ES-00/336

February 12, 2001

Frank J. Cianfrani, Chief
Regulatory Branch
Philadelphia District
U.S. Army Corps of Engineers
100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

Dear Mr. Cianfrani:

This letter transmits the U.S. Fish and Wildlife Service's (Service) final Biological Opinion regarding our review, in accordance with Section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*.) (ESA), of proposed dredging of back-bay basins within the Borough of Stone Harbor and subsequent disposal of dredged material at Stone Harbor Point within the Borough of Stone Harbor, Cape May County, New Jersey (Public Notice CENAP-OP-R-199901066-24, dated June 23, 2000), and the effects of the project on the federally listed (threatened) piping plover (*Charadrius melodus*).

The Borough of Stone Harbor's comments on the draft Biological Opinion, were considered and, where appropriate, were incorporated into the enclosed final Biological Opinion. Regarding comments from the Borough's attorney, Mr. Richard Hluchan, the Service's review of the Philadelphia District, U.S. Army Corps of Engineers' (Corps) proposed action of issuing a Department of the Army permit for the project followed the regulations governing interagency consultations (50 CFR 402) and the Endangered Species Consultation Handbook (U. S. Fish and Wildlife Service and National Marine Fisheries Service, 1998). Accordingly, the Service's review was based upon the project description as modified by the Corps proposed permit conditions. Reasonable and prudent measures and the accompanying terms and conditions provided within the enclosed Biological Opinion are provided to minimize incidental take of piping plovers that is anticipated to occur as a result of the proposed project and are nondiscretionary. In order to be exempt from the prohibitions of Section 9 of the ESA, the Corps and the Borough must comply with the terms and conditions, which implement the reasonable and prudent measures.

Regarding the Borough and Mr. Hluchan's comments on the Corps proposed permit condition requiring bioaccumulation / bioassay testing, the Service recommends that the Corps refer the Borough to the joint U.S. Environmental Protection Agency (EPA) / Corps document, *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual* (1998) (a.k.a. Inland Testing Manual). The Inland Testing Manual explains when and how to perform bioaccumulation tests, and how to interpret the test results. Assistance in understanding and using the Inland Testing Manual would be best obtained from the agencies that produced the document (i.e., the Corps and EPA).

If you have any questions or concerns regarding this consultation, please contact John C. Staples or Annette M. Scherer of my staff at (609) 646-9310, extensions 18 and 34, respectively.

Sincerely,

Clifford G. Day
Supervisor

Enclosure

Literature Cited

U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. 1998. Evaluation of dredged material proposed for discharge in waters of the U.S.- Testing Manual. EPA-823-B-98-004, Washington, D.C.

U. S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered species consultation handbook, provisions for conducting consultation and conference activities under section 7 of the Endangered Species Act. U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, National Marine Fisheries Service, Washington, D.C. 154 + appendices

cc: NJFO (5)
ARD, ES
R5, ES, Hecht
NJDEP, ENSP: Jenkins
Borough of Stone Harbor: Mayor Suzanne Walters
M.V. Engineering: Brian Murphy
Congressman Frank LoBiondo

NJFO:ES:AScherer:ams: 02/09/01

FINAL

BIOLOGICAL OPINION ON THE EFFECTS OF DREDGED MATERIAL DISPOSAL ACTIVITIES AT STONE HARBOR POINT, CAPE MAY COUNTY, NEW JERSEY ON THE PIPING PLOVER

Prepared for:

U.S. Army Corps of Engineers
Philadelphia District
Philadelphia, Pennsylvania 19107-3390

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Prepared for:

U.S. Army Corps of Engineers
Philadelphia District
Philadelphia, Pennsylvania 19107-3390

Prepared by:

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February 2001

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I. INTRODUCTION

This document represents the U.S. Fish and Wildlife Service's (Service) Biological Opinion, in accordance with Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.) (ESA), on the effects of the U.S. Army Corps of Engineers, Philadelphia District's (Corps) proposed issuance of a Department of the Army permit for dredging of back-bay basins within the Borough of Stone Harbor and subsequent disposal of dredged material at Stone Harbor Point within the Borough of Stone Harbor, Cape May County, New Jersey (Public Notice CENAP-OP-R-199901066-24, dated June 23, 2000) on the federally listed (threatened) piping plover (*Charadrius melodus*).

At issue is the proposed dredged sediment disposal plan identified in the Public Notice for the subject permit, in which sediments from back-bay basins would be dewatered in a temporary confined disposal facility (CDF) and then re-graded into subtidal and intertidal zones at Stone Harbor Point, New Jersey. The CDF, as proposed, would appreciably reduce available piping plover nesting and foraging habitat at Stone Harbor Point for at least one full piping plover breeding season. In addition, preliminary chemical analysis of the proposed dredge sediments revealed total mercury concentrations at levels of concern, both for benthic organism toxicity via bioaccumulation and for the potential to biomagnify in the aquatic food chain. Piping plovers, which are primarily dependent on the benthic invertebrate community (marine worms, crustaceans, mollusks) as a prey base, nest and forage on or near the proposed disposal site.

For the purposes of this consultation, the Service evaluated the project with modifications proposed by the Corps, including permit conditions proposed by the Corps to minimize or avoid adverse impacts to the piping plover. This biological opinion is based on information provided within the *Environmental Impact Statement for Dredging of Backbay Basins with Environmental Restoration of Stone Harbor Point, Borough of Stone Harbor, Cape May County, New Jersey* (M.V. Engineering, 2000a) and the *Biological Assessment for Restoration of Stone Harbor Point, Borough of Stone Harbor, Cape May County, New Jersey* (BA) (M.V. Engineering, 2000b), other information provided by the Corps and the Borough of Stone Harbor (applicant) for Service review, and discussions with the Corps and the applicant during telephone conversations and meetings as outlined below. A complete administrative record of this consultation is on file in the Service's Ecological Services, New Jersey Field Office.

II. CONSULTATION HISTORY

The Service engaged in informal consultation with the Corps and the applicant regarding the proposed project. During informal consultation and following initiation of formal consultation the Service participated in numerous telephone calls and exchanged additional information via electronic mail or facsimile with the Corps and the applicant. During the period of December 15, 2000 to February 12, 2001, the Service and the Corps exchanged frequent telephone and electronic communications regarding the Service's draft Biological Opinion and refinement of the Corps proposed permit

conditions. A chronology of key correspondence, meetings and telephone communications is provided below.

August 14, 1997 — The applicant's preliminary project proposal was discussed, during an Interagency (Joint) Permit Processing Meeting (JPPM), at the New Jersey Department of Environmental Protection (NJDEP) offices in Trenton, New Jersey. Applicant representatives provided background information on the proposed back-bay basins dredging project, which included a preliminary evaluation of four dredged material disposal site alternatives (i.e., Site 103, Scott property, Sedge Island, and Stone Harbor Point).

January 21, 1999 — Applicant representatives provided a revised project proposal, during a JPPM, that included an "environmental restoration" plan using dredged material at the Point. The applicant proposed to place material dredged from 9 back-bay basins onto Stone Harbor Point, within a confined disposal facility (CDF), and construct an associated maintenance vehicle access road in conjunction with a beach nourishment project proposed by the Corps. The applicant and the Corps were advised by the Service that consultation pursuant to the ESA would be required regarding piping plovers nesting at Stone Harbor Point.

April 1999 — The Service reviewed a copy of the document entitled, *Environmental Impact Statement for Environmental Restoration of Stone Harbor Point* (EIS) (M.V. Engineering, 1999). The EIS concluded that piping plovers were not likely to nest within the proposed project area at Stone Harbor Point, but included measures to protect piping plovers, including a restriction on construction activities from April 1 through August 15. In addition, information in the EIS indicated that increases in contaminant levels at the dredged material placement site (Stone Harbor Point) were not expected from the proposed project.

May 27, 1999 — The Service received a copy of the Waterfront Development Law (N.J.S.A. 12:5-3 *et seq*.) (WDL) and Coastal Area Facility Review Act (N.J.S.A. 13:19-1 *et seq*.) (CAFRA) permit application for the Borough of Stone Harbor back-bay dredging proposal from the NJDEP, Office of Dredging and Sediment Technology (ODST)).

May 28, 1999 — The Service received a copy of the ODST's letter indicating deficiencies in the Borough of Stone Harbor's WDL and CAFRA application. The ODST informed the Borough of Stone Harbor that dredging projects must be consistent with the regulations listed in NJDEP's 1997 dredging technical manual. The ODST requested information regarding the erosion potential and

	fate of the dredged material following placement at the Point. In addition, ODST informed the Borough of Stone Harbor that bulk sediment chemistry and elutriate testing would be required for any dredged material consisting of less than 90 percent sand.
June 3, 1999	The Service received a copy of the Corps - Planning Division's letter to the applicant enumerating several unresolved concerns regarding the proposed CDF, use of the dredged material for environmental restoration, proposed project revisions, and project life.
June 28, 1999	The applicant's representative, M.V. Engineering, provided the Corps with a letter describing the applicant's project purpose as habitat restoration and dredged material disposal and providing information regarding project modifications that included an increase in dredged material volume and methods of dredged material volume calculation (i.e., using digitized maps, Global Positioning System (GPS), and computer calculation of the fill volumes).
July 2, 1999	Via telephone, the NJDEP, Endangered and Nongame Species Program (ENSP) provided the Service with information regarding current piping plover nesting activity at Stone Harbor Point. The ENSP documented 3 pairs of piping plovers nesting at Stone Harbor Point during the 1999 nesting season.
July 2, 1999	The Service provided written comments and recommendations to the ODST regarding the Borough of Stone Harbor's application for a NJDEP CAFRA and WDL permit for the proposed project. The Service recommended revising the Borough of Stone Harbor's EIS to include an alternatives analysis and dredged material contaminants testing. Other Service concerns included the long-term nature of the proposal, human disturbances to piping plovers associated with proposed CDF access roads, and State-listed threatened and endangered species that are known to nest at Stone Harbor Point. The Service requested that the Borough of Stone Harbor prepare a Piping Plover Management Plan to ensure the long-term protection of piping plovers nesting within the project area.
July 8, 1999	Borough of Stone Harbor representatives presented a revised project proposal at the monthly JPPM, held at the NJDEP offices in Trenton, New Jersey. The Service informed the Borough of Stone Harbor of its responsibilities regarding compliance with restrictions during the piping plover nesting and brood-rearing season (i.e., April 1 through August 15). Corps - Planning Division representatives discussed the potential for dovetailing with the federal (Water Resource Development) beach nourishment project proposed at the Point.

	Corps - Regulatory Branch representatives stressed the importance of an alternatives analysis for the subject project.
August 10, 1999	Via letter, the ODST responded to the Borough of Stone Harbor's request for guidance on sediment sampling and testing. The ODST response indicated that, based upon the exclusionary criteria for sand, only the Paradise Bay substrate would not require further chemical testing. The ODST response listed the core samples required and indicated that 5 bulk sediment chemistry tests and modified elutriate tests would be required on the remainder of the basin composite samples.
September 22, 1999	Service Biologists met with ENSP Biologists at Stone Harbor Point. The meeting was held to observe site conditions and discuss concerns regarding piping plover nesting and feeding habitats in relation to the proposed federal (Corps) beach nourishment project and the Borough of Stone Harbor's proposed dredging/habitat restoration project.
January 6, 2000	The Service received a Permit Application Transmittal (File # 0510-99-0012.1 & 12.2) from the NJDEP, ODST for Service review of the revised EIS for the subject project. Information in the January 2000 EIS (M.V. Engineering, 2000a), regarding potential impacts to piping plovers, was essentially the same as provided in the previous (April 1999) version of the EIS and did not fully address potential impacts to nesting plovers from the proposed project.
February 22, 2000	The Service provided a letter to ODST in response to Land Use Regulatory Program (LURP) application (No. 0510-99-0012.1 & 12.2) for the Borough of Stone Harbor's dredging / habitat restoration proposal. The Service concluded that the information provided in the EIS was insufficient to make a determination that the project posed negligible risk to fish and wildlife resources from exposure to environmental contaminants. The Service recommended bulk sediment chemistry analysis for compounds known to be bioaccumulative (i.e., polychlorinated biphenyls (PCBs)), using detection limits sufficient to determine risk to marine and estuarine aquatic organisms, and then comparison of analytical results with appropriate guideline levels. The Service recommended that sediments with toxicant concentrations exceeding such levels be prohibited from placement in open water.
March 17, 2000	The ODST provided a letter to M.V. Engineering requesting additional information based on a March 15, 2000 site inspection with Corps and Borough of Stone Harbor representatives. The letter addressed concerns regarding the revised footprint for the Stone Harbor Point CDF. The ODST

recommended delineating intertidal areas within the proposed CDF footprint using the neap phase of high tide.

April 10, 2000 — Borough of Stone Harbor, ENSP, National Marine Fisheries Service (NMFS) and Service representatives met at Stone Harbor Point to discuss resource agency concerns regarding the revised CDF footprint relative to beach nesting bird habitats, including intertidal areas. The Borough's representative indicated that some native sand (i.e., from Stone Harbor Point) would be used to construct the CDF berm and that it was anticipated that berm construction could be completed in approximately 2 weeks. The Borough's representative also indicated that the final footprint of the material, following dewatering (after approximately 1 year) would be based on recommendations by ENSP, NMFS, and the Service.

May 16, 2000 — Borough of Stone Harbor, ENSP, NMFS, Corps, ODST, and Service representatives met at the Service's New Jersey Field Office (NJFO) to discuss the Section 7 formal consultation process and other project concerns. The Borough expressed concerns regarding the timing of the project relative to required seasonal restrictions. Since placement of material at the Stone Harbor Point CDF was proposed to extend throughout at least one piping plover nesting and brood-rearing season (i.e., April 1 to August 15), the Service advised that formal consultation, under Section 7 of the ESA, would be necessary. The Service indicated that a Biological Assessment (BA), including the recommended contaminants test results, would be required for the Service to prepare its Biological Opinion. The Borough was informed that the Corps could not finalize any permit authorization until Section 7 consultation was completed.

May 29, 2000 — Via conference call, the Service discussed Section 7 consultation concerns regarding the subject project with staff from U.S. Senator Frank Lautenberg's office. The Service provided a brief background of the proposal, including the apparent geomorphological changes and resulting piping plover nesting that has occurred at Stone Harbor Point since 1995. The Service also explained the applicant's responsibility to prepare an assessment of potential project impacts to federally listed species and to avoid or minimize such impacts, including minimization of exposure to potentially contaminated dredged sediments.

June 6, 2000 — In a telephone conversation between the Service and the ODST, the ODST stated that the Borough of Stone Harbor had proposed additional mercury testing of sediment from Stone Harbor Point, pursuant to recommendations by the NJDEP. The proposed testing was to determine background mercury

values at Stone Harbor Point and to compare these values with back-bay basin values reported in the EIS.

June 19, 2000 — The Service received a preliminary draft of the Borough of Stone Harbor's BA, dated June 16, 2000. Following a review of the draft BA, the Service determined that the draft BA did not include a complete project description or adequately identify potential impacts to piping plovers. The Corps was notified that additional information would be needed.

June 20, 2000 — The Corps - Regulatory Branch sent a letter to the Service requesting initiation of formal consultation pursuant to Section 7 of the ESA and indicating that the requested BA would be forwarded when available. The Service notified the Corps via telephone that the consultation period would not begin until the Service's receipt of the final BA.

June 28, 2000 — The Corps and Service Biologists met with Borough of Stone Harbor representatives to assist in identifying additional information that should be included within the Borough's final BA. The Service recommended that the BA include a description of project phases (especially with respect to the proposed Stone Harbor Point CDF), proposed project implementation dates, CDF berm design, site plans for the dewatering area, and final site design. With respect to the dredging portion of the proposal, the Service noted that the BA lacked information regarding sediment grain size, preliminary contaminants information, and a description of analytical methodologies. Preliminary restoration project plans (dated June 6, 2000) included the creation of 9.5 acres of bayberry (*Myrica pensylvanica*) habitat within currently suitable piping plover nesting and feeding habitat. Meeting participants agreed to consider any contours above the 3.8-foot elevation as potential piping plover nesting habitat. Elevations at or below the 2.0-foot elevation are considered intertidal piping plover feeding habitat. Based upon comments provided by the Service, the Borough agreed to reduce the acreage of bayberry habitat to be created.

