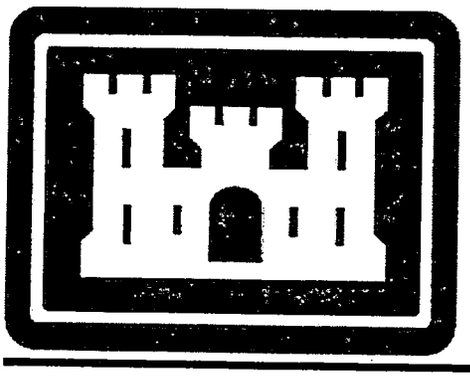


U.S. Army Corps of Engineers
New York District

Dredged Material Management Plan for the Port of New York and New Jersey

DRAFT

Programmatic Environmental Impact Statement

September 1999

CONFIDENTIAL

MAXUS2022760

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LIST OF ABBREVIATIONS and COMMONLY USED TERMS

AP	Acid Precipitation
BHNIP	Boston Harbor Navigation Improvement Project
BOD	Biological Oxygen Demand
CAC	Consolidated Aggregate Corporation
CAD	Contained Aquatic Disposal
CCMP	Comprehensive Conservation Management Plan
CDF	Confirmed Disposal Facility
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CSO	Combined Sewer Overflow
CWA	Clean Water Act
CY	Cubic Yard
DDT	Dichlorodiphenyltrichloroethane
DDMIWG	Dredged Material Management Integration Work Group
DMMP	Dredged Material Management Plan
DO	Dissolved Oxygen
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
FMC	Fishery Management Councils
GRNA NPS	Gateway National Recreation Area, National Park Service
HARS	Historic Area Remediation Site
HEP	Harbor Estuary Plan
HTRW	Hazardous, Toxic and Radioactive Waste
ISC	Interstate Sanitation Commission
MA	Massachusetts
MCY	Million Cubic Yards
MDS	Mud Dump Site
MESA	Marine Ecosystem Analysis
mg/l	milligrams per liter
MOTBY	Military Ocean Terminal at Bayonne
MPRSA	Marine Protection Research and Sanctuaries Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act of 1996
MSRC	Marine Science Research Center
NJAC	New Jersey Administrative Code
NAAQS	National Ambient Air Quality Standards
NBCDF	Newark Bay Confined Disposal Facility
NEPA	National Environmental Policy Act
NJ	New Jersey
NJDEP	New Jersey Department of Environmental Protection
NJMR	Office of New Jersey Maritime Resources

LIST OF ABBREVIATIONS and COMMONLY USED TERMS

NJSD	New Jersey SCUBA Diver
NJSHPO	New Jersey State Historic Preservation Office
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOX	Nitrogen Oxides
NRHP	National Register of Historic Places
NY	New York
NYCDEP	New York City Department of Environmental Protection
NYCEDC	New York City Economic Development Corporation
NYCLPO	New York City Landmarks Preservation Office
NYD	The United States Army Corps of Engineers – New York District
NYSDEC	New York State Department of Environmental Conservation
NYSHPO	New York State Historic Preservation Office
OENJ	Orion Elizabeth New Jersey
PA	Pennsylvania
PANY/NJ	Port Authority of New York/New Jersey
PADI	Professional Association of Diving Instructors
PAH	Poly aromatic Hydrocarbons
Pb	Lead
PCB	Polychlorinated Biphenyl
PEIS	Programmatic Environmental Impact Statement
PM-10	Inhalable Particulates
ppm	parts per million
PSE&G	Public Service Electric and Gas
PWP	Priority Waterbody Problems
RCRA	Resource Conservation and Recovery Act
RPF	Redox Potential Discontinuity
SAV	Submerged Aquatic Vegetation
SEQRA	State Environmental Quality Review Act (New York)
SERG	Senior Executive Review Group
SHPO	State Historic Preservation Offices
SO_2	Sulfur Dioxide
SPI	Sediment Profile Imagery
SS	Smoke Shade
STORET	EPA Storage of HTRW Information
SVOC	Semi-Volatile Organic Compounds
TCLP	Toxic Characteristic Leaching Procedure
TSCA	Toxic Substances Control Act
TSP	Total Suspended Particulates
TSS	Total Suspended Solids

LIST OF ABBREVIATIONS and COMMONLY USED TERMS

USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compounds
WES	Waterways Experiment Section

1 SUMMARY

1.1 Major Findings and Conclusions

a. Coordination with interested parties including scoping meetings and the Dredged Material Management Integration Work Group has resulted in a consensus that the Port of New York/New Jersey serves a vital role in the economy and well being of the entire region. This is supported by the fact that $29 billion enters the economy and 92,000 direct jobs and 74,000 indirect jobs depend on the Port generated business (DMMP). Many of the Port of New York/New Jersey channels are too shallow to allow efficient operation by the Port users without maintenance dredging. The current trend toward deeper draft vessels requires even deeper channels. Thus, a difficult situation has been developing in which the Port of New York/New Jersey will cease to be a major destination for shipping unless action is taken to maintain currently authorized channel depths and deepen others.

b. Lightering is used as an interim measure until navigation channels and berths can be dredged. This process is the off-loading of a vessel's cargo in deep waters onto a shallow draft vessel or barge that would then be able to berth at shallower cargo handling facilities. In many instances the larger vessels, which draw less water in a 'lightered' state, can then access the shallower facilities as well. Double handling of cargo increases the chance of accidents and spillage, and greatly increases the cost of shipping. The dependence on such practices as lightering is incentive to major shipping lines to move to other ports with channels deep enough to avoid such costly practices.

c. The amount of material that currently needs to be dredged includes the volume to bring Federal channels to their authorized depth, as well as the volume to maintain or improve individual Port berthing areas and non-Federal channels (DMMP Table 1-1). There are several authorized or planned increases in depth of channels to accommodate the deeper draft of many present and future vessels. In addition, there is a major Port improvement study that is investigating long-term needs including additional channel deepening. The New York & New Jersey Harbor Navigation Study is a parallel planning effort. The development of a comprehensive plan to manage dredged material for all of these maintenance and deepening activities, including associated contaminants, is the subject of the Dredged Material Management Plan (DMMP, first document of this volume), and of this draft Programmatic Environmental Impact Statement (PEIS).

d. The United States Army Corps of Engineers-New York District (NYD), along with its cost sharing sponsors the States of New York and New Jersey and the Port Authority of New York/New Jersey (PANY/NJ), have the final responsibility for deciding which options are included in the DMMP. In order for the plan to be successful it must have support from the regions' stakeholders and incorporate the findings of the various Port

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planning efforts that may affect the volumes and time frames for implementing the selected options. These studies include the following:

- PANY/NJ Major Port Improvement Study
- New York City Economic Development Corporation (NYCEDC) Cross Harbor Freight Movement Major Investment Study
- NYCEDC Strategic Plan for the Redevelopment of the Port of New York
- NYD's NY/NJ Harbor Navigation Study

e. The DMMP, its Technical Appendix and the draft PEIS, are combined in one volume for ease of understanding. The DMMP describes the planning process and presents alternatives and a recommended course-of-action. The PEIS addresses generic impacts of the options evaluated in the DMMP. This information was used in selecting among the different options for inclusion in the DMMP's recommedations. The Technical Appendix provides supporting information and the results of agency coordination.

f. Harbor dredging is needed to avoid the problems and costs associated with shallow channels and berthing areas; and to accommodate a new class of larger vessels. A plan for the disposal of dredged material is needed to provide for the large volumes and long duration of dredging operations in an environmentally acceptable and economic manner. The DMMP has evaluated many options including a wide range of technologies and many potential disposal sites. In conjunction with long-term programs to reduce contaminants at their source and to reduce sediment dredging needs, a recommended course-of-action which treats dredged material as a resource for beneficial use applications has emerged as the preferred approach to dredged material management. Beneficial use options such as ocean remediation (HARS), habitat creation, enhancement and restoration, and land remediation (including landfills, brownfields, and mined land) are combined with decontamination technologies in the recommended course-of-action. In recognition of the uncertainties associated with the estimates of volumes, the timing of dredging projects and the timely availability of specific recommended options, confined aquatic disposal pits (CADs) have been identified as a contingency to be used if beneficial use options do not meet disposal needs. CADs would be located in selected areas of the Upper Bay Complex so that this disposal-only option confines contaminated sediments in areas where contamination is already present.

g. The DMMP was designed as a flexible plan that would be modified over time following annual reviews by the DMMP working group. Because important preferred management options are in the small scale that stage and new techniques or options may evolve in the future, changes to the plan can be expected. The recommended course-of-action is divided into a 2000 to 2010 time interval (2010 plan), which encompasses major ongoing and proposed channel improvements, and a 2011 to 2040 time interval (2040 plan) during which maintenance dredging is the primary need and contaminant reduction efforts increase the volumes of clean sediments.

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1.2 Relationship to Environmental Requirements

a. Table 1-1 presents the environmental statutes that have applicability to the options under investigation. Since this is a broad environmental assessment of the spectrum of management options for the purpose of aiding in the selection of options that would go into the plan, site-specific details are not available to fully assess impacts of specific options at specific locations. As specific options along with permit reviews are implemented, additional site-specific NEPA documentation and assessments will be necessary to complete compliance with most of the existing regulations.

Table 1-1: RELATIONSHIP OF OPTIONS TO ENVIRONMENTAL STATUTES

FEDERAL ENVIRONMENTAL LAWS AND EXECUTIVE ORDERS	COMPLIANCE
Abandoned Shipwreck Act of 1987	Pending (1)
Anadromous Fish Conservation Act	Pending (1)
Archaeological and Historic Preservation Act of 1974, as amended	Pending (1)
Clean Air Act, as amended	Pending (1)
Coastal Barrier Resources Act	Pending (1)
Coastal Zone Management Act of 1972, as amended	Pending (1)
Comprehensive Environmental Response, Compensation and Liability Act of 1980	Pending (1)
Endangered Species Act of 1973, as amended	Pending (1)
Estuary Protection Act (PL90-454)	Pending (1)
Federal Migratory Bird Treaty Act	Pending (1)
Federal Water Pollution Control Act (Clean Water Act, 1977)	Pending (1)
Federal Water Project Recreation Act, as amended	Pending (1)
Fish and Wildlife Coordination Act of 1934, as amended	Pending (1)
Land and Water Conservation Fund Act of 1965, as amended	Pending (1)
Marine Mammals Protection Act of 1972	Pending (1)
Marine Protection, Research, and Sanctuaries Act of 1972, as amended	Pending (1)
Magnuson-Stevens Fishery Conservation and Management Act of 1996	Pending (1)
National Environmental Policy Act of 1969, as amended	Pending (1)
National Historic Preservation Act of 1966, as amended	Pending (1)
Outer Continental Shelf Lands Act	Pending (1)
Resources Conservation and Recovery Act	Pending (1)
Rivers and Harbors Appropriation Act of 1899, as amended: Section 10	Pending (1)
Rivers and Harbors Act of 1970, Section 122	Pending (1)
Watershed Protection and Flood Protection Act, as amended	Pending (1)
Wild and Scenic Rivers Act	Pending (1)
Executive Order 11988, Floodplain Management	Pending (1)
Executive Order 11990, Protection of Wetlands	Pending (1)
Executive Order 12114, Environmental Effects of Major Federal Actions	Pending (1)
Executive Order 12898, Environmental Justice	Pending (1)
APPLICABLE STATE LAWS OF NEW JERSEY	COMPLIANCE
Coastal Area Facility Review Act (NJSA 13:19-1 et seq)	Pending (1)
New Jersey Green Acres Land Acquisition Act of 1961 (NJSA 13:8 A-47)	Pending (1)
Waterfront Development Law (NJSA 12:5-3)	Pending (1)
Wetlands Act of 1970 (NJSA 13:9 A-1 et seq)	Pending (1)
Waterfront Harbors Facility Development Law of 1914	Pending (1)
Coastal Zone Management Act (State Administered)	Pending (1)
New Jersey Water Pollution Control Act (NJSA 58:10A-1 et seq)	Pending (1)
Riparian Interests (NJSA 12:3-1 et seq. and 18:56-1 et seq)	Pending (1)
Flood Hazard Area Control Act (NJSA 58:16A-50 et seq)	Pending (1)

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Freshwater Wetlands Protection Act	Pending (1)
APPLICABLE STATE LAWS OF NEW YORK	COMPLIANCE
Agricultural District Law (1971)	Pending (1)
Coastal Zone Consistency	Pending (1)
Coastal Zone Management Act	Pending (1)
Environmental Conservation Law, as amended	Pending (1)
Environmental Quality Review Law (1976)	Pending (1)
Fish and Wildlife Code (Title Three)	Pending (1)
Floodplain Protection Law (1974)	Pending (1)
Freshwater Wetland Protection Act (Article 24) (1975)	Pending (1)
Local Zone Enable	Pending (1)
New York State Environmental Laws (Local Admin)	Pending (1)
Open Space (ATRT13, Stat 247)	Pending (1)
Port District Enabling Law	Pending (1)
Soil Conservation District Law	Pending (1)
Stream Protection Law	Pending (1)
Tidal Wetlands Act	Pending (1)
Waterfront Revitalization and Coastal Resources Act	Pending (1)
Wildland Protection Law	Pending (1)
Wild, Scenic and Recreational Rivers System	Pending (1)

(1) Pending, because this is a programmatic EIS and final selection of options and sites have not been determined. Compliance with law depends on the outcome of the selection process and analysis of site-specific alternatives.

1.3 Areas of Controversy

a. Areas of concern, have been articulated by various members of the public, environmental groups, and government agencies at public informational and scoping meetings, (through use of prepared statements, taped transcripts and written forms) or in letters responding to past DMMP documents (the Interim Report, Progress Report, Beneficial Use Report and Siting Criteria Report) (see Chapter 6 for details of the Public Involvment). In addition, concerns have also been raised during some of the numerous meetings of the Dredged Material Management Integration Work Group (DMMIWG) as well as other agency and public forums. These concerns have been addressed through the DMMP by the addition of design and/or operational controls to some of the options, by incorporation into siting analyses or by recommending more environmentally beneficial options. Areas of concern still persist, however, among various segments of the public.

b. The single most pervasive area of comment dealt with the use of the Raritan/Lower Bay complex. Many commentors felt that the overall quality of Raritan Bay has been improving and fish and shellfish are once again becoming abundant. Thus, many do not want any dredged material they termed as toxic placed in the bay because of their perception that it would destroy the bay by spreading into the water column during placement, or escaping from the facility after placement and thereby contaminate the fish and shellfish in the bay. They are opposed to having "toxic" material from elsewhere in the harbor (especially Newark Bay) disposed of in the Raritan Bay area. Their preference was to leave it where it is, treat it, or bury/build an island CDF in Newark Bay. This

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concern arose out of the preliminary site screening for aquatic disposal options that identified a zone for an island CDF or new subaqueous CAD pits within Lower Bay (adjacent to Raritan Bay), and a second zone for new CAD pits in Raritan Bay. The concern with CAD pits includes the loss of contaminants (spread) and the loss of habitat, although that loss would only be temporary until the pit was filled. Many commentors view an island CDF as especially detrimental and unwarranted because of the loss of hundreds of acres of bay bottom habitat.

c. Verbal and written comments argued that upland disposal was acceptable. Some qualified their comments by saying that only non-toxic material should be placed in upland landfills, and that toxic material should be stockpiled until decontamination technology can be developed. On the other hand, many members of the public and their elected officials strongly opposed the use of most of the upland sites specifically identified in a preliminary site screening presented in the Interim Report. Comments on capping indicated a perceived lack of confidence in the technique, with associated environmental health hazards and loss of property values. The concern was voiced that contaminants would be volatilized during disposal; but few written comments on capping or contaminant dispersal were received.

d. Numerous commentors stated that treatment/decontamination technologies should be used as the primary way to manage dredged material, with strong support for contaminant reduction as a means of avoiding implementation of less favorable containment options (island CDFs and nearshore fills).

e. A substantial number of citizens commented on their desire to have public hearings held immediately, with formal presentations and an official stenographic transcript of testimony. Most of these comments were verbal, with a few written comments submitted.

f. Regarding the scoping for the EIS, several comments were received about the Interim Report, erroneously believing that this report was the decision-making document. Many questioned when the EIS would be finished and asked about the roles of the states of New York and New Jersey in the decision-making process. Many of these same concerns were expressed at the three public meetings held in April of 1998.

1.4 Unresolved Issues

a. Issues, which remain unresolved at this time, include:

- The Historic Area Remediation Site (HARS) will be remediated at some time in the future and will no longer be able to accept material. Should a new ocean disposal or remediation site for suitable material be designated, and if so what steps would be necessary to do so?

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- If sub-channel CAD pits are used, should they be actively capped or be allowed to passively fill with sediment from upstream sources.
- Mitigation is unresolved as to the scope, amount and kind. (Note: It was agreed among the agencies at the Interagency scoping meeting held on May 1, 1998 that out-of-kind mitigation would be required for certain options.)
- What is the current habitat use/value of existing pits?
- How can contaminants be kept from spreading outside pit areas during disposal and after closure?

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2 PURPOSE AND NEED FOR ACTION

2.1 Study Authority

a. Legal authority to conduct navigation studies and maintain the New York Harbor includes the Rivers and Harbors Appropriation Act of 1899 (33 USC 401-466n), the Federal Water Pollution Control Act of 1972 (Clean Water Act, or CWA), and the Marine Protection, Research and Sanctuaries Act of 1972 (MPRSA). With respect to the preparation of the Dredged Material Management Plan (DMMP), the United States Army Corps of Engineers (Corps) planning guidance (EC 1165-2-200) requires each district to prepare long-term plans to maintain the projects authorized in accordance with the mission defined in the above documents. The plans must also consider non-Corps dredging and management needs.

2.2 Problems and Opportunities

a. Two major problems are associated with dredging in the Port. The Port of New York/New Jersey has an average natural depth of about 19 ft. Vessel draft for many years has exceeded this depth, making dredging necessary. Furthermore, the draft of modern vessels continues to increase. Currently, the fact that the newest vessels, which will come into general service soon, require depths in excess of 50 ft when fully loaded makes it necessary to deepen channels even further for the Port to accommodate these ships. The current estimate of average annual dredging to maintain the existing channel system is 3.5 MCY/yr and to maintain a deepened channel system is 4.1 MCY. The Port is a vital economic and environmental resource to the entire region and the nation. Dredging must occur for the Port of New York/New Jersey to remain viable in the future. Failure to do so risks the loss of some 166,600 jobs and $25 billion in commerce per year. This does not include the estimated 14.4 MCY that would have to be dredged to deepen the channels initially.

b. Contamination of dredged material, is caused by anthropogenic (human-generated) and industrial activity in the Port watershed that adds pollutants to the Port sediments. The contaminants vary in concentration. Generally, a substantial portion of the potential dredged material, has low concentrations of contaminants. Nevertheless, the presence of measurable amounts of contaminants has resulted in requirements for special sites and handling to manage the dredged material to protect the marine and estuarine environment and biota in and around designated ocean disposal sites. As such, sediments are tested to determine if contaminants are present and if so, in what concentrations to determine dredging and management options. Best Management Practices (BMPs) would be employed in all cases to minimize impacts.

c. An opportunity exists to develop plans not only for safe placement of dredged material, but also for investigating opportunities to protect and restore the estuary associated with the Port of New York/New Jersey.

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2.3 Public Concerns

a. Public perception regarding the nature of the dredged material, which may contain metals, PAHS, PCBS, and dioxins, continues to be negative. Although this material does not meet requirements for ocean disposal, it generally falls below the criteria that would make it subject to hazardous waste regulations (RCRA), and would not normally be considered hazardous waste under either EPA or state regulations.

2.3.1 Organization of Stakeholders

a. The Dredged Material Management Integration Work Group (DMMIWG) has met monthly during the last several years. Its membership includes Federal and state representatives, including regulatory and government resource agencies, the States of New York and New Jersey, PANY/NJ (the City of New York), Port users, and involved stakeholder organizations. Its purpose has been to provide a forum for input to the planning process for harbor issues related to dredging and the environment, including the Dredged Material Management Plan (DMMP), and to coordinate these various efforts. This effort includes the Harbor Estuary Plan (HEP) and its Comprehensive Conservation and Management Plan (CCMP), endorsed by all the major agencies with responsibilities for the Port and its environment. In addition to this, formal meetings are held monthly among Port planners (NYD, PANY/NJ, and the States of New York and New Jersey) to discuss future needs and disposal/management options for the long term. Other meetings have been held with local interested parties. These have included meetings with working groups assembled by the borough presidents of Brooklyn and Staten Island. The public meetings included sessions on the Interim Report (1996) and Progress Report (1998) for the DMMP.

2.3.2 Scoping Process

a. Scoping is used to inform the public and other agencies of a contemplated Federal action and potential consequences of the action(s) and to obtain public responses for potential incorporation into the final decision document. The method used to inform the public can vary. The Corps generally holds some form of meeting(s) with the public. Public meetings, including poster sessions, were held on the various options and the overall planning process during February through April 1997. Scoping meetings that included posters explaining the scope of the EIS, followed by question/answer periods and the opportunity to make taped statements, were held during April 1998. Written comments were also solicited and gathered at these meetings and after their conclusion.

b. More than 2,000 notices of the public meetings to be held in 1997 and 1998 were sent out to Federal and state agencies, public officials, document repositories, and members of the public. Additionally, a Notice of Intent to produce a Programmatic

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Environmental Impact Statement (PEIS), including an outline of its scope, was published in the Federal Register of February 24, 1998.

2.4 DMMP Study Objectives

a. The objectives of the DMMP are to maximize and expand the use of the Port, while maintaining and enhancing the estuarine environment. The options evaluated in the DMMP and this PEIS provide the building blocks which, when assembled, furnish a long-term plan of action for managing disposal of dredged material for the Port through at least the year 2040. This plan includes the use of "backup" options should preferred options fail to come on line or meet goals.

b. The programmatic approach has been used in this document as a tool to allow decision makers a means of assessing the environmental impacts of potential options that is in keeping with the current level of planning. It will allow them to consider the key environmental impact issues necessary to make decisions. The PEIS is an umbrella document to consider generic impacts of options and, where available, general sites. The PEIS serves as one of the major inputs to the DMMP, and, along with that plan, will help decision makers select the options to be carried forward to form the plan for the Port for the specific disposal of dredged material for the next ten years and in general for the following three decades. The PEIS is the first tier of a "tiered" NEPA document. The second tier will be the NEPA documents and permits that would address implementation of site-specific options recommended in the DMMP.

2.5 Other Related Port Projects

a. In addition to the management of dredged material, other navigation-related work has been initiated or is under investigation. This NEPA document in support of the DMMP is, in fact, related to these other efforts, since some of the dredged material addressed in the DMMP would be placed as a result of these other actions.

b. Federal action associated with improvements to Federal channels to accommodate deeper draft vessels are currently being investigated by a comprehensive Port study of existing Federal channels (NY/NJ Harbor Navigation Study). The study includes an EIS designed to identify and compare the impacts associated with dredging these channels. In addition, construction of Port-related facilities has been proposed. These facilities, which include new offload/onload sites and storage associated with Port commerce, are being evaluated through studies by the PANY/NJ and New York City Economic Development Corporation's (NYCEDC). Plan for the Redevelopment of the Port of New York" (in progress). Since these facilities would increase the potential for privately funded dredging activities, such as at berthing areas, they also influence the DMMP.

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3 OPTIONS

3.1 Introduction

a. Scoping and extensive coordination over the last several years, have produced an array of options for managing dredged materials. The options under consideration are sediment contaminant reduction, sediment/dredging reduction, beneficial uses including: ocean remediation; habitat creation, enhancement and restoration, landfill, brownfield and mine remediation, and beach nourishment and construction related materials; decontamination, contained aquatic disposal facilities (pits), and confined disposal facilities (islands, nearshore, upland). Some of these basic options present a number of suboptions for managing dredged material. The DMMP is a comprehensive, flexible plan that includes multiple options and sites and will be subject to revision as different techniques/sites become available or as they drop out of consideration. For this reason additional site-specific NEPA documents will be completed and permits issued before any options, other than those already in use or permitted, can be implemented.

b. The descriptions of the options below are intended as brief summaries of the options that appeared in past NYD reports (1997, 1998) and have been updated to their current option status. They serve to describe each option for the reader in order to understand the impact assessment in Chapter 5. This chapter is not intended to provide a detailed description of each option. For such detailed descriptions, costs and comparisons of options the reader is referred to the DMMP and Technical Appendix (which accompanies this document). The summary tables of the DMMP provide convenient reference to the options. All options considered during the development of the DMMP have been included in this PEIS, even those no longer being proposed for use. The DMMP process included screening of all options for dredged material management and their ranking with respect to preference for use. (See DMMP Sections 1-4 and 1-5 for a discussion of the evaluation process and the ranking of options.) This PEIS will stress the preferred options, but includes all options in its analysis to compare the environmental impacts which were an important component in the ranking of options.

c. The options are grouped into alternatives which are potential courses of action for dredged material management. Grouping of the options is needed because no single option can provide for all of the dredged material that will be produced during the 40 year planning period. Four alternatives were developed for consideration:

- No Action
- Recommended Course of Action
- Environmentally Preferred Alternative
- Base Plan (Economically Preferred Alternative)

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d. These alternatives are described in detail in Chapter 3 of the DMMP. Because management options are grouped in the alternatives, the assessment of the alternatives is presented in the cumulative impact section (5.6 Cumulative Impacts of Alternative Plans). The Recommended Course of Action alternative is divided into two time periods, a near term (2000-2010) in which substantial new navigation work may occur in the harbor as well as maintenance dredging and a long-term (2011-2040) when the majority of dredged material is from maintenance of facilities in place by 2010.

3.2 Actions by Others

a. Several initiatives have been undertaken by others to dredge certain facilities and/or manage dredged material. These initiatives include the dredging of Howland Hook and transport of the material from the Port to a permitted Resource Conservation and Recovery Act (RCRA) site in Utah, the excavation of a contained aquatic disposal pit in Newark Bay, and use of treated dredged material at the Jersey Gardens Mall site for base fill under a parking lot. The Seaboard Site (formerly Koppers Coke) is a brownfield under the management of S.K. Services. Part of the Seaboard Site is already on line, and has received 1.0 MCY of dredged material to date. The second phase for this old industrial site is contingent on final permitting. Landfill sites are permitted as private sites for the receipt of treated dredged material. The Orion Elizabeth New Jersey (OENJ) site in Bayonne, New Jersey is an inactive municipal landfill and encompasses a brownfield. The site was fully permitted in 1998 and awaits the first contract for dredged material. Additionally, Port facilities to aid in the offload/onload and storage of goods transported by vessels are currently in the planning phase. This may require some changes in the configuration of berthing areas and excavation and deposition of material. The entity conducting these efforts (Port Authority of NY/NJ) would be responsible for preparing the relevant NEPA documents and permit applications.

3.3 Management Options

a. The Corps and other government and private entities have investigated management options for dredged material over the past several years. Options cover an array of possibilities, ranging from contaminant reduction to construction of an island CDF. Due to the large volume of dredged material to be handled, implementation will involve multiple options either sequentially or concurrently. For the most part, selected options stress beneficial uses and back-up options stress safe containment. Large scale options that do not lend themselves to beneficial uses or contingency implementation (such as islands) have not been selected as part of the DMMP, but are still included here to provide a sufficient basis for the analysis and comparison of impacts in Chapter 5.

