Appendix A

Relevant Project Correspondence

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES &
ENVIRONMENTAL CONTROL
DIVISION OF WATER RESOURCES
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

WETLANDS & SUBAQUEOUS
LANDS SECTION

TELEPHONE (302) 739-4691
FACSIMILE (302) 739-6304

Mr. Minas M. Arabatzis
US Army Corps of Engineers
Planning Division, DENAP-PL-E
100 Penn Square East, Wanamaker Building
Philadelphia, Pennsylvania 19107 - 3390

MAY 2 4 2005

Dear Mr. Arabatzis:

Enclosed is the Subaqueous Lands Permit/Water Quality Certification granted by the State of Delaware. Please read carefully all the Special and General Conditions contained within the Permit/Certification. The permittee is responsible to ensure that all the conditions, responsibilities and requirements of the Permit/Certification are strictly observed.

Also enclosed is the Contractor's Post-Construction Completion Report. **Within ten days of the completion of construction, the contractor must mail the completed and signed Post-Construction Completion Report to this office.**

A copy of this approval will be forwarded to the Corps of Engineers. If you have any questions, please feel free to contact this office.

Sincerely,

Laura M. Herr
Program Manager
Wetlands & Subaqueous
Lands Section

Enclosures

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES &
ENVIRONMENTAL CONTROL
DIVISION OF WATER RESOURCES
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

WETLANDS & SUBAQUEOUS
LAND SECTION

TELEPHONE (302) 739-4691
FACSIMILE (302) 739-6304

Subaqueous Lands Permit: SP-037/05
Water Quality Certification: WQ-038/05
Date of Issuance: 5/24/05
Construction Expiration Date: 5/24/08
Amended Date:

SUBAQUEOUS LANDS PERMIT/WATER QUALITY CERTIFICATION GRANTED TO THE U.S. ARMY CORPS OF ENGINEERS TO CONSTRUCT SHORELINE STABILIZATION BY

- **PLACING 270 LINEAR FEET OF NEW STONE RIPRAP AND 630 LINEAR FEET OF REPLACEMENT STONE RIPRAP IN SUBAQUEOUS LANDS, IMPACTING 5,000 SQUARE FEET OF SUBAQUEOUS LANDS AND**
- **PLACING 2,500 CUBIC YARDS OF SAND FILL MATERIAL IN 2,700 SQUARE FEET OF SUBAQUEOUS LANDS**

IN THE INDIAN RIVER INLET AT THE INDIAN RIVER MARINA, 39415 INLET ROAD, REHOBOTH BEACH, SUSSEX COUNTY, DELAWARE

Mr. Minas M. Arabatzis
US Army Corps of Engineers
Planning Division, CENAP-PL-E
100 Penn Square East, Wanamaker Building
Philadelphia, Pennsylvania 19107-3390

Pursuant to the provisions of 7 Del. C. 7203, and the Department's Regulations Governing the Use of Subaqueous Lands, permission is hereby granted on this 24th day of May A.D. 2005, to construct the above-referenced project in accordance with the approved plans for the Permit/Certification (3 Sheets), as approved on May 12, 2005; and the application dated February 7, 2005 and received by this Division on February 8, 2005.

WHEREAS, pursuant to the provisions of 7 Del. C. 7203, the Secretary of the Department of Natural Resources and Environmental Control through his duly authorized representative finds that it is not contrary to the public interest if this project is approved subject to the terms and conditions herein set forth.

WHEREAS, pursuant to the provisions of Section 401 of the Clean Water Act, the Secretary of the Department of Natural Resources and Environmental Control through his duly authorized representative finds that it is not contrary to the public interest if this project is approved subject to the terms and conditions herein set forth.

This Permit/Water Quality Certification is issued subject to the following conditions:

SPECIAL CONDITIONS

1. The conditions contained herein shall be incorporated into any and all construction contracts and other ancillary documents associated with earth disturbance and any other activities directly or indirectly associated with construction which may impact subaqueous lands associated with this project. The permittee and contractor are responsible to ensure that the workers executing the activities authorized by this Permit/Certification have full knowledge of, and abide by, the terms and conditions of this Permit/Certification.

2. Construction shall be conducted so as not to violate the State of Delaware Department of Natural Resources and Environmental Control's "Surface Water Quality Standards," as amended August 11, 1999.