June 28, 2000 — The Service received the Corps Public Notice (PN), (No. CENAP-OP-R-199901066-24) dated June 23, 2000, for the Stone Harbor Borough proposal.

July 10, 2000 — The Corps forwarded the Borough of Stone Harbor's final BA, dated July 6, 2000, to the Service along with the Corps request for initiation of formal consultation.

July 11, 2000 — The Service received the Borough of Stone Harbor's final BA and the Corps' request for initiation of formal consultation. The Borough's BA included revised

project plans (dated July 5, 2000) reducing the acreage of bayberry habitat to be created to approximately 4.6 acres.

July 18, 2000 — The Service received copies of analytical results for the Stone Harbor Point mercury testing from the ODST. Results indicated that background mercury concentrations from Stone Harbor Point sediments were approximately one order of magnitude lower than back-bay basin values reported in the EIS.

July 27, 2000 — The Service received a copy of M.V. Engineering's letter to ODST, dated July 25, 2000, indicating that total PCB levels for the five basins tested were below the Effects Range-Median (180 parts per billion) for Marine / Estuarine Sediment Screening Guidelines established by Long *et al*. (1995). According to Service review of the analytical data, PCB concentrations were also at or below Long *et al.'s* (1995) Effects Range-Low. These results satisfied Service concerns regarding PCBs, but did not address outstanding concerns regarding mercury. M.V. Engineering's letter concluded that placement of tested sediments at the Point would have a low probability of causing adverse benthic impacts and would, therefore, be consistent with the NJDEP Rules on Coastal Zone Management (CZM).

July 28, 2000 — The Service provided a letter to the Corps - Regulatory Branch acknowledging receipt of the Corps July 10, 2000 letter initiating formal consultation pursuant to the ESA.

August 3, 2000 — The ODST issued a Waterfront Development Permit / Water Quality Certificate for the Stone Harbor Borough proposal. The permit authorized one-time dredging (65,340 cubic yards) of the 9 basins, via hydraulic pipeline, to a depth of 6.0 feet below mean low water elevation. The permit also authorized the construction of a temporary CDF at Stone Harbor Point, which would impact a maximum of 9.82 acres of intertidal shallows. Administrative Condition No.1 of the permit indicated that federal approvals, including Corps authorization, must be obtained prior to project implementation. The permit does not apply to Shelter Haven, Snug Harbor and South Basin (high contaminant sites).

August 8, 2000 — The applicant contacted the Service regarding project modifications to forego pre-disposal bioaccumulation testing of the back-bay basin sediments, with the alternative being to pump the sediments into the CDF on schedule and then conduct additional bulk chemistry analysis after dewatering. The applicant indicated that the hydraulic dredging process would cause grain size segregation in the CDF, allowing for easier removal of fine-grained sediments if testing still revealed mercury concentrations of concern. The Service agreed to evaluate the feasibility of this proposal.

September 14, 2000	Representatives of the Borough of Stone Harbor, Corps, ODST, and the Service met at NJDEP headquarters in Trenton, New Jersey, during the September JPPM. The purpose of the meeting was to discuss further project modifications, notifications, and chemical testing requirements. The Corps Project Manager indicated that new plans, including revised dredging volumes, would be needed to reflect the proposed dredging of boat slips in the basins. The ODST indicated that the sediments in the areas close to the bulkheads (i.e., boat slip areas) may not have been sufficiently characterized. The ODST raised concerns that grain-size characteristics of sediments in the boat slip areas would reflect an affinity for mercury accumulation. The Service reiterated that further mercury testing would be required in order to address concerns regarding bioaccumulation / biomagnification of mercury in basin sediments proposed for placement on Stone Harbor Point.
September 22, 2000	Via letter, the Service submitted comments and recommendations to the Corps, based upon information provided in the Corps PN and conversations with Corps Biologists regarding proposed modifications (i.e., additional dredging in boat slips). The Service recommended that the Corps require the Borough of Stone Harbor to conduct a comprehensive evaluation of mercury contamination risks in order to demonstrate that sediments from the back-bay basins would not adversely impact piping plovers and other federal trust resources. The Service also recommended that the Corps require the Borough of Stone Harbor to re-assess dredged material disposal alternatives, should they decide not to proceed with further mercury contamination testing.
September 29, 2000	During a telephone conversation with M.V. Engineering, the Service explained the rationale and need for additional testing of the proposed dredged sediments to ensure the safety of piping plovers using Stone Harbor Point. The Service referred M.V. Engineering to the Inland Testing Manual, Appendix E (U.S. Environmental Protection Agency and U.S. Army Corps of Engineers, 1998) for specific information regarding relevant sediment testing criteria. M.V. Engineering was directed to the Corps' Internet website to obtain a copy of the Inland Testing Manual.
October 5, 2000	Representatives of the Borough of Stone Harbor, Corps - Regulatory Branch, and the Service met at NJFO to clarify the Service's position with respect to additional mercury testing recommendations. The Borough of Stone Harbor indicated that the project could not be implemented during the fall of 2000 if they were required to perform bioaccumulation testing of the dredged material prior to placement in the Stone Harbor Point CDF. The Corps and Service agreed to consider an option that would allow dredged material placement at

the temporary Stone Harbor Point CDF during the fall and winter of 2000-2001, provided: the CDF was constructed in a manner that would be likely to withstand typical coastal storms; necessary contaminant testing could be accomplished during the dewatering period and removed if necessary without extending the project duration into more than one nesting season; a performance bond or other financial assurance was provided sufficient to cover costs to remove materials determined to be unsuitable for disposal into an aquatic environment.

October 10, 2000 — The Service responded to an inquiry from U.S. Congressman Frank LoBiondo's office (2nd District, New Jersey) regarding the October 5, 2000 meeting and the status of the Service review of the subject project. The Service clarified that the chemical testing required was a tiered approach and that M.V. Engineering may have misunderstood that the first level of testing was used as a screening to determine the need for additional levels of testing. It was also conveyed that this recommended approach has been consistent with the Corps testing requirements for dredged materials.

October 10, 2000 — M.V. Engineering, in a letter to the Service, requested a waiver from performing any additional chemical testing.

October 11, 2000 — M.V. Engineering, on behalf of the Borough of Stone Harbor, submitted a sampling plan to the Corps, which included a sampling "grid" for dredged spoil sampling following dewatering at the Stone Harbor Point CDF. M.V. Engineering proposed a14-ppm mercury level as the Borough's threshold for dredged material removal.

October 12, 2000 — At the JPPM in Trenton, Service, NMFS, Corps, and U.S. Environmental Protection Agency, Region II (EPA), and representatives discussed several issues that still required clarification since the October 5, 2000 meeting at the NJFO. The NMFS requested further information regarding the acreage of intertidal impact of the dredged material following spreading. It was agreed that the14-ppm mercury testing limit, as requested by the Borough of Stone Harbor, was inappropriate for this level of testing (i.e., the testing limits as defined by the Long *et al*. (1995) criteria would be applied).

October 13, 2000 — M.V. Engineering submitted their interpretation of minutes from the October 5, 2000 meeting at NJFO.

October 16, 2000 — The Corps addressed M.V. Engineering's waiver request and proposed sampling plan. The Corps indicated that a waiver was not possible and

	requested details regarding the timing of dike construction, dredging, testing, and removal of contaminated dredged material from the Stone Harbor Point CDF. In addition, the Corps requested details regarding the guarantee (financially and logistically) for removal and disposal of contaminated material (i.e., material containing greater than 0.15 ppm mercury) and an engineering analysis on the stability of the proposed Stone Harbor Point CDF berm.
October 19, 2000	M.V. Engineering provided a response to the Corps October 16, 2000 requests and comments. M.V. Engineering continued to rebut the recommended chemical testing requirements and indicated that testing the dredged material at the Effects Range - Low for mercury, as established by Long, *et al*. (1995), would eliminate Stone Harbor Point as a feasible disposal alternative. In addition, M.V. Engineering indicated that specific timeframes for the various components of the project with respect to dredging, dredged material drying, and removal or spreading from the CDF, could not be addressed. M.V. Engineering did provide additional details regarding the Site 103 CDF, indicating its capacity to accept the 9,279 cubic yards of additional dredged material from the boat slip areas of the basins.
October 20, 2000	M.V. Engineering responded to the Corps request for additional information. In its letter, M.V. Engineering indicated that the Borough of Stone Harbor was willing to test the dredged material within the proposed Stone Harbor Point CDF and remove material that had "excessive" mercury levels; however, the Borough suggested that the threshold level of 0.15 ppm for mercury was unreasonable and arbitrary and did not provide any assurance that materials testing in the range of 0.71 to 0.15 ppm for mercury would undergo bioaccumulation testing or be removed.
October 25, 2000	The Corps - Regulatory Branch responded to M.V. Engineering's October 19, 2000 comments. The letter addressed several outstanding concerns including the logistics of beginning work during the fall of 2000, area of boat slips proposed for dredging, contractor re-mobilization logistics, and details regarding proposed impacts on intertidal areas as requested by NMFS.
November 1, 2000	The Service responded to M.V. Engineering's October 10, 13, 19, and 20, 2000 correspondence. A summary of the October 5, 2000 meeting was provided. The Service also addressed several inaccuracies and misrepresentations made by M.V. Engineering regarding the Service's position. The response also served to clarify the Service's position on the sediment testing required to ensure minimization of potential environmental impacts.

November 3, 2000	M.V. Engineering responded to the Service's November 1, 2000 letter by requesting a document detailing the number of bioaccumulation studies required and the pass/fail criteria for these tests. In addition, M.V. Engineering requested copies of at least three bioaccumulation tests performed by the Corps.
November 16, 2000	The Service sent a written request to the Corps for a 60-day extension for issuance of the Service's final Biological Opinion.
November 17, 2000	Via conference call, the Service and the Corps discussed permit conditions that would be necessary to reduce project impacts to ensure that project authorization would not jeopardize the continued existence of the piping plover.
November 22, 2000	By letter, the Corps provided the Service with proposed conditions for the protection of the piping plover to be included on any permit issued for the subject project. In addition, the Corps provided its concurrence to extend the consultation period for an additional 60 days.
December 15, 2000	The Service provided the Corps with a draft Biological Opinion regarding the subject project. Immediately following receipt of the draft Biological Opinion, the Corps forwarded a copy of the document to the applicant's designated representative, M.V. Engineering.
December 29, 2000	The Service responded to M.V. Engineering's November 3, 2000 letter, referring the applicant to the Inland Testing Manual (U.S. Environmental Protection Agency and U.S. Army Corps of Engineers, 1998) regarding bioaccumulation testing requirements and pass/fail criteria. In addition, the Service recommended that the applicant contact the Corps or the EPA directly regarding questions specific to development of an appropriate sampling plan to accurately characterize the bioaccumulation risks for the proposed project.
January 5, 2001	The Service received correspondence from the Borough of Stone Harbor's Borough Solicitor requesting that the Borough be afforded the opportunity to provide input on the Service's draft Biological Opinion and requesting that a copy of the draft Biological Opinion be forwarded to the Borough Administrator.
January 8, 2001	The Service participated in a conference call with Corps and EPA representatives to discuss timing of bioaccumulation testing of dredged sediments and the need to review the CDF design to ensure that segregation of dredged materials will be maximized.

January 16, 2001	The Service forwarded a copy of the draft Biological Opinion to the Stone Harbor Borough Administrator and instructed the Borough to forward any comments on the draft Biological Opinion to the Corps. The Service reminded the Borough that any request for an extension of the comment period would need to be received in writing prior to the Service's January 19, 2001 deadline for issuing the final Biological Opinion.
January 18, 2001	The Service received the Borough of Stone Harbor's January 17, 2001 letter requesting that the comment period on the Service's draft Biological Opinion be extended to January 29, 2001.
January 18, 2001	The Service received a copy of the Corps January 17, 2001 letter to Stone Harbor Borough extending the deadline for receipt of comments from the applicant on the Service's draft Biological Opinion until January 23, 2001.
January 18, 2001	The Service received a copy of correspondence from M.V. Engineering to the Corps regarding segregation of materials within the CDF.
January 26, 2001	The Service received a copy of the Corps January 26, 2001 letter to Stone Harbor Borough further extending the deadline for receipt of comments from the applicant on the Service's draft Biological Opinion until January 30, 2001.
January 30, 2001	The Service received a copy of M.V. Engineering's comments to the Corps regarding the Service's draft Biological Opinion.
January 30, 2001	The Service received a copy of comments addressed to the Corps on the Service's draft Biological Opinion, prepared by Mr. Richard M. Hluchan, acting as special environmental council to the Borough of Stone Harbor.
February 5, 2001	The Service received the Corps written comments on the draft Biological Opinion. The Corps correspondence included comments regarding the terms and conditions outlined within the draft Biological Opinion to implement reasonable and prudent measures to minimize incidental take.

III. BIOLOGICAL OPINION

A. DESCRIPTION OF THE PROPOSED ACTION

1. Project Overview and Modification History

The proposed project entails dredging 9 back-bay basins, located along the east side of Great Channel (part of the New Jersey Intracoastal Waterway), within the Borough of Stone Harbor, Cape May County, New Jersey (Figure 1). The basins, including North Basin, South Basin, Snug Harbor, Shelter Haven, Stone Harbor, Pleasure Bay, Carnival Bay, Sanctuary Bay, and Paradise Bay, would be dredged to a depth of 6 feet below mean low water.

The proposed dredging would be accomplished via hydraulic method, with the pipeline submerged at the channel bottom. The pipeline would run south (within back-bay areas) from the basins to Stone Harbor Point, located at the southernmost portion of the Borough of Stone Harbor, between the Atlantic Ocean and Great Channel. The pipeline would rest on the intertidal portions of Stone Harbor Point until it enters a proposed temporary CDF located at Stone Harbor Point (south of 122nd Street). An area totaling 13.02 acres would be disturbed during the construction of the CDF. Of the 13.02 acres of disturbance, 9.82 acres of intertidal area (i.e., below high tide elevation) would be disturbed during the CDF construction. The proposed area of disturbance lies immediately south of an upland area dominated by bayberry and west of the ocean-front beach, dune and existing terminal stone groin. The diked portion of the CDF would be created using sand from within the project area. The temporary CDF, when completed, would encompass 10.44 acres (including dikes), with 9.37 acres of that area located below high tide elevation.

The dredged material from the basins would be pumped into the temporary CDF at Stone Harbor Point, with dewatering to occur via an overflow weir and discharge pipe at the southeastern end of the diked area, near an existing terminal groin. Once dewatering is completed, which will require approximately one year, the temporary CDF will be demolished. The CDF berms and the dewatered dredged material will be re-graded on-site to form a combination of upland, intertidal, and subtidal areas at Stone Harbor Point. The applicant proposes to use the finer-grained (i.e., silt and clay sized particles) sediments segregated in the CDF by the hydraulic pumping as a substrate in constructing a 9.5-acre upland area (5.0 feet above mean sea level or higher). The upland area would be planted with bayberry to extend the existing bayberry-dominated uplands. Coarser grained sediments from the CDF would be re-graded into the existing intertidal and subtidal zones, effectively moving the sediments into Hereford Inlet to extend the physical dimensions of the Point waterward. Due to the potentially dynamic conditions at Stone Harbor Point, final plans for regrading would be developed when the dredged material has dried sufficiently and the existing conditions can be evaluated by the participating State and federal resource agencies.

Figure 1. Stone Harbor Back-Bay Dredging and Stone Harbor Point Disposal Site Location Map

Sediments from the back-bay basins proposed for dredging were initially sampled and analyzed for bulk chemistry in 1999. Sediment cores were collected from eight of the nine back-bay basins and composited into five samples. Bulk chemistry testing was not required at the ninth back-bay basin, Paradise Bay, due to its high percentage of sand (99.4 percent). Based on concerns regarding both back-bay basin sediment mercury concentrations and inadequate laboratory analysis for PCBs, the NJDEP required the applicant to perform additional sediment testing in 2000. In evaluating these analytical results, PCBs were eliminated as a concern; however, concern remained regarding mercury. Total mercury concentrations detected were compared to sediment guideline values established for marine and estuarine waters (Long *et al*., 1995). These guideline values are used by the NJDEP (New Jersey Department of Environmental Protection, 1997), as well as by the Coastal Protection & Restoration Division of the National Oceanic and Atmospheric Administration (Buchman, 1999), to evaluate potential impacts to benthic communities resulting from dispersal of contaminated suspended sediments. The Long *et al*. (1995) guidelines, Effects Range - Low (ERL) and Effects Range - Median (ERM), represent sediment contaminant levels at which adverse benthic organism impacts were found in approximately 10 and 50 percent, respectively, of examined toxicity studies. Concentrations between the ERL and ERM are indicative of adverse impacts at a frequency somewhere between 10 and 50 percent.

