the coastal engineering models.

5. The caption in the figure has been modified.

Bogle, Brian P NAP

From: [redacted]
Sent: Thursday, February 27, 2014 11:48 AM
To: christopher.constantino@dep.state.nj.us; Bogle, Brian P NAP; Blum, Peter R NAP; Brandreth, Mary E NAP
Subject: [EXTERNAL] First Ward Dune Project Wildwood New Jersey

1. [redacted] Constanino,It was very nice talking with you today concerning Army Corp. plans to construct a dune in Wildwood New Jersey..However it is my opinion that this would be detremental to my plans in the near and distant future on beach property I own or rent.As long as this property is deeded to myself and others I would have to oppose any plans for this property that were not my own.The property block 270,lot 3.01 is the property above mentioned with D.K. Rentals Inc. a New Jersey corporation operating on same property ,with others, in the first ward ,Wildwood New Jersey.Thank you for your time and kind consideration.[redacted]

Email from concerned citizen dated 27 February 2014.

1. There are multiple properties within Wildwood that may be impacted by the placement of a dune. During the more detailed Planning Engineering and Design (PED) phase the impacts to properties are minimized to reduce the need for easements and takings/relocations.

THE BOROUGH OF WILDWOOD CREST

6101 Pacific Avenue, Wildwood Crest, NJ 08260

www.wildwoodcrest.org

CARL GROON
Mayor -
Public Safety

JOYCE GOULD
Revenue &
Finance

DON CABRERA
Public Works &
Recreation

COMMISSIONERS
BOROUGH CLERK
609-522-5176
FAX 609-522-7108

FIRE PREVENTION/
CODE ENFORCEMENT
609-729-5152
FAX 609-729-7089

PUBLIC WORKS
609-522-7446

RECREATION
609-523-0202

TAX ASSESSOR
609-522-3891

TAX COLLECTOR
SEWER COLLECTION
609-522-3843
FAX 609-522-6692

TREASURER
609-522-0401
FAX 609-522-6692

March 4, 2014

Mr. Peter Blum, PE
ATTN: Environmental Resources Branch
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

RE: Hereford Inlet to Cape May Inlet
Draft Feasibility Report Comments
Wildwood Crest, Cape May County, New Jersey

Dear Mr. Blum:

On behalf of the Borough of Wildwood Crest, we are pleased to provide herewith comments in response to the above referenced U.S. Army Corps of Engineers (USACE) draft feasibility report. These comments are based on a thorough review of the document, multiple meetings with USACE and New Jersey Department of Environmental Protection (NJDEP) representatives, discussions by the Board of Commissioners at various public meetings, and miscellaneous memoranda and e-mail correspondence between our offices.

Based on the Borough's review of the report, it is apparent that the USACE's primary objectives are consistent with those of the Borough, such as reducing storm damage and excessive shoreline accretion. However, the Borough also places a very high value on the aesthetic and recreational qualities of the beach that the public has long enjoyed and that contribute to the economic and cultural vitality of the community. The Borough also desires to minimize both initial costs and the possibility of future costs associated with the maintenance of the USACE improvements.

Therefore, we are providing the following comments on the draft report:

1. We believe that the proposed 16' (NAVD88) dune elevation is unnecessarily high. As has been discussed at meetings with your office and the NJDEP on this subject, the proposed dune height would significantly reduce the public's enjoyment of the beachfront areas by impeding the views of the ocean and making it more difficult to access the beach. The report states that benefits continue to increase with dune heights greater than 16', but that the dune height was limited to 16' in order to be acceptable to the community. The Borough appreciates the rationale of limiting the dune height to accommodate the community's concerns; however, based on extensive feedback from the public, the 16' dune is not acceptable to the community as assumed in the report. Therefore, the Borough requests that the dune be reduced to elevation 12' (NAVD88).

   We would request that the USACE consider reducing the dune height while attempting to achieve the same degree of storm protection by widening the dune and/or establishing an elevated berm in front of the dune to compensate for the reduced height. However, it is our understanding that the establishment of the proposed 16' elevation was not in strict compliance with National Economic Development (NED) procedures. Therefore, we would request that the reduction of the dune height not be bound by a strict application of a compensating width. That is, if the storm damage protection compensation for a reduction of four (4) vertical feet requires an unacceptably wide dune that would be vulnerable to erosion from moderate storm events, we would request that the width be reduced even if it does not strictly compensate for the reduced dune height.