3. All construction debris and refuse incidental to this activity shall be collected, placed above the influence of surface water and appropriately contained at all times to prevent its entry into surface water or wetlands.

4. There shall be no stockpiling of materials in wetlands or subaqueous lands.

5. All material associated with the proposed project and included in the above-referenced plans shall be clean and free from oils, grease, asphalt, and other contaminants.

6. There shall be no movement of equipment within subaqueous lands or wetlands not specifically authorized by this Permit/Certification. Any equipment traversing subaqueous lands as may be authorized by this Permit/Certification shall be supported on mats. Any areas disturbed, other than the authorized impact areas, shall be returned to pre-construction conditions and elevations and appropriately stabilized.

7. Erosion and sediment control measures shall be implemented in accordance with the specifications and criteria in the Delaware Erosion and Sediment Control Handbook (1989) so as to minimize entry and dispersal of sediment and other contaminants in surface waters.

8. This structure on subaqueous lands shall be constructed for the explicit purpose of providing bank stabilization.

9. A copy of this Permit/Certification must be available on-site during all phases of construction activity.

10. No fill material shall be placed in tidal wetlands.

GENERAL CONDITIONS

1. The project is to be undertaken in accordance with the plans submitted and attached hereto. Any activities not specifically authorized herein may require a supplemental approval from this office prior to the initiation of construction. A determination on the need for a supplemental approval will be made by this office pursuant to the permittee submitting written notification and revised plans indicating project changes to this office.

2. Representatives of the Department of Natural Resources and Environmental Control may inspect such work during any phase of the construction and may collect any samples or conduct any tests that are deemed necessary.

3. This Permit/Certification does not cover the structural stability of the project units.

4. Any actions, operations or installations which are considered by the Department to be contrary to the best interests of the public shall constitute reason for the discontinuance and/or removal of said action, operation or installation.

5. The issuance of this Permit/Certification does not imply approval of any other part, phase, or portion of any overall project the permittee may be contemplating.

6. This Permit/Certification is subject to the terms and conditions contained in any easement, license or lease that may have been granted by the State or any political subdivision, board, commission or agency of the State in the vicinity of the project.

7. This Permit/Certification is granted for the purposes stated herein. Any other use without prior approval shall constitute reason for this Permit/Certification being revoked.

8. This Permit/Certification shall expire if the project has not been completed within three (3) years from the date of issuance.

9. If the permittee considers three (3) years insufficient for completion of the project, the permittee may submit a project time schedule for consideration by the Department. If the time schedule is approved it shall be attached hereto and made a part hereof.

10. The permittee shall notify the Department of Natural Resources and Environmental Control within ten (10) days of the date work will be commenced.

11. This Permit/Certification is personal and may not be transferred without the prior written consent of the Department. Prior to the transfer of the adjacent upland property, the permittee shall obtain the written consent of the Department to transfer this Permit/Certification to the new upland property owner. Failure to obtain such written consent may result in the revocation of

this Permit/Certification and the removal of all structures authorized by this Permit/Certification at the expense of the permittee.

12. The permittee shall at all times comply with all applicable laws and regulations of the Department of Natural Resources and Environmental Control.

13. The issuance of this Permit/Certification does not constitute approval for any of the activities as may be required by any other local, state or federal governmental agency.

14. This Permit/Certification may be revoked upon violation of any of the above conditions.

IN WITNESS WHEREOF, I, Laura M. Herr, the duly authorized representative of John A. Hughes, Secretary, Department of Natural Resources and Environmental Control, have hereunto set my hand this 24th day of May, 2005.

By Laura M. Herr, the duly authorized representative of the Secretary of the Department of Natural Resources and Environmental Control

DEPARTMENT OF NATURAL RESOURCES
AND
ENVIRONMENTAL CONTROL

NOTICE OF AUTHORIZATION

Permit/Lease No. and Description: SP-037/05, WQ-038/05 To construct shoreline stabilization by placing 270 liner feet of new stone rip rap and 630 linear feet of replacement stone rip rap in subaqueous lands, impacting 5,000 square feet of subaqueous lands and placing 2,500 cubic yards of sand fill material in 2,700 square feet of subaqueous lands in The Indian River Inlet at The Indian River Marina, 39415 Inlet Road, Rehoboth Beach, Sussex County, Delaware

Issued to: The U.S. Army Corps of Engineers
Location of Work: Same as above
Date of Expiration: 5/24/2008

DISPLAY THIS CERTIFICATE IN A HIGHLY VISIBLE LOCATION ON THE JOB SITE.