3.3.1 Sediment Contaminant Reduction

a. Contaminant reduction is a regionally based initiative with the goal of lowering contaminant levels in the sediments and biota of the New York/New Jersey Harbor. Dredged material that fails to meet EPA criteria for HARS (designated "non-HARS

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material in the DMMP") can be troublesome and costly to manage even though the levels of contaminants generally fall below standards for being subject to hazardous waste regulations. The NYD estimates that much of the dredged material from maintenance projects will not meet the criteria for HARS. As a result, the cost-per cubic yard to dispose of dredged material has increased substantially in recent years due to the presence of contaminants.

b. These sediments are contaminated as a result of a complex history of pollution events that have occurred over decades. Currently the volume of Federal and non-Federal maintenance material that is unsuitable for HARS averages approximately 1.9 MCY per year.

c. Dramatic decreases in sediment contamination from 1960s levels have been documented in some areas of the harbor. If trends toward cleaner sediments were to continue, or if reductions were duplicated in other areas of the harbor, significant reductions in the amount of non-HARS dredged material would be realized. This in turn would have profound effects on the long-term cost of dredging, on selection and siting of management options, on Port planning decisions, and on overall environmental restoration efforts.

d. Data are currently insufficient to reliably characterize contaminant trends for the entire harbor. The inability to accurately predict future contaminant levels constrains the region's ability to plan and budget for future needs. The contaminant reduction program would address this need through a comprehensive data gathering effort to identify and track down sources of pollution. Bi-state monitoring and source track down programs coordinated through the Contaminant Assessment and Reduction Program of HEP began in the summer/fall of 1998 and will continue through at least 2001. This is the first phase of the long-term control effort.

e. An accurate assessment of how much dredged material is unsuitable for HARS is essential to a successful dredged material management program. The collection and analysis of additional data would provide the basis for more reliable estimates and an important management tool for ongoing DMMP work.

f. These estimates would in turn facilitate the implementation of shorter term and lower capital cost dredged material management options compared to the current plan. As new information on contaminant sources and distributions becomes available, it would be incorporated into the contaminant reduction program and the DMMP. Because this program can increase the volume of dredged material that can be used beneficially, often at reduced cost, this option is strongly supported as a keystone of the DMMP.

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g. To meet the program goals, existing regulatory enforcement and improved remediation programs will be needed. Four main techniques have been identified to reduce contaminants: (1) elimination of point source discharge, (2) control and treatment of combined sewer overflows, (3) sewage treatment plant upgrades, and (4) removal or isolation of contaminated sediment hot spots.

3.3.2 Sediment/Dredging Reduction

a. Sediment/dredging reduction focuses on the *amount* of sediment that settles within the navigation channels and must be subsequently dredged. Sediment reduction would reduce the frequency of dredging and disposal operations necessary to maintain channels at authorized depths. Sediment reduction strategies takes four forms: watershed sediment reduction controls, channel design optimization, advanced maintenance dredging and structural modification.

b. Watershed sediment reduction controls are specific strategies to reduce the amount of sediment reaching a waterbody. Techniques include the implementation of Best Management Practices (BMPs) and Total Maximum Daily Loads (TMDLs) which are designed to reduce the volume of sediment laden runoff from agricultural lands, redirecting runoff to collection basins or to previous surfaces where infiltration to the groundwater can occur and protecting and reinforcing steep slopes and stream banks.

c. Channel design optimization involves decreasing the sedimentation rate within the channel by re-engineering and straightening the channels. This process, called channel realignment, increases water velocity within the channel. As a result, a larger amount of suspended sediments are entrained in the water column, causing a decrease in the amount of material that settles out.

d. Advanced maintenance dredging is a means of reducing dredging cost and frequency over the short term by dredging below the authorized channel depth. Sediment settling in the channel will eventually fill the channel to authorized depth, increasing the time between required maintenance dredging activities. A reduction in frequency of deployment of dredging equipment reduces costs. The decreased frequency of dredging may also reduce short term, localized environmental impacts likely to be associated with more frequent dredging.

e. Structural modifications are physical or mechanical devices designed to keep sediment moving through (instead of settling in) a channel, or even to prevent sediment from entering the channel or berth area. Typical structures include flow training dikes and sills, gates and curtains, pneumatic sediment suspension systems, and sedimentation basins.

3.3.3 Beneficial Uses

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3.3.3.1 Ocean Remediation

3.3.3.1.1 Historic Area Remediation Site

a. On August 28, 1997, USEPA closed the Mud Dump Site (MDS) and designated it as part of the Historic Area Remediation Site (HARS). The HARS consists of the former MDS and surrounding areas that have been impacted by previous disposal actions (Fig. 3-1).

b. Remediation of the HARS will be through the use of dredged materials that meet the current Category I standards (HARS suitable material) and that will cause no significant undesirable effects, including bioaccumulation. USEPA is now performing a public and scientific peer review process of the HARS dredged material testing evaluation framework. Although this may result in the revision of standards, for the purposes of the DMMP, it is assumed that current criteria for the suitability of dredged material for HARS will remain unchanged through the DMMP timeframe.

c. Based on the placement of a one meter thick cap in the priority remediation area, the HARS has a remaining capacity of at least 38.3 MCY. On the basis of current DMMP projections, HARS remediation could be completed by the end of the next decade. Monitoring of the site by NYD and EPA could result in expanding the capacity of HARS due to a number of factors including consolidation of the cap material or the need for a thicker cap in selected areas. Other management factors might also warrant future adjustments.

3.3.3.1.2 Additional Ocean Remediation

a. As contaminant reduction progresses, the volume of HARS suitable material will increase. A portion of this material may be appropriate for other beneficial use alternatives such as beach nourishment, or nearshore and inland habitat restoration. However, in time, the volume of HARS suitable material might exceed the capacity for these uses.

b. In response to such an increase and the successful use of dredged material for remediation at the HARS, consideration may be given to the identification of other degraded areas (e.g., acid waste, sewage sludge) of the Bight for remediation with HARS suitable material.

3.3.3.2 Habitat Creation, Enhancement, and Restoration

a. Many types of dredged material from the Port of New York/New Jersey (including selected use of non-HARS material) can be used for habitat improvement. Although these beneficial uses may not have the capacity for handling all of the dredged material derived from the harbor, the volume used (if

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all feasible applications were exploited fully) is significant. Examination of sites would determine suitability. Only if analyses determined that a net habitat benefit would result from an application, would implementation be pursued.

b. Potentially feasible applications in the estuary include upland restoration (particularly landfill cover and intermediate fill, brownfield remediations and mine and quarry reclamation), filling degraded basins and pits, creating or restoring wetlands for water quality treatment and habitat, and creating or restoring other aquatic habitats, such as artificial reefs with dredged rock. Dredged material may also be used to create oyster reefs, bird habitat, shellfish habitat and mud flats.

c. These options provide an important opportunity to improve or restore environmental resources that have been severely impacted by over 300 years of human manipulation of local ecosystems. The beneficial use of dredged material is one of the primary goals of the HEP, as is habitat creation and restoration. However, for this option to make use of a substantial portion of dredged material, it would require the acceptance of containment to safely isolate non-HARS material under a cap of HARS suitable material. In some cases it would also require selective conversion among habitat types, that is, the elimination of an existing habitat and replacement with a restored habitat that is more valuable to the local ecosystem.

d. Any use of non-HARS suitable dredged material for habitat creation, enhancement, and restoration will be limited to appropriate habitat improvement applications. Non-HARS material will not be considered for reef construction, oyster or other shellfish habitat creation. When the use of non-HARS material is possible (i.e., treatment and habitat wetlands, borrow pit restoration, upland habitat restoration, mud flats, recontouring, filling dead-end basins, bird habitat) special conditions would apply to prevent exposure of the non-HARS material to the environment. Non-HARS material would only be used for base material in these cases and would be adequately contained and capped with HARS suitable material (or other material such as Pleistocene sediments determined by EPA to be acceptable for that use). Small scale test projects would be conducted to validate the application technique prior to widespread use of a selected methodology.

e. The restoration of dredged borrow pits in Jamaica Bay and Lower Bay has the potential to accommodate a large volume of dredged material, but the environmental impacts of such filling needs to be determined. Studies involving Norton Basin and Little Bay in Jamaica Bay (Fig. 3-2) are included as preferred options within beneficial use to permit an evaluation of this approach. These areas and any other pits subsequently proposed for use, would have to be

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surveyed first to establish their level of use and community type. Further work would only take place if it were confirmed that the pit habitat was degraded and could benefit from filling. The projects would entail the use of HARS suitable material at Norton Basin then, after successful implementation, the use of non-HARS material at Little Bay incorporating capping with HARS suitable material. Intensive biological and physical investigations of both baseline and post-filling conditions would be conducted. The results of the Jamaica Bay projects would be evaluated and successful placement and containment as well as a net environmental benefit would have to be shown before expansion of the concept to larger pits in Jamaica Bay. The results of the Jamaica Bay tests would provide a baseline for evaluating this concept for degraded pits in the more open-waters of Lower Bay. The first application of this concept in Lower Bay would involve surveys to establish current levels of use and value of the two Hoffman-Swinburne pits. These small pits are ideal for test purposes and initial surveys show they contain stressed benthic communities. Only after surveys confirm their degraded condition would there be a project with HARS suitable material in the northern pit at Hoffman-Swinburne Islands. This would be followed by a project using non-HARS material at the southern pit in this area, if the test at the northern pit was successful. Additionally, consideration has been given to the West Bank and CAC pits (Fig. 3-3; see DMMP Table 2-2 for preference and status) for restoration in the future.

3.3.3.3 Landfill, Brownfield, and Mine Remediation

a. Land remediation combines the beneficial use of treated non-HARS material with the environmental and economic restoration of degraded lands. Land remediation would use treated dredged material for landfill and brownfield cover, and for reclamation of quarries and abandoned mines. Brownfields are former industrial/commercial facilities where expansion or redevelopment is complicated by environmental contamination. Examples include the New Jersey Garden Mall site and the Seaboard site in Kearny, New Jersey.

b. Land remediation, including mine reclamation, is a desirable option for several reasons: (1) it would target sites that in their present condition pose a risk to the environment and human health; (2) it would lead to a reduction in material that would otherwise have to be disposed of without beneficial use; and (3) the dredged material would be confined to a site that is already impacted and that is monitored for water quality and other environmental parameters. In addition, these sites generally incorporate other environmental controls, such as leachate collection systems, slurry walls and pump and treat systems as part of an overall remediation plan.

c. Due to its inherent high water content, use of dredged material requires that some treatment action be taken prior to its use to lower the amount of water in

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the material. Methods to accomplish this include natural drying, mechanical drying, or amending or processing with binding agents. Also, the use of binding agents prevents loss of contaminants off site, and other additives may improve the ability of the material to meet design criteria if the site is to be developed after remediation is complete.

d. Quarries were investigated as part of the land remediation aspect of beneficial use. These types of sites have substantial capacities because of the large excavated areas at most locations. Six potential quarry sites were located along the Hudson River waterfront between New York City and Albany, but these sites had permitting and environmental limitations that relegated them to non-preferred status. The Hunterdon Quarry in New Jersey has a large potential capacity, but only for HARS suitable, sandy material. Hunterdon has a preferred status pending evaluation and design studies. The sand would be washed to remove salts prior to transportation to the quarry.

3.3.4 Decontamination Technologies

a. The goal of decontamination technologies is the reduction, removal or immobilization of contaminants. This may be achieved through physical, chemical, thermal and/or biological processes. Not all non-HARS dredged material requires decontamination because the vast majority of sediments are generally not hazardous. Decontaminated material can have broader applications at a wider variety of placement sites than processed dredged material.

b. Developing processes that will be cost-effective is one of the challenges of this option. Low-end processes are relatively simple and inexpensive. They include solidification/stabilization and manufactured topsoil production and are generally applied to materials used for land remediation. High-end processes are typically more expensive, complex, and energy-intensive. These include solvent extraction, sediment washing, and thermal processes. Expanding the scope of a process beyond small-scale pilot studies will help drive down costs. High end processes create a value added market product (e.g., lightweight aggregate), which would tend to offset the higher costs of these processes. Other concerns related to this option include the ability to process and use the large volumes of material in a manner that is compatible with the environment and acceptable to the local communities where facilities would be located.

c. Two high-end processes were selected by EPA and USACE for commercial-scale demonstrations under the Section 405 of WRDA 1992, as amended in WRDA 1996 decontamination program: a sediment-washing process that makes clean fill or soil, and a thermochemical process that makes blended cement. These demonstrations are expected to expand from initial pilot scale volumes of 700 and 500 CY to full-scale volumes of 250,000 and 150,000 CY/yr, respectively.

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d. PANY/NJ and New Jersey Maritime Resources (NJMR) are also conducting test programs on sediment decontamination technologies. The PANY/NJ is currently evaluating treatability studies of four processes that produce construction materials such as aggregate and flowable fill. In late 1999, NJMR will commence pilot testing (30,000-150,000 CY) and a demonstration of five selected technologies. The volume target set by NJMR is to treat and stabilize 500,000 CY per year. This is the same target set for the EPA and NYD Section 405 program, which is coordinating closely with the NJMR effort. Achievement of these targets would substantially reduce the annual volumes of non-HARS material and open up substantial opportunities for beneficial uses.

e. The decontamination option will generally require a treatment facility and storage/ handling areas to hold material while it awaits processing or before it is shipped to its final use destination. Decontamination facilities can be sited at or near dredging sites and could be portable or permanent. A permanent facility provides for a greater processing capability and would be expected to offer the most cost-effective operation.

3.3.5 Confined Aquatic Disposal Facilities

a. A confined aquatic disposal (CAD) facility is a depression excavated into the bottom of a body of water for the purposes of disposing and confining dredged material. This option includes the construction of CAD facilities either outside channels or within channels (sub-channel CAD facilities) (Fig.s 3-4, 3-5, and 3-6).

3.3.5.1 CAD Facilities Outside of Channels

a. Sequencing the use of CAD facilities over many years instead of excavating one large pit could provide the flexibility to respond to shortfalls in the availability of other options, as well as responding to changes in sediment quality that may come about as a result of contaminant reduction or decontamination. This approach would ensure that the area disturbed was kept to a minimum and that the recovery of each pit site after capping would be underway as additional pits are added on an as needed basis. The first such facility in the harbor was constructed in Newark Bay by the PANY/NJ and is capable of holding up to 1.5 MCY of non-HARS material. Two other smaller pits were permitted but have not yet been constructed.

b. Other areas have been identified with a potential added capacity of up to 7 MCY for Upper Bay pits outside channels, while in Newark Bay, the potential capacity for out-of-channel pits is 16 MCY. Establishing CAD facilities in nearshore areas such as these can help reduce substrate contamination and keep contaminated sediments close to their existing source. For this reason they serve as contingency option in the event one or more of the preferred beneficial use

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options are not available (see DMMP Table 2-2 for the Preference and Status ranking of these potential CAD facilities). Constraints include the depth of contaminated sediment and the depth to bedrock, both of which can severely restrict the capacity of the sites.

c. The potential for this type of CAD facility has also been investigated in both Lower Bay and Raritan Bay. Zone 2 at roughly 12 square miles in Lower Bay (Fig. 3-4), has been identified as a potential new pit area with a capacity for 100 MCY or more (see DMMP Table 2-2 for preference and status). Based on feedback from various resource agencies, CAD facilities in Raritan Bay (Zone 1) are not considered feasible, due to concerns about biological impacts. Zone 2 while located some distance from the significant habitat complex of the Raritan and Sandy Hook Bays, is of concern regarding permanent loss of bay bottom with no in-kind mitigation for the loss. This option, therefore, is considered the least desirable of feasible CAD alternatives. The feasibility of using Zone 2 would be evaluated further before it would be implemented.

3.3.5.2 Sub-Channel CAD Facilities

a. A variation on the CAD option is the construction of pits within (beneath) an existing channel. This option involves placing dredged material in an area excavated below currently authorized or maintained depths within an existing channel or berthing area. Once the material has been placed, it can be left to be capped by natural sedimentation processes, or it can be capped with a suitable material brought from elsewhere. Sub-channel CAD facilities for the DMMP would be used as a contingency only if no other cost-effective disposal methods with comparable production rates were available.

b. Several advantages of sub-channel CAD facilities include: (1) habitat disturbance to other areas would be minimized because it would be limited to areas already subject to periodic disturbance from maintenance dredging; (2) introduction of non-HARS material to other areas would be reduced; (3) dredging operations can be optimized and costs reduced because transportation distances would be shortened. Potential disadvantages are: (1) effects on future channel deepening and turbidity associated with heavy vessel traffic including deep draft vessel disturbance to material placed in those facilities and (2) side slope excavation if very deep pits are needed which have potential adverse impacts on the biota and cultural resources.

c. The total volume available for sub-channel facilities within the Upper Bay is estimated at 8.5 MCY. In Newark Bay there is a potential capacity of 10 MCY in sub-channel facilities.

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3.3.6 Confined Disposal Facilities

a. A confined disposal facility (CDF) involves the construction of dikes or other retention structures to contain dredged material, thereby isolating it from exposure to the environment. Once filled, a CDF is typically capped with clean material that permanently isolates it from the environment. A CDF may be built on land, nearshore (attached to the shoreline), or as an island.

3.3.6.1 Upland CDFs

a. Construction of an upland CDF would require the construction of dikes or other retention structures. Material placed in an upland CDF would be placed for disposal only, not for site remediation. A liner and stormwater runoff collection system may be required, depending on the characteristics of the chosen site.

b. Tests would be carried-out as required on the liquid fraction of the dredged material. Adjacent surface and ground water would be monitored as necessary, to ensure that the material is properly contained. Based on feedback received from the public, local officials, and state representatives, all potential upland CDF previously identified sites have been dropped from further consideration at the present time.

3.3.6.2 Nearshore CDFs

a. Nearshore CDFs have at least one side contiguous to land. Nearshore CDFs may be used for the purposes of habitat remediation in existing degraded areas or for Port development. The cost of nearshore CDFs is dependent upon the site, its end use, and its level of required mitigation. Environmental concerns with this option include the permanent loss of nearshore aquatic habitat.

b. Given the limited available area in the inner harbor, the total nearshore CDF capacity currently under consideration is less than 5 MCY. Only four sites have been identified for potential nearshore CDF construction. These sites include: Long Slip Canal (Hoboken, New Jersey), River Terminals (Kearny, NJ), Atlantic Basin (Brooklyn, NY) and South Brooklyn Piers (Brooklyn, NY). Of these sites, Atlantic Basin has the highest potential capacity, approximately 1.77 MCY.

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3.3.6.3 Island CDFs

a. Islands CDFs result in the loss of ocean and bay bottom and the water column occupied by the fill and retaining structure. Due to the potential for significant coastal storms in this region, the containing structure of an island CDF would be designed to withstand extreme conditions so as to prevent loss of placed material. Because this type of CDF is relatively expensive to construct, it is generally used for dredged material disposal over many decades in order to increase cost-effectiveness.

b. A preliminary engineering and environmental siting process has identified potential island CDF sites in the Lower Bay of New York Harbor and in the New York Bight Apex (Figs. 3-7 and 3-8). However, given the substantial environmental, social, and institutional concerns likely to be associated with construction of an island CDF in either location, it has been classified as a non-preferred option and is no longer under consideration as a feasible DMMP option.

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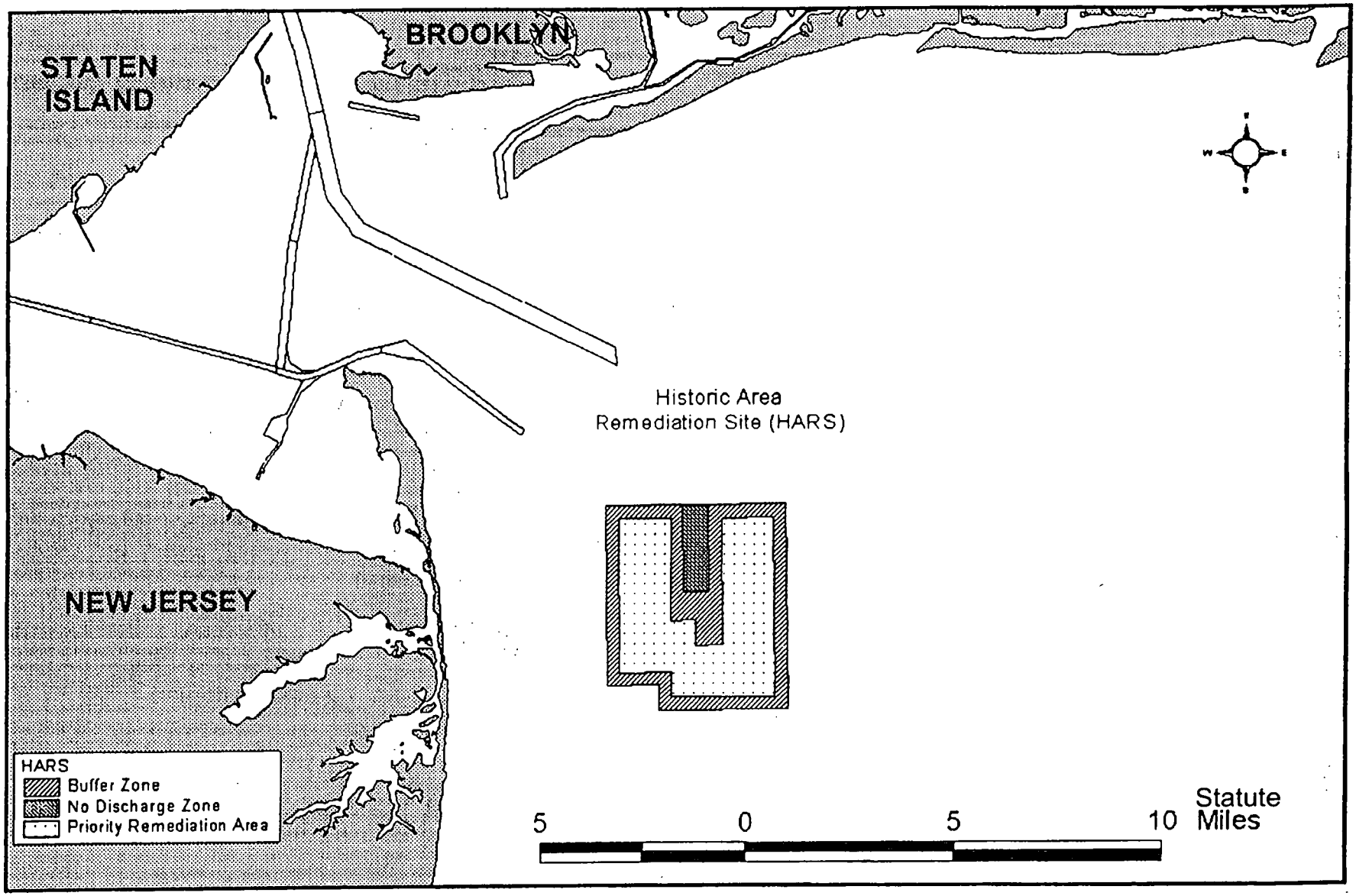


Figure 3-1. Historic Area Remediation Site

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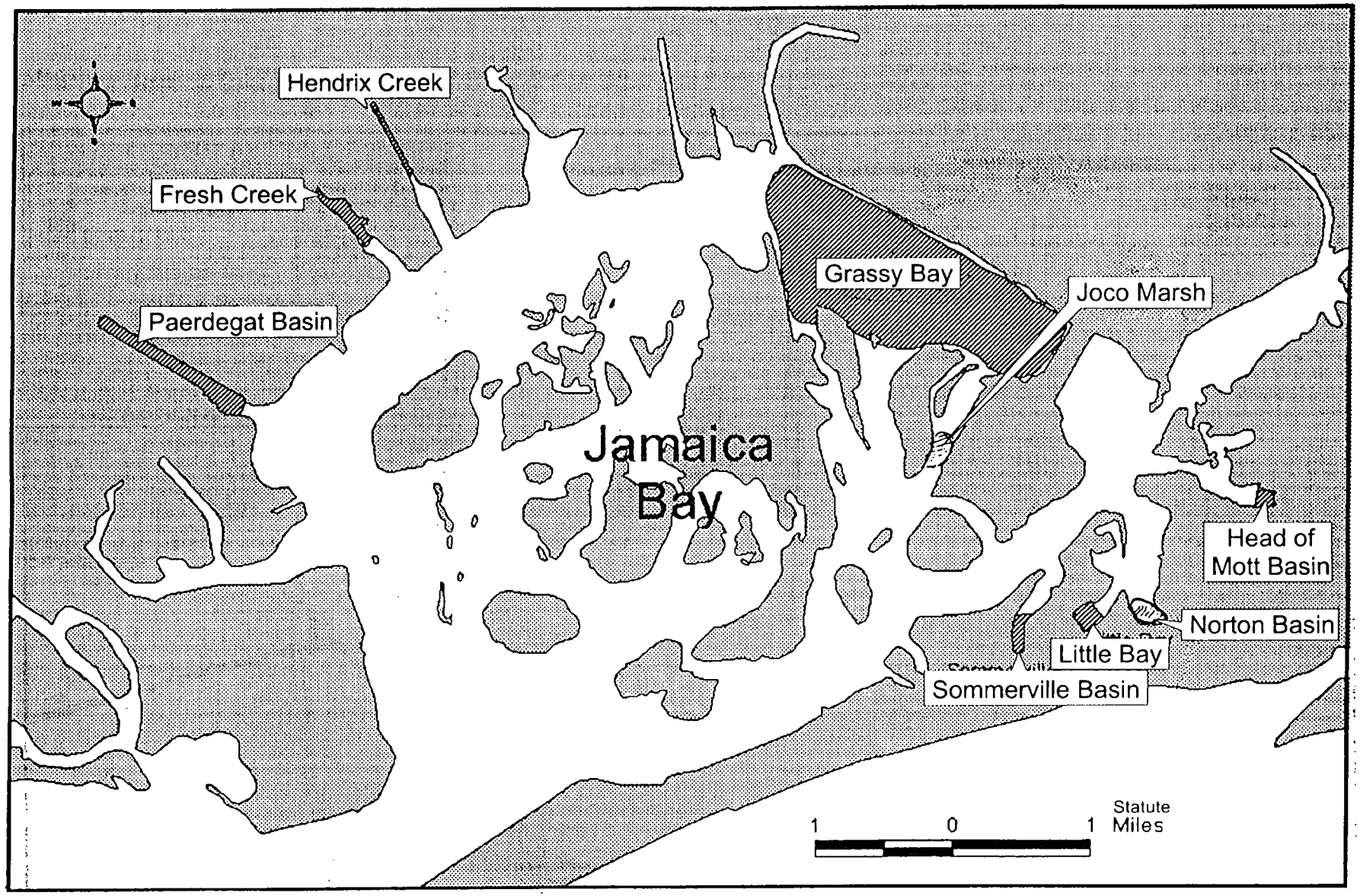