2. The Borough requests that the USACE consider elevating the berm in front of the dune in order to both protect the dune from periodic erosion from moderate storm events and to provide additional protection from ponding in these areas.

3. It is our understanding, based on previous meetings and correspondence, that the backpassing project will be conducted in such a way as to protect the public safety. Specifically, that the hydraulic excavation process will not create unsafe holes or depressions, but will be graded, *during construction*, to the slopes indicated on the cross sections contained in the report.

   Furthermore, it our understanding that if the excavation of sand in the vicinity of the Borough's outfall structures would result in exposure, or risk of exposure, to forces not considered in the Borough's earlier design of the outfall extensions, that the USACE will include the strengthening of these structures as part of the federal project.

4. In addition to the several ADA-compliant dune crossovers, the Borough requests that all dune crossovers be constructed with slopes not exceeding 12:1.

5. Some of the Borough's existing stormwater outfall pipes extending through the area of the proposed dune may be constructed of materials (or are in a condition) that may not support the additional loads from the proposed dune. Therefore, the Borough requests that the USACE evaluate the existing condition of these structures and replace them as necessary.

6. Since the construction of the dune has the potential to diminish the ability of the Borough's emergency personnel to respond quickly to emergencies, the Borough requests that a vehicular gravel access road, located between the existing bulkhead and the proposed dune, be incorporated into the project along the length of the proposed dune. This would increase the ability of the emergency personnel to respond to emergencies, thereby protecting the public safety.

7. Electronic mail correspondence from Mr. Christopher Constantino, of the NJDEP Bureau of Coastal Engineer, dated February 25, 2014, clarified that damage to the USACE's improvements in Wildwood Crest would be repaired under periodic renourishments, but that these renourishments would be subject to future Water Resources Development Act (WRDA) funding. Please clarify whether future losses of material in the dune would be considered erosion (subject to periodic renourishment) or damage (subject to repair under FCCE funding); or whether it would be eligible for repair under either of these mechanisms.

8. As has been discussed, the report provides significant detail on "without project" damages and benefits of alternative plans for North Wildwood, but does not provide an equivalent level of detail for Wildwood Crest. This additional information has been requested in previous correspondence. The review of these additional details will allow for a better understanding of the costs, benefits, and risks of accepting the USACE's proposed plan.

We look forward to your response to the above concerns, and trust that we can work together to develop a plan that achieves an appropriate balance among the federal, state, and local interests on this important project. We would be pleased to discuss this matter in further detail or to meet with both the USACE and the NJDEP at your convenience.

Very truly yours,

Carl H. Groon, Mayor

Joyce P. Gould
Commissioner

Don Cabrera
Commissioner

:trt

cc: Janelle M. Holzmer, Clerk
Joe Bond, CPWM, Superintendent of Public Works
Ralph Petrella, PE, Van Note-Harvey
James W. Verna III, Van Note-Harvey
Thomas R. Thornton, PE, CME, Hatch Mott MacDonald
Robert C. Mainberger, PE, CME, Hatch Mott MacDonald
Brian Bogle, USACE
Christopher Constantino, NJDEP Bureau of Coastal Engineering

Correspondence from Wildwood Crest dated 4 March 2014.

This correspondence was responded to in a letter from the District to the Municipality on 21 March 2014 contained on the following page.

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

CENAP-PL-PC

MAR 2 1 2014

Honorable Carl H. Groon
Mayor, Borough of Wildwood Crest
6101 Pacific Avenue
Wildwood Crest, New Jersey 08260

Dear Mayor Groon,

Thank you for your letter dated March 4, 2014 regarding the Hereford Inlet to Cape May Inlet feasibility study. This study was done in partnership between the New Jersey Department of Environmental Protection (NJDEP) and the U.S. Army Corps of Engineers (Corps). I am writing to respond to the questions and comments you expressed jointly with Commissioner Gould and Commissioner Cabrera on the draft feasibility report for this study.