Laura M. Herr, Program Manager
Wetlands & Subaqueous Lands Section

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

April 19, 2005

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

RE: Indian River Inlet Project , Sussex County, DE

Dear Mr. Arabatzis:

This responds to your letter, dated January 24, 2005, requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened within the above referenced project area. We have reviewed the information you enclosed and are providing comments in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

The federally threatened Atlantic Coast piping plover (*Charadrius melodus*) nests in the vicinity of the project area. This species has been observed nesting in Delaware Seashore State Park along the beach immediately north and south of the Indian River Inlet. Piping plovers nest above the high tide line on coastal beaches. Feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines, and shorelines of coastal ponds, lagoons, or salt marshes. Disturbance by human activity and pets often reduces the functional suitability of habitat and causes direct and indirect mortality of eggs and chicks. Ms. Holly Niederriter can provide further details regarding the activities of piping plovers in the state of Delaware. Ms. Niederriter may be contacted at (302) 653-2880 ext 121. Any potential impacts on piping plover habitat should be analyzed as a part of your environmental assessment. If such impacts may occur, further section 7 consultation with the U.S. Fish and Wildlife Service may be required.

The federally threatened seabeach amaranth (*Amaranthus pumilus*) is known to occur in Delaware Seashore State Park, both north and south of the Indian River Inlet. Seabeach amaranth is an annual plant native to the barrier island beaches of the Atlantic Coast. Its primary habitat consists of overwash flats at accreting ends of islands, lower foredunes, and upperstrands of non-eroding beaches. Any potential impacts on seabeach amaranth habitat should be analyzed as a part of your environmental assessment. If such impacts may occur, further section 7 consultation with the U.S. Fish and Wildlife Service may be required.

Except for occasional transient individuals, no other federally proposed or listed threatened or endangered species are known to exist within the project area. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available this determination may be reconsidered.

This response relates only to federally protected threatened and endangered species under our jurisdiction. For information on the presence of other rare species, you should contact Karen Bennett of the Delaware Natural Heritage and Endangered Species Program at (302) 653-2880.

An additional concern of the Service is wetlands protection. The Service's wetlands policy has the interim goal of no overall net loss of Delaware Bay's remaining wetlands, and the long term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of this policy and the functions and values wetlands perform, the Service recommends avoiding wetland impacts. All wetlands within the project area should be identified, and if construction in wetlands proposed, the U.S. Army Corps of Engineers, Philadelphia District should be contacted for permit requirements. They can be reached at (215) 656-6728.

We appreciate the opportunity to provide information relative to fish and wildlife issues, and thank you for your interest in these resources. If you have any questions or need further assistance, please contact Andy Moser at (410) 573-4537.

Sincerely,

G. A. M

Mary J. Ratnaswamy, Ph.D.
Program Supervisor, Threatened and Endangered Species

cc: Holly Niederriter, Delaware Natural Heritage Program, Smyrna, DE
John Brundage, U.S. Army Corps of Engineers, Dover, DE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

APR -6 2005

Minas M. Arabatzis
Chief, Planning Division
Department of the Army
Philadelphia District, Corps of Engineers
Wanamaker Building, 100 Penn Square East
Philadelphia, PA 19107-3390

Attn: Mark Eberle, Environmental Resources Branch

Dear Ms. Arabatzis,

This is in response to your letter dated January 24, 2005 regarding the Indian River Inlet Project, sponsored by the Delaware Department of Natural Resources and Environmental Control, Division of Parks and Recreation. The project would involve the placement of 900 feet of stone revetment along the shoreline to provide protection for the eroding shoreline on the north shore of Indian River Inlet. This project will supplement previous revetment that was placed in 1988. The Army Corps of Engineers (ACOE) has made the preliminary determination that the proposed project will not affect any threatened or endangered species listed under the jurisdiction of NOAA's National Marine Fisheries Service (NMFS).