For total mercury, the ERL guideline value is 0.15 mg/kg and the ERM is 0.71 mg/kg. Based on the results of contaminants testing, three basins (South Basin, Snug Harbor, and Shelter Haven) with sediment mercury concentrations above the ERM for mercury were determined by the NJDEP to be unsuitable for open water disposal. The applicant subsequently modified the project to provide for disposal of dredged sediments from South Basin, Snug Harbor, and Shelter Haven at an upland disposal area identified as Site 103. Site 103 is located on Nummy Island, approximately 0.75 mile west of Stone Harbor Point. According to M.V. Engineering (2000a), Site 103 is a privately owned, approximately 3-acre CDF previously used as a disposal site by the Corps and NJDEP. The applicant has estimated the volume of material to be placed at Stone Harbor Point, less the sediments from the three basins slated for Site 103, at 65,342 cubic yards.

The NJDEP's rationale for prohibiting Stone Harbor Point disposal for sediments from South Basin, Snug Harbor, and Shelter Haven was based solely on an assessment of potential adverse benthic community impacts resulting from direct toxicity, disregarding mercury's propensity to bioaccumulate and biomagnify in the food chain. The Service remained concerned that placing sediments from five basins (North Basin, Stone Harbor, Pleasure Bay, Carnival Bay, Sanctuary Bay), with preliminary mercury test results falling between the ERL and ERM, into open water at Stone Harbor Point would not comply with the Clean Water Act's Section 404(b)(1) guidelines (40 CFR 230). These guidelines state that "dredged or fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact, either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern." In situations involving contaminated sediments, such demonstrations often consist of data

generated through testing in addition to basic bulk sediment chemistry analyses (i.e., bioassays and/or bioaccumulation tests).

The applicant was referred to the regulatory framework and methodologies used for federal permit decisions on proposed open water dredged material disposal within the joint U.S. Environmental Protection Agency/Corps (1998) document, *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual*. This document is commonly referred to as the Inland Testing Manual (ITM).

The Borough of Stone Harbor originally proposed to maintain a buffer of 10 feet from any mooring facility (i.e., docks, piers, or bulkheads) and provide, via sloughing, an approximate 3:1 slope from the top edge of the dredged areas to the bottom of the basins. In September 2000, the project was modified by increasing the proposed dredging area of each basin to include dredging within 10 feet of existing boat slips and within individual, privately owned boat slips. Inclusion of individual boat slips will be at the discretion and expense of each private landowner. The number of boat slips to be included has not yet been determined. To avoid the need for additional substrate sampling and chemical testing, the applicant elected to dispose of sediments from individual boat basins at the Site 103 CDF rather than at Stone Harbor Point. Although this proposed project modification was not included in the Corps Public Notice (No. CENAP-OP-R- 199901066-24, dated June 23, 2000), or the applicant's Biological Assessment (M.V. Engineering, 2000b), the applicant has indicated via coordination with the Corps and the Service (i.e., September 15, 2000 and October 5, 2000 meetings), that dredging of the individual boat slips within each basin would be performed by via hydraulic pipeline method. Material dredged from the boat slips would be placed at the Site 103 CDF. Revised project plans, submitted via letter dated October 19, 2000 by M.V. Engineering, indicate that Site 103, with minor modifications, would have the capacity to accept the additional 9,279 cubic yards of dredged material that would be generated if 100 percent of the individual boat slips were dredged. If the maximum 9,279 cubic yards of material from the boat slips is dredged, a total of 30,257 cubic yards (including 20,978 cubic yards from South Basin, Snug Harbor, and Shelter Haven) would be placed at the Site 103 CDF. The applicant noted that Site 103 would not be of sufficient size to accommodate sediments from additional back-bay basins should they be determined to be unsuitable for open water disposal.

During an October 5, 2000 meeting, the Service and the Corps met with Borough of Stone Harbor representatives to clarify federal bioaccumulation testing requirements for dredged sediments from the back-bay basins proposed for disposal at Stone Harbor Point. The applicant requested that the Corps and the Service consider, as an alternative to conducting bioaccumulation testing prior to placement of dredged materials within the CDF, that the materials from the six basins (North Basin, Stone Harbor, Pleasure Bay, Carnival Bay, Sanctuary Bay, and Paradise Bay) be placed in the CDF with testing to occur after the sediments had segregated and concurrent with the dewatering process. The applicant proposed that materials with "unsuitable" levels of mercury would then be removed and disposed of at an upland disposal site to be later identified. To facilitate the applicant's desire to initiate dredging in 2000, the Corps and the Service agreed to consider such an alternative only if the applicant could

provide the following: a demonstration that the CDF was capable of withstanding winter storms typical for the area; a detailed contaminants sampling plan and time line showing that appropriate sediment testing and subsequent removal, if deemed necessary, could occur without encroaching on more than one piping plover breeding season; and a performance bond or other financial assurance that the Borough of Stone Harbor would have the resources to conduct appropriate bioaccumulation tests and/or remove sediments with unacceptable mercury levels within the required time frame.

2. Measures Proposed by the Applicant to Minimize Impacts to the Piping Plover

To minimize potential impacts to the piping plover, the applicant has incorporated the following measures into the project design and implementation schedule.

a. Construction of Stone Harbor Point CDF

The Stone Harbor Point CDF has been designed with safety and stability as major concerns. The CDF would be protected on the north by the developed residential portion of Stone Harbor, and on the east by an existing bulkhead, groin, and recreational beach. To help ensure the containment of the dredged material (i.e., against wave action from storm surges), the applicant proposes to construct at least 20-foot-wide CDF walls (berms), which are four times the size of the typical CDF berms designed for other projects. The applicant anticipates that further accretion of Stone Harbor Point will provide additional protection of the CDF from wind and wave action.

b. Proposed Dredging / Construction Timeframes

The proposed project prohibits all construction activities during the piping plover nesting and brood-rearing season (i.e., April 1 through August 15) (M.V. Engineering, 2000a). One month prior to the initiation of any construction (after August 15), the applicant proposes to conduct at least one piping plover survey per week in order to ensure that all plover chicks (if any) have fledged (M.V. Engineering, 2000b). Upon completion of the plover surveys, and concurrence by the Service and ENSP that all piping plover chicks have fledged, the following construction sequence for the project with respect to construction timeframes would be implemented (M.V. Engineering, 2000b):

	Activity	Time Required
(1)	Create the Point CDF	1 month
(2)	Dredge Back-bay Basins	4 months
(3)	Allow Sediments to Dry	12 months
(4)	Re-grade Point CDF	1 month
(5)	Create Suitable Habitats	2 months
	Total:	20 months

The applicant has accepted the terms and conditions of the NJDEP's ODST via acceptance of the required Waterfront Development Permit / Water Quality Certificate (Application No. 0501-99-00012.1 (CAFRA) and 0501-99-00012.2 (WDL) (CAFRA / WDL authorization). The terms and conditions of the CAFRA / WDL authorization were conveyed to the applicant via letter dated August 3, 2000 (Appendix A).

Based on the above-mentioned information, if construction of the CDF were to begin in August 2001, re-grading of the Stone Harbor Point CDF and creation of suitable habitats would be completed prior to the second piping plover nesting season (i.e., end of March 2003). Condition 10 of NJDEP's CAFRA / WDL authorization indicates that: (1) all disposal activities must be completed by January 15 to allow an adequate dewatering period (estimated at 12 months) and sufficient time for enhancement site grading; (2) removal of the CDF and its contents must occur no later than one year after the completion of dredging; (3) initial enhancement site grading must be completed by February 15 and upon completion, the applicant must contact ODST to arrange for agency inspection; and (4) final enhancement site grading must be completed by March 15, in order to allow natural processes to occur at the enhancement area prior to seasonal utilization by beach nesting bird species.

The January 15 deadline imposed by NJDEP for the completion of disposal activities is compatible with the recommendations provided by the National Marine Fisheries Service (NMFS). Via letter to the Corps dated November 13, 2000, the NMFS requested conditions pursuant to Section 305 (b)(2) of the Magnuson - Stevens Conservation and Management Act, that would restrict dredging from January 1 through May 31 in order to minimize adverse impacts to early life stages of winter flounder (*Pseudopleuronectes americanus*). The NMFS indicated that a less restrictive seasonal condition (i.e., January 15 through May 31) would be allowed if dredging were initiated within any lagoon prior to the end of December.

c. Habitat Enhancement

To provide habitat enhancement for beach nesting birds (Physical Condition 10.a. of NJDEP's CAFRA / WDL authorization), NJDEP has required an increase in the total area of tidal spits and intertidal sluices. These habitat features must mimic the existing tidal spits and intertidal sluices in general configuration and composition and shall be constructed in accordance with ENSP and Service oversight. In addition, regrading of the CDF and the dried material must occur within one year of the completion of dredging. Material of acceptable grain size from the CDF will be applied to existing intertidal areas at Stone Harbor Point, thereby raising the elevation approximately 6 to 24 inches with sandy material forming linear and irregularly shaped spits.

d. Dredged Material Testing

The applicant proposes to dispose of all dredged material from the five basins that tested below the ERM level for mercury, as described by Long, *et al*. (1995), into the temporary Stone Harbor Point CDF along with materials from Pleasure Bay (a basin that does not require additional mercury testing due to its high percentage of sand). Further testing for mercury would occur after disposal of dredged sediments into the CDF, as described below.

(1) Approximately 90 days after the placement of all dredge spoils at the Stone Harbor Point CDF, the Borough of Stone Harbor and its engineers will conduct bulk chemical analyses of sediments within the CDF. The applicant's proposed sampling grid divides the CDF into 9 sections. Nine core samples will be taken from within each grid section in a manner that will provide representative sampling of the entire CDF. These core samples may be composited into one sample for each grid section for mercury analysis. The number of sampling points was determined using the protocol set forth in the New Jersey Department of Environmental Protection's Manual (1997), entitled, *The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters*.

(2) The above-mentioned samples would be tested for total mercury content. The applicant proposes to use the 0.71 ppm threshold level for mercury to determine the amount of dredged material (if any) to be removed from the Stone Harbor Point CDF. The applicant proposes to remove all dredged material that contains mercury levels of 0.71 ppm or greater. The applicant has indicated that material removed as a result of exceeding the 0.71 ppm threshold, will be disposed of "in a site that is not habitat for threatened or endangered species." The applicant is in disagreement with the Corps proposed condition requiring bioaccumulation tests for any dredged sediments, proposed for placement into open water, with total mercury concentrations between the ERL and ERM.

3. Permit Conditions Proposed by the Corps to Minimize Impacts to the Piping Plover

As a result of discussions with the Service during formal consultation, the Corps proposes to issue a permit to the applicant for the project, as described above. However, the Corps proposes to require modifications to the project to ensure the protection of federally listed species. In particular, the Corps proposes to require that the applicant demonstrate that all dredged sediments are suitable for the proposed environmental restoration project at Stone Harbor Point, including discharge into the aquatic environment. Any dredged material determined to be unsuitable for the environmental restoration project shall be removed to uplands outside the vicinity of Stone Harbor Point and be appropriately contained and stabilized to prevent return to the aquatic environment. In addition, the Corps has provided assurances that all unsuitable materials will be removed by January 15 of the project calendar year 3 and that the restoration project will be completed so that the temporary CDF is not in place

during more than one piping plover nesting season. Permit conditions proposed by the Corps to minimize or avoid adverse impacts to the piping plover include the following:

(1) Seasonal restrictions including: a prohibition on construction activities prior to August 15 in the first year of construction (calendar year 1); a requirement that all final grading and equipment removal be completed by March 15 in project calendar year 3; and a prohibition on maintenance activities from April 1 to August 15 following construction.

(2) A prohibition on disposal of dredged material from Shelter Haven, Snug Harbor, South Basin and all boat slips at Stone Harbor Point.

(3) A requirement to perform testing and bulk sediment analysis for mercury of sediments placed within the temporary CDF within 90 days of the completion of dredging/disposal. The disposal site will be divided into nine approximately equal sized regions with nine core samples to be taken from each region (cores from each region may be combined into a composite sample). Results of the analysis must be provided to the Corps and the Service within 30 days of sampling.

(4) A requirement that any of the nine regions of the temporary CDF with test results greater than 0.71 mg/kg (ppm) mercury be completely removed to uplands outside the vicinity of Stone Harbor Point. Any region with mercury results less than 0.15 ppm may remain in the temporary CDF for the dewatering period. For any region with mercury test results between 0.15 and 0.71 ppm, the applicant will have the option of removing all material (excavated to native substrate) in that region to an off-site approved disposal area or performing bioaccumulation / bioassay testing. Any material determined to be unsuitable as a result of bioaccumulation / bioassay testing must be removed to an off-site approved disposal area.

(5) A requirement to provide evidence that funding is available (and committed) for removal of unsuitable material in a timely manner. This requirement would serve to avoid delaying the removal of the CDF and site restoration beyond March 15 of project calendar year 3.

B. STATUS OF THE SPECIES

Relevant biological and ecological information considered by the Service in formulating this Biological Opinion is presented below. Appropriate information on the piping plover's life history, habitat, distribution, and other factors affecting the species' survival is included to provide background for analyses in later sections. This section also documents the effects of all past human and natural activities or events that have led to the current status of the species.

1. Species/Critical Habitat Description

On January 10, 1986, the piping plover (*Charadrius melodus*) was listed as endangered and threatened pursuant to the ESA. Protection of the species under the ESA reflects its precarious status range-wide. Three distinct populations were identified: Atlantic Coast, Great Lakes and Northern Great Plains. The Atlantic Coast population, which breeds on coastal beaches from Newfoundland to North Carolina and winters along the Atlantic Coast from North Carolina south, along the Gulf Coast, and in the Caribbean, is listed as threatened under the ESA. No critical habitat has been designated or proposed for breeding habitat of the Atlantic Coast piping plover population (U.S. Fish and Wildlife Service, 1985).

The recovery plan for the Atlantic Coast population of the piping plover (U.S. Fish and Wildlife Service, 1996) delineates four recovery units or geographic subpopulations within the population: Atlantic Canada, New England, New York-New Jersey, and Southern (Delaware, Maryland, Virginia, and North Carolina). Recovery criteria established within the recovery plan defined population and productivity goals for each recovery unit, as well as for the population as a whole (see Table 1, below, for goals and current status). Attainment of these goals for each recovery unit is an integral part of a piping plover recovery strategy that seeks to reduce the probability of extinction for the entire population by: (1) contributing to the population total, (2) reducing vulnerability to environmental variation (including catastrophes, such as hurricanes, oil spills, or disease), (3) increasing likelihood of genetic interchange among recovery units, and (4) promoting recolonization of any sites that experience declines or local extirpations due to low productivity or temporary habitat succession. The plan further states: "A premise of this plan is that the overall security of the Atlantic Coast piping plover population is profoundly dependent upon attainment and maintenance of the minimum population levels for the four recovery units. Any appreciable reduction in the likelihood of survival of a recovery unit will also reduce the probability of persistence of the entire population." In accordance with the Endangered Species Consultation Handbook (U.S. Fish and Wildlife Service and National Marine Fisheries Service, 1998), since recovery units have been established in an approved recovery plan, this Biological Opinion considers the effects of the proposed project on piping plovers in the New York - New Jersey Recovery Unit, as well as the Atlantic Coast population as a whole.