As noted in your letter, the primary purpose of the study is to provide flood risk management. In response to your specific comments:

Comments 1 and 2. Dune height and berm width. Alternative plans were formulated and a recommendation was made in accordance with our requirements to follow National Economic Development (NED) procedures. Alternative dune heights ranged from +12 ft NAVD88 to +16 ft NAVD 88 with a berm width of 75 ft at elevation +6.5 ft NAVD88. Each alternative was evaluated for completeness, effectiveness, efficiency and acceptability and analyzed for inundation, wave attack and erosion. The recommended NED plan includes the +16 ft dune height. Your suggestion to reduce the recommended dune height from +16 ft to +12 ft would more than double the average annual damages (from $306,000 to $654,000). This additional flood risk ($348,000 in average annual damages) precluded a +12 ft dune plan from being the recommended NED plan.

Your letter also suggests compensating for reduced dune height with a wider dune base and / or establishing an elevated berm in front of the dune. In response, the Corps determined that the recommended NED plan required a 75 ft wide berm at +6.5 ft NAVD88 for Wildwood, Wildwood Crest and Lower Township. This additional beach fill will help stabilize the dune, prevent ponding and ensure the integrity of the project and its eligibility for Federal repair in the event of a declared Federal emergency. However, this addition will not compensate for a lower dune height in terms of reducing the effects of storm surge and dune overtopping.

Comment 3. Excavation process and outfall stabilization. The backpassing will be done in such a way as to protect public safety, avoiding unsafe holes or depression and be graded during construction to the slopes indicated on cross sections shown in the report. Outfalls will be strengthened as needed to consider any change in wave forces attributed to backpassing excavation.

Comment 4. ADA-Compliant Dune Crossovers. All will be constructed with slopes not exceeding 12:1.

Comment 5. Structural integrity of existing outfall pipes. The Corps will analyze the existing conditions and ensure structural integrity with the project in place.

Comment 6. Emergency access with dune in place. The Corps will consider this during the design phase and investigate the possibility of including a vehicular gravel access road between the existing bulkhead and the proposed dune.

Comment 7. Dune erosion. Erosion of the dune would be restored in both scenarios you describe, i.e., as part of a periodic nourishment cycle (if needed) and under emergency repair (FCCE) if damaged in a declared emergency.

Comment 8. Without project damages and benefits of alternative plans. This topic was discussed at a meeting in Wildwood Crest on February 19, 2014. The information we presented at the meeting is summarized in the table below. The data indicate that the average annual storm damage reduction benefit for the recommended NED plan, with the dune crest at +16 ft NAVD88, is $860,000, whereas the average annual benefit for the +12 ft NAVD88 dune plan is $512,000, reflecting the significant damage reduction benefit for Wildwood Crest associated with the recommended plan.

Community	Cell	w/o project	16 ' Dune		12' Dune	
		AAD	AAD	AAB	AAD	AAB
Wildwood Crest	4	$218,000	$74,000	$144,000	$198,000	$20,000
	5	$948,000	$232,000	$716,000	$456,000	$492,000
TOTALS		$1,166,000	$306,000	$860,000	$654,000	$512,000

I hope this information is helpful and I look forward to continuing to work with you in the future. Please call Mr. Brian Bogle at 215-656-6585 or me at 215-656-6540 if you have any additional questions.

Sincerely,

Peter Blum

Peter Blum, P.E.
Chief, Planning Division

CC: Christopher Constantino, NJDEP

2

Bogle, Brian P NAP

From: [redacted]
Sent: Monday, March 10, 2014 12:46 PM
To: Bogle, Brian P NAP; christopher.constantino@dep.state.nj.us
Subject: [EXTERNAL] Hereford Inlet to Cape May Inlet draft feasibility study

Gentlemen

On behalf of Seapointe Village, please accept this email as formal comment during the open public comment period regarding the Hereford Inlet to Cape May inlet draft feasibility study.

1. Seapointe Village takes no position regarding the study, and is neutral on dune height as proposed throughout the island, reserving concerns for any changes to dunes on Seapointe Village property.

Seapointe Village is concerned and objects to the method of borrowing sand from off-shore areas to build the dunes.

The bathing beaches along the Wildwoods have historically been very safe.

2. Removing sand from these beaches, especially so close to the tide lines, will create a drop off.

3. Seapointe Village is concerned about the effect of this drop off, the change in tides and potential for disturbing and changing the conditions along the bathing beaches of the Wildwoods to the detriment of the bathers.