Figure 3-2. Jamaica Bay Zones for Potential Aquatic Restoration

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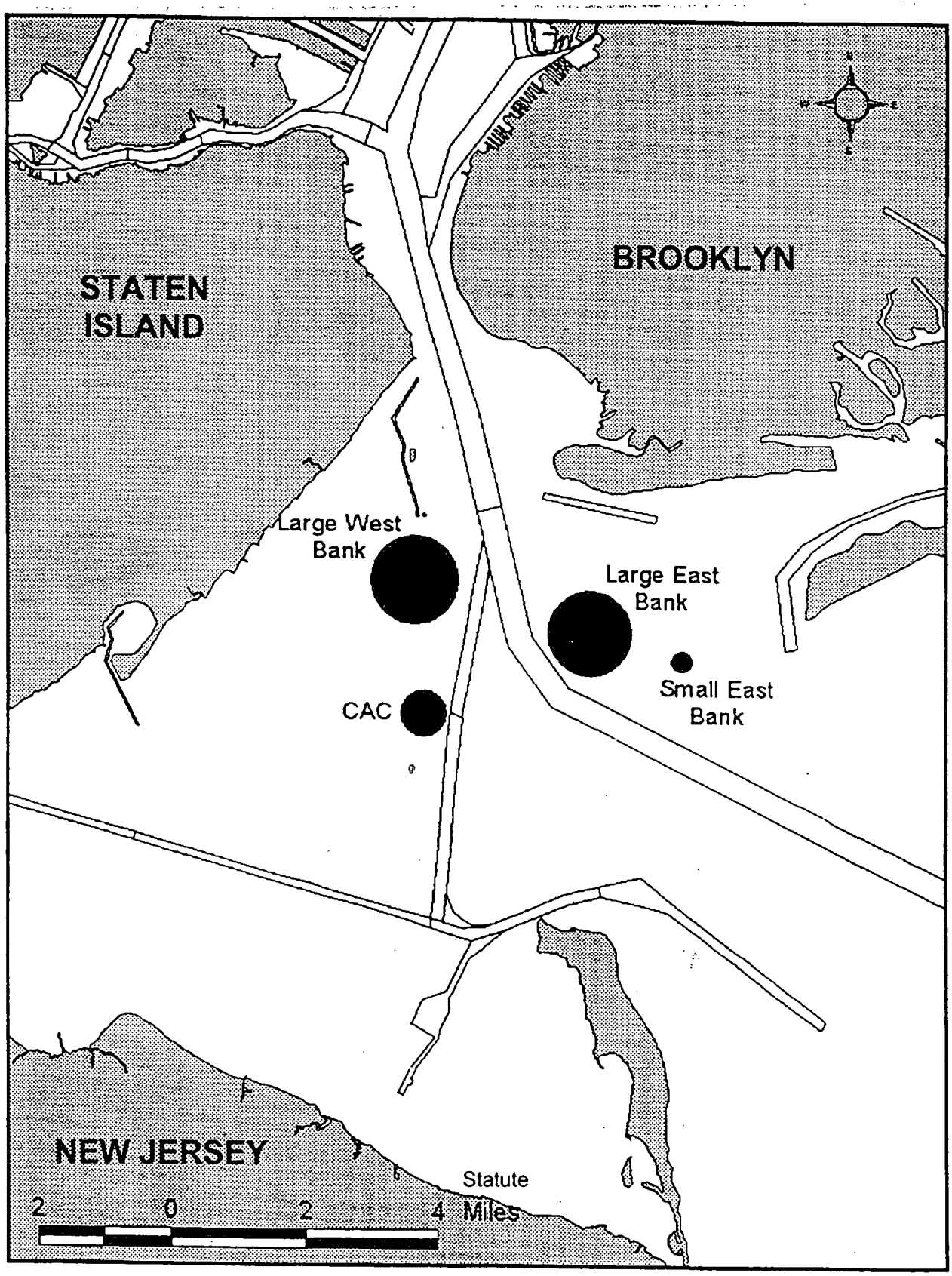


Figure 3-3. Existing Pits in the Lower Bay Complex

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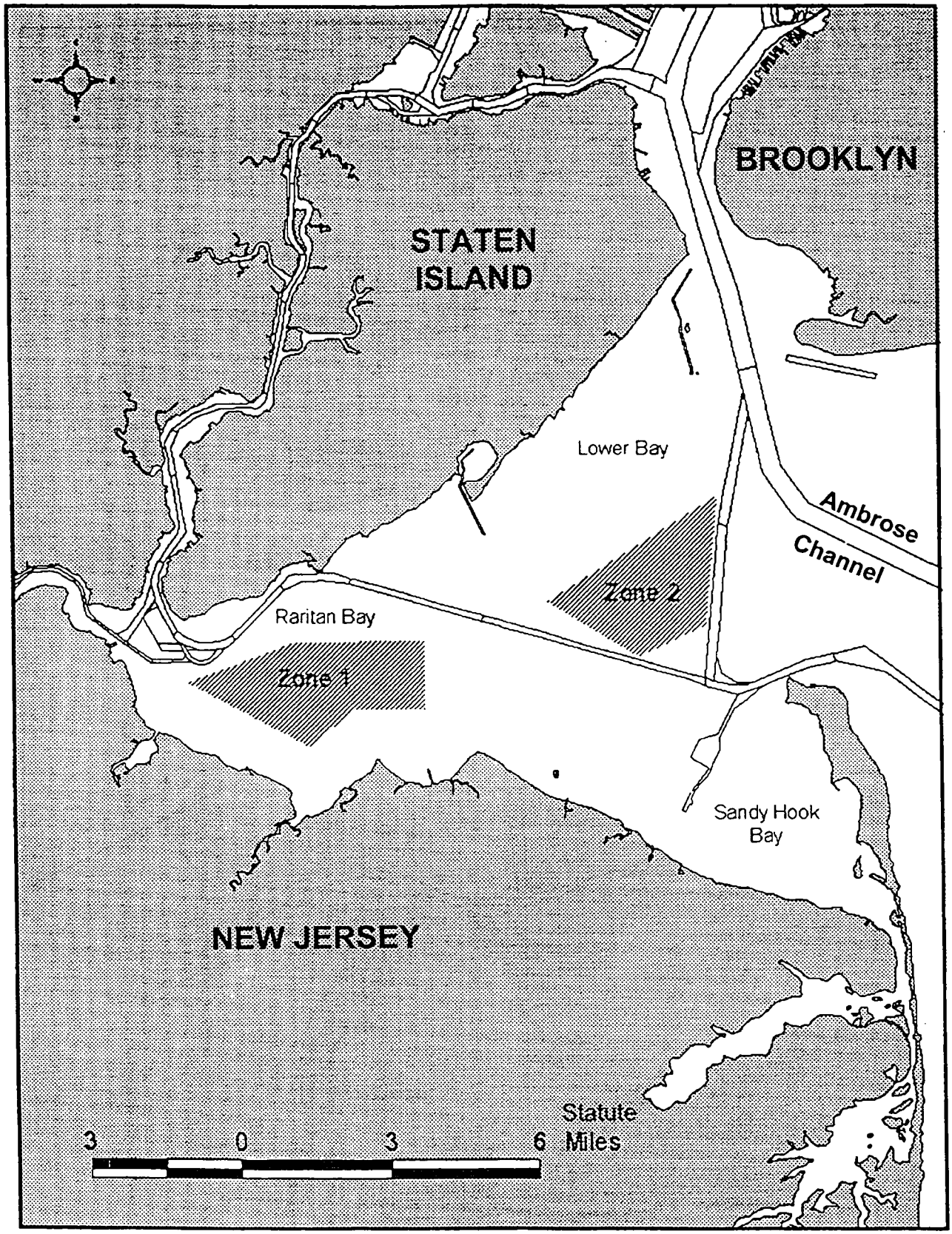


Figure 3-4. Siting Zones for New Pits in the Lower Bay Complex

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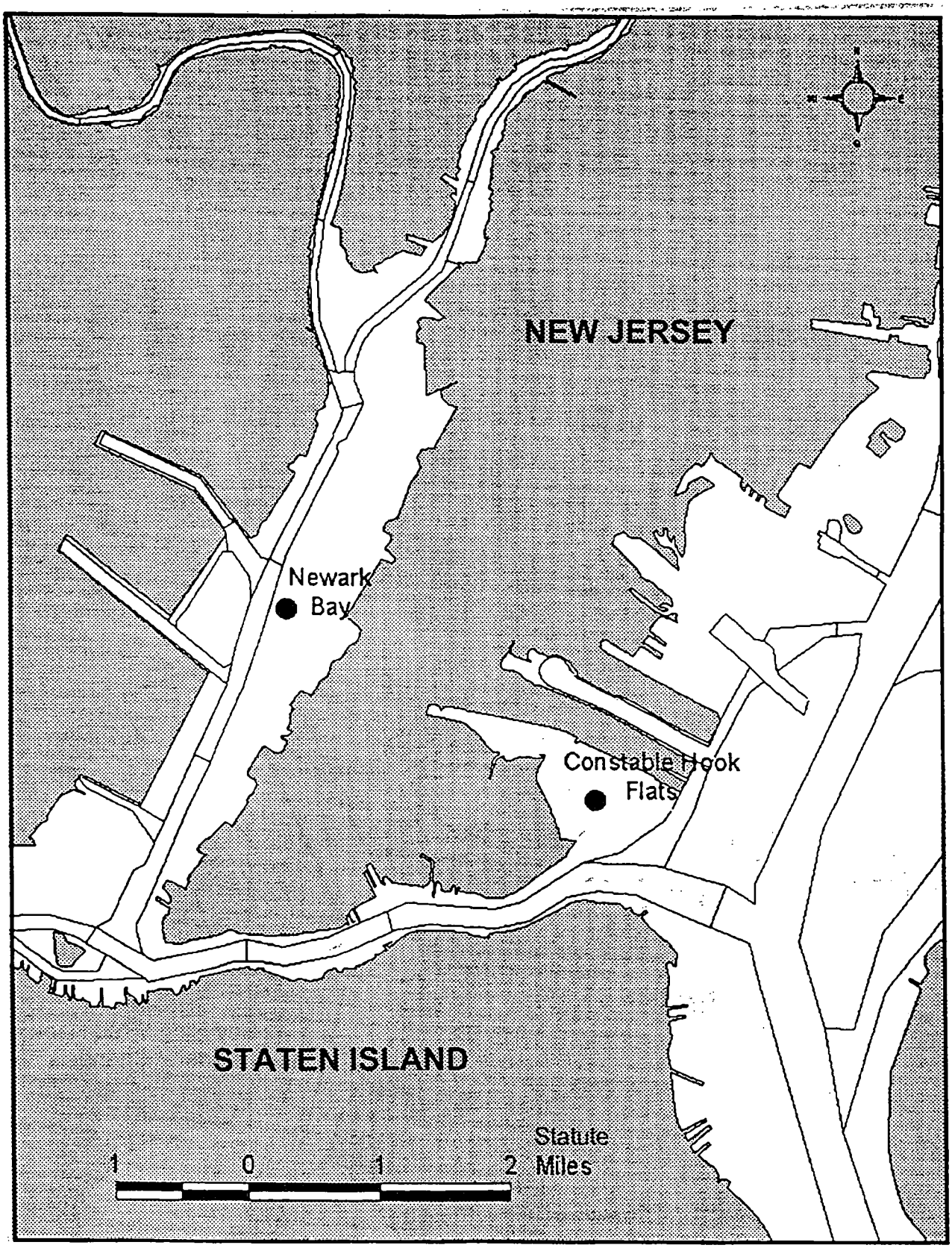


Figure 3-5. Siting Zones for New Pits in the Upper Bay Complex

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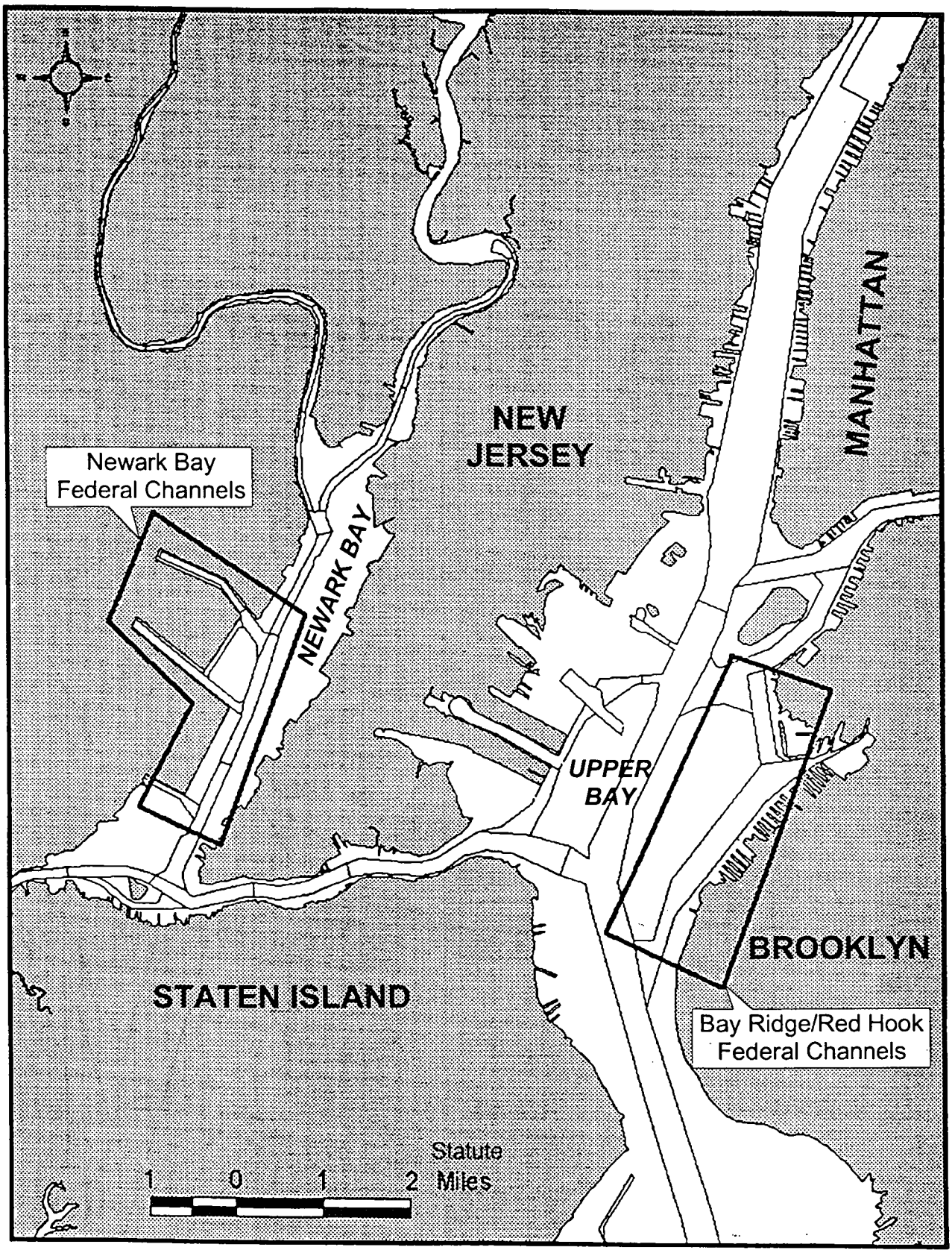


Figure 3-6. Potential In-channel Placement Pits – Upper Bay Complex

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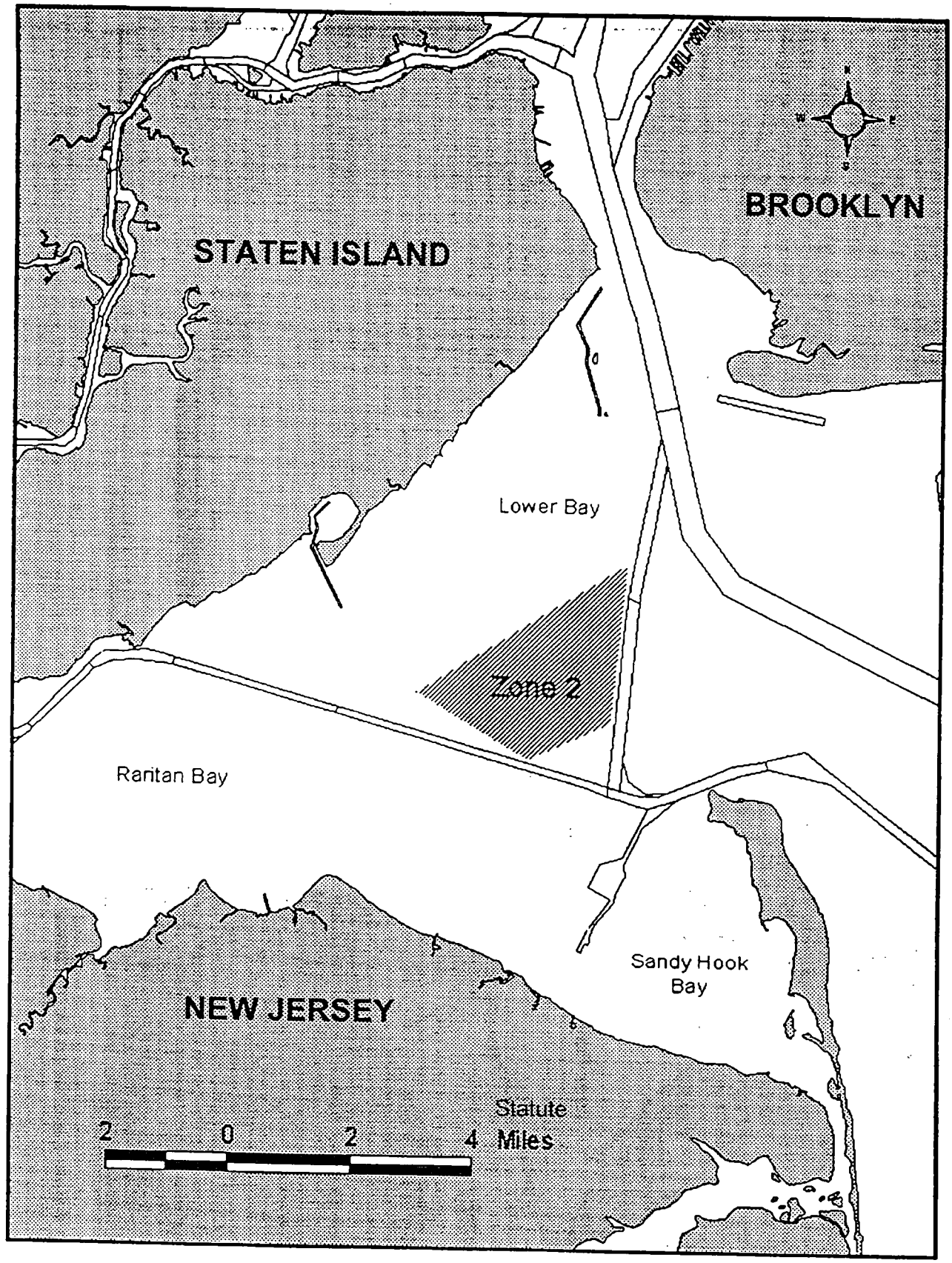


Figure 3-7. Siting Zone for a Bay Island

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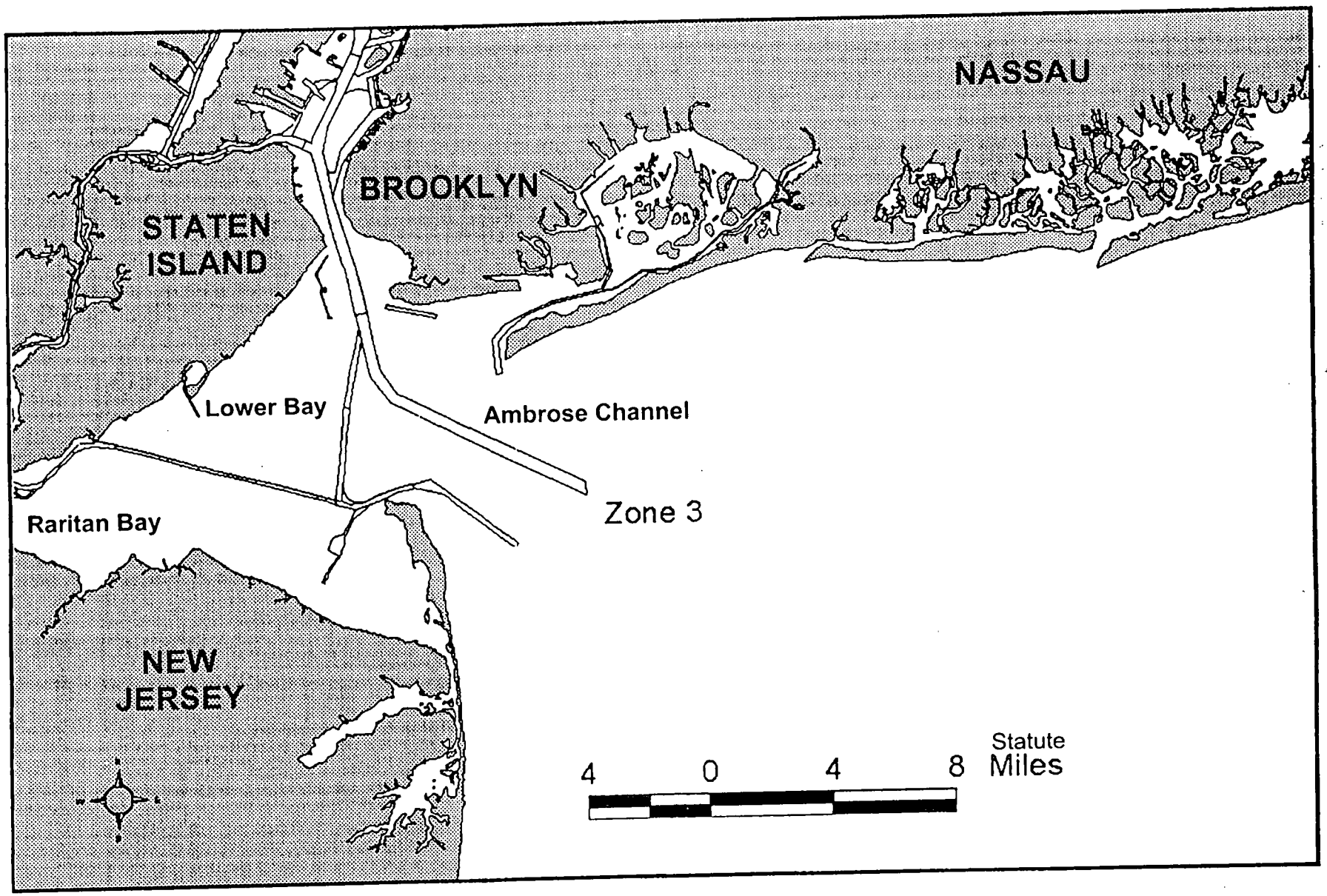


Figure 3-8. Siting Zone for an Ocean Island

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4 AFFECTED ENVIRONMENT

4.1 Introduction

a. This chapter discusses existing conditions in the areas potentially affected by one or more of the management options discussed in Chapter 3. It reflects the collection of considerable amounts of data over many years, including scientific information collected specifically for the DMMP. The topics covered in this section of the PEIS may overlap in several sub-sections. In order to eliminate repetition to the maximum practical extent cross-references to other sections of the PEIS and DMMP will be used.

b. For most of the management options, actual sites, if implemented, would require more detailed site specific descriptions of resources and perhaps site specific data collection than is presented here before a final NEPA evaluation would be conducted. It is anticipated that this would occur when selected options and sites are chosen for implementation. For now, the options and sites are being assessed for generic overall impacts upon the resources within the larger geographical areas (NY Bight Apex, Lower Bay Complex, Upper Bay Complex, Uplands).

4.2 Study Area

a. The study area is large due to the variety of potential disposal options, volumes of material that need to be placed, and number of potential sites available. The study area includes potential aquatic and upland sites.

4.2.1 New York Bight Apex

a. For purposes of this report, the New York Bight Apex is defined as the area of the Atlantic Ocean bounded from an imaginary transect line, referred to as the baseline, between Sandy Hook, New Jersey and Rockaway Point, New York; then east along the south shore of Long Island, New York to the meridian at 70° 40 mins west longitude; then south to the point where 70° 40 mins west longitude intersects the parallel at 40° 20 mins north latitude; then west to the New Jersey shore; then north along the New Jersey shore to Sandy Hook. This is the study area in which an island CDF has been considered for potential siting. This is also the location of the HARS and any potential new ocean remediation site(s). This is essentially the portion of the Atlantic Ocean created bounded by lines running south from Long Beach, Long Island and east from Monmouth Beach, New Jersey out approximately 20 miles offshore (Fig. 4-1). An exclusionary criterion has limited the CDF site to 3 to 12 miles from shore.

4.2.2 Lower Bay Complex

a. The Lower Bay Complex study area is defined as the water bodies that are landward of the Sandy Hook to Rockaway Point baseline and includes Raritan Bay,

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Lower New York Bay, and Sandy Hook Bay and their tributaries. Because this water area has no distinct separations, it is treated as one entity, the Lower Bay Complex (Fig. 4-2). As Jamaica Bay is under consideration for beneficial use options, it is included under the Lower Bay Complex, because while it is a distinct entity, it falls inside the Sandy Hook to Rockaway Point baseline. Potential management options within this area includes habitat creation/restoration.

4.2.3 Upper Bay Complex

a. The Upper Bay Complex of the study area includes four relatively compartmentalized sub-areas. These sub-areas are 1) the Upper Bay- from the Verrazano Bridge to the Battery, including Bay Ridge Flats, Red Hook Channel and the embayments, flats, and channels of New Jersey to opposite of the Battery, 2) the Arthur Kill, Kill Van Kull/Newark Bay, 3) the Hudson River from the Battery to the George Washington Bridge and 4) the East River from the Battery to the Throg's Neck Bridge (Fig. 4-3). Since somewhat distinct sections occur in the Upper Bay Complex, the resources for the four sections listed above are, in some instances, discussed individually. Potential management options within this area include CAD pits, habitat creation/restoration, nearshore CDFs, upland remediation and decontamination facilities.

4.2.4 Upland

a. Potential sites for land placement outside of the immediate area of the harbor (adjacent to the Lower Bay or Upper Bay Complex) include; Monmouth County, New Jersey and mine sites in Clearfield County, Pennsylvania, and Orange County, New York. Some of the sites under consideration for the placement of non-contaminated fill are also under consideration for placement of contaminated dredged material. One location in Pennsylvania is currently a demonstration project with a permitted capacity of 550,000 CY of which 500,000 CY will come from the Port. To date only 19,000 CY have been placed. The potential for increased permits could greatly increase the volume of material disposed of in this way. The single factor which connects the proposed upland sites is that human disturbance/development has occurred on them. Potential management options for uplands include containment, remediation, and treatment.

4.3 Resources by Major Area

a. A substantial portion of the following characterizations of the study area were synthesized from a report by the United States Fish and Wildlife Service entitled Significant Habitats, and Habitat Complexes of the New York Bight Watershed (USFWS 1997). As information was available and appropriate, the descriptions were augmented by other studies, including those conducted directly for the DMMP initial siting and design efforts, including a benthic infauna survey (Vittor 1998) and, an analysis of groundfish data for the Bight Apex (Wilk et al. 1992) Lower Bay Complex (Wilk et al.

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1998), and substantial segments of the Upper Bay Complex (USFWS 1985). Since these major areas are large to very large in size, this section will, where appropriate, concentrate on those resources most at risk of being impacted by various options under consideration.