Table 1. Comparison of Population Estimates and Ten-Year Average Productivity with Recovery Criteria by Recovery Unit

Recovery Unit	1999 Population Estimate (Number of Breeding Pairs)	Minimum Subpopulation Needed for Recovery (Number of Breeding Pairs)	1999 Population Estimate as Percent of Recovery Goal (%)	Average Productivity 1990-1999 (Number of Chicks Fledged per Pair)	Percent of Breeding Population 1990-1999 on Which Productivity Estimate is Based (%)	Average Productivity Needed for Recovery (Number of Chicks Fledged per Pair)
Atlantic Canada	230	400	57.5	1.56	51.7	1.5
New England	624	625	99.8	1.59	96.7	1.5
New York-New Jersey	350	575	60.9	1.09	82.5	1.5
Southern	182	400	45.5	1.00	75.0	1.5
U.S. Total	1156	1600	72.3	1.33	87.6	--
Atlantic Coast	1386	2000	69.3	--	--	--

2. Life History

Piping plovers are small, sand colored shorebirds, approximately 17 centimeters (7 inches) long with a wingspread of about 38 centimeters (15 inches) (Palmer, 1967) that nest on sandy, coastal beaches from South Carolina to Newfoundland. 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). Piping plovers are monogamous, but usually shift mates between years (Wilcox, 1959; Haig and Oring, 1988; MacIvor, 1990), and less frequently between nesting attempts in a given year (Haig and Oring, 1988; MacIvor, 1990; Strauss, 1990). Plovers are known to begin breeding as early as at one year of age (MacIvor, 1990; Haig, 1992); however, the percentage of birds that breed in their first adult year is unknown.

Piping plover nests can be found above the high tide line on coastal beaches, on sand flats at the ends of sand spits and barrier islands, on gently sloping foredunes, in blowout areas behind primary dunes, and in 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, 1987; 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 to 7 day egg-laying phase when the birds generally do not incubate (Goldin, 1994).

Eggs may be present on the beach from early April through late July. Clutch size for an initial nest attempt is usually four eggs, one laid every other day. Eggs are pyriform in shape, and variable buff to greenish brown in color, marked with black or brown spots. The incubation period usually lasts for 27-28 days. Full-time incubation usually begins with the completion of the clutch and is shared equally by both sexes (Wilcox, 1959; Cairns, 1977; MacIvor, 1990). Eggs in a clutch usually hatch within four to eight hours of each other.

Piping plovers generally fledge only a single brood per season, but may renest several times if previous nests are lost. Chicks are precocial (Wilcox, 1959; Cairns, 1982). They may move hundreds of meters from the nest site during their first week of life (U.S. Fish and Wildlife Service, 1994a), and chicks may increase their foraging range up to 1,000 meters before they fledge (are able to fly) (Loegering, 1992). Chicks remain together with one or both parents until they fledge 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).

Cryptic coloration is a primary defense mechanism for this species; nests, adults, and chicks all blend in with their typical beach surroundings. Chicks sometimes respond to vehicles and/or pedestrians by crouching and remaining motionless (Cairns, 1977; Tull, 1984; Goldin, 1993; Hoopes, 1993). Adult piping plovers also respond to intruders (avian and mammalian) in their territories by displaying a variety of distraction behaviors, including squatting, false brooding, running, and injury feigning. Distraction displays may occur at any time during the breeding season, but are most frequent and intense around the time of hatching (Cairns, 1977).

Plovers feed on invertebrates such as marine worms, fly larvae, beetles, crustaceans, and mollusks (Bent, 1929; Cairns, 1977; Nicholls, 1989). Important feeding areas may include intertidal portions of ocean beaches, washover areas, mudflats, sand flats, wrack lines, sparse vegetation, and shorelines of coastal ponds, lagoons or salt marshes (Gibbs, 1986; Coutu *et al.*, 1990; Hoopes *et al.*, 1992; Loegering, 1992; Goldin, 1993; Elias-Gerken, 1994). 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, Elias-Gerken, 1994), 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, 1990).

Feeding activities of chicks may be particularly important to their survival. Most time budget studies reveal that chicks spend a very high proportion of their time feeding. 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 percent 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).

Migration patterns are poorly understood. Most piping plover surveys have focused on breeding or wintering sites. Northward migration occurs during late February, March and early April, and southward migration extends from late July to August and September. Both spring and fall migration routes are believed to primarily occur within a narrow zone along the Atlantic Coast (U.S. Fish and Wildlife Service, 1996).

3. Status on the Atlantic Coast and in the New York-New Jersey Recovery Unit

a. Historical Population Trends

Historical population trends for the Atlantic Coast piping plover have been reconstructed from scattered, largely qualitative records. Nineteenth century naturalists, such as Audubon and Wilson, described the piping plover as a common summer resident on Atlantic Coast beaches (Haig and Oring, 1987). By the beginning of the 20th century, uncontrolled hunting, primarily for the millinery trade, and egg collecting had greatly reduced the population, and, in some areas along the Atlantic Coast, the piping plover was close to extirpation. Following passage of the Migratory Bird Treaty Act in 1918, and changes in the fashion industry, piping plover numbers recovered to some extent (Haig and Oring, 1985).

Available data suggest that the most recent population decline began in the late 1940's or early 1950's (Haig and Oring, 1985). Starting in 1972, the National Audubon Society's "Blue List" of birds with deteriorating status included the piping plover (Tate, 1981). Johnsgard (1981) described the piping plover as "... declining throughout its range and in rather serious trouble." The Canadian Committee on the Status of Endangered Wildlife in Canada designated the piping plover as "Threatened" in 1978 and elevated the species' status to "Endangered" in 1985 (Canadian Wildlife Service, 1989).

Reports of local or statewide declines between 1950 and 1985 are numerous and many are summarized by Cairns and McLaren (1980) and Haig and Oring (1985). While Wilcox (1939) estimated more than 500 pairs of piping plovers on Long Island, New York, the 1999 population estimate was 243 pairs (U.S. Fish and Wildlife Service, 2000). There was little focus on gathering quantitative data on piping plovers in Massachusetts through the late 1960's because the species was commonly observed and presumed to be secure (Blodget pers. comm., 1991) . However, numbers of piping plover breeding pairs declined 50 to 100 percent at seven Massachusetts sites between the early 1970's and 1984 (Griffin and Melvin, 1984). Further, recent experience of biologists surveying piping plovers has shown that counts of these cryptic birds sometimes goes up with increased census effort.

This suggests that some historic counts of piping plover numbers by one or a few observers, who often recorded occurrences of many avian species, may have underestimated the piping plover population. Thus, the magnitude of the species' decline may have been even more severe than available numbers imply.

b. Population Trends Since Listing Under the Endangered Species Act

Table 2 summarizes nesting pair counts for the Atlantic Coast piping plover population since listing in 1986 through 1999. Range-wide numbers for the 2000 breeding season for the Atlantic Coast piping plover population are not yet available.

The apparent increase in numbers of pairs between 1986 and 1989 (Table 2) is thought to at least partially reflect the effects of increased survey efforts following the proposed listing in 1985. Intensified survey effort may have played an especially important role in population estimates for New York and New Jersey. For example, Wich (1993) surmised that, although protection of beach nesting birds in New York increased after 1983, survey effort also intensified, especially at sites such as Breezy Point, Queens County, and Westhampton Beach, Suffolk County. While the relative contributions of each cannot be determined, he believes that "the stability of more recent estimates probably accurately reflects the status of New York's plover population." Ducey-Ortiz *et al*. (1989) documented an increasing plover monitoring effort in New York between 1984 and 1988 and found that, when results from 54 uniformly monitored sites were analyzed, the population trend did not increase or decrease significantly. The New Jersey plover coordinator conjectured that one quarter to one third of the apparent population increase observed in that state between 1987 and 1989 was due to increased survey effort (Jenkins, 1993).

The Atlantic Coast population increased from approximately 950 pairs in 1989 to almost 1,400 pairs in 1999, but the increase has been very unevenly distributed. From 1989-1999, the New England subpopulation has increased by 418 pairs while the New York-New Jersey subpopulation gained only 31 pairs and the Southern and Atlantic Canada subpopulations declined by 17 pairs and 3 pairs, respectively (U.S. Fish and Wildlife Service, 2000). While rapid overall population growth between 1991 and 1995, driven largely by the New England subpopulation, was encouraging, recent growth has been more modest, with an essentially flat population trend from 1995-1996 and only an overall 3 percent increase during 1997 to 1999. The New York-New Jersey subpopulation experienced a net decrease of 43 pairs (11 percent) between 1996 and 1998 and a slight rebound of 12 pairs in 1999 (U.S. Fish and Wildlife Service, 2000).

c. Productivity

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). However, because small populations may be

highly vulnerable to extinction due to variability in productivity and survival rates, the average productivity for a stationary population may be insufficient to assure

Table 2. Summary of Atlantic Coast Piping Plover Population Estimates, 1986 to 1999

STATE/UNIT	PAIRS														Goal
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	
Maine	15	12	20	16	17	18	24	32	35	40	60	47	60	56	
New Hampshire	-	-	-	-	-	-	-	-	-	-	-	5	5	6	
Massachusetts	139	126	134	137	139	160	213	289	352	441	454	490	495	501	
Rhode Island	10	17	19	19	28	26	20	31	32	40	50	51	46	39	
Connecticut	20	24	27	34	43	36	40	24	30	31	26	26	21	22	
NEW ENGLAND	184	179	200	206	227	240	297	376	449	552	590	619	627	624	625
New York[a]	106[b]	135[b]	172[b]	191	197	191	187	193	209	249	256	256	245	243	
New Jersey	102[c]	93[c]	105[c]	128	126	126	134	127	124	132	127	115	93	107	
NY-NJ UNIT	208	228	277	319	323	317	321	320	333	381	383	371	338	350	575
Delaware	8	7	3	3	6	5	2	2	4	5	6	4	6	4	
Maryland	17	23	25	20	14	17	24	19	32	44	61[d]	60	56	58	
Virginia	100	100	103	121	125	131	97	106	96	118	87	88	95	89	
North Carolina	30[e]	30[e]	40[e]	55	55	40	49	53	54	50	35	52	46	31	
South Carolina	3	-	-	-	1	1	-	1	-	-	0	-	-	-	
SOUTHERN UNIT	158	160	171	199	201	194	172	181	186	217	189[d]	204	203	182	400
U.S. TOTAL	550	567	648	724	751	751	790	877	968	1150	1162[d]	1194	1168	1156	1600
ATLANTIC CANADA	240	223	238	233	229	236	236[f]	236[f]	182	199	186	197[g]	204	230	400
ATLANTIC COAST	790	790	886	957	980	987	1026	1113	1150	1349	1348[d]	1391	1372	1386	2000

Table 2, continued:

a The only statewide count tallied in New York in 1994-1999 is the window census.

b The recovery team believes that this estimate reflects an incomplete survey effort.

c The New Jersey plover coordinator conjectures that one quarter to one third of the apparent population increase between 1986 and 1989 is due to increased survey effort.

d Reflects correction in 1996 Maryland population from 60 pairs reported in 1996 Status Update to 61 pairs.

e The recovery team believes that the apparent 1986-1989 increase in the North Carolina population is due to intensified survey effort. No actual surveys were made in 1987; estimate is that from 1986.

f 1991 estimate.

g Assumes that the number of pairs in Newfoundland in 1997 was 11 pairs, the same as 1996; Newfoundland reported 35 adults in 1997, up from 27 in 1996, but provided no 1997 estimate for breeding pairs.

a high probability of species' survival (see discussion of effects of productivity rates on vulnerability to extinction below). Therefore, the recovery plan establishes productivity goals needed to assure a secure 2000-pair population at 1.5 chicks per pair in each of the four recovery units, based on data from at least 90 percent of each recovery unit's population.

Table 3 provides a summary of piping plover productivity from 1990 to1999. Ten-year (1990-99) average productivity for piping plovers portion of their Atlantic Coast range is 1.33 chicks per pair. Peak productivity in the U.S. was observed in 1993 and 1994, when average productivity approached or exceeded the recovery plan productivity goal of 1.5 chicks per pair. However, productivity in 1997 was only 1.16 chicks per pair (based on data from 93 percent of the total U.S. breeding population), the lowest level since 1990 and well below the 1.24 chicks per pair required to produce a stationary population. While weather events were major contributors to egg and chick losses in 1997 (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 1990 to 1999 in the New York-New Jersey recovery unit was 1.09 chicks per pair. The 1.24 chicks per pair productivity needed to maintain a stationary population has only been attained twice, in 1994 when productivity reached 1.25 chicks per pair and 1999 when productivity reached 1.36 chicks per pair. In addition, productivity estimates for this recovery unit reflect a substantial gap between the number of pairs for which productivity is monitored and the total breeding population, with the ten-year average based on productivity data from only 83 percent of the total. Nearly all pairs in the recovery unit for which productivity is unknown nested in New York (U.S. Fish and Wildlife Service, 2000).

d. Habitat Utilization

A growing body of information shows that overwash habitats, including bayside flats, unstabilized and recently closed inlets, ephemeral pools (areas on the beach where sea and/or rain water pooled during storm overwashes and rains), and moist, sparsely vegetated barrier flats, are especially important to piping plover productivity and carrying capacity in the New England, New York-New Jersey, and Southern Recovery Units (Wilcox, 1959; Strauss, 1990; Massachusetts Division of Fisheries and Wildlife, 1996; Jones, 1997).

Research indicates that plovers utilizing New England beaches are attracted to, and highly productive on, a wider variety of habitats (Massachusetts Division of Fisheries and Wildlife, 1996; Jones, 1997) than in the other recovery units in the southern half of their range. However, studies in the New England Recovery Unit also recognize the optimal value of overwash habitats with open connections to bayside foraging habitats. Out of 80 piping plover nests observed by Strauss (1990), no nests were found seaward of steep foredunes in Sandy Neck, Massachusetts, where this habitat constituted 83 percent of the beach front. Many areas in Strauss's study site had been artificially plugged with discarded Christmas trees and/or snowfences. Goldin and Regosin (1998) found significantly higher

Table 3. Summary of Piping Plover Productivity Estimates for the U.S. Atlantic Coast, 1990-1999

STATE/UNIT	CHICKS FLEDGED PER PAIR										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999[a]	10 year AVG[q]
Maine	1.53	2.5	2	2.38	2	2.38	1.63	1.98	1.47	1.63 (56)	1.88 (389/389)
New Hampshire	-	-	-	-	-	-	-	0.6	2.4	2.67 (6)	1.94 (16/16)
Massachusetts	1.38	1.72	2.03	1.92	1.8	1.62	1.36	1.32	1.5	1.60 (490)	1.59 (3388/3534)
Rhode Island	0.9	0.77	1.55	1.8	2	1.68	1.56	1.34	1.13	1.79 (39)	1.46 (357/363)
Connecticut	1.63	1.39	1.45	0.38	1.47	1.35	1.31	1.69	1.05	1.45 (22)	1.35 (299/299)
NEW ENGLAND	1.38	1.62	1.91	1.85	1.81	1.67	1.4	1.38	1.46	1.62 (613)	1.59 (4449/4601)
New York	0.8	1.09	0.98	1.24	1.34	0.97	1.14	1.36	1.09	1.35 (266[u])	1.17 (1641/2226)
New Jersey	0.93	0.98	1.07	0.93	1.16	0.98	1	0.39	1.09	1.34 (107)	0.98 (1196/1211)
NY-NJ UNIT	0.88	1.04	1.03	1.08	1.25	0.97	1.07	1.02	1.09	1.36 (373)	1.09 (2837/3437)
Delaware	2	1.6	1	0.5	2.5	2	0.5	1	0.83	1.50 (4)	1.39 (44/44)
Maryland	0.78	0.41	1	1.79	2.41	1.73	1.49[r]	1.02[s]	1.3	1.09 (58)	1.34 (385/385)
Virginia	0.65	0.88	0.59	1.45	1.65	1	1.54	0.71	1.01	1.21 (77)	1.08 (627/1032)
North Carolina	0.43	0.07	0.42	0.74	0.36	0.45	0.86	0.23	0.61	0.48 (31)	0.49 (388/465)
SOUTHERN UNIT	0.72	0.68	0.62	1.18	1.37	1.06	1.34[r]	0.68	0.99	1.04 (170)	1.00 (1444/1926)
U.S. AVERAGE	1.06	1.22	1.35	1.47	1.56	1.35	1.30[r]	1.16	1.27	1.45 (1156)	1.33 (8730/9964)
ATLANTIC CANADA	1.62	1.07	1.55	0.69	1.25	1.69	1.72	2.1	1.84	1.74 (189)	1.56 (1104/2135)

Table 3, continued:

a Parentheses indicate the number of pairs on which productivity is based.

b Parentheses denote number of pairs on which productivity is based/estimated number of pairs in the state or unit between 1990 and 1999.

c Number of pairs on which New York 1999 productivity is based exceeded the population estimate. Reasons for the relatively large discrepancy between the 1999 window estimate and the number of pairs on which the 1999 New York productivity estimate is based are currently unclear.

d Reflects a correction in 1996 Maryland productivity.

e Chicks surviving to 25 days projected from data collected through day 15 based on linear regression analysis.

chick survival and overall productivity among chicks with access to salt-pond "mudflats" than those limited to oceanside beaches at Goosewing Beach, Rhode Island. Goldin and Regosin (1998) also reported that broods on the pondshore spent significantly less time responding to human disturbance (1.6 percent) than those limited to the ocean beach (17.0 percent). Since ocean beaches are highly attractive to recreational beach-goers, limiting plovers to these habitats may also increase the potential for disturbance from people and pets.