Several listed species of whales and sea turtles are known to occur seasonally in the waters off of Delaware. Federally endangered North Atlantic right whales (*Eubalaena glacialis*) and humpback whales (*Megaptera novaeangliae*) are found seasonally in these waters. North Atlantic right whales and Humpback whales are expected to be in this area from November 1 – March 31. Fin (*Balaenoptera physalus*) and Sperm (*Physter macrocephalus*) whales are also seasonally present in these waters but are typically found in deeper offshore waters. Fin whales are likely to be present off the coast of Delaware from October – January and Sperm whales may be present in these waters from April – October. However, no listed whales are likely to occur in the Indian River Inlet, as such this project is not expected to affect whales.

The sea turtles in northeastern nearshore waters are typically small juveniles with the most abundant being the federally threatened loggerhead (*Caretta caretta*) followed by the federally endangered Kemp's ridley (*Lepidochelys kempi*). Loggerhead turtles have been found to be relatively abundant off the Northeast coast (from near Nova Scotia, Canada to Cape Hatteras, North Carolina). Loggerheads and Kemp's ridleys have been documented in waters as cold as 11°C, but generally migrate northward when water temperatures exceed 16°C. Sea turtles are typically present in offshore Delaware waters from April 15 – November 30, with the majority of sea turtles in the area from late May to early November. Concentrations of federally endangered leatherbacks (*Dermochelys coriacea*) have been observed during the summer off Delaware.

While leatherbacks are predominantly pelagic, they may occur close to shore, especially when pursuing their preferred jellyfish prey. Green sea turtles *(Chelonia mydas)* may also occur in Delaware waters in warmer months. Hawksbill sea turtles (*Eretmochelys imbricata*) may also be found in these waters, although these instances would be rare. While sea turtles may be seasonally present in the project area, sea turtles are strong swimmers with the ability to avoid areas of construction, as such, the installation of stone revetment is not expected to affect any sea turtles that may be found in the area.

The finding that the proposed project will not affect any listed species under the jurisdiction of NMFS is supported by the information provided by ACOE and NMFS has no additional information that supports a different conclusion. As Section 7 consultation is only required when an action may affect threatened or endangered species, no consultation pursuant to Section 7 of the ESA is necessary for this project. Should project plans change or new information become available that changes the basis for this determination, consultation should be initiated. Should you have any questions about these comments, please contact Sara McNulty at (978) 281-9300 ext. 6520.

Sincerely,

Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

Cc: Nichols, F/NER4

File Code: Sec 7 ACOE no effect – Indian River Inlet

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENTAL CONTROL
DIVISION OF SOIL AND WATER CONSERVATION
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

DELAWARE COASTAL MANAGEMENT PROGRAM

TELEPHONE: (302) 739 - 3451
FAX: (302) 739 - 2048

March 28, 2005

Minas Arabatzis
Philadelphia District Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

RE: Delaware Coastal Management Federal Consistency Certification
Indian River Inlet Shoreline Stabilization (FC 05.055)

Dear Mr. Arabatzis:

The Delaware Coastal Management Program (DCMP) has received and reviewed your consistency determination for the above referenced project. Based upon our review and pursuant to National Oceanic & Atmospheric Administration regulations (15 CFR 930), the DCMP concurs with your consistency determination for stabilizing approximately 900 feet of eroding shoreline along the north interior shoreline of Indian River Inlet in Sussex County, Delaware. Our concurrence is based upon the restrictions and/or conditions placed on any and all permits issued to you for this project.

If you have any questions regarding this determination please do not hesitate to contact me or Tricia Arndt of my staff at (302) 739-3451.

Sincerely,

Sarah W. Cooksey, Administrator
Delaware Coastal Management Program

SWC/tka

cc: File 05.055
Laura Herr- DWR

DELAWARE STATE HISTORIC PRESERVATION OFFICE

Mailing Address: #21 The Green, Suite A
Dover, DE 19901-3611
Phone Number: (302) 739-5685
Fax Number: (302) 739-5660
E-Mail Address: faye.stocum@state.de.us

FINDING OF NO HISTORIC PROPERTIES AFFECTED

Review Code: 05.01.24.03

Agency: Planning Division
Philadelphia District, Corps of Engineers
100 Penn Square East
Philadelphia, PA 19107-3390

Project: COE: Indian River Section 103 Project: Bank Stabilization along North Interior Shore of Indian River Inlet

The staff of the State Historic Preservation Office has reviewed the materials submitted regarding the above cited project. Based on this review, we concur with your determination that no historic properties, eligible for or listed in the National Register of Historic Places, will be affected by this proposed project.