4.3.1 New York Bight Apex

a. The marine environment of the New York Bight Apex seaward of the baseline between Sandy Hook, NJ and Rockaway Point, New York, is potentially directly impacted by three options for the disposal of dredged material. These options at one time included an island CDF, the HARS site, and a new ocean remediation site. Given the substantial environmental, social and institutional concerns regarding construction of an island CDF, this option has been reclassified as preference 5 (i.e., non-preferred DMMP Table 2-2). The HARS is located in the southern portion of the Bight Apex study area, and the resources within its boundaries as well as any impact on them, have already been addressed in a separate EIS (USEPA 1997)

4.3.1.1 Water Column

a. Two groups of biota influence water quality, although other groups may also reflect changes in water quality. These groups are bacteria and phytoplankton. Bacteria are defined in the broadest sense as those organisms that decompose organic matter to their basic inorganic forms. Also included in this group are pathogenic organisms known to be harmful to man. The coliform test, a measure of intestinal organisms discharged by man and animal, is most often used as an indicator of the presence of pathogenic bacteria.

b. In 1974, the USEPA conducted a routine bacteriologic monitoring program in the waters of the New York Bight Apex, most importantly in the surf and nearshore zones of Long Island and New Jersey beaches. These data show a decrease in bacteria from the harbor to the open ocean. However data given by Bigelow (1968) contrasts to this gradient by showing a gradient from the HARS outward. The data from these two surveys showed gradients proceeding in two different directions. It is clear from both studies, in addition to the 28-year study conducted by O'Connor (1980) that bacterial influence in the water column is confined to an area of 3-to5 km (2 to 3 mi.) radius from the HARS located 40° 23' Latitude and 73° 51' Longitude. The center of this site is approximately 9 miles to the west of the center of island siting Zone 3. Data from the USEPA study showed bacteria concentrations in the surf zones of Long Island and New Jersey beaches to be low, meaning water is of sufficient quality for swimming. The near shore waters 16 ft deep or less, show increases but still reflect average bacteria levels, well within standards. Bacteria levels of New Jersey waters were found to be higher than those of Long Island possibly due to the predominance of the Hudson-Raritan Plume.

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c. Phytoplankton are single or multi-celled plants that float in the sea. These organisms are capable of photosynthesis, releasing oxygen. Nutrient enrichment can result in the proliferation of plankton, with a detrimental impact on the ecosystem because decomposition by bacteria can lead to anoxic conditions. A convenient measure of phytoplankton biomass is chlorophyll *a* concentration. Phytoplankton has patchy distributions in water columns; abundance of individual species vary seasonally. Different species may be abundant in successive years and species composition is unpredictable (USEPA 1982).

d. Chlorophyll *a* showed a spring bloom during the March-April period with average chlorophyll *a* concentration of about 19 µg/l. A decline occured, with average concentrations leveling off at about 4 µg/l during the summer months. A secondary bloom occurs during the fall. No apparent reduction occured during winter. Mean concentrations of about 4 and 8 µg/l were observed during December and February respectively. No chlorophyll *a* data was available for near the bottom area. A variation in the distribution in the summer shows a region of high chlorophyll *a* concentrations close to the shore and then a rapid drop as one proceeds off-shore, thus it is lower in Zone 3 than closer to shore (e.g., the HARS). Surface chlorophyll *a* concentration outside the New York Bight Apex is generally less than 1 µ/g/l (O'Connor 1978). In addition to phytoplankton, the plankton community consisted of small animals (zooplankton) which feed upon phytoplankton, as well as each other. Some of the zooplankton are a permanent constituent of the water column while others are temporary such as larval fish which eventually become non-planktonic.

e. Additionally, various fish species (e.g., Atlantic mackerel) that prey upon the zooplankton may, depending on life stage, make-up part of the zooplankton community, occupy the water column. These are in turn preyed upon by larger fish (e.g., bluefish, tuna).

4.3.1.2 Bathymetry and Benthos

a. The bathymetry within the ocean study area was surveyed and analyzed by NOAA supplemented by USACE surveys during 1995 and 1996, (BVA 1998) using remote sensing tools (Fig. 4-4, Tables 4-1 and 4-2). The topographic features include relatively flat relief, with the Hudson River ancient riverbed which heads in a southeast direction as a relatively narrow channel, expanding and angling in a southerly direction at about 40° 25' N Lat. and 73 ° 50' W Long. Depths of this feature in the study area range from 100' to greater than 135'. Another naturally occurring feature is the change in the rather flat topography associated with the Christiansen Basin in the ocean study area, and the rock/gravel that projects into the study area from the north. Additionally, smaller but important areas such as the Shrewsbury Rocks are located off the New Jersey coast landward of the ancient Hudson River riverbed.

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b. Other substantial topographic features are the results of human activity and include the Mud Dump Site, Cellar Dirt Site, Acid Stain, and the sewage sludge site. Small features include material placed for artificial reefs and shipwrecks.

c. Areas with major bathymetric features such as the Hudson River canyon, Mud Dump etc. were excluded as possible sites for an ocean island. The general area within the zone that was being investigated is characterized by relatively flat but sloping (from northwest to southeast) topography with water depths ranging between 35-55 ft.

d. Within the most recently studied area of the New York Bight Apex (Fig. 4-1) the substrate is mainly silty-fine sands. The substrate in Zone 3 is part of a much larger silty-fine sand zone and is one of the two dominant sediment types (the other is organic mud). The infauna of the zone provided information on where impacts would be reduced. It supports mainly annelids and bivalves. Numerically, in the shallow water zone (<75 ft) annelids (45+%), mollusks (>25%) and crustaceans (<22%) comprised the vast majority of the taxa. With regards to biomass mollusks, mainly bivalves, dominated (~90%), while echinoderms, annelids, and crustaceans comprised the vast majority of the remaining biomass (MESA 1981). The difference between the make-up by numbers versus biomass reflects the size of the types of fauna involved, for instance due to the size/weight attained by the surf clam (*Spisula*) it dominated the biomass. While *Spisula* is dominant and commercially important its populations are ephemeral.

e. Though the entire Bight Apex was not surveyed for the DMMP because it would be cost prohibitive, a limited sampling of the MESA ocean study area was ground-truthed for NYD (Vittor 1998). Ground-truthing assessed the relationship of the current benthic community to the MESA survey of the late 1970's (Table 4.1, Fig. 4.4). The results indicated that there was a strong correlation with those data, that is, sediment and the associated communities correlated well with the MESA findings. The ground-truthing effort essentially verified the community described by MESA.

4.3.1.3 Fish and Megainvertebrates

a. The fisheries within this study area are varied. The time and space orientation of the various species can vary dramatically. The bluefish, for instance, resides in the area mainly from mid-May until mid-November, while certain species of the codfish family (*Gadidae*) reside in the area mainly in the late fall through the early spring months. The bluefish occupies various segments of the water column depending on time of day and food supply while the flatfishes (*Pleuronectiformes*) are bottom dwellers that only occasionally venture off the bottom in search of prey (Table 4.2). The invertebrates include

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important commercial species such as surf clam, sea scallop, American lobster, and squid.

b. Some fish species are highly migratory such as several species of tuna, and shark. Other migratory species that are usually found include mackerel that are usually present in the highest numbers in mid-spring, and bluefish that follow the mackerel schools. A portion of the bluefish populations remain in the Apex waters during the summer and into the fall. Still other migratory species generally are found close to or at the bottom, these include; black sea bass, scup (porgy) and summer flounder (fluke). There are other species that remain in the vicinity of the Bight Apex, but their population shifts in response to water temperature, and reproductive need (e.g., winter flounder).

c. The portion of the Bight Apex that represents the site of Zone 3 is mainly unstructured bottom. It is located in an area considered to have high fisheries capacity by NOAA-NMFS groundfish survey, with twelve trawl caught species from 1977-1988 (Chang 1990). These data provide information on usage of the area which was considered in site determinations. The finfish species include commercially and recreationally important ones such as winter flounder, summer flounder, and scup.

4.3.1.4 Amphibians and Reptiles

a. No amphibians are present in the Bight Apex ocean environment. The reptiles of the study area ocean zone are sea turtles, which are covered under the Federal Endangered Species Act and are discussed under the heading Endangered Species (4.3.1.7).

4.3.1.5 Birds

a. Birds, especially sea birds, use the nearshore areas of the Bight Apex seaward of the baseline, for feeding. Species that nest in the area and are most likely to use this zone are gulls and terns. Additionally, there are several species of sea birds and shore birds that migrate through the areas during the spring and fall. A few which breed in the southern oceans and summer here include species of shearwaters and Wilson's storm-petrel. Since Zone 3 is a wholly aquatic site no nesting species are found. Land areas adjacent to the NY Bight Apex have nesting species of shorebirds that include American oystercatcher, willet, killdeer, piping plover, and spotted sandpiper.

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4.3.1.6 Mammals

a. The ocean waters seaward of the baseline are occasionally visited by several species of small toothed whales including the bottlenosed (*Tursiops truncatus*), common dolphin (*Delphinus delphis*), and harbor porpoise (*Phocoena phocoena*). The commonly occurring seal in the ocean zone is the harbor seal (*Phoca vitulina*), and increasingly the gray seal *(Halichoerus grypus*). The great whales are discussed in the Endangered Species Section (4.3.1.7).

4.3.1.7 Endangered Species

a. In evaluating sites, substantial weight was given to endangered species in order to avoid impacts to them.

4.3.1.7.1 Flora and Fauna

a. Several species of flora and fauna covered under the Endangered Species Act have been identified from the area (USFWS, 1997). Others have been identified from the larger area discussed in that report, but are not discussed here because they are not known to be in the study area under consideration for dredged material disposal in the New York Bight Apex. Table 4-3, and the Fish and Wildlife Coordination Act Report attached as Appendix A list the species).

4.3.1.7.2 Sea Beach Amaranth

a. The sea beach amaranth (*Amaranthus pumilus*), an annual plant of the amaranth family, was listed as threatened in 1993. It has historically occurred on the barrier beaches of the Atlantic from Massachusetts to South Carolina. Currently the known sites for this species is limited to the south shore of Long Island. It is found in newly disturbed habitat (e.g., a blowout area of a dune). Because of its ephemeral nature it is possible that this species could be found in the outer reaches of the DMMP study area.

4.3.1.7.3 Sandplain Gerardia

a. Sandplain gerardia (*Agalinis acuta*), a member of the figwort family was listed as endangered in 1988. Its range is from Cape Cod to Maryland along the coastal plain. It is found in dry sandy soils. It now mainly occurs on Long Island and is not likely to be adversely impacted by the DMMP except at an upland site if one were chosen.

4.3.1.7.4 Northeast Beach Tiger Beetle

a. Northeast Beach Tiger Beetle (*Cicindela d. dorsalis*) was included on the Federal Endangered Species list during 1994. Its former range was from Cape Cod, MA to south/central New Jersey. It had been recorded at least 24 times from the beaches of the New York Bight before being

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extirpated. Development and oil spills have had the most impact on this subspecies. This subspecies was reintroduced to the beach at Sandy Hook, NJ and has become re-established there.

4.3.1.7.5 Reptiles. Sea Turtles

a. Several species of sea turtle occur in the ocean zone of the study area, they include; the endangered Kemp's Ridley (*Lepidochelys kempii*) and leatherback (*Dermochelys coriacea*), and the threatened green (*Chelonia mydas*), and loggerhead (*Caretta caretta*). The endangered hawksbill (*Eretomochelys imbricata*) is apparently only a rare straggler to the New York Bight area. There is no known special use of the area of Zone 3 by sea turtles.

4.3.1.7.6 Birds

4.3.1.7.6.1 Piping Plover and Roseate Tern

a. Nesting and feeding by piping plovers (*Charadrius melodus*) does occur at Sandy Hook and Rockaway Point. This coastal subspecies is Federally threatened. Also, the Federally endangered roseate tern (*Sterna dougallii*) occasionally is found in the vicinity. It was confirmed to be nesting at Breezy Point during 1997 and feeds on small species of fish in ocean and inlet waters adjacent to the nest site.

4.3.1.7.7 Mammals, Marine Mammals, Whales

a. Six species of great whales have the potential to be found in the New York Bight, but are most commonly found outside of the Bight Apex (study area) and none are known to use the area in and around Zone 3 in any special manner. All are listed as endangered, of these the Northern Right Whale being the most critical.

4.3.1.7.7.1 Blue Whale

a. Blue Whale (*Balaenoptera musculus*) are rare visitors to the ocean portion of the study area. Montauk, NY which is more likely to be frequented by this species, has had less than 12 confirmed sighting in the last 15 years.(Okeanos-reported in USFWS1997). These sightings were in waters of approximately 100 ft or deeper.

4.3.1.7.7.2 Finback Whale

a. Finback Whale (*Balaenoptera physalus*) is the most abundant of the great whales in the ocean off the mid and north Atlantic coasts. It primary use areas are all located well to the east of the study area.

4.3.1.7.7.3 Sei Whale

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a. Sei Whale (*Balaenoptera borealis*) distribution is less known than some of the other great whales of the mid-north Atlantic. Generally, it is believed to frequent areas above 40° N latitude, in waters 50-1000' deep. Sightings in the New York Bight, but not as close as the Bight Apex, are mainly from July and August.

4.3.1.7.7.4 Northern Right Whale

a. Northern Right Whale (*Eubalaena glacialis*) are endangered, perhaps critically so, since it is believed that only about 600 individuals remain, of which, 300-350 are believed to be in the North Atlantic Ocean. Sightings in the New York Bight, but not as close as the Bight Apex, occur every year from March through June apparently during the whales northbound migration. During the southbound migration they appear to take a more seaward route.

4.3.1.7.7.5 Humpback Whale

a. Humpback Whale (*Megaptera novaeangliae*) is the great whale that is most likely to be encountered in the vicinity of the New York Bight Apex. It has been found in New York Harbor (rarely) and other waterbodies in that proximity. Their temporal occurrence is bimodal since they mainly appear from June through September and again in December and January. Their diet consists in part on small schooling fish such sand lance (*Ammodytes* sp.). This may explain the occurrence of this species in nearshore waters in the New York Bight Apex, where sand lance is occasionally abundant.

4.3.1.7.7.6 Sperm Whale

a. Sperm Whale (*Physeter catodon*) is the largest of the toothed whales and owing to its size is considered to be a great whale. It is rarely found in waters less than 100 fathoms (600 ft). Its presence in the New York Bight Apex is rare.

4.3.1.8 Essential Fish Habitat

a. The Magnuson-Stevens Fishery Conservation and Management Act of 1996 (MSFCMA PL 94-265) as amended is the law that has as one of its provisions, the designation of Essential Fish Habitat (EFH) for any Federally Managed Species. The Fishery Management Councils (FMC) that manage species along the Atlantic Coast of the United States have made the draft EFH designations. These councils are the New England, Mid-Atlantic and South Atlantic FMC's. The Secretary of Commerce has approval authority for the designations.

b. The designations are based upon a 10' longitude by 10' latitude grid cell that, in the Port area, is approximately equivalent to a 100 square mile rectangle. The

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presence of a species on the FMC list does not automatically constitute its presence in the Port DMMP study area (e.g., white marlin). Designation for a species considers the pertinent life stages (e.g., most bony fish = eggs, larvae, juveniles, adult stages) any one of which would, if data indicated substantial presence in a grid cell, be included as EFH (Table 4-3).

c. Presence of EFH in a given grid cell for a species may be set aside if enough data exists that a section of the grid does not contain the species at all, or in enough numbers to justify that that section is EFH for a species. This would need to be determined in formal consultation with NMFS, under the MSFCMA.

d. NYD is currently initiating formal consultation under the MSFCMA to insure addressing requirements of the law, and review of EFH for designated species. This is especially true for species such as cobia where there is a question regarding the designation and whether it will remain in place for the Port study area. Further, the consultation will aid in addressing potential adverse effects as a result of potential implementation of options and given sites.

e. The New York Bight Apex portion of the Port study area for the DMMP has six EFH grid cells designated. These grid cells contain EFH for one or more life stages for an accumulated total of some 32 species. Most species are finfish, however several key invertebrates (2 species of squid, 2 species of bivalve) are also included. Species with the most presence based upon grid cells and life stages include the sandbar shark, winter flounder, and windowpane (a flounder). Other species which were also well represented using the total number of grids and life stages include red hake, silver hake, monkfish, bluefish, summer flounder, scup, butterfish, Atlantic herring, and black sea bass.

4.3.1.9 Cultural Resources

a. Significant cultural resources are any material remains of human activity that are eligible for inclusion or listed on the National Register of Historic Places (NRHP). The Federal authorities on Historic Preservation include Section 5 of the Abandoned Shipwreck Act of 1987, Section 106 of the National Historic Preservation Act of 1966, as amended, Executive Order 11593, and the Advisory/Council's "Procedures for the Protection of Historic and Cultural Properties (36 CFR Part 800)."

b. A preliminary cultural resource assessment was prepared for the Dredged Material Management Plan (DMMP) in 1996 (Rakos 1996). At that time, the DMMP study area, as defined was much larger and included most of the New York Bight Apex, off shore and nearshore, as well as uplands within two miles of the shoreline in the counties surrounding the Port of New York and New Jersey. That assessment provided a brief summary of existing cultural resource

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data for offshore and nearshore resources and summarized the types of resources that might be encountered in upland areas. The assessment also provided general descriptions of the cultural resource work that might be anticipated for each disposal option under consideration. The State Historic Preservation Offices (SHPO) of both New York and New Jersey and the New York City Landmarks Preservation Commission (NYCLPC) concurred with the approach the NYD proposed to take with regard to identifying and evaluating cultural resources for the various DMMP options (Appendix C of this PEIS).

c. A geomorphological assessment of the sediments recovered from a series of vibracores and borings was conducted in all offshore zones to assess the potential for these areas to contain paleoenvironmental data. During the last 10,000 years of the late Pleistocene and Holocene periods when ocean levels were lower than now these areas were on a relatively dry coastal plain that may have been inhabited by Native American populations. The geomorphological study concentrated on the analysis of pollen, foraminifera, and grain size, coupled with limited radiocarbon dating of sediments obtained from vibracores and borings. These data were used to reconstruct the paleoenvironment and ascertain areas that may have been favorable for occupation by native Americans and that are more likely to have been preserved under existing sediments, having withstood geological and human scouring processes. The preliminary analysis of these data indicates that several areas of the Apex do contain soils that may yield important information on the prehistoric landscape (LaPorta, Sohl, and Brewer 1998).

d. Zone 3 has a moderate potential to contain significant resources. Sediments recovered from this area are suggestive of a paleoshoreline. While such an environment would have a high probability for cultural resources, the location of Zone 3 on the continental shelf would have made it prone to extensive erosion during the late stages of the Holocene sea-level rise. It is therefore possible that some prehistoric sites have been eroded away (LaPorta, Sohl, and Brewer 1998). The final report will indicate which locations within Zone 3 have higher or lower potential for significant resources.

e. Historic resources that might be encountered in the New York Bight Apex area of potential effect consist primarily of shipwrecks and other isolated artifacts either lost or dumped at sea. The potential for shipwrecks is substantial although recent surveys in the Lower Bay Complex identified only a few potential cultural resources (Cox 1998). A remote sensing survey will be conducted for Zone 3 as the project proceeds.

f. Cultural resource issues for the HARS were addressed in the Environmental Impact Statement produced for that project. Six shipwrecks were identified. The New Jersey State Historic Preservation Office concurred that there would be no

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impact to these resources provided that the wrecks were avoided, as proposed in project plans. Fish reef construction and would be located on pre-approved, existing sites for which cultural resources have already been addressed. As options are selected and locations determined appropriate cultural resources studies will be undertaken. Section 106 compliance will be achieved for each selected site.

4.3.1.10 Socio-Economic Factors

4.3.1.10.1 Shipping

a. During 1996, more than 51 million tons of ocean borne cargo passed through the Port of New York/New Jersey. During 1996, the regional monetary impact of the Port and its dependent activities is estimated at more than $29 billion, and 166,000 jobs.

4.3.1.10.2 Commercial Fishing

a. Commercial fishing does occur in the New York Bight Apex. Some of the main target species include ocean quohog, surf clams, and a variety of finfish such as winter flounder, summer flounder, scup, and several species of the codfish family. Substantial numbers of people in the area engage in subsistence fishing.

4.3.1.10.3 Recreational Fishing

a. Computation of revenue associated with this activity are not readily available, but the New York/New Jersey metropolitan area has at least 750,000 saltwater recreational fisherman that fish on average of about 10+ days per year each. This activity provides substantial employment and commercial income to individuals and business at marinas, bait and tackle shops, and those who work on recreation fishing boats as captain and mates. Fishing in the New York Bight Apex utilizes a variety of vessels that include private boats, charter boats, and party (head) boats.

4.3.1.11 Water Quality

a. Surface Water. This section describes the surface water quality of the New York Bight Apex, specifically addressing temperature, salinity, dissolved oxygen, various nitrogen and phosphorus forms, silicate, pH, heavy metals, coliform bacteria, and phytoplankton. Major water quality monitoring in the New York Bight Apex began in 1948, but has been sporadic. Holland (1971) has identified three types of water in the New York Bight Apex shelf waters: inlet waters (also called Hudson River Plume water), surface shelf water, and bottom water.

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b. The Hudson River Plume water encompasses the combined discharges of the Hudson and Raritan Rivers and flow from the Lower Bay. This culminates into a low-salinity plume that is located in the northwest corner of the New York Bight Apex. Discharge volumes are maximal in April and minimal in August. Approximately one-half of the annual discharge occurs during March, April, and May (Bowman and Wunderlich 1976). The plume persists throughout the year; with an extent and depth highly dependent on local winds and flow rates from the Hudson and Raritan rivers. (McLoaughlin, et al. 1975). Generally the plume flows southward between the New Jersey coastline and the axis of the Hudson Shelf Valley. During winter, however, the plume may flow eastward along the southern coast of Long Island.

c. The surface shelf water is affected, by the onset in the spring, of heavy river discharge with average salinity varying more than 4 parts per thousand (ppt). Surface salinities in the New York Bight Apex decrease and a moderate salinity-maintained stratification occurs during the spring and summer months, separating surface shelf water from bottom shelf water. Decreasing winds and increasing isolation cause a stronger thermocline to develop (Charnell and Hansen 1974). The two-layer system reaches its maximum strength by August. Moderate salinity (25 ppt to 27 ppt) and high temperature characterize summer shelf water.

d. The bottom shelf water winter characteristics are essentially homogenous over the New York Bight Apex shelf. With rapid formation of a thermocline and separation of surface shelf water in spring, bottom waters become isolated until the next winter. Bigelow (1933) reported that this cool pool (temperatures typically less than 4°C) extended from south of Long Island to the opening of the Chesapeake Bay. Bigelow (1933) also found that the cooler pool of Bottom Shelf water was surrounded on all sides by warmer water. The upper layer of the Bottom Shelf water is usually found between 30m and 100m during the summer (Bowman and Wunderlich 1977). Seaward, near the shelf edge, steep density gradients prevents large scale mixing from occurring between shelf and slope waters during the year.

e. Anti-degradation policies apply to all surface waters of the States of New York and New Jersey. Existing uses must be either maintained or protected, and no irreversible changes to water quality are allowed that would impair or preclude attainment of designated uses.

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4.3.1.11.1 Physical Properties

a. Physical properties for the purposes of this document are temperature, light, salinity, and total suspended solids.

4.3.1.11.1.1 Temperature

a. Temperature fluctuations generally follow a seasonal pattern and on the spatial scale of the New York Bight Apex, are relatively unaffected by man-made inputs. However, unusual high or low temperature conditions occurring on various temporal and spatial scales can result in undesirable effects on the biological community. The solubility of gases in water declines as temperature increases. Saturation concentrations for dissolved oxygen in the New York Bight Apex can vary as much as 4 mg/l from winter to summer. Temperature must be considered when evaluating toxic substances in aquatic systems, as many substances (such as cyanide, phenol and zinc) exhibit increased toxicity at higher temperatures. In addition, aquatic organisms require certain ranges of temperature for optimal growth. Although not present during the winter, a strong thermocline develops during the summer with warm surface layers overlying cold bottom waters. The thermocline is easily penetrated by dredged material but forms a boundary restricting the movements of plankton, nutrients, and oxygen during the summer.

b. Surface temperatures of New York Bight Apex waters show a minimal variation over the long term with the average summer temperature ranging from about 21° to 24°C. Monthly variations show surface temperatures vary with a low of 2° C in winter to a high of about 23°C in late summer. A maximum average vertical temperature stratification of 7°C is observed during July and August. The most significant lateral gradients occur during the high runoff period in the spring. The influx of cold bottom (and surface) water from the oceans are evident during spring conditions. The summer surface profiles have relatively small lateral gradients, although the vertical stratification is quite evident during this period. The fall and winter data reflect the seasonal cooling and subsequent vertical mixing.

c. The average surface temperatures of the New York Bight Apex area range from 8.5° to 20°C in the spring. Increases in temperature are noted toward the New York Harbor and easterly to the Atlantic. Cooler temperatures are seen along the northern coast. Summer surface temperature average ranges from 18° to 24°C. Fall surface temperatures range from 3.5° to 15°C. Winter surface temperatures range from 2° to 13°C. The average bottom temperatures range from

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4° to 12°C in the spring, 6° to 21°C in the summer, 11° to 14°C in the fall and 1.5° to 8.5°C in the winter.

4.3.1.11.1.2 Light

a. Light that penetrates bodies of water is a fundamental source of energy for life and heat. In general, light decreases exponentially with depth. Light penetration is calculated as a measure of turbidity: the greater the turbidity reading, the less light penetration. In a highly turbid system where light penetration is diminished, photosynthetic activity is limited to the upper reaches of the water column. Turbidity can be influenced by many factors including river plumes and energy events that re-suspend sediments.

4.3.1.11.1.3 Turbidity

a. Surface turbidity can be measured by satellite imagery. These images of the New York Bight Apex show the Hudson Plume, which is distinguished by the difference in reflexive indexes due to turbidity, in contrast with its surrounding waters. The images of the plume show it extending southward and close to shore (Fedosh and Munday 1982). Northwest winds, followed by southwesterly winds, cause the plume to move off-shore by as much as 27 Km.

b. Turbidity below the surface can be measured using in situ instruments. Dragos and Peven conducted hydraulic surveys in 1994, which included high resolution vertical profiling of water column turbidity in the vicinity of the HARS. These hydraulic surveys showed low turbidity throughout the water column with a small mid-depth maximum in the central portion of the HARS study area. This feature seems to extend from the north and west in to the HARS but does not extend to the east of this area. The data did not reveal elevated turbidity in the vicinity of the HARS that might be attributed to dredged material disposal. However, the data did show the Hudson River discharge or coastal currents exerting notable influence on the turbidity. Time series tracking of individual dredged material plumes demonstrated that turbidity associated with disposal events in the HARS quickly reached background levels within a few hours (Dragos and Lewis, 1993). These data indicate that dredged material disposal in the HARS has transient impact on water clarity.

4.3.1.11.1.4 Salinity

a. The concentration of dissolved salts in seawater is usually expressed as a measure of salinity. A rapid means of obtaining the salinity of a water sample is by measuring electrical conductivity. Although water

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from the open ocean contains slightly more salts than expressed in salinity values (Strickland and Parsons 1968), salinity is essentially equivalent to the total dissolved solid content of seawater.

b. Density in the marine environment is a function of salinity and temperature. Density stratification is important in aquatic systems in that the different strata can have different environments and aquatic life communities. Density is also important in evaluating pollutant discharges into the aquatic system. Density differences between a sewage plume from an ocean outfall and the receiving waters can cause the plume to rise, resulting in the formation of a concentrated field on the surface of the receiving water body.

c. Salinity data in the Bight area was taken over a period of 28 years (from 1948 to 1976) with no distinct long-term overall pattern observed (although the higher flow years in the early 1970's appear to reflect a decrease in surface salinity). Average vertical gradients of salinity vary from less than 1 part per thousand (ppt) to almost 2 ppt from top to bottom. Seasonally, salinity profiles may vary. The effect of the high runoff from the Hudson River basin in the spring can be seen in the low salinity surface water extending into the New York Bight Apex. Southward along the New Jersey coast the bottom water is higher in salinity, producing maximum stratification during this period. In addition there is an indication of higher salinity bottom water penetrating into the Apex from the south.

d. For late summer, during the period of lowest average flow from the Hudson, salinities are greater than during spring. The movement of low salinity water southward along the New Jersey coast persists, as does the penetration of higher salinity in the bottom layer up the Hudson shelf valley, but with somewhat less stratification. In contrast to the littoral current pattern, the off shore summer salinities suggest a clockwise circulation driven by the incoming freshwater, the general southwesterly drift and to some degree, incursion of high-salinity bottom water.

e. The fall and winter data show less stratification, with the fall surface data again indicating the drift along the New Jersey shore. The winter surface data indicate some tendency for the surface flow to be deflected farther northward than usual. Vertical gradients are small, and generally movement of higher salinity bottom and surface water into the area from the southeast is apparent (O'Connor et al. 1977).