In New York, Wilcox (1959) described the effects of storms on piping plovers in 1931 and 1938 that breached the Long Island barrier islands, forming Moriches and Shinnecock Inlets and leveling dunes across the south shore. Only 3 to 4 pairs of piping plovers nested on 17 miles (27.4 kilometer (km)) of barrier beach along Moriches and Shinnecock Bays in 1929. However, following the natural opening of Moriches Inlet in 1931, plover numbers increased to 20 pairs in 2 miles (3.2 km) of beach habitat by 1938. In 1938, a hurricane opened Shinnecock Inlet and also flattened dunes along both Shinnecock and Moriches Bays. In 1941, plover numbers along the same 17-mile (27.4 km) stretch of beach peaked at 64 pairs. Numbers then gradually decreased, a decline that Wilcox attributed to deposition of dredged sand to rebuild dunes, planting of beach grass, and construction of roads and summer homes.

A 1992-1993 study of nest site selection on 90 km (55.8 miles) of beach on Jones Beach Island, Fire Island, and Westhampton Island, New York (Elias *et al.*, 2000) found that all 1-km beach segments with ephemeral pools or bay tidal flats were used for nesting and brood rearing, whereas less than 50 percent of beach segments without these habitats were used. When the amount of time that plover broods used each habitat was compared with its availability, broods preferred ephemeral pools on segments where pools were present. Where present, bay tidal flats and wrack were the most preferred habitats. On segments with neither ephemeral pools or bay tidal flats, wrack was the most preferred habitat, and open vegetation was second most preferred. Indices of arthropod abundance were highest on ephemeral pools and bay tidal flats. Chick peck rates were highest on ephemeral pools, bay tidal flats, and the ocean intertidal zone. To assist piping plover recovery, the authors recommend avoidance of beach management practices (e.g., jetty construction, breach filling, dune building, sand renourishment) that typically inhibit natural renewal of ephemeral pools, bay tidal flats and open vegetation habitats.

In New Jersey, Burger (1994) studied plover foraging behavior and habitat use at ocean, dune, and back-bay habitats. The primary focus of that study was the effect of human disturbance on habitat selection. Results showed that both habitat selection and foraging behavior correlated inversely with the number of people present. In the absence of people, plovers fed in ocean and bayside habitats. Burger concluded that protection of the entire beach ecosystem with high habitat diversity will help mitigate competition with human beach recreation.

Based on observations by Service biologists during the 2000 nesting season, 7 of the 21 sites (33 percent) occupied by nesting plovers in New Jersey were areas with low recreational use and access to

ephemeral pools and/or bayside tidal flats. These 7 sites supported 58 percent (65 pairs) of the 112 piping plover pairs nesting in New Jersey in 2000 and accounted for 62 percent of the Statewide productivity (97 of 157 chicks fledged).

On Assateague Island, Maryland, dramatic increases in productivity and breeding population occurred in response to overwash events between 1991 and 1992 on the northern 8 km of the island. Productivity, which had averaged 0.77 chicks per pair in a 5-year period before the overwash, averaged 1.67 chicks per pair from 1992 to 1996 following the overwash events. The nesting population also grew rapidly, doubling by 1995, and tripling by 1996, when 61 pairs nested there (MacIvor, 1990). Loegering and Fraser (1995) found that chicks on Assateague Island, which were able to reach bay beaches and the island interior, had significantly higher fledging rates than those that foraged solely on the ocean beach. The observed higher foraging rates, percentage of time spent foraging, and abundance of terrestrial arthropods on the bay beach and interior island habitats supported their hypothesis that foraging resources in interior and bayside habitats are key to reproductive rates on that site. Loegering and Fraser (1995) stressed the importance of sparsely vegetated cross-island access routes maintained by overwash, and the need to restrict or mitigate activities that reduce natural disturbance resulting from storms.

In Virginia, Watts *et al*. (undated) found that piping plovers nesting on 13 barrier islands in 1986-88 were not evenly distributed along the islands. Beach segments used by plovers had wider and more heterogenous beaches, fewer stable dunes, greater open access to bayside foraging areas, and closer proximity to mudflats. Watts *et al*. noted that characteristics of beaches selected by plovers are maintained by storms.

Further south at Cape Lookout National Seashore, North Carolina, 32 to 39 pairs of plovers nested on North and South Core Banks each year since 1992. While these unstabilized barrier islands total 44 miles (70.4 km) in length, nesting distribution is extremely patchy, with all nests clustered on the highly dynamic ends of the barrier islands, recently closed and sparsely vegetated "old inlets," expansive barrier mudflats, or new ocean-to-bay overwashes (Cape Lookout National Seashore, 1998). During a 1990 study, 96 percent of brood observations were on bay tidal flats, even though broods had access to both bay and ocean beach habitats (McConnaughey *et al.*, 1990).

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, and oil spills. These threats are described within the revised recovery plan (U.S. Fish and Wildlife Service, 1996), and discussion here is largely limited to the specific situation in the New York-New Jersey recovery unit. Many recent protection efforts in New York and New Jersey have been funded by revenues collected to restore oil spill damages (see below), and long-term funding for future protection efforts is uncertain.

a. Predation

As noted within the revised recovery plan (U.S. Fish and Wildlife Service, 1996) substantial evidence exists that human activities are exacerbating natural predation on piping plovers, their eggs, and chicks. Where Wilcox (1959) had observed 92 percent hatching success of nests observed between 1939-58 on Long Island, New York, and loss of only 2 percent of nests to crows (*Corvus* sp.), Elias-Gerken (1994) experienced loss of 21 percent of nests in her study area to crows in 1992-93. Elias-Gerken (1994) also observed crows perching and nesting in exotic Japanese black pines along the Ocean Parkway on Jones Island and hypothesized that this vegetation and other artificial perches exacerbated depredation by crows. Other important predators of plover eggs and chicks in the recovery unit include foxes (*Vulpes vulpes*), raccoons (*Procyon lotor*), Norway rats (*Rattus norvegicus*), herring gulls (*Larus argentatus*), and great black-backed gulls (*Larus marinus*) (Riepe, 1989; Jenkins and Nichols, 1994; Jenkins *et al.*, 1999a; Canale, 1997). Predators accounted for over half of all piping plover nest losses in New Jersey from 1995 to 1998 (Jenkins *et al.*, 1999a; Jenkins and Niles, 1999).

A variety of techniques that have been employed to reduce predation on plovers are discussed within the revised recovery plan (U.S. Fish and Wildlife Service, 1996). While some of these techniques, most notably the use of predator exclosures (fences around nests) have been used with demonstrated success to reduce predation on piping plover eggs (Melvin *et al.*, 1992; Rimmer and Deblinger, 1990) and credited with an important role in population increases in some parts of their range (Jenkins and Nichols, 1994; Jenkins *et al.*, 1999a), these same devices have also been associated with serious problems including entanglements of birds in the exclosure netting and attraction of "smart" predators that have "learned" that there is potential prey inside. The downside risks may include not only predation or abandonment of nests, sometimes at rates that exceed those that might occur in the absence of exclosures, but also induced mortality of adult birds. Exclosures provide no protection for mobile plover chicks, which generally leave the exclosure within one day of hatching and move extensively along the beach to feed.

While plovers have derived important benefits from use of exclosures in the New York-New Jersey Recovery Unit (Jenkins and Nichols, 1994; Jenkins *et al.*, 1999a; Canale, 1997), the incidence of problems associated with these devices has been especially prevalent. At the Arverne site in Queens, New York for example, vandalism of exclosures has been a substantial problem (Davis, 1997; Davis, 1998). In 1995, foxes keyed in on exclosures at Westhampton Dunes, New York, causing high rates of abandonment. Fortunately, trapping and removal of foxes at this site in 1996 and 1997 helped facilitate higher productivity (Houghton, 1997). At Sandy Hook, New Jersey, where exclosures had made important contributions to productivity between 1990 to 1996, heavy predation on exclosed and unexclosed nests was the major cause of a precipitous drop in productivity from 1.49 chicks per pair (1990-1996 average) to 0.36 chicks per pair in 1997 (McArthur, 1997).

b. Oil Spills

Oil and "tar balls"from the June 1990 discharge of 267,000 gallons of number 6 fuel oil from the B.T. Nautilus oil spill in the Kill Van Kull were found on southern Long Island beaches from Breezy Point to Fire Island and along the New Jersey coastline from Sandy Hook south to Brigantine. Evidence submitted in government claims for natural resource damages included direct visual confirmation of 27 oiled piping plovers, 10 in New York and 17 in New Jersey. Implementation of a restoration plan using funds collected from the responsible party was completed in New Jersey (1995-1999) and is currently underway in New York (1997-2001).

The May 1996 ANITRA oil spill discharged 42,000 gallons of light crude oil into Delaware Bay and spread oil along more than 70 miles of the southern New Jersey coastline. Oiling was detected on 51 adult plovers, nine of which were captured and cleaned (New Jersey Department of Environmental Protection, U.S. Department of the Interior, and National Oceanic and Atmospheric Administration, 1999). Negotiations between State and federal agencies and the responsible party to determine natural resource damages are still in progress at this time.

c. Disturbance from Humans, Pets, and Motorized Vehicles

Intensive management measures needed to protect piping plovers from disturbance by beach recreationists and their pets have been implemented at many New York-New Jersey plover nesting sites in recent years. In 2000, more than half of the occupied piping plover nesting sites in New Jersey were located on State or private land (12 out of 21 sites) (Jenkins, 2000). In New York, 95.8 percent of piping plover pairs nested on non-federal land in 1999 (Rosenblatt, 2000). Piping plover protection on non-federal lands is, therefore, highly dependent on the efforts of State and local government agencies and conservation organizations, and private landowners. Landowner efforts are often contingent on annual commitments. While many landowners are supportive and cooperative, others are not.

Recreational activities can be a source of both direct mortality and harassment of piping plovers. Pedestrians may flush incubating plovers from nests (Flemming *et al.*, 1988; Cross, 1990; Cross and Terwilliger, 1993) exposing eggs to avian predators or excessive temperatures. 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, 1993; Loegering, 1992; Goldin, 1993), forcing them out of preferred habitats, decreasing available foraging time, and causing expenditure of energy.

Concentrations of pedestrians may deter piping plovers from using otherwise suitable habitat. In Jones Beach Island, New York, Elias-Gerkin (1994) found less pedestrian disturbance in areas selected by nesting piping plovers than areas unoccupied by plovers. Burger (1991; 1994) found that presence of

people at several New Jersey sites caused plovers to shift their habitat use away from the ocean front to interior and bayside habitats; the time plovers devoted to foraging decreased and the time spent alert increased when more people were present. Burger (1991) also found that when plover chicks and adults were exposed to the same number of people, the chicks spent less time foraging and more time crouching, running away from people, and being alert then did the adult birds.

Fireworks are highly disturbing to piping plovers (Howard *et al.*, 1993). Plovers are also intolerant of kites, particularly as compared to pedestrians, dogs, and vehicles; biologists believe this may be because plovers perceive kites as potential avian predators (Hoopes, 1993).

Using motorized vehicles on beaches is a threat to piping plovers. Vehicles can crush eggs, adults and chicks (Wilcox, 1959; Tull, 1984; Burger, 1987; Patterson *et. al.*, 1991). In Massachusetts and New York, 18 piping plover chicks and 2 adults were killed by off-road vehicles (ORVs) in 14 documented incidents (Melvin *et al*., 1994). Goldin (1993) compiled records of 34 chick mortalities (30 on the Atlantic Coast and four on the Northern Great Plains) due to vehicles. Biologists that monitor and manage piping plovers believe that vehicles kill many more chicks than are found and reported (Melvin *et al.*, 1994).

Beaches used by recreational 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 recreational vehicle restrictions during chick-rearing periods have been combined with protection of nests from predators (Goldin, 1993). Beginning in 1999 at the North Brigantine Natural Area, Atlantic County, New Jersey, a seasonal closure to all motorized vehicles was imposed during the period when chicks are unable to fly. The number of nesting pairs of piping plovers at this site rose from 8 pairs in 1998 to 11 pairs in 2000; productivity rose from 1.50 chicks per pair in 1998 to a State record of 3.17 chicks per pair in 1999, with 2.45 chicks fledged per pair in 2000 (Jenkins *et al.*, 1998; Jenkins *et al.*, 1999b; Jenkins, 2000).

Once hatched, piping plover broods are mobile and may not remain near the nesting area. Typical behaviors of piping plover chicks increase their vulnerability to vehicles. Chicks frequently move between the upper berm or foredune and feeding habitat within 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 also significantly degrade piping plover habitat or disrupt normal behavior patterns by crushing wrack into the sand and making it unavailable as cover or a foraging substrate (Hoopes, *et al.* 1992; Goldin, 1993). Additionally, vehicles create ruts that can trap or impede movements of chicks and may prevent plovers from using habitat that is otherwise suitable (MacIvor, 1990, Strauss, 1990; Hoopes *et al.*, 1992; Goldin, 1993; Hoopes, 1994). Vehicles that are driven too close to the toe of the dune may destroy vegetation that may also serve as piping plover habitat (Elias-Gerken, 1994).

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 the danger of direct crushing of 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).

d. Habitat Loss and Degradation

While loss and degradation of habitat have been major contributors to the rangewide decline of the piping plover (U.S. Fish and Wildlife Service, 1996), this threat is especially prominent in the New York-New Jersey recovery unit. Within the New York Bight, which includes the species' entire range in New Jersey and the southern Long Island shoreline, more than half the beaches are classified as "developed" (U.S. Fish and Wildlife Service, 1997). The remaining so-called "natural, undeveloped beaches" in the New York Bight enjoy some protection from development through the Coastal Barrier Resources Act's limitations on federal assistance and flood insurance. However, many of these areas are also subject to extensive stabilization activities that promote the formation of mature dunes, thus preventing overwash, inlet migration, and other natural coastal processes that create and maintain optimal plover habitat.

The beaches on the south shore of Long Island are affected by a variety of federal and non-federal management activities including inlet management, beach nourishment, dune construction, and dune stabilization. There are six inlets stabilized by hard structures along the barrier chain system from Montauk Point west to East Rockaway Inlet. Within this stretch, multiple groin fields also exist. Gilgo Beach and Jones Beach on Jones Island, and Robert Moses State Park on Fire Island have been artificially nourished during the course of several Corps projects (see below). Almost exclusively, dune construction and beach nourishment are implemented solely to protect developments on the barrier island or mainland by reducing the potential for breaches and overwashes. Over the last 40 years, all major barrier island breaches have been artificially closed. Artificial plantings of American beachgrass and other species such as Japanese black pine (*Pinus thunbergii*), as well as the erection of snowfencing, are used to promote the formation of large, heavily vegetated dunes, thus reducing the potential for breaches and overwashes.

From 1986 to the present, the Corps has formally consulted with the Service’s New York and Long Island Field Offices under the interagency ESA regulations for seven beach nourishment or navigation

project activities between Jones Inlet and Montauk Point within the New York - New Jersey Recovery Unit. Biological Opinions (issuance date give in parentheses) were prepared for the following:

(1) Shinnecock Inlet Reformulation Project (December 8, 1986);
(2) Fire Island Inlet and Shore Westerly to Jones Inlet Combined Navigation and Beach Erosion Control Project (May 1987);
(3) 30-year Westhampton Interim Storm Damage Protection Project (December 1994);
(4) 3-year Breach Contingency Plan (BCP) (July 1995);
(5) Fire Island Inlet and Shore Westerly to Jones Inlet Combined Navigation and Beach Erosion Control Project, Seabeach Amaranth Transplantation Program (May 1995);
(6) 15-year Shelter Island, New York, Erosion Control Project (June 1995; revised October 1997).
(7) 6-year West of Shinnecock Interim Storm Damage Protection Project (Draft Biological Opinion August 1999; final Biological Opinion pending).