Daniel R. Griffith
State Historic Preservation Officer

By: _____
Faye L. Stocum, Archaeologist

Date: February 24, 2005

cc: Robert Dunn

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENTAL CONTROL
DIVISION OF FISH & WILDLIFE
NATURAL HERITAGE & ENDANGERED SPECIES
4876 HAY POINT LANDING ROAD
SMYRNA, DELAWARE 19977
TELEPHONE: (302) 653-2880
FAX: (302) 653-3431

February 22, 2005

Minas M. Arabatzis
Chief, Planning Division
Department of the Army
Philadelphia District, Corps of Engineers
Wanamaker Building, 100 Penn Square East
Philadelphia, PA 19107-3390

RE: Shoreline stabilization utilizing stone revetment (approximately 900 ft)
Indian River Inlet, adjacent to the US Coast Guard Facilities

Dear Minas Arabatzis:

Thank you for contacting the Natural Heritage and Endangered Species program about information on rare, threatened and endangered species, unique natural communities, and other significant natural resources as they relate to the above referenced project.

A review of our database indicates that there are currently no records of state-rare or federally listed plants, animals or natural communities at or adjacent to this project site.

We are continually updating records on Delaware's rare, threatened and endangered species, unique natural communities and other significant natural resources. If the start of the project is delayed more than a year past the date of this letter, please contact us again for the latest information.

Sincerely,
Edna J Stetzar
Edna J. Stetzar
Biologist

Delaware Atlantic Coast Protection Project

Final Fish and Wildlife Coordination Act Report

Submitted to:

Philadelphia District
Corps of Engineers

September 19, 1984

Prepared by:

U.S. Fish and Wildlife Service
Annapolis Field Office

Introduction

Delaware's Atlantic Coast extends approximately 24.5 miles from Cape Henlopen to the state line at Fenwick Island. Located on the relatively flat Coastal Plain, the region is a combination of highlands, baymouth barrier bars and coastal lagoons. Portions of the coastline are designated as State Parks and as such are somewhat protected from development, while other areas such as Rehoboth Beach, Bethany Beach, South Bethany and Fenwick Island are highly developed.

Indian River Inlet, located twelve miles south of Cape Henlopen, is the only site of water exchange between the Atlantic Ocean and Indian River and Rehoboth Bays. Historically this was a natural, unstable inlet which migrated north and south over a 3-4 mile area. The Federal navigation channel at the inlet was adopted in 1937, and two jetties were constructed in 1939 to stabilize the area. This is a hyraulically dynamic inlet with a four foot normal tide range and water velocities often exceeding three feet per second. It is characterized by steep sides and a deep, sandy bottom. Development in the immediate vicinity of the inlet includes a U.S. Coast Guard Station and a state-owned marina on the north side with a private marina, trailer park and state campground on the south side.

Statement of Problem

Construction of the jetties at Indian River Inlet created an erosion problem on the ocean beach north of the inlet by depriving this area of sediments carried by the northward littoral drift. Erosion has continued to a point where, during a major storm event, the adjacent highway might be endangered. Additionally, due the the swift currents and tide range within the inlet, its shorelines are also subject to severe erosion. The north shore has been eroding an average of 17 feet/year and the south shore approximately 6 feet/year. Attempts to control erosion within the inlet by installing bulkheads and riprap have only transferred the problem to shoreline west of these structures. The Corps has proposed a number of alternative solutions for these two problem areas involving structural protection of the inlet shorelines and nourishment of the ocean beach from a number of possible borrow sites. These project alternatives were previously discussed our January 1984 planning aid report (USFWS, 1984).

Resources

Vegetation:

A large portion of the back-barrier marshes north and south of the inlet consists of saltmarsh cordgrass. Higher areas in this vicinity are vegetated with saltmeadow hay, saltgrass, American beachgrass, American threesquare, marsh elder, groundsel tree, myrtle and phragmites. The dune area between the beach and the highway contains isolated wetland pockets supporting species such as American threesquare, American cranberry, peat moss, sundew, marsh rose, royal fern and marsh shield fern. Other species

present include American beachgrass, myrtle and loblolly pine. Wetlands in the area have been rated high value for primary production, wildlife and avian habitat, fish spawning and nursery areas, flood protection and recreation such as clamming, crabbing and fishing (Delaware, 1976).