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Maximum salinities occur inshore during February and March, averaging 33 ppt to 34 ppt (Bowman and Wunderlich 1977).

4.3.1.11.2 Chemical Properties

a. Chemical properties include dissolved oxygen, various forms of nitrogen, phosphorus, organics, pH, and certain heavy metals.

4.3.1.11.2.1 Dissolved Oxygen

a. Aquatic plants such as phytoplankton affect the dissolved oxygen level in a natural water body through photosynthesis and respiration. Because sunlight is the source of energy for this reaction, most photosynthesis occurs during the daylight hours and in the surface layers. Organisms such as bacteria utilize the oxygen resources of an aquatic system through respiration. In aquatic systems, a major source of dissolved oxygen is atmospheric regeneration. As major sinks use oxygen, oxygen from the atmosphere passes into solution to replace the deficiency. The amount of oxygen that will dissolve in water is limited and dependent upon salinity and water temperature. Generally, dissolved levels above 4 mg/l must be maintained in aquatic systems for many organisms to survive. (NOAA 1977).

b. Monthly variations in the New York Bight Apex-wide dissolved oxygen averages are vertically stratified, with dissolved oxygen at the surface near or above saturation with a maximum variation of about 16%. The variation of percent saturation at the bottom is much higher over the year. The values range from a maximum in January close to saturation, to a minimum of 63% in August. The maximum vertical stratification of about 40% occurs in August and September; generally little variation is observed in January and November. Dissolved oxygen concentrations vary from 12 to 7.6 mg/l at the surface and 11 to 5 mg/l at the bottom, from winter to summer respectively (NOAA 1977).

c. Seasonal stratification of dissolved oxygen occurs in the spring when vertical differences of 10 to 30% occur, with some indication of a bottom sediment oxygen demand reflecting the effects of sewage disposal in the Hudson shelf region. In summer, surface dissolved oxygen everywhere is greater than 100%, reflecting algal photosynthesis. The bottom percentage of oxygen saturation varies through the New York Bight Apex, with less than 60 % in the vicinity of the HARS and 70 to 80% in other areas including Zone 3. No spatial variances in dissolved oxygen content occur in the fall and winter, accept for the apparent discharge of low dissolved oxygen

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water from the Hudson River into the surface of the New York Bight Apex during the fall. In general, in the fall and winter near vertical homogeneity at reasonably high levels of dissolved oxygen occur.

d. Moving sewage sludge disposal from the 12-Mile Site to the 106-Mile site in 1986-1987 measurably improved the water quality of the inner Bight (Studlhome et al. 1995). Data collected between 1987 and 1989 to evaluate the response of the New York Bight Apex to reductions in sewage sludge loading showed that summer water column dissolved oxygen levels in previously impacted areas rose after the 12-Mile Site was closed. In particular, measurements of dissolved oxygen in bottom waters of the inner New York Bight Apex demonstrated rapid recovery of DO values to that above 4 mg/l from 1986 through 1988 (minimum values in 1989 were about 2.5 mg/l). This compared to values below 0.5 mg/l at the previously most heavily impacted satiation during the summer months from 1983-1985 (Mountain and Arlen, 1995). Dissolved oxygen levels were measured by EPA Region 2 in the coastal waters (original data from EPA 2 STORET database) off New Jersey and New York (to depths of 40m) between May and October from 1985 through 1994 indicated that, of 3,888 data points only 26 were less than 2 ppm and 102 less than 3 ppt. This strongly suggests that the vast majority of the Bight Apex contains enough dissolved oxygen to sustain marine life. No trends toward lower DO as depth increased were evident in this data set (USEPA 1997c).

4.3.1.11.2.2 Nutrients

a. The two major nutrients essential for primary production in the ocean are phosphorus and nitrogen. Other major nutrients, notably silicon, as well as micronutrients and metals, are also necessary for plant growth and may enhance or retard production. Most aquatic marine systems however, are dominated by the availability or unavailability of phosphorus and nitrogen, usually present in water and taken up by plants as phosphate or nitrate.

b. The biological reactivity of nutrients, seasonal physical structure of the water column, currents and wind conditions, and remobilization from sediments all affect the distribution and concentration of nutrients in the water column (Stoddard et al. 1986). The dominant factor affecting nutrients in the New York Bight Apex is the flux associated with the Hudson River outflow (Stanford and Young, 1988). The flux is the movement of water associated with tidal exchange and net outflow due to the discharges mostly from the

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Hudson and Raritan Rivers. The flux dominates the loading of nutrients to the inner Bight (Hydro Qual 1989a; Stoddard et al. 1986). Stoddard, et al (1986) summarized data from stations between 1973 and 1981 in the greater New York Bight. This summary indicates that nutrients in the New York Bight Apex typically show a winter maximum (period of lowest productivity) and summer minimum. The amplitude of this cycle decreases seaward. Primary production is highest in the spring with a summer minimum and secondary fall maximum.

c. Generally, nutrient enrichment in the off shore coastal waters of New Jersey routinely causes elevated phytoplankton levels (HydroQual, 1989b). Stoddard et al (1986) indicates that the enrichment could increase primary productivity by as much as 30 %. Annual monitoring of the coastal waters off the eastern seaboard by EPA Region 3 shows the effect of coastal outflows on chlorophyll enrichment (EPA Region 3, 1992a) and decreasing levels with increasing distance off shore including coastal New Jersey. Such enhancements are generally confined to the surface waters as the source of nutrient for phytoplankton growth are added above the seasonal density stratification limits exchange of nutrient rich bottom waters with surface waters. Under typical conditions, these same phenomena limits the availability of nutrients regenerated in the sediments from reaching the light rich surface layer, thereby limiting the impact of sediment regeneration on coastal productivity during the summer months (Kelly, 1993; 1995).

d. In the past 10 years nutrient loading in the New York Bight Apex has decreased resulting in improved water quality. Evidence of this is the increase in dissolved oxygen levels in the New York Bight Apex waters. Disposal of dredged material in the New York Bight Apex remains, as in the past, a minor source of nutrients.

e. In aquatic systems, inorganic phosphorus is generally in the form of orthophosphate, although other forms may be present. Readily available inorganic phosphorus is essentially a nutrient for plant and animal growth and passes through various stages of decomposition and recycling.

f. In the New York Bight Apex from 1949 to 1974, inorganic phosphorus means ranged from 0.012 to 0.025 mg/l at the surface and from 0.026 to 0.030 mg/l at the bottom. In the vicinity of the historic HARS, mean inorganic phosphorus concentrations at the bottom were

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higher than bottom concentration averages for the New York Bight Apex. Monthly variations show a decreasing trend in inorganic phosphorus from about 0.028 mg/l in January, to a minimum of about 0.018 mg/l in May. During the spring algal bloom, an increase occurs to mean values between approximately 0.02 and 0.04 mg/l. Vertical stratification is minimal except during the summer, when the difference between the mean concentrations at the surface and the bottom are about 0.01 mg/l.

g. Nitrogen is notable in the aquatic system because it is an essential component of all proteins, chlorophyll *a* and other biological compounds. Nitrification in aquatic systems is a phenomenon in which ammonia is oxidized to nitrites and nitrates. This phenomenon is dependent on bacterial action and is important in water quality management because of the significant amount of oxygen required for this process. Thus, the input of wastes can upset the natural balance. Nitrification in aquatic systems causing eutrophication (over-enrichment of the system) can result in excessive growth of aquatic plants. Atmospheric nitrogen is transferred to the aquatic system by electrical discharge and by nitrogen fixing bacteria and algae which convert elemental nitrogen to organic nitrogen.

h. Data on nitrogen in the New York Bight Apex-wide system were not obtained during years prior to 1969. Looking at nitrogen on a monthly scale, nitrates show a downward trend from a mean concentration of about 0.06 mg/l of nitrogen in February, to minimum values of about 0.008 mg/l in July. Vertical stratification is generally minimal. A notable exception occurs in April, when the mean surface nitrate concentration is about 11 mg/l, indicative of high nutrient input during the spring runoff period. The primary source of nitrogen appears to be from the Hudson River. There is a general tendency for higher nitrogen concentrations to extend southward along the New Jersey shore, in accordance with the general circulation patterns.

4.3.1.11.2.2 pH

a. pH is the measure of the acidity or alkalinity of a solution. Pure water, containing equal parts of hydrogen and hydroxide ions, is neutral with a pH of 7. The pH value generally encountered in the sea is between 7.5 and 8.4. Deviations from normal conditions may be indicative of contaminants. Photosynthetic activity can result in higher pH values as result of the reduction of CO2 in the water. Low pH indicates anaerobic conditions. No pH data were available before 1973. According to the data collected by O' Connor (1977), pH is

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consistently within a narrow range of from about 7.8 to about 8.3 on a New York Bight Apex-wide average. This pH is also normal for open ocean waters. The pH in the bottom layer is always from 0.1 to 0.4 standard units lower than in the surface layer.

4.3.1.11.2.3 Heavy Metals

a. Heavy metals included in this section have been selected on the basis of available data. Information on iron, manganese, copper, cadmium, and zinc were consistently available.

b. Iron and manganese concentrations are generally low in highly buffered aquatic systems that are well aerated, because oxidized precipitates form and settle out of the system. Background levels in the open ocean for iron and manganese are 0.010 and 0.002 mg/l, respectively (Wenk 1969). (Table 4-4).

c. Recent data show that the concentrations of metals in the water column decrease off shore from the mouth of the Harbor. The decreasing off shore gradient (EPA Region 2 1991; EPA Region 3 1992a; HydroQual 1989b; EPA 1992b; Hanson and Quinn 1993; Klinkhammer and Bender 1981) directly reflects dilution of the contaminant concentrations in the Hudson River Plume with seawater from the Bight region. Variations of this gradient may occur as the flow of the river changes and in response to other climatological factors that affect mixing and transport regimes of the inner Bight. The seasonal stratification of the water column also affects the vertical distribution of contaminants. For example, metals concentrations in surface waters are consistently higher than in waters from below the pycnocline (density layer). This reflects both the influence of the Hudson River outflow on the surface waters of the New York Bight Apex and natural geochemical processes that transport metals through the water column. Repeated sampling of the water column in the vicinity of the HARS shows that metals concentrations in this area are low and reasonably constant. Thus while heavy metals concentrations in the New York Bight Apex and study area can range widely, their spatial and temporal distributions are reasonably predictable. (USEPA 1997c).

d. In general, data on iron concentrations in the New York Bight Apex are measured as total iron, which includes soluble, particulate, colloidal and organic iron. The New York Bight Atlas took iron measurements 5 ft below the surface and 5 ft above the bottom. Data showed that average surface iron concentrations are highest during

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winter (about 160-299ug/l), with averages of about 40 ug/l generally observed during the remaining of the year. A second peak observed in April may be due to spring runoff. Vertical stratification of iron is minimal through the year, except for September, October and December, when the difference between surface and bottom averages is about 80 ug/l. compared to background levels for iron of 10 ug/l in the open ocean. Horizontal distributions of iron are present seasonally. Iron concentrations in the New York Bight Apex are generally higher then that of the open ocean levels. Peak concentrations occurred in the vicinity of the sewage sludge and acid waste disposal areas.

e. The background levels for copper; cadmium and zinc are 0.003, 0.001, and 0.01 mg/l respectively. Cadmium is an element of high toxic potential that concentrates in plant and animal tissues. A concentration of 0.01 mg/l has been used as a drinking water standard (McKee and Wolf 1963). Zinc is an essential element in biological metabolism. Concentrations of 0.03 to 4.0 mg/l have been reported toxic to fish (US Department of Health, Education and Welfare 1962).

f. The sulfates of copper and zinc, as well as copper and cadmium, are synergistic in their toxic effect on fish (McKee and Wolf 1963).

g. According to a NOAA 1977 study, copper averages at the surface decrease from 4.7 ug/l to about 3.5 ug/l during the winter-spring period. In the bottom layers, average concentrations during this period vary from about 3 to 4 ug/l to a maximum of approximately 8 ug/l in July and September respectively. Conditions are generally homogenous through the water column during this period.

h. The average cadmium at the surface and bottom decreases from 8.9 ug/l and 2.4 ug/l respectively, in February to a homogenous condition in the spring of less than 0.5 ug/l. The background ocean concentration of cadmium varies from about 2 ug/l in July and October to between 0.5 and 1 ug/l during other months. Averages at the surface vary from 1.5 ug/l in July to 0.5 to 1 ug/l for the other months. Thus vertical stratification exists in October, but with bottom levels greater than surface levels and with the opposite conditions in February.

i. The average concentrations of zinc at the surface were approximately 40 ug/l in February, August and September, decreasing to 20 ug/l in October and increasing to 35 ug/l in November. There is no notable vertical stratification of zinc except in August and

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September, when bottom average concentrations were 10 to 20 ug/l less than at the surface. The ocean background concentration of zinc is about 10 ug/l.

j. Mean surface manganese was less than 1 ug/l in February, whereas the ocean background level is 2 ug/l. In April, stratification is seen with a surface mean of 28 ug/l compared to a bottom mean of 10 ug/l. During the remainder of the year, mean concentrations varied from 5 to 15 ug/l at both surface and bottom, with vertical stratification during some months.

4.3.1.11.2.4 Organics

a. Chlorinated hydrocarbon's persistence and toxicity (e.g.,, DDT [dichloro-diphenyltrichloroethane] and PCB's [polychlorinated biphenyl's]) cause great concern due to their abundance and distribution in marine environments. Among chlorinated pesticides, only DDT and dieldrin are commonly detected in samples of sediments, biota and sewage sludge in the New York Bight Apex region.

b. Inputs of PCB's to the New York Bight Apex result primarily from sewage-sludge and dredged-material dumping, atmospheric fallout, and direct discharge from shore sources. Within the New York Harbor area (the source of dredged materials), important sources of PCB's to the water column and eventually the sediments are the Hudson River inputs. These inputs consist of PCB's from an estimated 500,000 kg (1.1 million pounds) that exist on the Hudson near Troy Lock and Dam, and approximately 3,100 kg of PCBs in the lower Hudson, annually (USEPA1998). Sewage treatment-plant discharges and atmospheric fallout accounts for a portion of the PCB load within the Hudson River (O'Connor et al. 1980). Concentrations of PCB's are lower off-shore than within the estuary.

c. HydroQual (1989b) summarized water column PCB concentrations as falling in the range of 0.33 to 0.6 ppb in the late 1970s, but suggested that the levels might be high due to analytical artifacts. The measured background concentrations of Dioxin in the water column of the HARS is low (<9.913 ug/l or <1/100th of one ppb) (Dragos and MacCarthy-Peven 1994). Further Bopp et al. (1995) indicate the DDT concentrations in water column particulate matter are low and can be traced to atmospheric inputs rather than dredged material from the HARS.

4.3.1.12 Groundwater

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a. Groundwater resources within the New York Bight Apex study area have generally not been classified. Existing studies on groundwater resources are confined to landmasses. The closest landmasses to this study area (Brooklyn and Queens, New York) are underlain by the Upper Glacier Aquifer, the Gardiners Clay Aquifer, Jameco Aquifer, Magothy Formation Aquifer, Raritan Clay Aquifer, and the Lloyd Sand Aquifer (Personal Communication, USGS NY). No extrapolation or studies have been performed to determine the boundaries of these aquifers as pertains to the New York Bight Apex (Personal Communication, USGS NJ/NY). The flow gradient of these aquifers is such that groundwater from the landmass is merging with the salt water of the New York Bight Apex.

4.3.1.13 Air Quality

a. Air Pollution has been defined as the presence in the air of substances in concentrations sufficient to interfere with health, comfort, safety, or the full use and enjoyment of property. As such, substances released into the air are considered potential pollutants not only in terms of their effects on human health but also in terms of their effects on agriculture products and on buildings, statues and other public landmarks.

b. Air pollution can be produced by both stationary and mobile sources, and can lead not only to acute and chronic health problems, but also long term global effects.

c. According to the 1996 National Air Quality and Emissions Trends Report prepared by the U.S. Environmental Protection Agency, air quality has continued to improve during the past 10 years for all six National Ambient Air Quality Standards (NAAQS) parameters. The NAAQS parameters are: Ozone (O3); Inhalable Particulates (PM-10); Sulfur Dioxide (SO2); Nitrogen Oxides (NOX); Carbon Monoxide (CO); and Lead (Pb). When examined individually, emissions for all criteria pollutants, except Nox, decreased between 1970 and 1996. Lead emissions had the greatest improvement overall with a 98% decrease from 1970 to 1996 (USEPA 1997b).

d. Volatile organic compounds can lead to the production of ozone, which at ground level can cause considerable harm. According to the EPA, estimates of ground level ozone appears to be the most pervasive problem nationwide.

e. The air quality of the aquatic areas associated with the proposed options under the DMMP are determined by both natural and anthropogenic processes. Natural processes consist of the emission of particulate matter and gases from the ocean surface. Anthropogenic emissions are characterized as particulate and gaseous material from land surfaces, stationary, and mobile sources. The majority of anthropogenic emissions are a result of fossil fuel combustion. The New York

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Bight Apex coastal areas are heavily industrialized and represent one of the largest emission sources in the United States. Air currents and winds disperse constituents released from point and non-point sources throughout the region. The National Weather Service maintains an off-shore meteorological platform, ALSN6-Ambrose Light at 40°46' North and 73° 83' West. This platform collects meteorological data including information on winds, waves, atmospheric pressure, and air temperature. The National Weather Service tabulated the average wind speeds from November, 1984 through December 1993 at Ambrose Light. Wind speeds are strongest during the fall and winter months, peaking in December with an average of 16.5 knots. Air temperature peaks in July with an average measurement of 22.4° C. The lowest average air temperature was 1.4° C in February.

f. Although air quality data is not collected specifically for the New York Bight Apex, air quality in this region is related to the air quality of the surrounding landmasses. These landmasses include Monmouth County New Jersey, and Brooklyn New York. According to the 1996 Annual New York State Air Quality Report there are 12 air monitoring sites within Richmond County (Staten Island) and 5 air monitoring sites within Kings County (Brooklyn).

g. Monmouth County is located in the Northern Coastal Pollutant Standards Index Reporting Region. For monitoring year 1996, this region had 1 unhealthful day and 3 days approaching unhealthful. Within the county, air-monitoring stations are located in Freehold and at Monmouth University. The Freehold station monitors for carbon monoxide and smoke shade. Ozone is monitored at the Monmouth University station. For monitoring year 1996, Monmouth County was in non-attainment of the National Primary (Health) Standard for ozone. This area was designated "Severe 2" with a design value of 0.191 - 0.279 ppm. The attainment date is November 15, 2007 for this parameter. Monmouth County was in attainment for monitoring year 1996 for the other parameters of concern (NJDEP 1996).

h. Staten Island (Richmond County) is currently designated as non-attainment for Carbon Monoxide (CO) with a moderate classification of 12.7 parts per million (ppm) (NYSDEC, 1997). Of the 12 monitoring sites located in this county none collects data on ambient CO. The county is not designated for Lead (Pb) or Inhalable Particulates (PM-10) parameters but multiple monitoring sites do collect data on these parameters. Data for 1996 did not exceed the parameter for lead. According to the 1996 Annual New York State Air Quality Report, PM-10 is monitored by six sites, of which all did not exceed the PM-10 parameter. Richmond County had non-attainment and severe classification for Ozone (O3) for monitoring year 1990 (ENFLEX 1998). The S. Wagner High School site monitors for O3 and had no exceedances in 1996 (NYSDEC 1997).

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i. Richmond County, which is part of the New Jersey-New York-Connecticut Interstate AQCR cannot be classified or is better than the national standards for Nitrogen Oxides (NOX) (ENFLEX 1998). Monitoring systems located throughout Richmond County do not monitor for this parameter. Sulfur dioxide (SO2) is monitored at the S. Wagner High School and had 0.027 ppm for a 24-hour average, which does not exceed the annual mean standard for this parameter. All but one monitoring site within the county collects data on total suspended particles (TSP) and for monitoring year 1996 there were no exceedances for this parameter (NYSDEC 1997).

j. Brooklyn is located in Kings County, which is also designated as the New Jersey-New York-Connecticut-Interstate AQCR. This county was in non-attainment for CO with a "Moderate 2" designation and a classification of 12.7 ppm in 1996. O3 was classified as "Severe 2" as of 1990, therefore the county was also in non-attainment for this parameter. Both PM-10 and Pb have not been designated and SO2 is not classified for Kings County. The New Jersey-New York-Connecticut-Interstate AQCR is designated as better than the national average for NO2 (ENFLEX 1998).

k. Within Kings County there are five monitoring sites that are part of the ambient air monitoring system of New York. Of the parameters monitored by these sites CO, O3, PM-10, TSP, SO2, and Pb did not exceed the state/federal standards determined for these parameters in the monitoring year 1996. Brooklyn Transit, a monitoring site for Kings County, has continually decreased in its exceedances for CO from 1984 to 1995. Trace metal concentrations for arsenic, cadmium, lead, mercury, nickel, and vanadium have also steadily decreased at the Greenpoint monitoring site from 1992 to 1996 (NYSDEC 1997).

4.3.1.14 Noise

a. The Atlantic Ocean at New York Bight Apex represents a natural resource that impacts 19 million people. Its shores support prime swimming areas in addition to recreational boating and fishing. A variety of finfish and shellfish have been commercially fished there for over a century. Shipping lanes cross its waters. Sand and gravel mining in addition to air traffic overflights and wind all contribute to its uses and contribute to its ambient noise levels.

b. The nearest areas of special concern are on the New York and New Jersey coasts, and were established for the protection and enhancement of waterfowl and shore birds. The largest area of special concern is the 26,000-acre Gateway National Recreation Area (GNRA NPS 1996) that encompasses most of the Jamaica Bay and Rockaway Point region of Long Island, as well as part of Sandy Hook, New Jersey.

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4.3.1.15 Aesthetics

a. Aesthetic resources of the New York Bight Apex study area can be defined as the perceived view of this area by the population. Federal laws which apply to aesthetic resources include the Coastal Zone Management Act of 1972 (Sections 302b, 303b), the National Environmental Policy Act of 1969 (Section 101b), the Water Resources Planning Act of 1965 and the "amenities" criteria of the Marine Research, Protection and Sanctuaries Act of 1972.

b. The perceived aesthetic view for this study area can be described as the visible surrounding land and water use. For establishing the aesthetic environment in the New York Bight Apex study area, special consideration may be given to the direct view of the aquatic project site from public and private access shoreline points and scenic viewpoints surrounding the study area. The daily visibility for the New York-New Jersey region is recorded by the National Weather Service, Northeast Regional Climate Center from the Newark Airport (Essex County, New Jersey), the J.F. Kennedy Airport (Queens County, New York), LaGuardia Airport (Queens County, New York), and Central Park (Manhattan, New York). The recorded visibility for these locations ranges from limited visibility (ability to view objects less than one-quarter mile away only) to visibility greater than ten miles (Schultz, 1998). The New York Bight Apex study area is visible from Monmouth and Middlesex County shoreline regions in New Jersey and from Richmond, Kings, and Queens County shoreline regions in New York. Off-shore visibility may be lessened in the spring months due to off-shore fog created by warm southerly flows of air passing over the cold ocean water.

c. The public access shoreline points and scenic viewpoints surrounding the New York Bight Apex study area may include community facilities such as schools, churches, libraries, community centers, parks, designated federal or state wild and scenic rivers, historic or recreational facilities, designated scenic viewing areas, wildlife areas, public foot trails, fishing piers, boat docks, boat access ramps and other designated open spaces. Consideration may also be given to the residential zones and all roadways or rail systems in relation to the project vicinity (New York Environmental Conservation Law 1987; Conner et al. 1979; and USACE 1996).

d. Additionally, consideration may be given to the viewscape from the aquatic study area by the recreational fishermen and boaters using this area. General aesthetic degradation of the New York Bight Apex region is a major concern to this group (Conner et al. 1979). The Bays and waterways in the New York Bight Apex study area are used extensively by boat, barge, and freighter traffic of

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commercial and recreational interests. Boaters within and surrounding the New York Bight Apex study area may be in view of the disposal location.

e. Whether viewing the study area from the surrounding shorelines or waterways, the viewscape of the New York Bight Apex study area may include lightly traveled waterways, light air traffic, developed commercial shorelines, residential beach shorelines, and undeveloped shorelines.

4.3.1.16 Recreation

a. The New York Bight Apex is the focal point for many recreational activities. New York and New Jersey shores are dotted with beaches, state and national recreation areas, wildlife refuges, and marinas. These areas along the coast provide recreational opportunities for the large population residing close by. The recreational opportunities that occur in the Atlantic Ocean in the area of the New York Bight Apex include boating, sailing, scuba diving, surfing, swimming, bird watching, and surf and deepwater fishing, hence environmental quality and recreation are linked.

b. The most popular recreation activity in New York and New Jersey is swimming and sunbathing (Carls 1978). The Gateway National Recreation Area offers two units in the New York Bight Apex region of the Atlantic Ocean for beach activities. These are the Sandy Hook Unit and the Jamaica Bay/Breezy Point Unit. Other beaches can be found in Queens County such as Rockaway Beach, Atlantic Beach, East Atlantic Beach, and Long Beach in Nassau County. In New Jersey, south of Sandy Hook, beaches are found in the towns of Highlands, Navesink, Sea Bright, Monmouth Beach, and Long Branch. The Gateway areas at Sandy Hook (~4 miles) and at Breezy Point (~5 miles).

c. Long Island and New Jersey are famous for their surf and deepwater fishing. Fishing is among the most popular marine recreational activities and is important to many coastal town economies. A number of important recreational fishing grounds are found in the New York Bight Apex. Typical species landed include Atlantic cod, striped bass, black sea bass, bluefish, weakfish, bluefin tuna, scup, summer flounder, and winter flounder (Grosslein and Azarovitz 1982). Anglers have the opportunity to fish from the beach and piers along the coast or from boats in the deeper waters of the ocean, such as zone 3.

d. Party boats (head boats) depart from several New York Ports to fish the Bight Apex waters. These Ports include Captree, Freeport, Point Lookout, Gerritsen Beach, Howard Beach, Sheepshead Bay and Staten Island. This may involve as many as 20 different vessels. Further, several charter boats, which can take as many passengers as party boats also, fish the Apex. Additionally, many small charter boats that carry up to 6 passengers also fish off shore in the bight. New Jersey also has a number of party boats large and small charter boats that ply the

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Bight Apex waters for fish. Fishing in Zone 3 is mainly for bluefish, although there are other zones where fishing is concentrated.

e. Scuba diving occurs throughout the New York Bight Apex where divers from Pennsylvania, New York and New Jersey come to enjoy the shipwrecks, artificial reefs and marine life. These waters contain many shipwrecks dating from the 18th century to the present day. Estimates for the number of shipwrecks off the coast range between 4000 and 7000. These sites are popular with scuba divers for exploring historical wrecks as well as for observing the sea life that is attracted to these areas. Other popular dive sites in the Atlantic Ocean are the many artificial reefs that are constructed to provide habitat for sea life (NJSD 1998). The Professional Association of Diving Instructors (PADI), the worlds largest dive certifying agency certified 5,000 and 10,000 individuals in New Jersey and New York respectively in 1997; each spends an average of $200.00 for each certification course (New Diver Bench Mark Report 1993). There are an estimated 120-dive shop and certifying facilities in the counties surrounding the New York Bight Apex (Telephone directory search). The biggest attraction to diving in this area is the wreck dives. Scuba diving takes place year round, though summer months are the most frequently dived. According to Charternet.com there are approximately 18 scuba diving charters in New York and 11 in New Jersey within the vicinity of the study area. No prominent wrecks or structures for diving are known from zone 3.