The Service has also conducted informal section 7 consultations with the Corps for many projects in the New York portion of the New York - New Jersey Recovery Unit. Some recent examples are provided below. In the case of the navigation projects, these consultations are conducted consistent with the Corps channel maintenance schedule, or about every 2-3 years.

(1) Long Beach Island Beach Erosion Control (May 1994);
(2) Moriches Inlet Navigation Project (March 1996 and July 1998);
(3) Jones Inlet Jetty Rehabilitation Project (June 1995 and July 1998);
(4) Shinnecock Inlet Navigation Inlet Maintenance Dredging (July 1998);
(5) Fire Island Inlet and Shore Westerly to Jones Inlet Combined Navigation and Beach Erosion Control Project (June 1999);
(6) Coney Island; and
(7) East Rockaway Shore Protection Project.

Of approximately 125 miles of Atlantic coastline in New Jersey, stretching from Sandy Hook to Cape May, all but approximately 13 miles (Sandy Hook Unit, Gateway National Recreation Area and Little Beach Island within the Edwin B. Forsythe National Wildlife Refuge) are encompassed within a Corps beach nourishment project area. Shore protection projects within the New Jersey portion of the New York-New Jersey Recovery Unit for which the Service completed informal section 7 consultation with the Corps for the initial phase of beach nourishment include the following:

(1) Sea Bright to North Asbury;
(2) Asbury Park to Manasquan Inlet;
(3) Manasquan Inlet to Barnegat Inlet;
(4) Barnegat Inlet to Little Egg Inlet;
(5) Brigantine Inlet to Great Egg Harbor Inlet;

(6) Great Egg Harbor and Peck Beach (Ocean City Beachfill);
(7) Great Egg Harbor Inlet to Townsends Inlet;
(8) Townsends Inlet to Cape May Inlet;
(9) Cape May Inlet to Lower Township (Cape May Beachfill);
(10) Lower Cape May Meadows to Cape May Point; and
(11) Delaware Bay Coastline.

Authorized Corps navigation projects located within the New Jersey portion of the New York -New Jersey Recovery Unit include:

(1) Manasquan Inlet;
(2) Barnegat Inlet; and
(3) Cape May and Ocean City.

The Service is currently conducting formal consultation with the Corps regarding renourishment activities at Ocean City, New Jersey and is aware of the following future Corps beach nourishment / renourishment projects in New Jersey that will require formal consultation (listed below with anticipated project start dates in parentheses):

(1) Avalon and Stone Harbor (Fall 2001);
(2) Sea Bright to Manasquan Inlet (Fall 2001);
(3) Lower Cape May Meadows and Cape May Point (Fall 2001);
(4) Brigantine (2003);
(5) Southern Ocean City and Sea Isle City (2004);
(6) Long Beach Island (2004);
(7) Manasquan Inlet to Barnegat Inlet (2005); and
(8) Great Egg Harbor Inlet to Townsends Inlet (2005).

The above consultations are a part of the many section 7 consultations that the Service performs for federal agency actions and do not reflect those undertaken by the Corps pursuant to section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act for state, local, or private beach nourishment or dredging activities. Ultimately, these projects accelerate the formation of mature dunes, and are implemented to substantially reduce the probability of inlet creation and overwash that would otherwise form sparsely vegetated, low-lying barrier beach habitats that are important to the piping plover. Under natural conditions, barrier beaches continually erode and accrete. Storms and high tides create overwash fans and flats behind and between dunes. Periodic breaches along barrier islands allow for the formation of new inlet areas, while accretion over time fills in inlets. The piping plover evolved in this highly dynamic ecosystem and has adapted to relocating nesting areas as natural coastal processes occur. As dune or back beach areas become established in accreting areas and vegetated through natural succession, these areas decline in suitability as piping plover habitat.

Throughout much of the New York-New Jersey Recovery Unit, periodic beach nourishment has interfered with natural coastal processes by precluding formation of newly forming inlets, overwash zones, and accreting beach habitats that would create, replace or revitalize piping plover nesting and foraging habitat.

5. Vulnerability to Extinction

The Atlantic Coast Piping Plover Recovery Plan (U.S. Fish and Wildlife Service, 1996) provides a discussion of the demographic and genetic factors that were used to assess the species vulnerability to extinction. A population viability analysis estimated probabilities of extinction, as well as probabilities that populations of various sizes and rates of fecundity would fall below thresholds of 50, 100, and 500 pairs during the next 100 years. The modeled scenarios that most closely approximate the current status of the Atlantic Coast population (i.e., 1200 and 1500 pairs with average productivity of 1.25 chicks per pair) showed extinction probabilities of 35 percent and 31 percent over 100 years, respectively. In addition, the model showed 95 percent and 92 percent probabilities of the population dropping below 500 pairs during the same period.

While the scenarios described above are based on survival rates observed in a 1985-1989 Massachusetts study, modeling also showed that even small drops in survival rates could very substantially increase the risk of extinction. Such long-term declines in survival rates could occur due to continuing declines in availability or quality of wintering or migration habitat, increased human disturbance on wintering grounds, increased mortality due to disease, parasites, or environmental contaminants, increased predation, or reduced longevity or fitness due to unforeseen genetic factors. When declines in adult and chick survival rates of just 5 percent and 10 percent, respectively, were modeled for a 1,500 pair population with average fecundity of 1.5 chicks per pair (far above the 1990-99 average of 1.33 chicks per pair), the extinction probability increased from 9 percent to 40 percent, and the probability that population size would drop below 500 pairs increased from 44 percent to 97 percent.

The assessments of continuing vulnerability to extinction based on modeling, described above, are validated by empirical data from 1986-1999 coast-wide population and productivity monitoring. For example, the nearly flat population trend between 1995 to 1996, following 1995 productivity of 1.35 chicks per pair (well above the estimated rate needed to maintain a stationary population) and productivity of 1.47 and 1.56 chicks per pair in 1993 and 1994, respectively, suggests that survival rates may have been lower in 1995 to 1996 than in preceding years. While fluctuations in survival rates are to be expected, their occurrence provides vivid illustration of the inherent vulnerability of such small populations.

Another graphic demonstration of the Atlantic Coast piping plover's continuing precarious status is provided by the population trend in New Jersey. A highly encouraging 44 percent population increase in the State population, from 93 pairs in 1987 to 137 pairs in 1992, was followed by a flat trend

between 1993 and 1995. The New Jersey population then dropped precipitously over the next two years, returning to 1987 levels by 1998, when only 93 pairs were counted in the State. Since listing (1986 to 1999), despite the intensive protection efforts, productivity in the New York - New Jersey Recovery Unit has been below that needed to maintain a stationary population in all but two years.

The overall probability of extinction for the Atlantic Coast piping plover is exacerbated by the fact that increases in yearly productivity and abundances of the Atlantic Coast plover population over the last five years are largely attributable to the New England portion of the range (see Table 2). In contrast, populations of the other three Recovery Units have remained low, as has productivity in New York-New Jersey and the Southern Recovery Units (see Tables 2 and 3). Failure to distribute population gains evenly across Recovery Units increases overall vulnerability to catastrophes (such as oil spills or disease). It also leaves the population vulnerable in the event that a hiatus in the occurrence of large storms leads to a decline in habitat conditions in the New England portion of the range.

The New York-New Jersey Recovery Unit provides a vital link between the New England and Southern subpopulations. Available information demonstrates slow rates of dispersal between subpopulations (U.S. Fish and Wildlife Service, 1996); movements of birds (adults or chicks) between Recovery Units are few and movement large enough to span the distance between non-adjacent Recovery Units has never been documented. Thus, loss or even near-extirpation of the New York-New Jersey Recovery Unit could acutely destabilize the population by isolating the Southern Recovery Unit, thereby forestalling exchange of breeding birds and genetic material across more than half the species' range. In light of the fundamental underlying importance of accessible overwash habitats to both the productivity and carrying capacity of plovers in the Recovery Unit; overall scarcity of these habitats, the systematic and widespread practice of forestalling the formation of overwash habitats in the New York-New Jersey Recovery Unit threatens the security of the Recovery Unit and the entire Atlantic Coast population.

C. ENVIRONMENTAL BASELINE

1. Status of the Species Within the Action Area

In 1999, after being absent for more than a decade, three pairs of piping plover nested at Stone Harbor Point (Jenkins *et al.*, 1999b) (see Table 4). These three piping plover pairs made five nesting attempts during 1999. Three nesting attempts failed, two due to flooding and one due to avian predation. Of the two nests that successfully hatched, three chicks fledged from one nest, but no chicks survived to the fledgling stage from the remaining nest. While chick losses are often difficult to determine, avian predation by gulls is the suspected cause of these chick losses (Shutz, pers. comm., 2000). In 2000, five piping plover pairs nested at Stone Harbor Point (see Table 4), making nine nesting attempts. Five nests failed due to flooding; two were lost to unknown causes. Although two nests hatched, all chicks were lost soon after hatching. The suspected cause of chick losses was gull predation (Shutz, pers. comm., 2000).

Table 4. Stone Harbor Point Piping Plover Nesting Summary

Year	Number of Breeding Pairs	Number of Nests Hatched	Number of Chicks Fledged	Number of Chicks Fledged / Pair
1999	3	2	3	1.00
2000	5	2	0	0.00

2. Factors Affecting Species Environment Within the Action Area

a. Habitat

Prior to 1997, Stone Harbor Point had been undergoing erosion at rates of up to 100 feet per year. Between 1968 and 1996 over 250 acres of coastal habitat had been lost at Stone Harbor Point (M.V. Engineering, 2000b), eliminating suitable nesting habitat for the piping plover and other beach nesting birds. However, this erosional trend reversed and coastal processes within the Stone Harbor Point area changed to an accreting phase. By the 1997 nesting season, sufficient sand had accumulated to accommodate a small colony of 6 pairs of least terns (*Sterna antillarum*), a State-listed endangered species. In 1998, the least tern colony grew to over 70 pairs. A large colony of over 500 State-listed endangered black skimmers (*Rynchops niger*) also nested at Stone Harbor Point in 1998. In 2000, 225 pairs of black skimmers and 28 pairs of least terns nested at Stone Harbor Point, successfully fledging 82 and 52 young, respectively. While the tern colony fared well in 2000, the skimmer colony experienced heavy nest losses to flooding (Shutz, pers. comm., 2000). Piping plovers nest in close association with the aforementioned beach nesting birds.

Since the Stone Harbor Point area appears to be in an accreting phase, available piping plover habitat within the action area is likely to remain the same or increase in size through naturally occurring coastal processes. However, should this trend reverse, the area could once again be subject to erosion, resulting in the loss of suitable piping plover nesting and foraging habitat.
It is likely that for the duration of the project (August 2001 to March 2003) the Stone Harbor Point area will continue to accrete overall, but that some erosion will occur during the winter season and the area will be subjected to periodic coastal storms, flooding and overwash as is typical for Atlantic coastal beaches in New Jersey.

b. Mercury in Sediments

Preliminary chemical analysis of the proposed dredge sediments within the Stone Harbor back-bay basins revealed total mercury concentrations at levels of concern, both for benthic organism toxicity via bioaccumulation and for the potential to biomagnify in the aquatic food chain. Piping plovers nesting at

Stone Harbor Point are primarily dependent on the benthic invertebrate community (marine worms, crustaceans, mollusks) as a prey base.

(i). Back-bay and Stone Harbor Point mercury concentrations

Sediments from the back-bay basins proposed for dredging were initially sampled and analyzed for bulk chemistry in October and November 1999. Sediment cores were collected from eight of the nine back-bay basins and composited into five samples. The ninth back-bay basin, Paradise Bay, was not required to undergo bulk chemistry testing due to its high percentage of sand (99.4 percent). Total mercury concentrations detected in the five composite samples are presented in Table 5, along with the back-bay basins from which the samples were collected.

Table 5. Total Mercury Concentrations in Back-Bay Sediment Composite Samples. [mg/kg (ppm) Dry Weight]

Composite A	Composite B	Composite C	Composite D	Composite E
0.350	0.346	0.335	0.611	0.284
Sanctuary Bay	Carnival Bay Stone Harbor	Pleasure Bay	Shelter Haven Snug Harbor South Basin	North Basin

For total mercury, the ERL guideline value is 0.15 mg/kg and the ERM is 0.71 mg/kg (Long *et al.*, 1995). The back-bay sediment mercury concentrations reported in the applicant's EIS (M.V. Engineering, 2000a), as presented in Table 5, are approximately 2 to 4 times the ERL and, in one instance (Composite D) approached the ERM value. These concentrations indicated that the proposed placement of dredged back-bay sediments into intertidal and subtidal zones at Stone Harbor Point could result in some degree of adverse impact on benthic communities, both to the existing site organisms that would be initially buried and to the benthic organisms that would re-colonize the newly deposited sediments.

The NJDEP required the applicant to perform additional sediment testing for mercury at the three basins that comprised the original Composite D sample (i.e., Shelter Haven, Snug Harbor, South Haven), as this sample had the highest original mercury concentration. In addition to re-sampling these three back-bay basins, the applicant also sampled sediments from the area offshore of Stone Harbor Point. The Stone Harbor Point sediment sampling was done at the recommendation of the NJDEP to determine if sediment mercury concentrations currently existing at Stone Harbor Point, representing ambient background conditions, would be comparable to the concentrations reported for the back-bay basins. Comparable concentrations would have provided assurance that placing back-bay basin

sediments into open water at Stone Harbor Point would not adversely impact aquatic resources through a significant increase in background mercury levels.

For the additional back-bay testing, discrete samples were collected from each of the three Composite D back-bay basins. Results from each basin were then combined to calculate separate average concentrations. Average concentrations from each basin were above the ERM mercury value (Table 6). Analytical results for sediments from the proposed Stone Harbor Point disposal site are presented in Table 6. Mercury concentrations in these sediments were significantly lower than the ERL guideline values and, on average, approximately one order of magnitude lower than concentrations reported for the original composite samples (Table 5.). These results indicate that placement of back-bay basin sediments into open water at Stone Harbor Point would have the potential to significantly increase mercury levels above ambient conditions.

Table 6. Total Mercury Concentrations from Re-Sampled Back-bay Basins and the Proposed Stone Harbor Point Disposal Site. [mg/kg (ppm) Dry Weight]

Back-bay Basins (Average)			Proposed Point Disposal Site		
0.93 South Basin	0.84 Snug Harbor	0.90 Shelter Haven	0.058 PT-1 A&B	0.031 PT-2 A&B	0.027 PT-3 A&B

(ii). Mercury from similar sites in southern New Jersey

Mercury found in the environment may originate from a variety of sources, including anthropogenic activities and naturally occurring emissions (U.S. Department of Health and Human Services, 1999). Contamination of tidal water sediments may result from surface water discharges, marina and boating operations, and atmospheric deposition (New Jersey Department of Environmental Protection, 1997). When analyzing sediments in and around areas of human activity in New Jersey, it is not uncommon to find varying concentrations of mercury. These concentrations may represent normal background conditions or be indicative of elevated input levels. During review of the proposed action, the Service attempted to compare the mercury concentrations detected in proposed dredge sediments with data from similar environs.

A technical memorandum produced by the National Oceanic and Atmospheric Administration, entitled *Contaminants in Sediment and Fish Tissue from Estuarine and Coastal Sites of the Northeastern United States* (U.S. Department of Commerce, 1990) presented analytical data generated from sediment samples collected from three sites in Great Bay, New Jersey during years 1985 - 1986. A total of six samples were analyzed for a suite of metals, including total mercury. Reported concentrations ranged from <0.231 - 0.607 mg/kg dry weight, with an average concentration of 0.395

mg/kg. These values are similar to concentrations reported for the proposed project's back-bay basins.