Aquatic:

Aquatic resources were listed and discussed in our August 1983 planning aid report (USFWS, 1983). The area supports a wide variety of subtidal and intertidal species including primary producers and primary and secondary consumers. All are valuable components of the aquatic ecosystem, important in transferring energy along the food web. Diatoms and dinoflagellates are the primary phytoplankton groups in the area although other groups are represented as well. Calanoid copepods dominate the zooplankton community along the Delaware coast. Benthic macroalgae are not abundant in the project area, there being little stable substrate to which they can attach. Invertebrates are well represented and include benthic, nektonic, commensal and semi-terrestrial species. Those of commercial importance include bluecrabs, hard and soft clams, razor clams and surf clams. None of these animals are believed to be present within the project area in sufficient quantities to have commercial value. Lobsters populate the jetties and are taken recreationally. The abundance of nutrients and forage organisms makes this region a productive finfish area as well, with approximately 61 species likely to be found off the coast. Many of these species use the area as spawning and nursery grounds.

Terrestrial:

Terrestrial wildlife resources were also previously discussed in our August 1983 planning aid report. The vicinity of Indian River Inlet is less highly developed than other sections of the Delaware coastline and as such is most valuable for wildlife. The area receives high bird use by shorebirds, waterfowl and other species, some of which nest in the immediate vicinity. Many previously used nest sites have been lost either to development or erosion, therefore the few remaining undeveloped areas suitable for nesting are becoming increasingly essential for these species. A wide variety of reptiles and mammals also occurs along this stretch of coastline, but as with the birds, suitable habitat is rapidly disappearing due to the increasing development of this portion of the state.

Threatened and Endangered Species:

Threatened or endangered species expected to occur within the project area were discussed in our August 1983 planning aid report. The only endangered fish possibly occurring within the project area is the shortnose sturgeon (Acipenser brevirostrum). Five species of threatened or endangered sea turtles and six species of endangered whales may also be found along Delaware's coast. Two endangered birds are known to occur in the vicinity - the bald eagle and peregrine falcon. The Ipswich sparrow (Passercylus sandwichensis princeps), while not threatened or endangered, is a rare

species known to winter along the Atlantic coastal beaches and dunes. There are also two rare plant species which may exist within the project area - the sea beach pigweed and the chaffseed.

Project Impacts

Selected project alternatives are: 1) stone revetments for the interior inlet shorelines (NS-1 and SS-1), and 2) beach nourishment of the north exterior shoreline (NSE-4) using 80,000 cy of initial nourishment dredged from the flood shoal and continuous nourishment using the jet pump system. None of the alternatives for the South Bethany portion of the project were found to be justified (USACE, 1984).

1. Interior Inlet Shorelines

The selected alternative for this portion of the project involves constructing 1850 feet of stone revetment along the north interior shore and 1580 feet along the south interior shore. These revetments would extend from -4.5 NGVD to +5 NGVD with a 2:1 slope. As mentioned in our 1984 planning aid report (USFWS, 1984), many of the impacts associated with revetments are related to their construction. Benthic organisms are destroyed, as well as some subtidal, intertidal and upland habitat. The resulting temporary increase in water turbidity and sediment deposition adversely affects aquatic organisms, covering spawning areas, smothering benthic organisms and reducing bottom habitat diversity and food supply. Depending on the time of year, construction may disrupt spawning activities of aquatic organisms, nesting activities and resting of waterfowl, seabirds and shorebirds in the vicinity, and recreational use of the area.

Some of these adverse impacts are offset by the fact that revetments create a different type of habitat for organisms. The more irregular the revetment surface the better, since this provides more cracks and crevices to shelter aquatic organisms. Setting time of year restrictions for construction activities may alleviate some of the impacts as well.