Considering the interdependency of the natural attractions of the ocean and beaches and their value as economic drivers, Seapointe Village is opposed to this specific aspect of the feasibility study.

Thank you.

[redacted]

General Manager

Seapointe Village

[redacted]

Email from Seapointe Village Association dated 10 March 2014.

1. Most of the material to be removed from the beach is in Wildwood Crest and Wildwood. The comparison of the without project model runs and the with project model runs indicate shortening the beach and creating a dune will reduce storm damages project wide.

2. The existing slopes to the beach will be maintained at 1:30 in the offshore to reduce steep drop-offs and pits.

3. The plans currently do not have any material being excavated from Lower Township. Any adjustment to the profiles will be the result of the shoreline reaching equilibrium between Lower Township and Wildwood Crest, not the direct removal of material from the Township.

March 7, 2014

U.S. Army Corps of Engineers
100 Penn Square East
Philadelphia, PA 19107-3390
Attn: Brian P. Bogle
Project Manager, Coastal Planning Section

State of New Jersey
Dept. of Environmental Protection
1510 Hooper Ave
Toms River, NJ 08753
Attn: Christopher Constantino
Environmental Services Specialist

Re: New Jersey Shore Protection Study
Hereford Inlet to Cape May Inlet
Draft Feasibility Request dated December 17, 2013

It was a pleasure speaking with you at the public meeting in North Wildwood on February 21, 2014. Thank you for the opportunity to review the report and allow us to formally comment on some areas of concern. I am writing to follow up and inquire about how we can more fully engage in the discussion.

As I noted at the meeting, we were happy to hear that you are considering adding or increasing the size of the berm in front of the dune based on recent discussions you have had with the municipalities involved. We agree that this is a needed enhancement to the current plan.

1. Our greatest concern relates to the proposed location of the dune which is shown to pass under our four piers at varying distances from the boardwalk. We understand from your comments at the meeting that one of the reasons for this preliminary location was out of consideration for access to the piers. We appreciate this concern and can agree that access is one of the many issues that need to be addressed. However, much more concerning to us is the fact that unlike the protection offered the other public and private facilities on the island, this scheme leaves our four piers (and the two directly to the north) essentially unprotected.

While a berm will afford some measure of protection, one significant nor'easter can remove the largest of berms leaving us unprotected until the beach is replenished. We strongly feel that all six of the island's boardwalk and entertainment/amusement piers are an integral part of the community and require protection at least as substantial as that being provided the rest of the island. It is important that we continue this discussion and look forward to hearing from you regarding how we can most effectively contribute.

Morey's Surfside Pier • Morey's Mariner's Landing Pier • Morey's Adventure Pier • Ocean Oasis Waterpark & Beach Club • Raging Waters Waterpark
3501 Boardwalk, Wildwood, NJ 08260 *phone* - 609.729.3700 *fax* - 609.729.0788 www.MoreysPiers.com

2. Additionally, in an effort to clarify the issues that have come up during discussions with the municipalities regarding the various activities that occur on the beach that directly relate to the location of the dune, we have developed a plan of the island delineating the different areas which will be created once the dune project is complete. We are currently sharing this plan with the municipalities and will be happy to forward once we have been able to complete these discussions.

If you have any questions, please do not hesitate to contact me.

[redacted]
Director of Construction

Enclosure
MG/am

cc: Mayor Patrick Rosenello, City of North Wildwood
Mayor Ernie Troiano, Jr., City of Wildwood
Mayor Carl Groon, Borough of Wildwood Crest
Will Morey
Jack Morey

Correspondence from Morey's Pier dated 7 March 2014.

1. The final design will evaluate exact dune locations in order to reduce impacts to the piers and the location of the borrow area relative to the piers. We can also evaluate small changes to the location of the dunes to prevent flooding on certain sections of the piers, and/ or betterments and improvements to the design during the Planning Engineering and Design phase to reduce storm impacts.

2. We look forward to discussing your future recreation plans for the project area.

Q.Q.