An evaluation of contaminants in sediments and forage organisms conducted by the Service at the Cape May National Wildlife Refuge included analysis for mercury in 25 sediment samples collected from various fresh and estuarine waters in Cape May County, New Jersey (U.S. Fish and Wildlife Service, 1994b). Mercury concentrations ranged from 0.04 - 0.42 mg/kg dry weight, with a mean concentration of 0.23 mg/kg. These values are also similar to those reported for the back-bay basin sediments.

(iii). Comparison of mercury concentrations in project area sediments with similar sites in southern New Jersey

Sediment samples collected from the aforementioned studies in Great Bay and Cape May National Wildlife Refuge were collected from areas continually inundated with either fresh or salt water. In contrast to the mercury concentrations reported in these two studies, sediments collected by the applicant at the proposed Stone Harbor Point disposal site were significantly lower: 0.058, 0.031, and 0.027 mg/kg dry weight. The average of these three concentrations is 0.0386 mg/kg. This value is an order of magnitude lower than the average concentration (0.328 mg/kg) calculated from the original composite back-bay basin samples. The reason for the lower baseline mercury concentrations within the proposed Stone Harbor Point disposal site sediments, as compared to other New Jersey estuarine sediments, is not known at this time. Site characteristics such as the hydrodynamic regime or depositional rate may contribute to the lower sediment mercury concentrations at Stone Harbor Point. However, it is clear that sediments from the project's back-bay basins have significantly higher mercury concentrations than the ambient conditions at the proposed Stone Harbor Point disposal site.

c. Mercury in Piping Plover

Addled piping plover eggs were collected from nesting areas within New Jersey during 1990 and evaluated by the Service for environmental contaminants (U.S. Fish and Wildlife Service, 1991). A total of 14 eggs were collected and composited into six different samples. Corrected for percent moisture, mercury concentrations in these plover eggs ranged from 0.077 - 1.07 ppm (mg/kg) wet weight, with a median concentration of 0.164 ppm wet weight. These concentrations were compared to published effects concentrations, with the Service concluding "With the exception of 1.07 ppm wet weight mercury in eggs from Brick Township, the mercury residues detected in this study appear below those thought causative of avian reproductive anomalies." It is important to note that eggs were analyzed for total mercury only and did not examine concentrations of methylmercury, the most stable and toxic form of mercury (Thompson, 1996).

d. Inconsistency with Standard Contaminants Testing

As stated earlier, the Clean Water Act's Section 404(b)(1) guidelines require that "dredged or fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact, either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern." In situations involving contaminated sediments, such demonstrations often require bioassay and/or bioaccumulation testing in addition to basic bulk sediment chemistry analyses. The Corps standard practice is to require such bioassays or bioaccumulation tests *prior* to actual dredging and to determine whether sediments are appropriate for open water disposal *prior* to project initiation.

Allowing contaminants testing of dredged materials after disposal is not standard practice. However, following coordination with staff from EPA, Region II and the Corps' Environmental Laboratory at the Waterways Experiment Station, Vicksburg, Mississippi, the Corps determined that further testing of back-bay dredged sediments should occur *following* deposition into the temporary CDF at Stone Harbor Point rather than *prior* to dredging. It is the Corps' and the EPA's position that testing materials following placement in the CDF would provide a better representation of materials that would be discharged into the aquatic environment and account for chemical and physical changes that would take place in the material (including segregation of grain sizes and changes to microbial populations).

D. EFFECTS OF THE ACTION

In evaluating the effects of the federal action under consideration in this consultation, 50 CFR 402.2 and 402.14(g)(3) require the Service to evaluate both the direct and indirect effect of the action on the species, together with the effects of other activities that are interrelated or interdependent with the action that will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for project justification. Interdependent actions are those that have no independent utility apart from the action under consideration. The proposed disposal of back-bay basin dredged sediments within a temporary CDF, and subsequent distribution of dredged materials at Stone Harbor Point, will cause direct and indirect effects on piping plovers nesting within the action area as discussed below.

1. Direct and Indirect Impacts From Project Construction

Due to the proposed prohibitions on construction activities within piping plover habitat during the breeding season, direct mortality or disturbance due to construction activities will be limited to disturbance of adults or fledged juveniles that might stop at Stone Harbor Point during the 2001 Fall migration or the 2003 Spring migration. However, indirect effects to piping plover habitat from the CDF are anticipated.

A temporary CDF will be constructed at Stone Harbor Point using existing on-site materials. Sediments hydraulically dredged from six back-bay basins, totaling 65,342 cubic yards, will be

discharged into the CDF. Following an approximate one-year dewatering period, the temporary CDF and the dredged sediments will be graded and the project area will be re-contoured to recreate beach nesting bird habitat. When completed, the CDF will encompass 10.44 acres. Construction of the CDF will disturb approximately 13.02 acres, including 9.82 acres of intertidal area. Of the 13.02 acres of disturbance, 9.0 acres are currently suitable as nesting habitat. The applicant estimated that, as of July 2000, approximately 21.3 acres of suitable nesting habitat was available at Stone Harbor Point. The applicant proposes to time construction of the CDF, deposition of dredged materials, and site restoration outside of the piping plover nesting season to minimize direct impacts (M.V. Engineering, 2000b). However, the CDF will remain in place throughout one piping plover nesting season to allow dewatering of dredged sediments to occur. Piping plover nesting habitat encompassed by the CDF, comprising approximately 42.2 percent of available nesting habitat, will be made unavailable to plovers or will be substantially degraded during one full breeding season. In addition, the physical presence of the CDF may discourage piping plovers from attempting to nest at Stone Harbor Point, or may cause the birds to nest within areas of Stone Harbor Point that are lower in elevation than the habitat from which they have been displaced, making the nests more susceptible to losses from flooding. In addition, in the first season following recreation of nesting habitat, newly graded beaches may not have yet developed habitat features that attract nesting plovers, such as newly forming dunes, washover areas, and exposed shell areas.

The applicant estimated that, as of July 2000, approximately 41.6 acres of suitable foraging habitat was available at Stone Harbor Point (M.V. Engineering, 2000b). The CDF will disturb 12.4 acres or 29.8 percent of piping plover foraging habitat available at Stone Harbor Point. Piping plover foraging habitat encompassed by the CDF will be unavailable to plovers or degraded during one full breeding season. Additionally, impacts to prey resources within piping plover foraging habitat may extend beyond one season. Construction of the CDF and subsequent deposition of the dredged materials will bury and cause mortality of invertebrate organisms that serve as food resources for piping plovers within the footprint of the CDF. Additionally, activities to recreate suitable beach nesting bird habitat conditions will bury prey resources outside of the footprint of the CDF. No estimate of the acreage that will be temporarily impacted during restoration activities was provided. The project time line provided by the applicant indicates that regrading of Stone Harbor Point is scheduled for completion just prior to the piping plover nesting season (M.V. Engineering, 2000b), leaving minimal time for benthic fauna to recolonize areas impacted by project activities.

While several studies have been undertaken to determine the impact of beach nourishment on oceanside infauna, the impact to bayside infauna has not been well studied as most beach nourishment projects occur on oceanside beaches rather than bayside beaches. As with beach nourishment of oceanside beaches, it is anticipated that the disposal of sediments at Stone Harbor Point's bayside beaches will bury and cause mortality of invertebrate organisms that serve as food resources for piping plovers. For oceanside beach nourishment, the intertidal zone fauna is most affected by nourishment activities (Lynch, 1994). Studies conducted in Florida, North Carolina, and South Carolina show that recolonization rates by benthic invertebrates are variable and somewhat dependent on the time of year

in which the nourishment occurs (Reilly and Bellis, 1983; Bacca and Lankford, 1988; Lynch, 1994). Recolonization begins within days, but can take up to one year for full recovery of some species (Reilly and Bellis, 1983; Bacca and Lankford, 1988; Lynch, 1994). In a study of the effects of beach nourishment on oceanside intertidal benthos conducted by the Corps in Monmouth County, New Jersey, a "worst-case" recovery time of eight to nine months was estimated (U.S. Army Corps of Engineers, 1999). The macrofaunal community after recolonization may differ considerably from the original community (Hurme and Pullen, 1988). Once established, it may be difficult for species of the original community to displace the new colonizers (Hurme and Pullen, 1988). Beach nourishment affects the species richness, abundance, and biomass at the sand placement area in the short term following the nourishment (U.S. Army Corps of Engineers, 1999). The applicant estimates that full recovery of benthic prey resources will occur within one year of final regarding of the site (M.V. Engineering, 2000b). Therefore, project activities at Stone Harbor Point may be expected to impact piping plover prey resources for at least two breeding seasons.

While the project, once completed, will increase the quantity of available nesting and foraging habitat above current conditions, artificially created habitats may be inferior to naturally accreted beach and overwash habitat, tidal pools, bayside flats, and sand spits that are likely to form absent the proposed project.

2. Indirect Effects of Increased Recreational Disturbance

The proposed project will increase the attractiveness of Stone Harbor Point to recreationists. The increased recreational use of nourished beaches is often cited by the Corps and others as a benefit of beach nourishment. Recreational activities that may potentially adversely affect plovers include off-road vehicle use, unleashed pets, fireworks, and kite flying. In addition, use of the area by recreationists may result in vandalism of nests and eggs, destruction of wrack by off-road vehicles, and an increase in predators attracted to improperly disposed of trash or food scraps. The applicant has indicated that, while providing recreational use at Stone Harbor Point is a goal of the project, recreational activities at Stone Harbor Point will be managed by the Borough of Stone Harbor to prevent adverse impacts to piping plover and other beach nesting birds. However, the subject project may increase recreational use, increasing the effort required to manage piping plover-recreation conflicts.

3. Indirect Effects of Increased Predation

Dredged materials placed within the CDF are likely to contain dead or dying benthic organisms that may attract predators such as gulls, crows, raccoons, red foxes, and Norway rats, increasing the number of predators occurring at Stone Harbor Point. Areas of ponded water and drying dredged sediments within the CDF could serve as a roosting/loafing site for gulls during one full piping plover breeding season, increasing the incidence of gull predation on eggs and chicks or increasing abandonment of nesting attempts by adult birds.

4. Indirect Effects of Contaminants

The proposed project, as conditioned by the Corps, will allow dredge sediments from six back-bay basins to be deposited into a temporary CDF at Stone Harbor Point prior to final contaminant testing for mercury. Testing for mercury will be concurrent with the dewatering process. Any dredged sediments with total mercury concentrations above the ERM (0.71 ppm) will be removed from the Stone Harbor Point CDF; any sediments with concentrations below the ERL (0.15 ppm) may remain in the CDF without further testing. Permit conditions proposed by the Corps require that any sediments with concentrations of mercury or any other element or compound between its respective ERL and ERM value must *either* be removed from the CDF and disposed of in an approved alternative upland site located outside the vicinity of Stone Harbor Point *or* undergo and pass approved bioaccumulation / bioassay testing to determine suitability for open water placement at Stone Harbor Point.

Only those sediments with concentrations below the ERL or those sediments passing approved bioaccumulation / bioassay testing will be used for habitat restoration at Stone Harbor Point. Such sediments will contain levels of mercury that are higher than the existing mercury background levels at Stone Harbor Point of 0.027 to 0.058 ppm (see Tables 5 and 6). Even sediments with mercury concentrations below the ERL (0.15 ppm) would exceed background mercury levels and may result in an overall increase in mercury at Stone Harbor Point. However, the Service does not anticipate adverse impacts to piping plovers or prey resources from exposure to sediments with mercury levels below the ERL or from sediments with mercury concentrations between the ERM and ERL where bioaccumulation / bioassay tests have shown that such sediments are suitable for disposal within open water.

a. Potential Mercury Exposure Routes from Proposed Project

Sediments from five of the six basins proposed for disposal at Stone Harbor Point contain concentrations of mercury that will require the applicant to conduct further testing to demonstrate that the sediments are suitable for open water disposal and that such sediments will not adversely affect piping plovers or their prey resources. As proposed, the Corps would allow the applicant to dispose of dredge sediments from back-bay basins prior to completion of contaminants testing. During the dewatering period (approximately one year), dredge sediments will be contained within an open, low-walled (10 foot high) berm. Such a structure would be similar in nature to some man-made structures with documented use by piping plovers. In Virginia, piping plovers have been known to nest and forage in man-made impounded areas where sand or mud flats are exposed (i.e, Wash Flats at Chincoteague National Wildlife Refuge and Craney Island). In Nebraska, piping plovers have been documented to nest on sand and gravel spoil piles on three major rivers (U.S. Fish and Wildlife Service, 1988). Migrating and breeding piping plovers may, therefore, nest or forage within the temporary CDF at Stone Harbor Point. However, it is unlikely that benthic organisms will survive the dredging operation and subsequent dewatering process. The Borough anticipates that a surface crust

will form on dredged materials during the initial dewatering period that will discourage the birds from nesting or foraging within the CDF.

The Stone Harbor Point area has a history of erosion from coastal processes. Stone Harbor Point has been in an accreting phase in recent years. Should this trend reverse, the temporary CDF could be breached. Additionally, the Stone Harbor Point area is subjected to frequent coastal storms, including hurricanes. Should a breach in the CDF occur prior to testing and removal of unsuitable sediments, mercury contaminated sediments would be distributed throughout Stone Harbor Point and the adjacent tidal wetlands and waters. While a major storm event capable of breaching the dike would likely result in mixing and, therefore, dilution of mercury-contaminated sediments, normal wind and wave action at Stone Harbor Point can be expected to further redistribute sediments. Fine-grained particles (those most likely to have higher mercury levels) would be expected to migrate to bayside shallow water habitats. At low tide, these areas are exposed and are a favored foraging area for piping plover. Subsequent isolation and removal of mercury contaminated sediments would be difficult to achieve. The Corps has reviewed the Borough's proposed CDF construction plan and has found the proposed structure to be satisfactory for containment of the subject sediments (Boyer, pers. comm., 2000; 2001).

b. Mercury Impacts to Benthic Organisms

As stated earlier in this Biological Opinion, sediment mercury concentrations above the established ERL guidelines indicate a potential for adverse impacts to benthic organisms. In Long *et al*.'s review (1995), benthic effects resulting from mercury contamination were reported in approximately 23 percent of the studies with concentrations between the ERL and ERM values. The mercury concentrations reported from five of six of the project's back-bay basins fell between the ERL/ERM guidelines, indicating at least some expected adverse impact to the benthic community. The proposed activity may result in a reduced benthic prey base at the proposed Stone Harbor Point disposal site. However, if sediments testing between the ERL and ERM undergo and pass approved bioaccumulation / bioassay testing, as the Corps proposes to require as a condition of any permit issued for the subject project, any such reduction would be anticipated to be minimal and would not significantly diminish the overall prey resources available to piping plovers foraging at Stone Harbor Point.

c. Mercury Impacts to Piping Plovers

The scientific community is in general agreement that mercury can be bioconcentrated in organisms and biomagnified through food chains, and that contamination in living organisms causes varying degrees of toxicity (Eisler, 1987). Biological or chemical processes can result in the formation of methylmercury, the most hazardous mercury species due to its high stability, lipid solubility, and high ability to penetrate membranes in living organisms (Eisler, 1987). Methylmercury is efficiently absorbed from the diet, attacks the nervous system, and is generally accepted to be the most toxic form of mercury to wildlife (Thompson, 1996).

Acute symptoms associated with mercury poisoning in birds include muscular incoordination, falling, slowness, fluffed feathers, calmness, withdrawal, hyporeactivity, hypoactivity, and eyelid drooping (Eisler, 1986). In addition, the U.S. Department of the Interior (1998) Guidelines for Interpretation of the Biological Effects of Selected Constituents in Biota, Water, and Sediment report acute methylmercury symptoms as including reduced food intake leading to weight loss; progressive weakness in wings and legs; difficulty flying, walking and standing; and an inability to coordinate muscle movements. Sublethal effects on birds include adverse impacts on growth, development, reproduction, blood and tissue chemistry, metabolism, and behavior (Eisler, 1987). Thompson (1996) reports that a wide range of deleterious effects to birds have been documented in controlled mercury dosing experiments, while some studies involving free-living populations and individuals have failed to detect adverse impacts.