2. North Shore Exterior

The selected alternative for the ocean shoreline involves a combination of dredging and use of the jet pump system. Initially, 80,000 cy of beachfill would be dredged from the flood shoal and placed along 1500 linear feet of beach immediately north of the inlet. Following this, a semimobile jet pump system installed just south of the inlet would continue beach nourishment, pumping 100,000 cy of material per year from the south fillet onto the northern beach over a 3,500 linear feet span. The jet pump system includes a pump house installed behind the dunes on the south side of the inlet, with a water suction pipe in the inlet and two flexible sand suctioning pipes extending into the surf zone immediately south of the south jetty. The discharge pipe would cross the inlet by attachment to the Route 1 bridge, and then

extend along the north beach for a distance of 3,500 feet. A low profile, timber-sheet pile groin, 400 feet long, would be constructed 200 feet south of the jetty to maintain the beach to the south and prevent progressive degradation due to pumping.

Dredging the flood shoal would have a number of impacts, primarily the destruction of benthic organisms and habitat. Any existing shellfish grounds would be disrupted as would forage areas for other species. There would also be a temporary increase in turbidity, which would adversely impact aquatic organisms in the vicinity. Placing the borrow material on the north ocean shore would cause a temporary increase in turbidity, bury any benthic organisms inhabiting the beach and intertidal zone, and disrupt feeding activities of shorebirds.

Installation of the jet pump system would damage some habitat and organisms in the immediate vicinity. Table 20 of the 1984 Re-evaluation Report lists "minor short-term disturbance of dunes" as one of the adverse impacts, although there is no discussion of this in the body of the report. Sand dunes are extremely important in coastal protection, serving as a primary buffer for the land behind them during storm events. They are also very fragile ecosystems supporting a diversity of flora and fauna, but easily destroyed when subjected to misuse.

Operation of the jet pump system would create additional adverse impacts. One possible problem involves the water intake pipe. There is no indication of the size of this pipe, but such a structure has the potential to destroy aquatic organisms which venture near it during operation. The sand intake pipes pose the same problem, impacting benthic organisms primarily, but they may also disturb the lobster population inhabiting the jetty. These intake pipes may be deployed over a fairly wide range, and the constant disturbance associated with their operation destroys benthic organisms and precludes biotic recovery at the site. This, in turn, removes this area (for the life of the project) as a useful part of the aquatic ecosystem, both as habitat for benthics and as a forage area for other species. On page 127 of the Re-evaluation Report the statement was made that because the south fillet borrow site is smaller in surface area than the ebb or flood shoals, long term impacts would be less using this site. However, use of the jet pump system creates a <u>permanent</u> disturbance in this smaller area, ruining the chance of effective biotic recolonization. By using the ebb and flood shoals as alternate borrow sites, at least there is an opportunity for recovery in each area, since offshore sites tend to recolonize in about a year. We are also a bit uneasy about the capability of the south fillet to provide 100,000 cy of sand each year. The several methods used to determine net longshore transport rates, as described in the Re-evaluation Report under the "Sediment Budget and Shoreline Erosion Analyses" section produced some rather large discrepancies (USACE,1984).

Pumping borrow material to the feeder beach represents another form of constant disturbance, burying benthic organisms and increasing turbidity. Since the jet pump system is only scheduled to operate between November and April, it may not interfere with spawning activities of many species, but it would preclude effective recolonization of this section of beach by benthic organisms. Reilly and Bellis (1978) found that biotic recovery of a nourished beach usually requires one or two seasons unless it is subjected to periodic nourishment, in which case complete recovery may never occur. As a result, 3500 linear feet of beach and intertidal zone would be removed as benthic habitat and as a feeding area for shorebirds and other species. On page 127 of the Re-evaluation Report, in the discussion of impacts on the nourishment site, the statement is made that "populations of beach organisms are already depressed due to the dynamic nature of the beach." Almost all ocean beaches are dynamic, subject to erosion and/or accretion of sand, and the species diversity of resident macrofauna is limited as a result of this characteristic. Without supporting data, we question that the north exterior shore supports significantly fewer beach organisms than other areas.

Mitigation

The U.S. Fish and Wildlife Service has developed a Mitigation Policy, published in the January 23, 1981, Federal Register, in an effort to conserve fish and wildlife resources subject to the adverse effects of major environmental changes caused by resource development. The purpose of the Mitigation Policy is fivefold:

1. To assure consistent, effective recommendations to conserve important fish and wildlife resources for the benefit of people.

2. To facilitate balanced development and multiple use of natural resources - particularly energy, water and strategic minerals.