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Land Use Regulation
Mail Code 501-02A
P.O. Box 420
Trenton, New Jersey 08625-0420
www.state.nj.us/dep/landuse

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

MAR 07 2014

Peter R. Blum, Chief
Planning Division
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

RE: Federal Consistency & Section 401 Water Quality Certificate
File No.: 0500-03-0001.1 (CDT 130001)
Hereford Inlet to Cape May Inlet - Coastal Storm Damage Reduction Project
North Wildwood, Wildwood, Wildwood Crest, and Lower Township
Cape May County

Dear Mr. Blum:

The New Jersey Department of Environmental Protection, Division of Land Use Regulation, acting under Section 307 of the Federal Coastal Zone Management Act (P.L. 92-583) as amended, agrees with the certification that the above referenced project is consistent with the approved New Jersey Coastal Management Program and New Jersey's Rules on Coastal Zone Management N.J.A.C. 7:7E-1.1 et seq., as amended on April 16, 2013. This determination also authorizes a Section 401 Water Quality Certificate for the authorized work.

The proposed project site is located along the Atlantic Coast shoreline of New Jersey from Hereford Inlet to Cape May Inlet and includes work within North Wildwood, Wildwood, Wildwood Crest and a portion of Lower Township. The U.S. Army Corps of Engineers has proposed berm and dune restoration utilizing sand (1,362,000 cubic yards) which will be hydraulically back-passed from the beaches of Wildwood, Wildwood Crest and Lower Township. This sand will then be utilized to provide beach nourishment material to reduce storm damage in the form of a storm protective berm and dune in North Wildwood, Wildwood and Wildwood Crest, with a dune only in Lower Township. The proposed dune will be at elevation +16 NAVD88 with a crest width of 25 feet and a 75 foot wide berm with an elevation of +6.5 feet. Side slopes for the dune will be 1V:5H and 1V:30H for the seaward slope of the berm. To maintain the design template, the ACOE is conditionally authorized to perform periodic nourishments of 305,000 cubic yards of sand every four years following the completion of the initial project.

The proposed project includes the installation of approximately 64 acres of dune grass, 28,000 linear feet of sand fence, 44 extended crossovers, 7 new pedestrian crossovers, 7 extended handicap crossovers, 6 new handicap crossovers, 8 existing vehicle crossover extensions and 5 new vehicular crossovers.

This consistency determination is issued subject to compliance with the following conditions.

1. Prior to commencement of work and/or site preparation, all authorizations and/or easements from all owners of property within the project area must be obtained.

2. Prior to commencement of work and/or site preparation, final engineering plans must be submitted to the Division of Land Use Regulation for final review and approval.

3. Federally endangered shorebird nesting areas are located in the northern inlet section of the beach and north and west of the terminal groin in North Wildwood. Therefore, for the protection of these species, no work shall occur within this nesting area between March 15th and August 31st of any given year.

4. Proposed work (i.e., dune taper area) adjacent to the Hereford Inlet area may potentially impact/disturb nesting Piping Plover and Least Terns, therefore authorized work within this area may not be performed during the timing restriction from March 15-August 31 of any given year. Prior to the placement of any snow fence within this area, the permittee must coordinate with ENSP and USFWS to determine the appropriate methods to ensure beach nesting bird habitat is either not impacted or that the impacts have been minimized to the maximum extent possible.

5. Should any habitat for a currently listed Federal or State Threatened or Endangered shorebird species be identified on any portion of the beach within the duration of this Federal Consistency Determination, the ACOE shall cease work and immediately contact USFWS and ENSP to determine whether the borrow and placement areas have become suitable/active habitat for nesting birds. Work may not proceed until this coordination has been completed and the USFWS and ENSP authorize resumption of work. No work is authorized within any nesting habitat that is identified within the life of the project.

6. Should any additional species and/or species habitat be added to the Federal and/or State Threatened and Endangered Species protection list that may occur within the scope of this project, the ACOE shall contact USFWS and ENSP for further evaluation and guidance. In such an event, the Department reserves the right to impose additional timing restrictions.

7. Within 90 days of conducting any four (4) year nourishments the ACOE shall provide DLUR with the information listed below. Future maintenance work authorized by this Federal Consistency determination shall not commence until the ACOE receives written notification from this office that the work may proceed in accordance with existing or modified conditions.

    - An updated list of plover nesting areas and other beach-nesting birds that may be present (e.g., least tern or black skimmer),
    - Locations and numbers of any seabeach amaranth plants discovered,
    - Limits of proposed work, proposed volume of sand, proposed areas of dune maintenance or re-construction,
    - Vehicle access points and travel corridors,
    - Material stockpile and equipment storage areas,
    - Anticipated schedule of activities.