4.3.2 Lower Bay Complex

a. DMMP options under consideration in the Lower Bay are Contained Aquatic Disposal (CAD) pits and sub-channel CAD pits. The pit option is under investigation in Zones 1 and 2 and Ward's Point Bend in the Lower Bay Complex. Several of the techniques for Beneficial Uses/Habitat Restoration/ Creation are also proposed for the Lower Bay including Wetland Creation, Enhancement and Restoration, Oyster Reef Creation, Enhancement and Restoration, Shellfish Bed Creation, Enhancement and Restoration, and Borrow Pit Restoration. Work connected with the restoration of wetland and borrow pits has been proposed for areas around, and within, Jamaica Bay. No specific sites have been designated yet for the oyster reefs or shellfish beds but they would probably be located in the Lower Bay Complex.

4.3.2.1 Water Column

a. The biota of the water column will contain both phyto and zooplankton. The species composition and density will vary throughout the year and will vary compared to the New York Bight Apex. Differences from the Bight Apex include the planktonic stages of species of fish and shellfish that mainly reproduce in the Lower Bay Complex. Some of the plankton will include invertebrates such as hard clam larvae, and fish larvae such as winter flounder that occupy the water column before settling to a life on the bottom.

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4.3.2.2 Benthos

a. Sediment Profile Imagery (SPI) and Shipek/Smith McIntyre grab samples were utilized by the United States Army Corp of Engineers to survey the benthic habitat within the NY/NJ Harbor (Fig. 4-5) from October 1994 to February 1998(Wilber et al. in prep). SPI is a vertical photograph of the sediment water interface showing various characteristics of the sediments (color texture, RPD) and benthic community structure (burrows and tubes). At approximately every 5th site an overhead picture was also taken. The combination of SPI and benthic grabs provides a more complete analysis of the benthic community than either method would have provided independently.

4.3.2.2.1 Lower Bay

a. As with the New York Bight Apex, studies to determine benthic areas of greater and lesser value were undertaken. The benthic environment of the Lower Bay can be described by using five general habitat classes: shell beds, Ampelisca mats, sand, silt, and oligozoic. These are listed in descending order of 'value'. Shell beds can contain either clams or mussels, or may contain both. Ampelisca mats are areas where thousands of tube-dwelling amphipods (in the genus *Ampelisca*) completely cover the surface of the sediments like a rug. Sand and silt habitats are based on grain size characteristics where sand is more coarse (larger grain size) than silt. Oligozoic bottom substrate is characterized by poor ecological conditions and sometimes shows bacterial growth.

b. Cerrato et al. (1989) found the amphipod *A. abdita* in high numbers throughout the year within a band of muddy sediments ranging from Sandy Hook Bay to Staten Island in a southeast to northwest direction. Moderate numbers were also collected in the northern portion of the Lower Bay, especially along Staten Island and in Gravesend Bay. In the sandy areas of Old Orchard Shoal, Flynns Knoll, Romer Shoal, and the East Bank, it was entirely absent or very low in numbers.

c. The shell beds described by Cerrato et al. (1989) consisted mainly of the blue mussel *Mytilus edulis* (second most abundant species taken in the study) and the soft-shell clam *Mya arenaria*. *M. edulis* was found mostly in the northern part of the Lower Bay being most prominent in the areas west and south of the tip of Coney Island and west of Rockaway Point. The numbers were the highest in the spring (mostly small juveniles) declining steadily throughout the rest of the year. In addition, Sandy Hook Bay contained consistently moderate numbers all year long. *M. arenaria* was most abundant in Raritan Bay where, although not consistently taken within its inner reaches, a dense population was present year round. Three other bivalves of

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commercial value were also found in the Lower Bay. The hard clam *Mercenaria mercenaria* occurred in patches all over the Lower Bay, except in the southern half of Raritan Bay and the East Bank. The surf clam *Spisula solidissima* was collected all year long on a transect ranging form Rockaway Point to west of Sandy Hook. It was also found during the summer and fall in sandy areas along the Staten Island and New Jersey coast. The oyster *Crassostrea virginica* was rare and was only found in isolated patches during the spring and summer.

d. Wilber et al. (in prep) found the shell beds to be more diffuse, while being mainly composed of five species; *M. mercenaria*, *M. arenaria*, *Mulinia lateralis* (small noncommercial surf clam), *M. edulis*, and *C. virginica*. There was a large shell bed lying just north of the Ampelisca mat surrounding the Raritan Channel. This shell bed also ranged south bisecting the amphipod mat almost exactly in the middle. Several smaller shell beds were dispersed within the Apelisca mats south of the Raritan Channel and in Sandy Hook Bay. Other shell beds were located near the West Bank pit, north of Hoffman Island, in and around the large East Bank pit, around both the little East Bank pit and the CAC pit, and at Romer Shoals. *M. arenaria* and *M. mercenaria* dominated the shell beds in the southern part of the Lower Bay. *M. mercenaria*, *M. lateralis*, and *M. edulis* dominated the shell beds in the north.

e. Oligozoic is a relatively rare type of bottom substrate habitat, which is almost devoid of all benthic infauna. In the Lower Bay Complex (other than Jamaica Bay), oligozoic habitat was limited to three small areas in or just west of the West Bank pit (Wilber et al., in prep). Silty sediment, which is finer than sandy sediment, was found mainly around Hoffman and Swinburne Islands and at the CAC pit. The CAC pit generally contained sand or silty sediments with the bottom of the pit mostly silt and the rim of the pit sandy. The West Bank and the rest of the northern portion of the Bay was mainly silt and sand with small areas containing mixtures of silt, sand, and gravel. The East Bank and the rest of the northeast portion was also mostly sand with a few areas of silt, sandy silt, silty sand, and gravelly silt in and around the larger East Bank pit. The central portion of the Lower Bay was almost entirely sand with smaller areas of gravelly sand, silty sand, and sandy silt. The Ampelisca mat surrounding the Raritan Channel covered mainly silt and sandy silt bottoms, while some of the mat covered sand and silty sand. Most of the sand and gravelly sand sediments in the same area were covered with shell beds. The Ampelisca mat in Sandy Hook Bay almost exclusively covered sandy silt sediments.

f. Coch (1986) noted that the Lower New York Bay contained three distinct regions of sediments separated by narrow gradational facies. The three

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regions were: the New York Bight Apex in the north and northeast, Sandy Hook Bay in the south, and Raritan Bay in the west. Sands with aprons of gravelly sands and patches of sandy gravel covered most of the bottom of the northern portion of the Lower Bay. These facies graded into the sands covering the apex of the New York Bight to the east and southeast. Silty sands underlay Sandy Hook Bay and graded into sand along the shoreline of New Jersey and Sandy Hook. Sandy clayey silt covered Raritan Bay and extended into the Raritan River estuary to the west and into the Arthur Kill to the northwest. These sediments graded into sands of the northern Lower Bay to the northeast and the sand along the New Jersey coast to the southeast.

g. A regional study of the benthos in the Lower Bay of New York Harbor was done seasonally in 1986-87 (Cerrato et al., 1989). Eighty-four sites were sampled extending from Raritan Bay, across to Sandy Hook, up to Rockaway Point, and across to the Varrazzano Narrows. The sediments were variable ranging from 100% sand and gravel to silty clay. The amphipod *A. abdita* accounted for 55.8% of the total number collected, and the blue mussel *M. edulis* ranked second at 18.6%. Other abundant species included the polychaetes *Asabellides oculata* and *Heteromastus filiformis*, the soft shell clam *M. arenaria*, the slipper shell *Crepidula fornicata* and the ampipods *Corophium tuberculatum* and *Elasmopus levis*.

h. In benthic grab samples collected from October 1994 to February 1998 by Wilber et al. (in prep), the amphipod *A. abdita*, and the polychaetes *Streblospio benedicti* and *Mediomastus ambiseta* were the most abundant species. The sandy and silty bottom substrates had fewer organisms and lower species diversity than the Ampelisca mates. Other abundant organisms were the amphipod *C. turberculatum*, the surf clam *M. lateralis*, the amethyst gem clam *Gemma gemma*, and the Atlantic nutclam *Nucula proxima*.

4.3.2.2.2 Jamaica Bay

a. An adjunct section of the Lower Bay Complex is Jamaica Bay, which was sampled by Wilber et al. (in prep) in 1996-97. Two benthic habitat classes, Ampelisca mats and Oligozoic dominated the Bay. Ampelisca mats were found throughout much of the Bay in its main channels (Runaway Channel, North Channel, Beach Channel, and the Raunt) and its core, where valuable fish and wildlife habitat exists. Amphipod and sandy habitats dominated salt marsh and natural tidal creeks. Surrounding this viable core were highly degraded areas (Mill Basin west of the Belt Parkway, Paerdegat Basin, Hendrix Creek, the terminal end of Thurston Basin, Little Bay, Norton Basin, and Sommerville Basin) consisting of dead-end canals that are receptacles for sewage and landfill leachate. These Oligozoic areas contained bacterial mats, silty material, gas voids, and few benthic infauna. The one notable exception

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to the healthy habitat in the Bay proper is Grassy Bay, which was sampled by SPI imagry. Grassy Bay exhibited signs of a degraded environment with methane gas pockets and bacterial mats associated with low or no dissolved oxygen. The excavation in association with the construction of Idlewild (JFK) Airport changed the circulation patterns and water exchange rate in Grassy Bay causing the degradation of the benthic habitat. Additional confirmatory sampling would be undertaken if these sites were selected for potential use.

4.3.2.3 Fish and Megainvertebrates

a. A report for the Harbor Estuary Program (Woodhead 1991) identified some 101 species of fish, mainly from the marine environment present within the study area. Some 60 species were found by trawl in lower New York Bay (Lower Bay), where bottom salinity averages 30 ppt. In relative terms the highest abundance and diversity were reported in dredged channels.

b. NMFS (Wilk et al 1998) has conducted sampling of adult and older juvenile fish and megainvertebrates for the last 5 years (Table 4-6). Six species of fish and megainvertebrates have dominated (greater than 90% the catch number and weight). These species are subject to Fishery Management Plans associated with Essential Fish Habitat provisions of the reauthorized Magnuson-Stevenson Fishery Conservation and Management Act. Designation of the habitats is expected later in 1999 for the Port waters landward of the Sandy Hook/Rockaway Peninsula transect.

c. Among the invertebrates, three species of crab were found in substantial numbers, the Atlantic rock crab (*Cancer irroratus*), blue crab (*Calinectes sapidus*), and lady crab (*Ovalipes ocellatus*). Also the longfin squid (*Loligo pealei*) was an important portion of the sample.

d. Some 22 species of fish dominated the catch of finfish, and included three species each of skates, codfish family fish, and flounder, as well as, two species each of sea robin, temperate bass, herring, and croakers. Other important species included the scup (porgy), butterfish, tautog (blackfish), bluefish, and bay anchovy. Table 4-6 presents the list of those species which comprised the greatest percentage (>90%) of the catch during the NMFS survey based upon 6+ years of data collection (Wilk et al. 1998).

e. The channels were used proportionately more than the 'flats' by those species that dominated the catch, especially in the winter. Reasons for this have not been firmly established but could include the presence of food, thermal refuge, structure, salinity, depth preference, predator avoidance and migratory pathway. A substantial number of species and individuals were collected on the flats as well, but tended not to be as concentrated as in the channels.

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f. Invertebrates such as the blue crab utilized channels in the Lower Bay Complex, the flats south of the Raritan Channel, Sandy Hook Bay and the area south of the Verrazano Bridge, and to a lesser extent an area just north and west of Hoffman Island. They were also collected in other scattered locations, but not in concentrations. Atlantic rock crab, and to a greater extent lady crab were more widely scattered in the Lower Bay Complex. The latter two species of crab tended to be found on the flats mainly during spring, and the lady crab in the summer also.

g. Species such as the red hake and silver hake showed a stronger affinity for channels in all seasons when present. These species are more associated with ocean environment and its higher salinity. Species such as the scup, while found in relatively high numbers in the channels, were also found on the flats, occasionally in numbers/trawl similar to the channel catches.

h. Flatfish such as the summer flounder, winter flounder, and windowpane were found throughout the sampling area. Concentrations of summer flounder were in the Raritan channel, and south of it in the flats, and Sandy Hook Bay, as well as, near Hoffman and Swinburn Islands, and just south of the Verrazano Bridge. The flats north of the Raritan Channel and west of the Chapel Hill Channel in the vicinity of Zone 2 were most often utilized in summer.

i. Winter flounder exhibited a similar pattern as summer flounder with regard to favoring channels, Sandy Hook Bay, and the area just south of the Verrazano Bridge, but unlike summer flounder, they were also concentrated in the Red Bank reach of the Raritan Channel, Ambrose Channel, and large East Bank Pit. Some utilization of the Lower Bay Complex flats in Zone 1 and Zone 2 occurred especially in winter and spring (Fig. 3-4).

j. Windowpane (a flatfish) generally showed as stronger affinity for channels as well as Sandy Hook Bay. They also used the flats associated with Zones 1, and 2.

k. Although some recent studies (Wilk et al. 1997; Clarke et al, in prep.) have shown fish use in all the Lower Bay CAD pits. They have not been characterized to the extent that differences or similarities can be definitively demonstrated. Clarke et al. (in prep) and others have shown that the CAC pit is well mixed (unstratified) from top to bottom for temperature and salinity during sampling in various seasons indicating that the CAC pit is unlikely to be a 'thermal refuge' for overwintering fish.

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l. In Jamaica Bay a survey of finfish was conducted by the National Park Service, in cooperation with the US Fish and Wildlife Service, in 1985-86, and 1988-89, which updated studies performed by Texas Instruments and the New York Aquarium. A total of 81 species of finfish were found using otter trawl, gill net and beach seines. Environmental and other variables were recorded, e.g., temperature salinity, pH, dissolved oxygen, total and fecal coliforms, and chlorophyll *a*.

m. Most species of finfish caught in Jamaica Bay were juveniles utilizing the bay as a nursery. Winter flounder dominated the otter trawl catch accounting for almost half (44.7%) of the fish caught in 1985-86. Lesser dominants (4.5 to 9.6%) taken in the otter trawl in 1985-86 were summer flounder, tautog, windowpane, grubby, weakfish, bay anchovy, and scup. Winter flounder again dominated during the 1988-89 effort. Other species which contributed substantially to the otter trawl catch during both sampling periods were; red hake, Atlantic cod, bay anchovy, blueback herring, American eel, weakfish, scup, black sea bass, striped bass, spotted hake, striped sea robin, grubby, butterfish, and cunner.

n. Dominant fish species caught in the beach seines in 1985-86 were silversides, mummichog, striped killifish, and juvenile bluefish. Limited gill netting showed that six species dominated; they were, menhaden, winter flounder, summer flounder, bluefish, scup, and tautog. Individual samples were quite variable depending on location within the bay, season, and sampling period.

4.3.2.4 Amphibians and Reptiles

a. No amphibians are present in the Bight Apex ocean environment, and reptiles are represented only by the diamondback terrapin (Malaclemys terrapin) and sea turtles. The diamondback terrapin is found in the marshes of the Lower Bay complex and in Jamaica Bay. It prefers lower salinity waters (3-7 ppt.). Its population is considered stable in the Lower Bay Complex (USFWS 1997). Sea turtles are covered under the Federal Endangered Species Act and are discussed under the topic Endangered Species (4.3.2.7 below).

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4.3.2.5 Birds

4.3.2.5.1 Waterbirds

a. While a large number of bird species fly over the Lower Bay Complex during the northbound and southbound migrations, it is chiefly waterbirds that use the area of the Lower Bay Complex for feeding. Species most likely to use this zone are two species of loons, two species of grebes and two species of cormorant. These species utilize the complex in the winter months, although the double-crested cormorant has in recent years begun to nest in larger numbers in the Port area. These species feed on small species of fish. Additionally, at the fringe of the complex shallow waters especially in salt marsh areas provide feeding habitat for some 10 herons and allied species. They feed on a relatively wide range of invertebrates and vertebrates. These species will nest in appropriate habitat on the fringe of the Lower Bay Complex. Other groups that utilize the complex in winter include several species of ducks such as bufflehead, and greater scaup.

4.3.2.5.2 Shorebirds

a. The other large group of species to utilize the waters of the Lower Bay Complex include over 25 species. These shorebirds (e.g., plovers, oyster-catchers, and sandpipers) which feed on a variety of invertebrates at the waters edge. Most of these migrate through the areas to breeding grounds in or near the arctic. Several species of shorebirds nest in the Port area; they include, American oystercatcher, willet, killdeer, spotted sandpiper and piping plover (Andrle and Carrol, 1988).

4.3.2.5.3 Gulls/Terns

a. Two species of gulls (i.e., herring gull, greater black-backed gull) are found year-round. They are opportunistic feeders, whose diet ranges from storm deposited species such as several types of molluscs and starfish to scavenging for scraps of food left by humans. Additionally, the laughing gull nests within marshes of Jamaica Bay. The terns (common, Roseate and least) mainly target living prey namely small species of fish. These species of gulls and terns and a closely allied species (black skimmer) utilize the study area for nesting.

4.3.2.6 Mammals

a. Great whales rarely or ever visit inside the baseline, but they are discussed in the Endangered Species Section (4.3.1.7). The humpbacked whale is the most likely visitor based upon past sightings. The bay complex waters are occasionally visited by several species of small toothed whale including the bottlenosed (*Tursiops truncatus*), and common dolphin (*Delphinus delphis*), and harbor porpoise (*Phocoena phocoena*). The commonly occurring seal inward of

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the baseline is the harbor seal (*Phoca vitulina*), and increasing the gray seal (*Halichoerus grypus*).

4.3.2.7 Endangered Species

a. Federally listed species in the Lower Bay Complex, under consideration for each dredged material disposal option are limited to those which may be expected in the area.

4.3.2.7.1 Fish

a. A species of concern, not yet listed or nominated is the Atlantic sturgeon. This fish has seen substantial population declines and a moratorium on taking of this species in the Hudson River estuary has recently been invoked.

4.3.2.7.2 Sea Turtles

a. The most likely species of sea turtles to be found in the Lower Bay Complex are the Kemp's Ridley, and the loggerhead sea turtle . Occasionally a green turtle may also be found in the bay complex, while leatherback sea turtles are less likely to visit the area.

4.3.2.7.3 Birds

4.3.2.7.3.1 Peregrine Falcon

a. The peregrine falcon (*Falco peregrinus*) nests within the study area and three nesting sites border the Lower Bay Complex at the Outerbridge Crossing, Staten Island, the Verrazano Bridge (at the narrows between Upper and Lower Bay Complexes) and the Gil Hodges Memorial Bridge (Jamaica Bay). The nesting adults stay in the vicinity of the Bight during winter. Further, the New York/New Jersey metropolitan area is important, in that it is along the migratory route for the highly migratory subspecies (*tundrius*) which nests in Canada.

4.3.2.7.3.2 Bald Eagle

a. The bald eagle (*Haliaeetus leucocephalus*) does not nest in the study area. Both subspecies of bald eagle do migrate through the area, and the northern subspecies of bald eagle occasionally overwinters in the Bight area. Its most important overwintering areas in the vicinity of the study area are the Hudson River north of the Tappan Zee Bridge, and the Catskill Reservoirs (USFWS 1997). The northern subspecies continues to rebound, but future nesting in the general vicinity of the Lower Bay Complex (adjacent to Zones 1 and 2) is unlikely, due to the density, and activity of the human population.

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4.3.2.7.3.3 Piping Plover

a. Nesting by piping plovers does occur at Sandy Hook and Rockaway Point. This species' coastal subspecies is Federally threatened. It nests and feeds along beaches. The Federally endangered roseate tern occasionally is found in the vicinity, and nesting was confirmed at Breezy Point in 1997, with feeding areas likely to be nearshore adjacent to nesting areas.

4.3.2.7.4 Marine Mammals, Whales

a. Six species of great whales are found in the in the New York Bight. They are less common in the Bight Apex, and their presence landward of the Sandy Hook to Rockaway Point baseline is highly unlikely, with the exception of the humpback whale which has been found in New York Harbor, although its occurrence is rare.

4.3.2.8 Essential Fish Habitat

a. There are five EFH grid cells within the Lower Bay Complex. Some 18 species have been identified as having EFH in this complex. Winter flounder and windowpane were designated in each grid cell for all life stages. Scup was in four of five grid cells for all life stages and for two life stages in the other grid cell. Also designated in most grid cells for most life stages were red hake, summer flounder and sandbar shark. Two other species bluefish and Atlantic mackerel also had a high number of designations within the Lower Bay Complex.

4.3.2.9 Cultural Resources

4.3.2.9.1 Prehistoric

a. As with the New York Bight Apex above, a geomorphological study was conducted to assess the potential for prehistoric resources for the CAD pits, in-channel and island options. Analysis suggests that all areas examined have some potential to preserve prehistoric sites although some are more sensitive than others (LaPorta, Sohl and Brewer 1998). All of Zones 1 and 2 have been rated to have a "high potential" for significant resources. This part of the continental shelf could have been subject to rapid flooding and sedimentation during the Holocene sea-level rise, which would have preserved prehistoric sites. Ward's Point was also rated to have a "high potential" for significant resources. Several Native American archaeological sites have been recorded in the Jamaica Bay area and the New York State Museum considers this location sensitive for prehistoric resources, including areas now filled or inundated (Brighton 1993, Black 1981). Other locations proposed for beneficial uses will require cultural resource surveys.

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4.3.2.9.2 Historic

a. Background historical research and a magnetic and acoustic remote sensing survey were conducted in March and April 1998 for Zones 1A, 1B, 1C and 2. No underwater archaeological investigations were undertaken. Data analysis suggests that four targets show characteristics suggestive of cultural resources, possibly shipwrecks (Cox 1998). Two are in Zone 1 and two "hits" in Zone 2 have the potential to be submerged cultural resources (Cox 1998). Current project plans call for the avoidance of targets and anomalies within the project area but if avoidance is not a viable option, additional archaeological investigations of the identified targets will be undertaken. Remote sensing was not conducted for Ward's Point Bend, as dredging of the channel would have disturbed any historic resources. Historic resources may be an issue with Beneficial Uses in the form of shipwrecks in the areas proposed for restoration. Restoration work in nearshore areas around Jamaica Bay has the potential to impact historic resources such as piers, bulkheads and other shoreline structures. Other locations proposed for beneficial uses will require cultural resources surveys.

4.3.2.9.3 Existing Pits

a. Existing borrow pits represent a disturbed environment from a cultural resources point of view. Any cultural resources that may have existed in these pits would have been significantly disturbed, if not completely destroyed, by sand mining activities. It is unlikely that intact cultural resources eligible for listing on the National Register of Historic Places (NRHP) will remain in existing borrow pits if all disposal activities are limited to areas previously disturbed by pit construction. If additional excavation is required additional cultural resources studies may be necessary.

4.3.2.10 Socio-Economics

4.3.2.10.1 Shipping

a. Shipping is described in subsection 4.3.1.9

4.3.2.10.2 Commerical Fishing

a. Commercial fishing in the Lower Bight Apex includes harvesting of finfish such as summer flounder; shellfish such as hard clam which may need to be depurated (cleaned before sale), and crustaceans such as blue crabs. Values for this activity are not available.

4.3.2.10.3 Recreational Fishing

a. Recreational fishing in the Lower Bay Complex includes bottom fish such as flounder species (summer and winter), tautog, black sea bass, and scup, and those that feed at various water column depths such as weakfish,

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bluefish, and striped bass. The New York/New Jersey metropolitan area has at least 750,000 saltwater recreational fisherman.