3. To allow action agencies and developers to anticipate Service recommendations.

4. To reduce delays and conflicts.

5. To make clear that the Service's policy is not "acre for acre" but is based on the significance and scarcity of the habitat.

Briefly, the Service's mitigation policy reflects the goal that the most important fish and wildlife resources should receive the greatest level of mitigation when the environment of a particular area is changed. By designating four resource categories, the Service can vary the degree of mitigation it recommends according to the value and scarcity of the habitat at risk:

Resource Category	Criteria for Resource Category Designation	Mitigation Planning Goal
1	Habitat is of high value for evaluation species* and is unique and irreplaceable.	No loss of existing habitat value.
2	Habitat is of high value for evaluation species and is scarce or becoming scarce.	No net loss of in-kind habitat value.
3	Habitat is of high to medium value for evaluation species and is abundant.	No net loss of habitat value, while minimizing the loss of in-kind habitat value.
4	Habitat is of medium to low value for evaluation species.	Minimize loss of habitat value.

* Evaluation species are those important fish and wildlife resources with high public interest or ecological significance, or both.

In the case of the Delaware Atlantic Coast Protection Project, the Service believes that most of the habitat impacted would fall under Resource Category 3. That is: "habitat to be impacted is of high to medium value and is relatively abundant on a national basis." Guidelines to achieve the mitigation goals are as follows:

> "The Service will recommend ways to avoid or minimize losses. If losses are likely to occur, then the Service will recommend ways to immediately rectify them or reduce or eliminate them over time. If losses remain likely to occur, then the Service will recommend that those losses be compensated by replacement of habitat value so that the total loss of habitat value will be eliminated.
>
> It is preferable, in most cases, to recommend ways to replace such habitat value losses in-kind. However, if the Service determines that in-kind replacement is not desireable or possible, then other specific ways to achieve this planning goal include: 1) substituting different kinds of habitats, or 2) increasing management of different replacement habitats so that the value of the lost habitat is replaced. By replacing habitat value losses with different habitats or increasing management of different habitats, populations of species will be different, depending on

the ecological attributes of the replacement habitat. This will result in no net loss of total habitat value, but may result in significant differences in fish and wildlife populations. This is generally referred to as out-of-kind replacement."

Given the selected alternatives for this project, resource losses will occur, some of which can be reduced, others cannot. Temporary construction impacts, such as bottom habitat disruption, increased turbidity and dune disturbance, can be alleviated somewhat by imposing time of year restrictions to avoid spawning and nesting periods, by keeping dune disturbance to an absolute minimum, and by reconstructing and re-vegetating damaged dunes. Concerning the water intake pipe, if the pipe is of sufficient size and intake velocities high enough to significantly affect aquatic resources in the vicinity through entrainment, then some type of protective screen would be required.

Other effects such as smothering benthic organisms and precluding biotic recovery in the borrow and nourishment areas, disrupt forage areas for aquatic species and shorebirds and adversely affect the food chain. Such losses cannot really be avoided and must therefore be compensated by replacement of habitat value. However, replacing such habitat value losses in-kind would be impossible in this instance because it is impossible to create additional beach, intertidal and subtidal habitats with their associated flora and fauna in the area. In such cases out-of-kind replacement is necessary, substituting different kinds of habitat and/or increasing management of different replacement habitats so that there is no net loss of total habitat value.

Such measures might include implementation, by the State, of long-range biological management plans using project funds to protect and enhance habitat in the vicinity for fish and wildlife resources. As mentioned in our 1984 planning aid report, suitable habitat for colonial nesting birds in the area is being rapidly reduced, and a management plan addressing enhancement measures for such habitat would greatly benefit a number of species. On page 92 of the Re-evaluation Report there is a statement that the south shore of Burtons Island has been subject to erosion since 1939 (when the Federal project at Indian River Inlet was initiated). This island is, at present, relatively undeveloped and, as such, is of high value to wildlife species. Therefore, another mitigation effort would be to institute protection measures for this shoreline.

The Service fully agrees that erosion control is necessary at Indian River Inlet. However, the project will result in unavoidable resource losses which must be mitigated. This section of the state, while becoming rapidly developed, still maintains important values for fish and wildlife resources, and a continued net resource loss in this area is totally unacceptable.

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