8. All dune creation areas must be planted with "Cape" American beachgrass or a species listed in the Standards Applicable to Dune Creation and Maintenance (7:7E-3A.3) within the following planting season. Native dune vegetation must be planted in the mid to late spring, annually, to establish vegetative cover on the dune in accordance with the specifications contained in Guidelines and Recommendations for Coastal Dune Restoration and Creation Projects (DEP, 1985) and/or Restoration of Sand Dunes Along the Mid-Atlantic Coast (U.S. Soil Conservation Service, 1992). These documents are available upon request from the Department's Division of Land Use Regulation, PO Box 439, Trenton, New Jersey 08625-0439, (609) 292-0060.

   Dune vegetation should be limited to a variety of the following coastal species: American Beachgrass (Ammophila breviligulata), Coastal Panicgrass (Panicum amarulum), Bayberry (Myrica pennsylvanica), Beach Plum (Prunus maritima), Seaside Goldenrod (Solidag sermpervirens), Beach Pea (Lathyrus japonicus), Sea Oats (Uniola paniculata), Bitter Panicgrass (Panicum amarum), and even Saltmeadow Cordgrass (Apratina patens).

This Federal Consistency is authorized pursuant to all parties following the guidelines set forth, and agreed upon, for the construction of the proposed structures.

Pursuant to 15 CFR 930.44, the Division reserves the right to object and request remedial action if this proposal is conducted in a manner, or is having an effect on, the coastal zone that is substantially different than originally proposed.

Thank you for your attention to and cooperation with New Jersey's Coastal Zone Management Program. If you have any questions regarding this determination, please contact Colleen Keller of our staff at (609) 633-2289.

Sincerely,

David B. Fanz

David B. Fanz, Assistant Director
Division of Land Use Regulation

3/7/14
Date

C: John Gray, Office of Permit Coordination and Environmental Review
Marty Rosen, Division of Coastal and Land Use Planning
Christopher Constantino, NJDEP Bureau of Coastal Engineering

Correspondence from the NJDEP dated 7 March 2014

1. Concur. All necessary easements will be obtained by the Non-Federal Sponsor prior to construction.

2. Concur. Final plans will be submitted to the Land Use Regulation Program for final review.

3. Concur. If endangered birds are present in the project area, no work in the nesting area will occur between March 15^{th} and August 31^{st}. In addition, the appropriate buffer areas around the nesting sites will be utilized.

4. Concur. If endangered birds are present in the project area, no work in the nesting area will occur between March 15^{th} and August 31^{st}. In addition, the appropriate buffer areas around the nesting sites will be utilized. Sand fence placement will be coordinated with NJDEP and USFWS to minimize impacts to beach nesting birds.

5. Concur. The Corps will notify USACE and ENSP of the presence of any nesting activity, or foraging birds in the project area based on the guidelines established in the 2005 Biological Opinion for buffer zones and seasonal restrictions.

6. Concur. Any additions to the Federal and/or State Threatened and Endangered Species protection list will be coordinated with USFW and ENSP.

7. Concur. The ACOE will provide the DLURP with the information it's requested prior to the beginning of any four year nourishment cycle.

8. Concur. Native dune vegetation will be provided for planting.

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NATURAL & HISTORIC RESOURCES
Office of Engineering and Constructions
501 East State Street
Mail Code 501-01A
P. O. Box 420
Trenton, NJ 08625-0420
Tel. 609-292-9236 FAX 609-984-1908

BOB MARTIN
Commissioner

April 9, 2014

John C. Becking, P.E.
Lieutenant Colonel, US Army Corps of Engineers
Philadelphia District
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107

Reference: Hereford Inlet to Cape May Inlet Feasibility Study

Dear Colonel Becking:

The purpose of this letter is to confirm the New Jersey Department of Environmental Protection's (Department) support of the US Army Corps of Engineers (USACE) recommended plan contained in the Hereford Inlet to Cape May Inlet Feasibility Study. The Department is committed to partnering with the USACE Philadelphia District and will continue to provide the staffing and support needed to complete the project.