4.3.2.11 Water Quality

a. The Lower Bay-Estuary portion of the study area is a dynamic estuarine system that acts as a catchment from natural and man-induced inputs originating mainly from the Hudson River, with the Raritan River and its drainage basin also contributing substantially to the flow. The Bay complex is relatively shallow (5 to 20m or 16 to 66 ft) but has an irregular topography, due mainly to the numerous ship channels and sand borrow pits in Lower and Raritan bays.

b. Sewage effluent from the New York Metropolitan area is the principal source for the high concentrations of nutrients observed in the bay complex. Tributary, urban runoff and accidental spills are also notable sources of nutrient contamination. A large fraction of these nutrients are consumed in biological processes occurring within the bay complex. There is a net transport of nutrients and chlorophyll *a* to the apex of New York Bight. The nutrients originating from the bay complex and transported seaward have been implicated as an important factor leading to the decline in oxygen in the bottom waters of the Bight during summer periods (O'Connor 1978).

c. Waters of the Bay Complex exchange and mix with the waters of Upper Bay, mainly through the narrow constriction between Brooklyn and Staten Island (appropriately named The Narrows) and with the open ocean, through the relatively wide (~10km or 5.4 mi.) opening between Sandy Hook, NJ, and Rockaway Point, LI, (the Sandy Hook-Rockaway point transect). The Arthur Kill, a tidal canal along the West Side of Staten Island, shunts a small amount of Upper Bay waters to Raritan Bay.

d. Physical Properties-Salinity. Salinity into the Complex varies seasonally, daily and annually. The non-tidal estuarine circulation largely determines seasonal salinity distribution. NOAA conducted a study in 1979 to collect salinity measurements in the Lower Bay between Sandy Hook and Rockaway Point. The following are salinity measurements taken from that study. The seasonally and tidal averaged salinities associated with the Bight-ward flow at the surface from Sandy hook to near the middle of the Sandy Hook -Rockaway Point transect, are approximately 24 ppt in the summer, and greater than 22 ppt in the winter. Salinities greater than 27 ppt in the summer months and 29 ppt in the winter months were observed to be associated with the flow at near the bottom near Sandy Hook. Fresh water entering the Lower Bay Complex along with salt-water encroachment influences the salinity levels. The semidiurnal tides cause the salinity to vary daily with surface salinities ranging from 34 ppt to 24 ppt and the bottom salinities ranging from 18 ppt to 27 ppt for the after the flood

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tide. After ebb tide, surface salinities even out and range from 31 ppt to 28 ppt and the bottom salinities range from 24 ppt to 9 ppt. It is thought that salinities may change annually due to storm events and flooding though no annual figures could be found.

e. Fresh water entering the Complex, along with salt-water encroachment, affects the salinity levels. Research conducted by NOAA in the Lower Bay complex shows that peak river flows during spring warming correspond to rapidly decreasing salinity. Minimum salinity occurs about one month after the peak discharge. Tides affect the flow of the Hudson all the way to Green Island. Large fluctuations also exist in annual mean flows of the Hudson, Raritan, and Passaic Rivers. In 1965, there was a dramatic decrease in discharge of the Hudson and Passaic Rivers, which resulted in a decrease in the flushing of the Bay Complex.

f. In a typical estuary, horizontal density gradients caused by salinity gradients are established by fresh water inputs at the head of the estuary (Pritchard 1952, 1954, and 1956). Gravitational forces associated with these gradients maintain a net circulation in which the upper, less saline layer moves seaward and the lower, more saline layer moves up the estuary. As the bottom saline water flows upstream, it mixes vertically and becomes entrained in the overlying waters, to be carried seaward. In the lower Hudson estuary, a two-layer flow is known to be well-developed (Abood 1972; Overland 1973).

g. Fresh water discharge from the Raritan River produces an east-west salinity gradient that drives the estuarine circulation, consisting of a modest flow of saline waters westward near the bottom. These waters enter the Lower Bay through Sandy Hook channel and remain confined to the channel as they flow westward. Some saline waters may also enter the Raritan Bay through Chapel Hill and Swash channels. In addition to these deep flows, there is a seaward drift of freshwater confined to the south side of Raritan Bay. It is separated horizontally from the westward flow of slightly more saline waters.

h. In addition to riverine inputs, the Lower Bay Complex receives fresh water from rain and snow. During the winter, total precipitation exceeds evaporation; in the summer, evaporation is greater than precipitation, both affecting the salinity of the complex. It has been calculated that fresh water input from precipitation for the bay complex amounts to about 4.3 cu m/sec.

i. The bay complex also receives a considerable volume of fresh water from sewage effluent and city street runoff. Data from sewage treatment records indicate that about 60 m3/sec of treated and untreated effluent are discharged into the local waters surrounding the New York metropolitan area (Interstate

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Sanitation Commission 1974). The frequency, intensity, and duration of episodic rainstorms have notable effects on the concentrations of pollutants and amounts of fresh water entering the bay complex.

j. A study conducted between October 1973 and June 1974 by the Marine Science Research Center (Duedall et al. 1979) at Stony Brook determined the tidal variability in water properties of the Lower Bay complex. The center found that the Bightward flow of Hudson-Raritan waters in the surface layer near Sandy Hook, accompanied by the harbor flow of Bight waters at depth near Sandy Hook and through-out the water column near Rockaway Point, produced the observed salinity gradient across the Sandy Hook-Rockaway Point transect. Salinities less than 24 ppt, associated with the Bight-ward flow, extend at the surface from Sandy Hook to near the middle of the Sandy Hook-Rockaway Point transect. Salinities greater than 27 ppt were observed to be associated with the flow near the bottom in the vicinity of Sandy Hook and from surface to bottom over the northward third of the channel. The maximum tidal averaged salinities were observed at depths greater than 5m (16ft) in Ambrose Channel and near Rockaway Point and were associated with harbor-ward flow.

k. The movement of salt into Raritan Bay is confined to depths greater than 4m (13ft) in Sandy Hook channel; similarly, high salinity waters are observed to be confined to the south side of Rockaway Inlet. The distribution of tidally averaged salinity in the Narrows showed the accepted increase in salinity with depth.

l. Seasonal variation in tidal salinities show salinity is more variable near Sandy Hook, due to the seasonal variation of freshwater entering the bay complex. High salinity is seen in the waters near Rockaway Point and low salinity estuarine waters near Sandy Hook.

m. Temperature. The distribution of temperature during November shows that the more saline bottom waters were warmer (12.6°to 13°C) than the less saline surface waters whose tidally average temperatures were between 11.6° and 12°C. In January, a similar temperature inversion is present, but the entire water column cooled to 3.6° to 5°C. In March, the water column warms slightly but is near isothermal from top to bottom, with tidally averaged temperatures ranging between 5.4°and 5.7°C. In April, tidally averaged surface temperatures increased to 9°C. The bottom temperatures in the water column had increased substantially; in June, tidally averaged surface temperatures were at 17°C and bottom temperatures at 15.8°C.

n. Suspended Solids. Suspended solids (measured as turbidity) concentrations also showed some variability. The highest concentrations are usually found

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between Sandy Hook and Ambrose Channel, but are not necessarily associated with peak fresh water discharge. Seventy-seven percent of the suspended solids load is contributed by the tributaries in the area, 94 percent of which is contributed by the Hudson River. Wastewater contributes about 14 percent of the total load, and urban runoff the remainder. The major source of oxygen-demanding organic load (BOD) emanated from wastewater, compromising 71 % of the total load.

o. Chemical and Biological Properties-Nutrients and Chlorophyll *a*. According to the aforementioned study by MRSC, tidal water properties in the complex, except for nitrate concentrations, are primarily associated with riverine input (Duedall et al 1977). The distributions of tidally averaged nutrient concentrations were observed to be associated with the lower salinity waters, resulting from the introduction of these nutrients with sewage effluent. Similarly, the distribution of chlorophyll concentrations corresponds to that of lower salinity waters. However the most likely source of chlorophyll *a* concentrations in the Sandy Hook-Rockaway Point transect was the very high concentrations observed in Raritan Bay near Sandy Hook (Parker 1976). Tidally averaged concentrations of chlorophyll *a* in the Narrows and in Rockaway inlet were much lower than those observed in Raritan Bay or the Sandy Hook-Rockaway Point transects.

p. Seasonal variations in nutrients and chlorophyll *a* concentrations show more variability between Sandy Hook and Ambrose Channel due to the combined effects of seasonal variation in biological and physical processes, such as variations in freshwater flow from the Hudson, and advection of Raritan Bay waters into the transect. (NOAA 1979). Jeffreys (1962) described the nitrate and phosphate chemistry on Raritan Bay where he found an apparent rapid regeneration of phosphate relative to nitrate. This rapid renewal of phosphate along with the relative sluggish circulation was suggested as an important factor leading to the observed dense populations of phytoplankton. Parker and associates (1976) calculated that in Raritan Bay, ammonium and other nutrients advected from Lower Bay are biologically consumed. They also calculated that the Raritan Bay exports chlorophyll *a*. Thomas, O'Riely, and Evans, through personal communications with NOAA, reported record high values of 700 to 1050 g carbon.m2/yr of primary productivity for Raritan Bay. This evidence indicates that the Raritan Bay is capable of absorbing by biological processes a notable fraction of the nutrients discharged from sewage (NOAA 1979).

q. NOAA (1982) described the sources of microbial load to the Hudson-Raritan Estuary as unchlorinated municipal wastewater discharges and urban runoff from sewer overflows. There is year-round chlorination of treatment plant effluent.

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The pathogens chapter of the HEP CCMP estimates that 89% of the bacteriological loadings to the harbor are from CSOs.

r. Groundwater. Although saltwater migration into groundwater aquifers has not been studied under the water bodies of the Lower Bay Complex, information is available regarding salt-water intrusion into the aquifers of surrounding landmasses. Over-pumping of the Coastal Plain aquifers has resulted in the development of large regional cones of depression and a corresponding increase in the chloride concentration of the aquifer. The most extensive cone of depression is present in the Potomac-Raritan-Magothy aquifer system (NJDEP 1994). A well study performed on Staten Island in 1953 also found impacts due to saltwater intrusion (USGS 1988). The Brooklyn and Queens significant improvement in encroachment has occurred owing to years of aquifer recovery after most commercial pumpage has ceased. Indeed, recovery of the aquifers has raised groundwater levels to the point that flooding is occurring in certain NYC subway systems (see USGS NY 203 "Monitoring and Simulation of Proposed Groundwater Supply and Dewatering Operations, Kings and Queens Counties, New York" report in progress).

4.3.2.12 Air Quality

a. Air quality in the Lower Bay-Estuary is also directly related to the air quality of the surrounding landmasses: Staten Island New York, Monmouth County New Jersey, Middlesex County New Jersey, Essex County New Jersey, Union County New Jersey, and Hudson County New Jersey. USEPA Monitoring sites C1-1, SP-1, SP-2, SP-3, and SC-4 are all located south of Staten Island and west of Brooklyn. Sites SP-4, SP-5, and SC-1 are located within Newark Bay. Surrounding landmasses are comprised of Essex, Union, and Hudson Counties New Jersey. Air quality in Staten Island, Brooklyn, and Monmouth County has been previously discussed within the New York Bight Apex section.

b. Middlesex County contains six monitoring stations, which collect data for six air parameters in all. This county is part of the Suburban Pollutants Standards Index Reporting Region of northern New Jersey. Within this reporting region there were two unhealthful days and four days approaching unhealthful in 1996. Also, on July 14, 1996 O3 was rated as unhealthful for that day and exceeded or approached the health standard for this parameter (NJDEP, 1996).

c. In monitoring year 1996 Middlesex County was non-attainment for ozone under the National Secondary (Welfare) Standard and was designated as "Severe 2" with a design value of 0.191 - 0.279 ppm. The attainment date for this parameter is November 15, 2007. Pb, NO2, and PM-10 were not designated as non-attainment for Middlesex County while both SO2 and CO are in attainment as of 1996 (NJDEP, 1996).

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d. According to the 1996 Air Quality Report from the NJDEP Bureau of Air Monitoring Middlesex County had no violations or did not exceed the standard for the following parameters; SO2, PM-10, CO, and Pb. Violations were placed for exceeding both the Primary (Health) and Secondary (Welfare) Standards for O3 in monitoring year 1996. Also, a violation was placed for the TSP parameter, which exceeded the Secondary (Welfare) Standard in 1996.

e. Essex County in Northern New Jersey is located in the Southern Metropolitan Pollutant Standard Index Reporting Region. Essex County in 1996 was in non-attainment for CO under the National Primary (Health) Standard and had been designated as "Moderate 2" with a design value of 12.8-16.4 ppm. Ozone was also in non-attainment for the National Primary (Health) Standard with a design value of 0.191-0.279 ppm which is classified as "Severe 2". The attainment date for this parameter is November 15, 2007. The remaining parameters Pb, O3, and PM-10 have not been designated as non-attainment for this county (NJDEP, 1996).

f. Essex County utilizes four monitoring sites, one located in East Orange and three throughout Newark. These sites monitor for ten different parameters pertaining to the New Jersey Air Monitoring Program. Essex County had no violations for the following parameters in monitoring year 1996; SO2, PM-10, CO, NOX, Pb, or smoke shade (SS). The National Secondary (Welfare) Standard was exceeded for both TSP and O3 therefore, Essex County had violations placed for both parameters as of 1996 (NJDEP 1996).

g. For monitoring year 1996 the Southern Metropolitan region had two unhealthful days and four approaching unhealthful (NJDEP 1996).

4.3.2.13 Noise

a. Activities that contribute to background ambient noise include those discussed below. The bay complex is part of one of the world's busiest seaports (Hannon 1976), and it is also used for sand and gravel mining (Schlee and Sanko 1975). Sport and commercial fisheries are major activities in the Raritan Bay and thousands of people annually enjoy swimming and recreational boating in the Lower and Raritan Bays. In addition to water-based industry and recreational activity, the complex is exposed to air traffic overflights.

4.3.2.14 Aesthetics

a. The existing aesthetic view for this study area can again be described as the visible surrounding land and water use. For establishing the aesthetic environment in the Lower Bay Complex study area, particular consideration is given to the direct view of the aquatic project site(s) from the public and private access shoreline points and scenic viewpoints encompassing the study area. The

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National Weather Service, Northeast Regional Climate Center, records daily visibility from the Newark Airport (Essex County, New Jersey). The recorded visibility for this location ranges from limited visibility (less than one-quarter mile viewing distance) to greater than ten miles. The Newark Airport site has, on average, seventeen days of limited visibility per year. On any typical day the visibility is recorded as greater than ten miles (Schultz 1998). The Lower Bay study area is visible from Monmouth, Middlesex, Union, and Hudson County shoreline regions in New Jersey and from Richmond and Kings County shoreline regions in New York. During the spring months, offshore visibility may be decreased due to coastal fog.

b. Public access to shoreline points and scenic viewpoints surrounding the Lower Bay Complex include community facilities such as schools, churches, libraries, community centers, parks, designated Federal or state wild and scenic rivers, historic or recreational facilities, designated scenic viewing areas, wildlife areas, public foot trails, fishing piers, boat docks, boat access ramps and other designated open spaces. Consideration may be given to the residential zones and all roadways or rail systems in relation to the project vicinity, as well (New York Environmental Conservation Law 1987; Conner et al. 1979; and USACE 1996).

c. In addition, consideration may be given to the viewscape from the aquatic study area by the recreational fishermen and boaters using the Lower Bay area. The bays and waterways in the Lower Bay study area are used extensively by boat, barge, and freighter traffic of commercial and recreational interests. The waterways around Richmond County, New York are additionally used by tourist cruise liners. Anyone traveling the Lower Bay Complex waterways or the surrounding waterways may be in view of the Lower Bay study area disposal sites at or above the surface (islands).

d. The Lower Bay viewscape from either the shoreline or the waterway may include heavy boat traffic along the bay channels; moderate boat traffic elsewhere in the bays and rivers; moderate air traffic; residential and commercially developed beaches; undeveloped, moderately developed, and heavily developed shorelines. Features of the horizon include; Hoffman Island and Swinburne Island (Lower Bay); Verrazano-Narrows Bridge, Outerbridge Crossing, Goethals Bridge, and Shooters Island (Arthur Kill); New Jersey Turnpike Extension Bridge (Newark Bay); and Bayonne Bridge (Kill Van Kull).

4.3.2.15 Recreation

a. The Lower Bay Complex supports a wide variety of recreational uses for a large number of people in New Jersey and New York. Activities include swimming, surf fishing, scuba diving, sailing, and bird watching. Many clubs and businesses that support recreational uses, such as boating, fishing, surfing,

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and scuba diving, can be found in the coastal towns bordering the bay, hence environmental issues and recreation are linked.

b. In New York and New Jersey, swimming is the most popular outdoor recreation (Carls 1978). The NJDEP monitors water quality at all designated recreational beaches along the New Jersey coastline of the Raritan Bay. Swimming areas are maintained at seven beaches in New Jersey in the towns of Keansburg, Middletown, Leonardo, Highlands, and the Sandy Hook Unit of Gateway National Recreation Area (Loftin 1998). Large numbers of bathers visit the Gateway National Recreation Area where the National Parks Service maintains miles of beach in both Queens County, and Richmond County, New York. Public beaches at Coney Island in Brooklyn provide access to the bay for many New York City residents (National Park Service 1998).

c. Coney Island and Gateway National Recreation Area, two major recreation destinations of New Yorkers, provide miles of access to the water and beaches of the bay. The National Park Service maintains nature trails in Great Kills Park along the western shore of the Lower Bay. Swimming, bird watching, and surf fishing occur in the parks and recreation areas along its shores. Trails provide an opportunity for bird watchers to view the birds that nest within the Lower Bay. Hoffman and Swinburne Islands, which are maintained by the National Park service, are nesting sanctuaries for many native bird species. They are not open to the public.

d. The Lower Bay Complex contains fishing grounds used by a large number of recreational fishermen from New York and New Jersey. Weakfish, bluefish, winter flounder, summer flounder, black sea bass, and striped bass are among the most popular species. Most of the primary fishing areas are concentrated near the intersection of the Chapel Hill South Channel, Raritan Bay Channel (Figley, 1988), Sandy Hook Bay, Old Orchard Shoal, Flynn's Knoll, and Romer Shoal. These primary fishing areas are mostly accessed by boat. Much fishing, however, occurs from piers and beaches along the bay's coastline. The New Jersey Department of Environmental Protection has detected high levels of PCBs and certain pesticides in fish taken from the Raritan Bay.

4.3.3 Upper Bay Complex

a. Several options are under consideration for potential disposal of dredged material in the Upper Bay Complex. The options include; contained aquatic disposal such as sub-channel placement, and confined disposal facilities such as nearshore fill. Additional options under consideration include decontamination processes, land remediation and habitat restoration. Past studies including those directly associated with the DMMP were used in site determination.

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4.3.3.1 Water Column

4.3.3.1.1 Upper Bay

a. The water column within the Upper Bay contains varying amounts of silt. Turbidity is partially dependent upon silt and plankton blooms. Rainfall from the upstream Hudson River watershed causes erosion and contributes the vast amount of the silt to the Upper Bay. Mixing of the water column will be substantial most of the time, due to the downstream currents from the Hudson coupled with the twice-daily tidal exchange.

b. Dissolved oxygen will also vary with biological and chemical oxygen demand associated with rainfall, combined sewage outfalls (CSO's), and non-point source runoff. Also influencing dissolved oxygen, will be those seasonal changes associated with air temperature, and hence water temperature, with higher oxygen readings occurring when water temperatures are lowest.

c. The biota of the water column will contain both phyto and zooplankton. The species composition and density will vary throughout the year. Some of the plankton will include invertebrates such as hard clam larvae, and fish larvae such as winter flounder.

4.3.3.1.2 Arthur Kill/Kill Van Kull/Newark Bay

a. The water column within the Arthur Kill, Kill Van Kull/Newark Bay contains varying amounts of silt. Turbidity is partially dependent upon silt and plankton blooms. Turbidity is related to rainfall upstream from the Hackensack and Passaic, increasing sediment and plankton blooms. Mixing of the water column is substantial most of the time for several reasons, which include; the downstream currents from these rivers, the shallowness of substantial portions of Newark Bay, and tidal exchange. Mixing on both Arthur Kill and Kill Van Kull would occur mainly due to the twice daily, tidal exchange.

b. Dissolved oxygen will also vary with biological and chemical oxygen demand associated with rainfall, combined sewage outfalls (CSO's), and non-point source runoff. Also influencing dissolved oxygen will be those seasonal changes associated with air temperature and therefore water temperature, with the higher dissolved oxygen readings generally occurring when water temperatures are lowest.

c. Two main rivers drain into the Newark Bay, the Passaic and the Hackensack Rivers. Seven major tributaries feed into the main stem of the Passaic River. Riverine surface water quality of the Passaic River and its

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tributaries varies from moderately good in the freshwater upstream tributaries to degraded in the Passaic River reach below Two Bridges.

d. The water quality conditions in Newark bay are considered to be good, based on existing STORET (water quality) data, observations taken by the National Marine Fisheries Service, and the Stevens Institute of Technology. Both Newark Bay and the Passaic River below Dundee Dam are tidal. The dissolved oxygen levels in Newark Bay generally range from about 3 mg/l up to 11 mg/l, and the temperature range from 34°F to 82°F throughout the year. There is usually a gradient of lower salinity near the Passaic/Hackensack River mouths to higher salinity at Kill Van Kull. Average salinity in Newark Bay varies depending on rainfall. While heavy rainstorms (25-100 year events, Cerco and Bunch 1997) can effectively reduce salinity to at or near 0.0 ppt for several days, the normal range is from 14-24 ppt.

e. Newark Bay is a partially stratified estuary with lower salinity at the surface and higher salinity at the bottom. Surface salinity is lowest (2 to 20 ppt) near the mouth of the Passaic River, which has greater freshwater flow than the Hackensack River (Suszowski 1978). The vertical gradient is most pronounced in the northern part of Newark bay, particularly near the Passaic River, and decreases to the south. The highest surface salinity is found at the confluence of Newark Bay and the Kill Van Kull.

f. The highest concentration of total suspended sediment (TSS) in Newark bay occurs during the spring in the Passaic River. The TSS concentrations in near-bottom water in Newark bay are higher in the northern portion of the Bay than in the Southern, These higher concentrations are known as the turbidity maximum. The turbidity maximum is caused by estuarine-type circulation, wherein the bottom water has an average upstream velocity during flood tide equal to it's average downstream velocity during ebb tides (net velocity equals zero) and suspended sediment is circulated. The turbidity maximum usually breaks down during low river flow when stratification is reduced.

g. Newark Bay is classified as SE3 saline estuarine waters by NJDEP with the designated uses of: (1) secondary contact recreation; (2) maintenance and migration of fish populations; (3) migration of diadromous fish; (4) maintenance of wildlife; and (5) any other reasonable uses. The surface and bottom water measurements at four stations in Newark Bay were averaged in these plots. These variations reflect typical meteorological and hydrological conditions in Newark Bay and the waters that flow into it (Arthur Kill, Kill Van Kull, Hackensack, and Passaic Rivers). According to the Water Quality

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standards established by the NJDEP, fecal coliform in Class SE3 waters shall not exceed a geometric mean of 1500 counts / 100 ml.

h. Although historical data on conventional water quality constituents in Newark Bay are sparse, there are data for NYCDEP's Harbor survey sampling at Shooters Island in Kill Van Kull, which is at the southern end of the Bay. The trend in DO since 1968 shows a steady increase attributed to upgraded wastewater treatment. In the last 10 years the DO at Shooters Island exceeded the NYCDEP criterion of 3.0 mg/l. The geometric mean fecal coliform concentrations in the surface and bottom waters at NYCDEP's sampling station at Shooters Island were 67 and 68 counts/100ml, during the summer 1994. The 1994 data reflected an improvement over previously collected data.

i. As part of EPA's development of wasteload allocation for metals in NJ/ NY harbor, Newark Bay was sampled and analyzed for metals in 1991. Three surveys were conducted, sampling Newark Bay, Shooters Island, and the Passaic River. Results showed concentrations of arsenic, cadmium, nickel, lead, silver, and zinc in all waters samples from Newark Bay were lower than EPA criteria. The copper concentration in the dissolved phase was below the site-specific criterion of 5.7 ug/l. Total recoverable mercury concentrations in Newark Bay, the Kill Van Kull and the Hackensack and Passaic rivers were consistently above criterion of 0.025 ug/l.

4.3.3.1.3 Hudson and East Rivers

a. The water column within the Hudson River is similar to the Upper Bay but becomes less saline as one proceeds upriver (USFWS 1985), with varying amounts of silt depending upon upstream rainfall. The water column within the East River contains varying amounts of silt, and hence turbidity depending upon rainfall upstream mainly from the Hudson River flow that is diverted through the Harlem River. Mixing of the water column will be substantial most of the time due to the downstream currents and tidal exchange that is very turbulent bordering Manhattan.

b. Within the Upper Bay Complex there are a number of sediment hot spots such as Newtown Creek and Gowanus Canal that have much higher contamination levels than found in navigation channels. However, testing of sediment from Newtown Creek and other sites indicated that the sediment passes Toxicity Characteristic Leaching Procedure (TCLP) which is the standard test, used by the USEPA and the states to determine whether a solid waste is deemed to be RCRA hazardous waste. An exception sediment is found in the lower Passaic River below Dundee Dam covering a six mile

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reach which is part of the Diamond Alkali Superfund site, portions of which are hazardous waste.

c. In September the effect of local heating from the 59th Street power plant effluent released into the lower Hudson showed surface temperatures having risen to 20°C. This warm surface core overlies the Upper Bay bottom water of less than 19°C and is separated from upstream bottom river water greater than 20.5°C. In the fall, isotherms in Upper Bay move upstream and the warm core, with surface temperatures over 21°C, moves some 10-km upstream.

d. Dissolved oxygen will also vary with biological and chemical oxygen demand associated with rainfall, combined sewage outfalls (CSO's), and non-point source runoff. Also influencing dissolved oxygen, will be those seasonal changes associated with air temperature and therefore water temperature, with higher dissolved oxygen readings generally occurring when water temperatures are lowest.

e. The biota of the water column will contain both phyto and zooplankton. The species composition and density will vary throughout the year. Some of the plankton will include invertebrates such as hard clam larvae, and fish larvae such as winter flounder.

4.3.3.2 Benthos

a. The benthos of the Upper Bay Complex is addressed by the different sections, Upper Bay, Arthur Kill, Kill Van Kull/Newark Bay, Hudson River from the Battery to the George Washington Bridge, and the East River from the Battery to the Throgs Neck Bridge including major embayments.

4.3.3.2.1 Upper Bay

a. In the Upper Bay, sampling revealed a biologically diverse habitat at the edge of the main shipping channel on the New Jersey flats (USFWS 1984-1985). This zone of highest abundance and diversity was found to be on the flats adjacent to the main channel from Robbins Reef north to just east of Ellis Island (SPI sampling, Wilber in prep.). Generally, the Upper Bay benthic infauna abundance and biomass was less in the Upper Bay compared to Lower Bay. Sampling of the shipping channels is currently underway.

b. These sites were dominated by clam beds, mussel beds, and Ampelisca mats, intermixed with sandy bottom. The shipping channel connects Constable Hook Reach of Kill Van Kull in a northerly direction with the Military Ocean Terminal at Bayonne (MOTBY) and the former Elizabeth Rail Yards and contained silt. Samples taken landward of this channel were

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dominated by silty sediment with some samples yielding oligozoic sediment sometimes containing little or no benthic organisms bacterial mats. These mats were particularly prevalent at the end of the dead end channels (e.g., at Global Marine Terminal) and in the central part of the Constable Hook Flats (Fig. 4-5).

c. Diversity and abundance on the New York side was highest at the eastern edge of the Bay Ridge Flats. Here clam beds and mussel beds predominated, interspersed with sand (USFWS 1997). On the east side of the Red Hook Channel along the piers of the Brooklyn Waterfront from Owls Head Park to the vicinity of the Brooklyn Bridge the sediment was dominated by silty bottom with interspersed areas of oligozoic sediment in the Atlantic Basin (Wilber et al. In prep.). A few Brooklyn interpier areas contained samples dominated by gas voids indicating anaerobic decomposition.

4.3.3.2.2 Arthur Kill/Kill Van Kull/Newark Bay

a. Benthic sampling in these areas was limited to Newark Bay and was conducted by NMFS during 1993-4, and WES during 1996. Results of the benthic samples collected for the DMMP in the Newark Bay shallows revealed that the sediment was dominated by silty material especially on the east side of the bay east of the shipping channel although bacterial mats and sand patches were interspersed. Five samples in the shallows between the Port Elizabeth and Port Newark Channels revealed two sites with gas voids, two with silty bottom and one that was sandy.

b. The NMFS survey of Newark Bay collected 100 benthic grabs. The southern portion of the bay was generally comprised of finer sediments mostly described as light, soft silt and clay with some shells and debris. Several sites contained thick hard red clay. Sediment analysis in the north section of the bay were generally soft with varying consistency that was mainly gravel, shell, sand, silt and clay. Sediments at the lower Passaic River contained soft black silty clay.

c. The results of the benthic biological sampling in Newark Bay included 54 species of 7 phyla. The samples mainly contained live soft clams, dwarf surf clams, polychaetes (marine worms), and crustaceans.

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4.3.3.2.3 Hudson and East Rivers

a. The benthos of the Hudson River from the Battery to the George Washington Bridge has not been systematically sampled. However some generic conclusions can be drawn based upon the strong salinity gradient from higher salinity at the Battery to lower salinity at the George Washington Bridge. Increases in species of annelids (worms), and molluscs which are more tolerant of lower salinity will occur. For instance, oligochate worms would be expected to increase in abundance, and polychaete worms decrease. Likewise mollusks such as some species of snails will increase with a decrease in salinity.

b. No sampling is known to exist for the main channel of the East River. This may be due to the strong currents there, especially at Hell Gate. The side channels such as Newtown Creek, Bowery Bay and Flushing Bay are dominated by silty sediment. In Bowery Bay the western side closest to the CSO was dominated by bacterial mats and gas voids. Closer to main channels Ampelisca dominated. Silty sediments reflected reduced benthic life, while bacterial mats were identified with the absence of other benthic life.