Although a Burger and Gochfeld (1988) study of metals in tern eggs in a New Jersey estuary showed a decline in mercury levels over an 11-year period, the authors point out studies showing that female birds can eliminate pollutant body burdens by sequestering them in their eggs, which could potentially impact the developing embryos. The authors state that immediate nutrition makes a significant contribution to egg composition and that metal levels entering the egg during development may be derived from both stored body burdens and current food stocks, reflecting levels in the female parent. The potential for this phenomenon is relevant to the proposed project because, although piping plovers only spend five months of the year on their New Jersey breeding grounds (U.S. Fish and Wildlife Service, 1991), plovers use the Stone Harbor Point for nesting and brood rearing. Mercury accumulated in the plover's benthic prey base may be passed into the developing embryos of plover eggs, reducing local population viability. However, if sediments testing between the ERL and ERM undergo and pass approved bioaccumulation / bioassay testing, as the Corps proposes to require as a condition of any permit issued for the subject project, no such adverse impact would be anticipated as a result of the proposed project.

5. Cumulative Effects

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

E. CONCLUSION

After reviewing the current status of the piping plover, the environmental baseline for the action area, the effects of the proposed dredging project and the potential cumulative effects, it is the Service's Biological Opinion that the Corps issuance of a Department of the Army permit for dredging of back-bay basins within the Borough of Stone Harbor and subsequent disposal of dredged material at Stone Harbor Point within the Borough of Stone Harbor, Cape May County, New Jersey, is not likely to

jeopardize the continued existence of the piping plover. Although the Service has serious concerns regarding the potential impacts of this project to piping plover populations in the relatively precarious New York - New Jersey Recovery Unit, the scale of the project (as compared to other beach nourishment projects) and short duration of anticipated project impacts was a significant factor in this non-jeopardy determination. The Service's evaluation of the effects of the proposed project on the piping plover were based on a project description that included permit conditions proposed by the Corps to minimize or avoid adverse impacts to the piping plover. Assurances afforded by the Corps proposed permit conditions, such as the requirement that the applicant conduct appropriate contaminant testing of dredged sediments, including bioaccumulation / bioassay testing if warranted; evidence that the applicant has funding available and committed to cover all parts of the project, including contingencies for removal of unsuitable material; and, assurances that effects on habitat will be limited to a single breeding season, were key considerations. These permit conditions were relied upon by the Service in making this non-jeopardy finding. Because the Corps proposed to include the aforementioned permit conditions as part of its agency action, these conditions were considered as an integral part of the project description and are, therefore, nondiscretionary, as are the reasonable and prudent measures and terms and conditions provided in the below incidental take statement.

No critical habitat has been designated for this species; therefore, no critical habitat will be affected.

IV. INCIDENTAL TAKE STATEMENT

A. DEFINITION OF INCIDENTAL TAKE

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

B. EXTENT OF ANTICIPATED TAKE

The applicant proposes to conduct project construction activities outside of the piping plover nesting season. Therefore, no take due to the direct effects of project construction are anticipated. However, the proposed project will require that the temporary CDF at Stone Harbor Point remain in place during a one-year dewatering process that will extend throughout one full piping plover nesting season. Therefore, the Service anticipates that take in the form of reduction of 9.82 acres of suitable piping plover nesting habitat and 12.4 acres of suitable foraging habitat will occur for a one-year period from construction of the CDF.

The Service anticipates that project activities proposed by the Borough of Stone Harbor could result in unsuccessful nesting attempts, nest abandonment, or impaired reproduction in up to five pairs of piping plover during the 2002 nesting season. In a "worst-case" scenario whereby all nesting pairs at Stone Harbor Point are impacted by the subject project, the maximum incidental take expected would be in the form of harassment and impaired reproduction in five pairs of piping plover, resulting in the loss of up to four piping plover fledglings during the 2002 nesting season. However, since not all suitable nesting and foraging habitat at Stone Harbor Point will be eliminated, the Service anticipates that the likely incidental take will be impaired reproduction of two to three pairs of piping plover and loss of two fledglings during the 2002 nesting season. This level of take is based on the number of pairs occupying the project area in 2000 and a productivity rate of 0.77 chicks per pair based on the five year average (1996-2000) fledge rate of Stone Harbor Point and nearby piping plover nesting sites extending from Corsons Inlet State Park to Cape May Meadows, New Jersey. This take would result from a combination of reduction of breeding and foraging habitat, diminishment of prey resources and increased predation from gulls or other predators attracted to the CDF, and increased conflicts with beach recreation activities.

Full recovery of benthic prey resources may take as long as one year following grading and re-contouring of habitats at Stone Harbor Point. Therefore, take in the form of diminished prey resources is also anticipated during a second piping plover breeding season (2003). However, the proposed project timing will allow for a short period of benthic organism recovery prior to arrival of adult piping plovers. Additional benthic organism recovery will occur prior to hatching of chicks. Take in the form of harm to five pairs of adult plovers and their progeny is anticipated. Impacts during the 2003 breeding season will be greatly reduced over those in the 2002 season; therefore, loss of no more than one piping plover fledgling is anticipated.

The Service does not anticipate incidental take of piping plovers from exposure to mercury contaminated sediments due to the Corps determination that the proposed CDF design and construction is sufficient to properly contain dredged sediments until all necessary contaminants testing and / or removal of materials can be accomplished, and to the Corps proposed permit conditions requiring removal of materials determined to be unsuitable for the environmental restoration project (i.e., materials with mercury concentrations above the ERM or those materials with mercury concentrations between the ERL/ERM values that do not undergo or pass bioaccumulation / bioassay

testing). Should any breach occur in the CDF as a result of a catastrophic event (i.e., hurricane, major coastal storm) or CDF engineering deficiency, take that may occur as a result of exposure to mercury contaminated sediments would not be covered by this incidental take statement. Furthermore, the Corps would need to reinitiate consultation regarding its proposed remediation activities.

C. EFFECT OF THE TAKE

The Service has determined that the level of take anticipated, as described above, from the proposed action is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

D. REASONABLE AND PRUDENT MEASURES

The measures described below are nondiscretionary, and must be implemented by the Corps to become binding conditions of any permit issued to the Borough of Stone Harbor in order for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps: (1) fails to demonstrate clear compliance with the reasonable and prudent measures and their implementing terms and conditions in this Biological Opinion; or (2) fails to require the applicant or its contractors or co-operators to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to contracts or permits; and/or (3) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Reasonable and prudent measures are measures considered necessary or appropriate to minimize the amount or extent of anticipated incidental take of the species. The Service has concluded that the following reasonable and prudent measures are necessary and appropriate to minimize take of piping plover.

(1) Ensure that the physical loss of piping plover nesting and brood rearing habitat due to the construction of the CDF is limited to no more than one piping plover breeding season.

(2) Ensure protection of piping plovers from human disturbance and predation in the project area for the duration of project implementation (August 15, 2001 through March 31, 2003).

(3) Ensure that the temporary CDF is not used as a roosting, feeding, or perching site for avian predators and that the CDF does not attract mammalian predators.

(4) Ensure that no dredged sediments containing concentrations of mercury sufficient to cause adverse impacts to piping plovers through bioaccumulation and biomagnification are released into the subtidal or intertidal zones at Stone Harbor Point.

(5) Ensure that placement of dredged sediments at Stone Harbor Point does not cause an unacceptable increase in benthic organism toxicity, such that the available prey base for piping plovers is impoverished.

E. TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the ESA, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

(1) Prohibit construction of the CDF during the piping plover breeding season (April 1 to August 15) (unless completion of nesting and brood-rearing activity occurs earlier).

(2) Complete re-grading of the CDF and creation of suitable habitats prior to the second piping plover nesting season (i.e., April 1, 2003) as follows:

(a) all disposal activities must be completed by January 15, 2002 to allow an adequate dewatering period (estimated at 12 months) and sufficient time for enhancement site grading; removal of the CDF and its contents must occur no later than one year after the completion of dredging;

(b) initial enhancement site grading must be completed by February 15, 2003; upon completion, the applicant must contact the Corps to arrange for agency inspection; and

(c) final enhancement site grading must be completed by March 15, 2003 to allow natural processes to occur at the enhancement area prior to seasonal utilization by beach nesting birds.

(3) Take any actions necessary to restore the CDF area to mimic pre-project baseline conditions in the event that the applicant fails to initiate removal of the CDF and restoration of beach nesting bird habitat at Stone Harbor Point by February 1, 2003. Baseline conditions are considered as those documented on project site plans (sheet 4 of 12, revision dated July 5, 2000) included within the applicant's BA (M.V. Engineering, 2000b).

(4) Ensure that the applicant has a program in place to implement management of recreational use activities to avoid impacts to piping plovers during the nesting season as described within the applicant's BA.

(a) A written plan describing the applicant's management program must be developed and provided to the Service and the ENSP for review at least 30 days prior to initiation of any project-related construction activities.

(b) The applicant's management program must be conducted 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* (enclosed as Appendix B)

(5) Prohibit mechanical removal of natural organic material in the areas used by plovers to preserve feeding habitat for the duration of project implementation (August 15, 2001 to March 31, 2003). Trash and litter may be manually removed from the wrack line.

(6) Require that the applicant control any avian and mammalian predators using the CDF as a resting, feeding, or perching site, as determined by the Service or the ENSP. Predator control must be conducted in accordance with State and federal regulations.

(a) Enlist the services of a licensed animal damage control contractor, animal control officer, or the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) to conduct control of avian and mammalian predators.

(b) Prohibit feeding of wildlife, especially gulls, crows, and red fox at Stone Harbor Point.

(c) Allow the ENSP to construct and erect predator exclosures on piping plover nests where and when appropriate, as determined by the ENSP.

(d) Provide written permission to the New Jersey Division of Fish and Wildlife to engage in predator control activities at Stone Harbor Point, including trapping of red fox and feral cats (*Felis catus*).

(7) Conduct an on-site inspection of the CDF prior to commencement of disposal of any sediments at Stone Harbor Point to verify the structural integrity of the facility.

(8) Provide verification that sediments from Shelter Haven, Snug Harbor, and South Basin and from boat slips in all basins are properly disposed of at Site 103 and not within the Stone Harbor CDF.

(9) Ensure that the timeframes for sediment testing and analysis reporting to the reviewing agencies (Corps, EPA, Service) are strictly adhered to. If the Borough fails to adhere to the timeframes set forth in any permit issued by the Corps for this project, take any actions necessary to initiate removal and proper disposal of sediments within the CDF.

(10) Ensure that materials determined to be unsuitable for the environmental restoration project and that require removal from the CDF (i.e., materials with mercury concentrations above the ERM or those materials with mercury concentrations between the ERL/ERM values that do not undergo or pass bioaccumulation / bioassay testing) are disposed of at a properly contained approved site outside the vicinity of Stone Harbor Point.

(11) Exercise care in handling any specimens of dead piping plover adults, young, or non-viable eggs to preserve biological material in the best possible state. In conjunction with the preservation of any specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead or non-viable specimens does not imply enforcement proceedings pursuant to the ESA. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective. Upon locating a dead bird, initial notification must be made to the following Service Law Enforcement office:

Senior Resident Agent
U.S. Fish and Wildlife Service
Division of Law Enforcement
Sea Land Building, 2nd Floor
1210 Corbin Street
Elizabeth, New Jersey 07201
(973) 645-5910

Upon locating an abandoned nest or non-viable egg specimen, initial notification must be made to the following Service office:

Supervisor
U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main Street, Bldg. D
Pleasantville, New Jersey 08232
(609) 646-9310

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the aforementioned level of incidental take is exceeded, such incidental take would represent new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Corps must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

V. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The following conservation recommendations are directed to the Corps as the federal permitting authority for this action.

(1) Ensure that impacts to State-listed endangered beach nesting birds (i.e, least tern and black skimmer) from project-related activities are minimized. In addition to the positive benefits to these species that would result from such protection, piping plovers nesting within or adjacent to tern and skimmer colonies may benefit from the defensive behaviors against avian predators that is typical of these colonial species.

(2) Collect information on the effects of project related dredge disposal on bayside benthic communities and the time frames for benthic community recolonization and recovery.

(3) Conduct outreach and education efforts regarding the piping plover to increase community and recreational users understanding of the species and its protection needs.

VI. REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the effects of the Corps proposed issuance of a DA permit for dredging of back-bay basins within the Borough of Stone Harbor and subsequent disposal of dredged material at Stone Harbor Point on the piping plover. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or, (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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Appendix A.

New Jersey Department of Environmental Protection, Office of Dredging and Sediment Technology Waterfront Development Permit / Water Quality Certificate

Stone Harbor Borough Back Bay Maintenance Dredging with Environmental Restoration of Stone Harbor Point, Cape May County, New Jersey

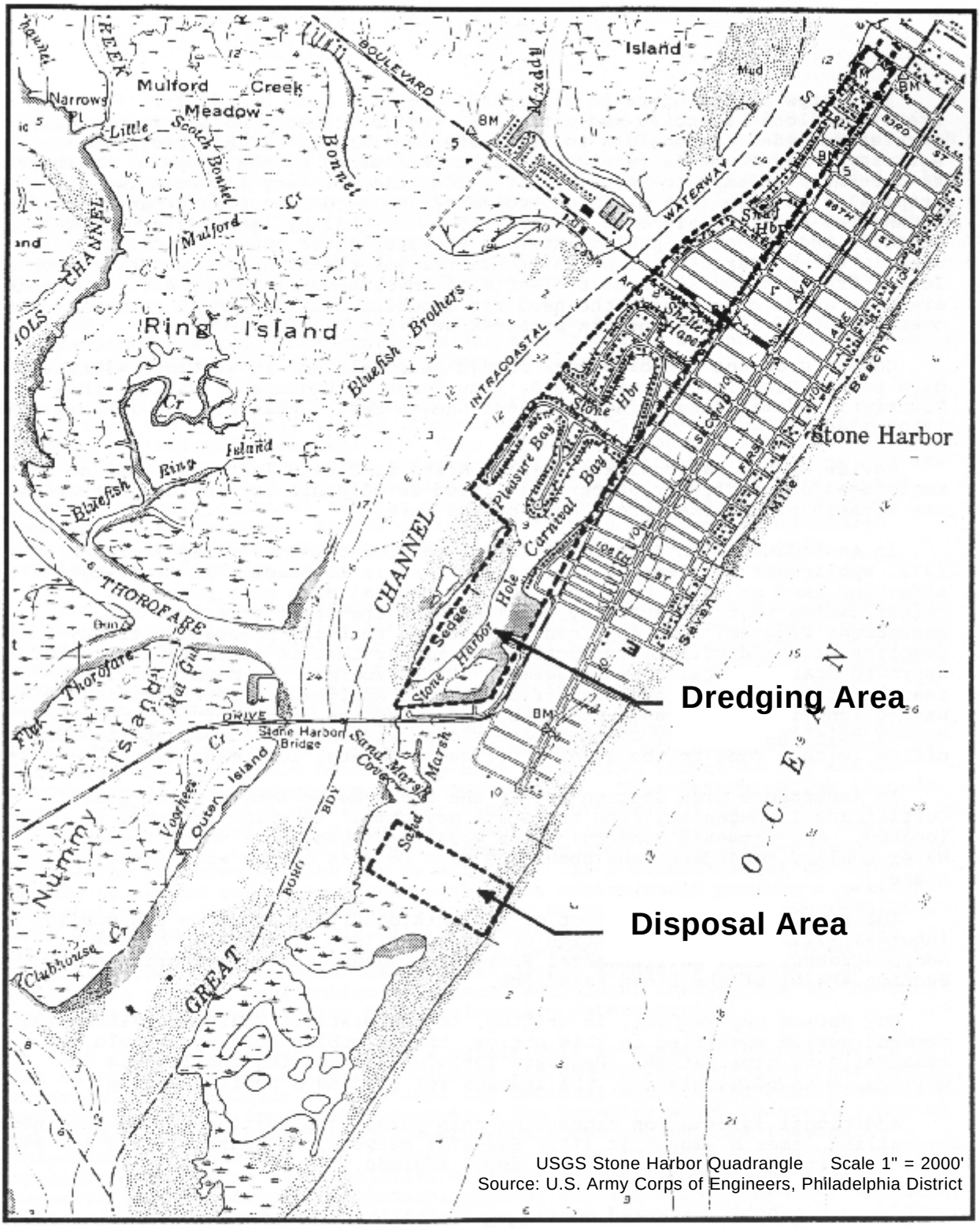

Figure 1. Stone Harbor Back-Bay Dredging and Stone Harbor Point Disposal Site Location Map