Sincerely,

Dave Rosenblatt
Administrator

**NON-FEDERAL SPONSOR'S
SELF-CERTIFICATION OF FINANCIAL CAPABILITY
FOR AGREEMENT FOR THE CONSTRUCTION OF THE
HEREFORD INLET TO CAPE MAY INLET PROJECT**

I, Adrienne Kreipke, do hereby certify that I am the Director of Budget and Finance of the New Jersey Department of Environmental Protection (the "Non-Federal Sponsor"); that I am aware of the financial obligations of the Non-Federal Sponsor for the Hereford Inlet to Cape May Inlet Project; and that the Non-Federal Sponsor has the financial capability to satisfy the Non-Federal Sponsor's obligations under the Project Partnership Agreement for the Hereford Inlet to Cape May Inlet Project, consistent with Article XVII of the PPA.

IN WITNESS WHEREOF, I have made and executed this certification this 9th day of April, 2014.

BY: A Kreipke

TITLE: Director, Budget + Finance

DATE: 4/9/14

Appendix H.

Public Access

H. Public Access

The beach access plan includes pedestrian, handicap, and vehicle access over the project dune. Pedestrian access will consist of modular walkway accesses extending up and over the dune at skewed angles and bordered with sand fencing. Access will be provided at existing access points with spacing of ½ mile or less between each access point, at a minimum. Handicap access will be provided at regular intervals and will consist of timber deck ramps with handrails. Vehicle access will be provided and will consist of a geogrid ramps filled with densified sand. Final locations of access points will be coordinated with the sponsor and local communities during preparation of plans and specifications.

Local communities may have special, site-specific requirements for beach access appurtenances that may require construction of additional access paths or modification of proposed access paths. This is conditionally acceptable to the Corps of Engineers so long as the access plans are fully coordinated with the Corps of Engineers to ensure no loss of project integrity and satisfy minimum access requirements, and coordinated with the Non-Federal Sponsor, the New Jersey Department of Environmental Protection, for adherence to State coastal zone regulations.

Parking

North Wildwood	
Parking Locations Parallel to beach (NWW)	
Streets (within 1/4 mile of access)	
Beach Drive from 2nd -26th; 20 spaces per block maximum	480
Ocean Drive from 2nd -26th; 20 spaces per block maximum	480
Surf Ave from 2nd -26th; 24 spaces per block maximum	576
Parking Locations Perpendicular to beach (1/4 mile landward)	
2-26 Ave (both sides)	?
Subtotal	1,536
Wildwood	
Parking Locations Parallel to beach (WW)	
Streets (within 1/4 mile of access)	
Atlantic Avenue 16 spaces per block maximum	400
Pacific Avenue 16 spaces per block maximum	400
Parking Locations Perpendicular to beach (1/4 mile landward)	
Parking Lots WW	
Juniper - Poplar	175
Poplar - Magnolia	100
Magnolia-Glennwood	100
Glennwood-Maple	100
Convention Center-Ocean Montgomery	75
Convention Center-Middle Lot	500
Convention Center- Bennet Lot	100
Subtotal	1950
Wildwood Crest	
Parking Locations Parallel to beach (WWC)	
Streets (within 1/4 mile of access)	
Ocean, 20 spaces per block maximum	820
Atlantic, 20 spaces per block maximum	820
Seaview, 20 spaces per block maximum	820
Pacific, 20 spaces per block maximum	820
Parking Locations Perpendicular to beach (1/4 mile landward)	
40 blocks from Cresse to Jefferson	?
Parking Lots WWC	
Subtotal WWC	3280
Lower Township	
Parking Locations Parallel to beach (LT)	
Streets (within 1/4 mile of access)	
Atlantic Ave, 20 spaces per block maximum	60
Seaview Ave, 20 spaces per block maximum	60
Parking Locations Perpendicular to beach (1/4 mile landward)	
3 blocks from Jefferson to Raleigh	?
Subtotal	120
Total	**6,886**

Access Points	North Wildwood 2nd - 26th	Wildwood Juniper-Cresse	Wildwood Crest Cresse-Jefferson	LT- Jefferson - Raleigh
Distance (feet)	6,600	7,705	9,768	1,689
Number of Access Points	25	24	41	4
Average Distance Between Access Points (miles)	0.05	0.06	0.05	0.08