4.3.3.3 Fish and Megainvertebrates

a. During 1984 an otter trawl survey of the deeper water in the Upper Bay Complex was conducted by the Marine Science Research Center of SUNY. Sampling sites in the Upper Bay Complex included 15 sites from the Upper Bay and five sites on the Hudson below 59th St. and three more above 59th St. to Spuyten Duyvil.

b. Many of the same species that were abundant in otter trawls on the flats adjacent the channels (USFWS 1985) were also were also found in substantial numbers in the deeper navigation channels. Theses species included bay anchovy, tomcod, killifish, silversides, black sea bass, white perch, striped bass, cunner, winter flounder and summer flounder.

c. The U.S. Fish and Wildlife Service collected data from the Upper Bay and along the Hudson River to Spuyten Duyvil Bay in depths generally ranging from 7-14 ft. Three sampling techniques were used, namely; otter trawl, gill net, and beach seine (USFWS 1985).

d. At least 36 species of finfish were collected from Upper Bay sites including four species each from the herring, and codfish family, and six flatfish species. Additionally, two members of the temperate bass, drum, wrasse, and sea robin families were captured.

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e. The most numerous species was bay anchovy (n=665, ~50%), and most were caught in August. These were most likely adults, since this species is small and not subject to full sampling (gear selectivity) with the gear used. Winter flounder was the second most common (n=194,~14%), followed by summer flounder (n=112, ~8%). August, October and May produced the most individuals with May being the highest, but this again was due to the presence of a relatively large number of bay anchovy. Further up the bay, bay anchovy, Atlantic silversides, striped killifish, and winter flounder dominated. The silversides and killifish were mainly caught by beach seine as were more than 50% striped bass, but were juveniles. From December through March species and individuals in shallow water dropped. This observation most likely reflected movement to avoid low temperatures in the shallows.

f. High salinities and sandy bottom were associated with an increase in capture of flatfish species. Fish species attracted to vertical structure were also taken near piers, riprap etc., included black sea bass, tautog, and cunner. Juvenile fish captured included bay anchovy, Atlantic tomcod, red hake, striped bass, and striped sea robin.

g. As decrease in salinity was noted, the following shift in species was observed; 1) white perch were captured for the first time compared to downstream, 2) weakfish and butterfish increased, 3) scup numbers declined, 4) black seas bass were not captured despite the presence of appropriate structure, and 5) abundance in general decreased except for herring which increased. This portion of Upper Bay revealed that bay anchovy was the single most abundant species (~50%), followed by winter flounder and striped bass. Striped bass and blueback herring were captured by gill nets. (USFWS 1985).

h. The main sampling of fish and megainvertebrates of the Arthur Kill, Kill Van Kull/Newark Bay took place in Newark Bay during sampling by NMFS in 1993-94 (Wilk et al. 1997). Their analysis revealed that the numerically the most abundant species in the shipping channels using 8.5 meter otter trawl were striped bass (28%), tomcod (13%), male blue crab (*Callinectes sapidus*) (12%), white perch (11%), female blue crab (10%), weakfish (8%), winter flounder (5%), and spotted hake (4%). This represented were some 33,503 individuals of 56 species of fish and megainvertebrates. These deep-water channels consistently contain greater concentrations of fish than adjacent flats. This bay is relatively small in size (~3,200 acres) of which only about 20% are channels, which are utilized by young of the year and other non-adult year class fish. It is apparently a nursery area, but because of its size and susceptibility to receipt of river floods, only has limited value for recruitment to the fish populations of the Port area.

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i. In the shallows of Newark Bay (eastern side) the numerically most abundant species using a 4.9 meter otter trawl were; bay anchovy (47%), Atlantic herring (22%), tom cod (10%), male blue crab (*Callinectes sapidus*) (5%), winter flounder (5%), striped bass (4%), female blue crab (2%) Atlantic silverside, summer flounder, and bluefish (1%) each. This represented some 2,978 individuals of 33 species of fish and megainvertebrates. The shallows of the bay support proportionately lower amount of fish species and individuals, which offsets its larger size compared to the channels as a place to support fish populations.

j. Experimental gill nets in the shallows collected 1,154 individuals of 16 species of fish and megainvertebrates. The most abundant species were; Atlantic menhaden (42%), striped bass (19%,), male blue crab (13%), bluefish, and blueback herring (6% each), female blue crab and Atlantic herring (4% each), weakfish (3%), alewife and white perch (1% each).

k. Hudson River. The fish and megainvertebrates of the Hudson River from the Battery to the George Washington Bridge were also surveyed by USFWS (1985). Several sites were sampled including the area extending from Creenville Yard Jersey City, NJ to the Battery, Manhattan, and from the Battery north to the former Conrail Yard at Weehawken, NJ to the 70th Street Manhattan efforts captured 25 species of fish and 2,537 individuals. Bay anchovy, white perch, Atlantic tomcod, winter flounder, and striped bass dominated the catch. Further decline in salinity resulted in increased capture of white perch, and more consistent capture of hog choker (a form of sole). Striped bass were captured in the shallows in the interpier areas. Winter flounder, striped bass and white perch were captured during each sampling month. At least six species of juvenile fish were captured and included; bay anchovy, Atlantic tomcod, weakfish, striped sea robin, windowpane, and winter flounder. An increase in the number of tomcod was likely the result of the decrease in salinity and the presence of a soft muddy bottom substrate (USFWS 1985).

l. Further upstream, between Conrail Yard at Weehawken, NJ north to 70th Street Manhattan, and north from Blumer Beach to Spuyten Duyvil 27 species and 2,955 individuals were captured. This reach exhibited remarkable changes in the nature of the fish species assemblage, including; 1) hog choker which comprised almost 50% of the catch and were captured from March through October, and 2) Atlantic tomcod, white perch, and bay anchovy which comprised the next largest component of the catch. Six species of the herring family were captured. The increase in herring is hypothesized to be the result of the relative narrowness of the Hudson at this point. Northern pipefish were also collected, and found in substantial numbers downstream of a sewage plant, where floatables from the plant provided cover.

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m. East River. The fish and the macroinvertebrates from the East River have not been systematically sampled. In recent years, however, a fishery for bluefish and striped bass has developed in this waterbody. Since the East River is a tidal river and has only limited freshwater input, it is likely that the same species occupy the East River, as occupy the lowest reaches of the Hudson River where the salinity is highest. It is likely that this water body acts a migration pathway.

n. In summary, both the flats and the channels are important areas for fish, data from previous sampling and analysis indicate that channels are relatively more important, because larger numbers of fish of more species were found in them (Houston and Will 1988; Wilk et al 1995; Wilk et al 1998).

4.3.3.4 Amphibians, Reptiles, Birds, Mammals

4.3.3.4.1 Estuarine Amphibians

a. There are no known estuarine amphibians that use this complex.

4.3.3.4.2 Reptiles

a. Some diamondback terrapin would be likely to occur in small numbers in the Upper Bay portion of the Upper Bay Complex in suitable areas, mainly confined to the New Jersey side of the bay where some marsh habitat still exists, especially along the Arthur Kill. In the Hudson River from the Battery to the George Washington Bridge, the diamondback terrapin would become rarer than in the Upper Bay because little habitat is available south of the Piermont Marsh in the Tappan Zee Area. The eastern mud turtle (*Kinostemon subrubrum*) may also be present in the Upper Bay Complex, mainly in Arthur Kill.

4.3.3.4.3 Birds

4.3.3.4.3.1 Waterbirds, Shorebirds, Gulls and Terns

a. The use of the Upper Bay Complex by birds is mainly associated with water birds. These include loons, grebes, cormorants, waders, waterfowl (Anseriformes), shorebirds and gulls and terns. Of these groups, cormorants, waterfowl and gulls are the most likely users because of water depths and habitat availability. A few areas along the west (New Jersey) side of the Upper Bay are shallow and hold the potential to attract waders such as herons and egrets, and at low tide shorebirds such as; dowitchers, sandpipers and plovers. Further discussion can be found under 4.3.2.5.

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4.3.3.4.3.2 Herons

a. There are two heronries in this section of the Upper Bay Complex, which were active until 1997, they are. Shooter's Island found just north of Staten Island at the south end of Newark Bay by the confluence of the Arthur Kill and Kill Van Kull Channels, and Prall's Island in the Prall's Island Reach of Arthur Kill. There is a currently active heronry at Isle of Meadows.

4.3.3.4.1 Aquatic Mammals

a. Few aquatic mammals are expected to inhabit the Upper Bay Complex.

4.3.3.5 Endangered Species

4.3.3.4.1 Fish

a. Short-nosed sturgeon (*Acipenser brevirostrum*). The short-nosed sturgeon is usually associated with low salinity (i.e., 3 ppt or less). Because of the relatively high salinity in the Upper Bay, Kill Van Kull/Newark Bay, and Arthur Kill these water bodies are less likely to harbor this species, though the species has been recorded in the area. Any sites located in upstream areas of the Hudson where the salinity is less than 3ppt become more likely to harbor this species. This sturgeon occurs regularly as one proceeds upstream toward Troy Lock and Dam, Troy, NY (USFWS 1997) where major spawning, nursery and over wintering areas occur. Coordination with NMFS on this species will continue (Table 4.3).

4.3.3.4.2 Sea Turtles

a. Sea turtles become increasingly uncommon in the Upper Bay Complex. The Arthur Kill, Kill Van Kull, and Newark Bay are the least likely to harbor these species. The Kemp's Ridley in the 2-5 year old range enter the Lower Bay Complex and occupy the area from June through October, however, they are not known to occupy the Upper Bay Complex in any numbers. The loggerhead turtle has two different populations in the area, only one of which enters the bay waters, mostly in the Lower Bay Complex (USFWS 1997).

4.3.3.4.3 Birds

4.3.3.4.3.1 Peregrine Falcon

a. The peregrine falcon nests within the study area and some 15 aeries have been discovered and monitored primarily on bridges and buildings in the area of the upper bay complex. The nesting adults tend to stay in the vicinity during winter. Further, the New York/New Jersey metropolitan

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area is important, in that it is along the migratory route for the highly migratory subspecies that nest in Canada.

4.3.3.4.3.2 Bald Eagle

a. The bald eagle does not nest in the study area. Both subspecies of bald eagle do migrate through the area, and the northern subspecies, occasionally overwinters in the Bight area, although its most important over wintering site near the study area is along the Hudson River and Catskill Reservoirs (USFWS 1997). The northern subspecies continues to rebound, but future nesting in the general vicinity of the Upper Bay Complex is unlikely due to the close proximity of humans and their industry.

4.3.3.4.3.3 Piping Plover

a. There are no known nesting sites for this species in the Upper Bay Complex, and habitat for nesting is scarce or non-existent.

4.3.3.4.3.4 Roseate Tern

a. There are no known nesting sites for this species in the Upper Bay Complex, and habitat for nesting has not been identified.

4.3.3.4.4 Marine Mammals

a. Great whales are rarely if ever found landward of the baseline, with the possible exception of a rare visit of the humpback whale. Great whales in the Upper Bay Complex would be accidental and mostly likely associated with injury or disease.

4.3.3.6 Essential Fish Habitat

a. The Upper Bay Complex contains four grid cells designated as EFH. Nineteen species from the Upper Bay complex have been identified. As with the Bight Apex and the Lower Bay Complex, winter flounder and windowpane were found in each grid cell for all life stages. The sandbar shark also had designation for the very young of the species and the adults, in each grid cell. Other species, which were found in most or all grid cells for most or all life stages, included scup, Atlantic herring, red hake, summer flounder and butterfish. Other species that were designated less frequently but with relative high frequency of occurrence were bluefish and Atlantic mackerel.

4.3.3.7 Cultural Resources

a. Prehistoric. A geomorphological study was conducted to assess the potential for prehistoric resources in preliminary potential placement areas in Newark Bay, Hudson River, Bowery Bay, Constable Hook/Port Jersey, and Red Hook/Bay Ridge. The analysis suggests that all areas examined have some potential to preserve prehistoric sites although some are more sensitive than others (LaPorta,

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Sohl and Brewer 1999). Constable Hook/Port Jersey was designated as having a "low potential." Bowery Bay and Red Hook/Bay Ridge were classified as "moderate to low." Newark Bay area was deemed to have a "moderate potential" primarily because modern construction has disturbed any remains of prehistoric occupation. The Hudson River channel was assessed as "low potential" for the middle channel where a river channel has been in place prior to any occupation of the area but the outer portions of the river channel have been assessed as "moderate to high." In general, the sites proposed for the Upper Bay are not as sensitive for prehistoric resources as those proposed for the Lower Bay due to modern disturbances.

b. The Beneficial Use options in the Upper Bay are all proposed for nearshore locations. These nearshore zones have the potential to contain buried prehistoric deposits. Cultural resource data may be available for a number of the proposed sites such as Pralls and Shooters Islands and the Brooklyn waterfront in other NYD reports. These reports are related to the Collection and Removal of Drift Project as well as other navigation projects such as the Arthur Kill (Wagner and Siegel 1997). Locations have not yet been determined for the Mudflat Creation, Enhancement and Restoration.

c. Historic. Remote sensing was not conducted for the in-channel disposal options as the historic dredging in the channels and anchorages would have likely removed any historic wrecks or debris. Historic cultural resources may be an issue if nearshore options are considered. Many nearshore resources in the New York area, such as piers and waterfront structures, have been listed on, or determined eligible for listing on, the National Register of Historic Places (NRHP), although some of these historic properties may have been recorded and removed as specific projects proceeded. The Atlantic Basin, a potential Confined Disposal Facility site, in Brooklyn, was not evaluated as a whole when reviewed for the NYD Collection and Removal of Drift Project, but cribwork around the basin's outer perimeter was determined to be potentially significant (Raber Associates, 1984). Most of the Bush Terminal, a location proposed for water quality wetlands, was also determined eligible (Flagg and Raber, 1986). Other structures along the waterfront may be potentially significant and additional studies to identify other resources may be required. Indirect impacts to historic sites will also need to be assessed. This work should evaluate the effects of the proposed facility on landscape and setting as well as on the viewsheds of significant properties like the Statue of Liberty and Ellis Island, two National Historic Landmarks. Historic resources of particular concern for DMMP options evaluated immediately adjacent to the shoreline are derelict vessels and waterfront structures such as bulkheads, wharves and piers related to industry and historic landfilling. Dredging may have occurred along segments of shoreline that could have adversely impacted resource preservation.

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4.3.3.8 Socio-Economics

4.3.3.8.1 Shipping

a. (See 4.3.1.9)

4.3.3.8.2 Commercial Fishing

a. No commercial fishing is known to take place in the Upper Bay Complex.

4.3.3.8.3 Recreational Fishing

a. Local recreational fishing from the shoreline and from private boats occurs in the Upper Bay Complex and with improvement in water quality use will likely increase.

4.3.3.9 Water Quality

a. Surface Water. New York and New Jersey have assigned water quality classifications to many of their major rivers, lakes, estuaries, and ocean waters. These classifications are based on the extent to which these surface waters will attain the aquatic life support and swimmable goals of the Clean Water Act, and the designated uses outlined by the State. The designated uses for New Jersey are defined in the state's Surface Water Quality Standards regulations (N.J.A.C. 7:9 et seq) and are generally based on a set of numeric and narrative water quality criteria. The swimmable goal is intended to have all possible surface waters of sufficient quality to allow for primary contact recreation. The fish propagation and management goal is designed to have all possible waters supporting healthy and reproducing aquatic biota.

b. NYSDEC Division of Water publishes a list of surface waters that either cannot be fully used as a resource, or have problems that can damage their environmental integrity. This list, The Priority Waterbodies List, is used as a base resource for the Division of Water's program management.

c. The Interstate Sanitation Commission (ISC), a tri-state environmental agency, provides assistance in water pollution abatement programs to the waterways shared by Connecticut, New Jersey, and New York. A long-standing goal of the ISC is making additional areas available for shellfishing and swimming. The ISC's programs include minimization of the effects of combined sewers, participation in the National Estuary Program, control of floatables, enforcement, compliance monitoring, pretreatment of industrial wastes, toxics contamination, sludge disposal, dredged material disposal, and monitoring of ambient waters (ISC 1997). Table 4-9 is based upon EPA data and indicates reaches where water quality is suspected of being impaired by point source discharges.

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d. Therefore, according to the New Jersey 1994 State Water Quality Inventory Report, such waters are not required to meet clean water goals and their designated uses are less stringent than these goals (Berry 1998). The Upper Bay waters from the confluence of the East River to the confluence with the Kill Van Kull are designated "Use Impaired" by the NJDEP due to toxic discharges from point sources. The NYSDEC has classified the Upper bay as Use Impaired with an advisory on striped bass fishing use. The NYSDEC considers the Upper Bay a priority waterbody. Interstate Sanitation Committee reported that total and fecal coliform are the cause for these waterbodies to be in non-attainment. The elevated levels of these parameters are a result of combined sewer overflow (CSO), surface water runoff, treatment plant upsets, and effluents from upstream waterbodies (Sattler 1998).

e. Hudson River to the George Washington Bridge. The Hudson River drains a watershed of about 35,000 sq. km and empties directly into the New York Bight Apex. About 50% of annual discharge occurs between February and May (Giese and Barr 1967). The mean discharge of the Hudson River over 1957 and 1965 was 20,000 cubic ft per second.

f. Studies found that the river and estuarine waters show a strong salinity and temperature stratification that occurs during periods of high spring runoff into the Hudson River. Bottom values are greater than 25 ppt at the Narrows and surface values are less than 4 ppt 40 km upstream in the Hudson River. This distribution illustrates the intense horizontal vertical density and salinity gradients typical of periods of heavy runoff in this area.

g. A study of the Hudson River estuary circulation and discharge was conducted by the US Geological Survey (Giese and Barr 1967; Darmer 1969; Busby and Darmer 1970; US Army Corps of Engineers 1961), and by MSRC in 1972. The results indicate that the Hudson River estuarine system is dynamic and that acts as a catchment for natural and man-induced inputs originating mainly from the Hudson River itself.

h. In September, salinity distribution in the estuary has increased compared to April. Although salinity in the Narrows is only a little more than during April observations, salinities 40 km up the river have increased to about 12 ppt.

i. Siltation problems in the lower Hudson estuary occur where the river empties into New York Harbor. The abrupt widening causes the salinity structure to change from well mixed to partially mixed. Sediments are transported upstream by the landward bottom flow until they meet the seaward flow in the well-mixed region.

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j. The PCB contamination of the Lower Hudson River and the impact of this contamination on the aquatic community are among the serious water quality problems in the basin. The original source of this problem is the historic discharge of PCB's to the waters of the upper Hudson River. Although the direct discharge of PCB's has ceased, the contaminated sediment serves as a continuing source of PCB's in the waters of the Lower Hudson. This contamination has resulted in a 200 mile reach of the Hudson from Hudson Falls to the Battery being designated a Federal Superfund Site. Recent monitoring data indicates that PCBs in the fish are declining.

k. More conventional pollution problems related to municipal wastewater discharges, combined sewer overflows and urban runoff, while showing steady improvement in recent years, continue to reduce the water quality of the river. Hudson River water quality is best in the lesser populated mid Hudson Valley. Water quality then deteriorates over the final 20 miles of the river as it flows through the very high-density population areas of New York City and New Jersey. Even in this section of the Hudson, however the upgrading of the New York City and New Jersey wastewater plants to provide secondary treatment has resulted in measurable improvements in water quality.

l. The NY Department of Environmental Conservation Priority Waterbody Problems (PWP) List indicates that nutrient enrichment in the Lower Hudson River Drainage Basin reduces the water quality over six water segments. Generally these high nutrient loads can be attributed to the rapid pace of development. Failing and/or nonexistent on-site septic systems, groundwater leaching from these systems, lawn fertilizing, and general runoff, all contribute to nutrient pollution. Even in areas where development pressures are not as great, agricultural activities are often cited as sources of excessive nutrient loads.

m. The NJDEP has initiated commercial fishing bans and recreational fishing advisories for the sections of the Interstate Hudson River running through New Jersey as a result of the detection of high levels of PCBs and certain pesticides (primarily chlordane) in finfish taken from these waters. NYDEC considers this river to be impaired and a Priority Waterbody. NYDEC has banned commercial fishing of striped bass due to PCB contamination. A health advisory has been issued by the NYDEC for recreational fishing of striped bass. Other advisories have been announced by the NYDEC on a variety of finfish and shellfish consumption. A classification of non-contact recreation impairment has also been assigned to the Hudson River.

n. High sediment loads and siltation also threaten fish survival and propagation in many streams in the basin including the Hudson River. Development pressures are a major factor in siltation with construction activities and runoff

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contributing to the problem. (See Table 4-9, 4-10, and 4-11) Significant Statewide Water Quality Trends Suspected of Impairing Waters Based Upon Discharges From Point Sources).

o. East River to the Throgs Neck Bridge. Surface Waters. The East River flows through a highly industrialized area bordered by Brooklyn, Manhattan and Hudson County. According to the New York State Department of Environmental Conservation 1996 Priority Waterbodies List, the East River, located in the Atlantic-Long Island Sound Basin is a Class I stream with medium resolution. Untreated sewage discharges from CSO's have impaired fish propagation in the stream. Fish consumption is impaired due to PCB contamination. The stream use impairment is due to high Biological Oxygen Demand (BOD) caused by priority organics.

4.3.3.10 Groundwater

a. Groundwater beneath the waterbodies within the Upper Bay-Estuary portion of the study area has generally not been classified. By reviewing the geology of the surrounding landmasses it is possible to infer the type of groundwater present. Manhattan is underlain primarily by till and bedrock. This type of geology has limited groundwater found in cracks and fractures within the rock (Cadwell, 1989). Bedrock aquifers commonly yield only small to moderate amounts of water and consist of carbonate, sandstone, and crystalline metamorphic and igneous rocks. The water transmitting capability of each rock type is dependent on fracture permeability. Surficial aquifers composed of coarse-grained stratified glacial drift are the most heavily used in New York. They occur in individual stream valleys and are physically and hydraulically bounded by bedrock that forms the valley walls. Area extensive flow systems occur in glacial aquifers on Long Island. The aquifers consist of thick stratified glacial outwash. Water moves through these aquifers along continuous, low hydraulic gradients, to principal streams and the ocean where it is discharged. Continuous flow systems also occur in unconsolidated Coastal Plain sediments that make up the Magothy and Lloyd aquifers. These thick and productive aquifers underlie the upper glacial aquifer on Long Island (www.usgs/publicdocs/abstract - Ground Water Atlas of the United States).

b. The principal sandstone aquifer occurs in the Newark basin in southeastern New York in faulted early Mesozoic basins. Staten Island is underlain by unconsolidated formations of Holocene, Pleistocene and Cretaceous age. These consist of Holocene artificial fill, Pleistocene glacial drift of till, till moraine, outwash sand and gravel and Cretaceous deposits of clay, silt, sandy clay, sand and gravel (Perlmutter and Arnow, 1953, USGS Bulletin GW-32). Staten Island bedrock consists of Triassic sandstone and its associated igneous intrusive, the Palisades Diabase, and Lower Paleozoic serpentinities (Geologic Map of New

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York State, Lower Hudson Sheet; NYS Museum and Science Service Map and Chart Series No. 15).

c. Groundwater reservoirs found in the unconsolidated deposits and bedrock of Staten Island. The largest yields of groundwater are obtainable from sand and gravel beds and lenses in the upper Pleistocene deposits, principally from outwash. Small to moderate supplies of groundwater are available from sand beds in the Cretaceous Raritan Formation and older bedrock (USGS, 1988).

d. Information on saltwater intrusion indicates that general overpumping of coastal aquifers has led to an acceleration of the concentration of saltwater present in these subsurface waters. The Saltwater Monitoring Network operating in New Jersey observes the limits that saltwater has migrated. The USGS also performs studies to identify and map the 250 ppm chloride isochore every few years. Chloride levels of 250 ppm have been established as levels of concern since this is the drinking water standard (Kecskes 1998).

4.3.3.11 Air Quality

a. The Upper Bay-Estuary portion of the study area is comprised of the waters from the Verrazano Bridge to the Battery including: Upper Bay, the East River to the Throgs Neck Bridge, the Hudson River, Bay Ridge flats, Red Hook Channel and the embayments, flats, and channels of New Jersey to opposite of the Battery. This portion of the study area encompasses five sites; The New Constable Hook Flats, the Bay Ridge/Red Hook Federal channels, New Bowery Bay, the Hudson River Federal Channels, and the Atlantic Basin. Air quality data for these areas was obtained by examining the surrounding landmasses that include; Hudson County New Jersey, Staten Island New York, Queens County New York, Manhattan New York, and Brooklyn New York. The air quality data for Hudson County New Jersey is discussed in the Section 4.3.2.11 (Lower Bay-Estuary). Brooklyn (Kings County) and Staten Island (Richmond County) air quality is as previously discussed in the Section 4.3.1 (New York Bight Apex-Ocean).

b. Queens is located in Queens County and has one monitoring site located at Queens College, which only monitors for two parameters SO2 and O3. Neither of these parameter's standards were exceeded in monitoring year 1996 (NYSDEC 1997).

c. In monitoring year 1996, Queens was in non-attainment for CO with a "Moderate 2" designation and a classification of 12.7 ppm. O3 was classified as "Severe 2" as of 1990, therefore the county was also in non-attainment for this parameter. PM-10, SO2 and Pb do not have a designation and The New Jersey-New York-Connecticut-Interstate AQCR is designated as better than the national average for NO2 (ENFLEX 1998).

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d. In monitoring year 1996, Manhattan, located in New York County, was in non-attainment for CO with a "Moderate 2" designation and a classification of 12.7 ppm. O3 was classified as "Severe 2" as of 1990 therefore, the county was also in non-attainment for this parameter. The parameter PM-10 was in non-attainment for New York County and as of 1994 was classified as moderate. Both NO2 and Pb do not have a designation and NO2 for The New Jersey-New York-Connecticut-Interstate AQCR is designated as better than the national average for NO2 (ENFLEX 1998).

e. There are seven air quality-monitoring sites situated throughout Manhattan that monitor for eight different air parameters. New York County has had a steady decrease in exceedances in association with CO from 1981 to 1995 at all four sites monitoring this parameter. There were no exceedances in 1996 for the following parameters; CO, PM-10, SO2, NOX, and Pb. Trace metal concentrations for arsenic and nickel showed a slight increase while cadmium, lead, mercury, and vanadium demonstrated a steady decrease at the Madison Avenue monitoring site from 1992 to 1996 (NYSDEC 1997).

4.3.3.12 Noise

a. The Upper Bay is located along the shores of an industrialized and highly populated region of the country. Industry, including air and vehicular traffic, all contribute to the ambient noise level of this area. Hudson County borders the Bay to the north, to the east is Brooklyn, and to the west is Staten Island. The East River, Hudson River and the Kill Van Kull all feed into this Bay. Steam ship operation and boat traffic are major contributors to ambient noise levels. In addition, housing, churches, schools, and hospitals, located along the shores of these waters, serve as the primary receptors.

b. This area also contains small islands with State Parks located on them, including Liberty State Park, Ellis Island, and Liberty Island. Rail lines and the NJ Turnpike run along the west bank of the river. Bordering the south reaches of the bay, the U.S. Coast Guard station at Fort Gay and Ferry Plaza are located on Staten Island, all contributing to background noise levels.

c. The Arthur Kill, Kill Van Kull and the Newark Bay are located along the shores of one of the most industrialized and highly populated regions of the country. Industry, including air, vehicular traffic, and steam ship operation all contribute to the ambient noise level of this area. The proposed project sites are bordered to the west by the Port of Newark/Elizabeth marine terminals and heavy industrial areas. Noise levels from these sources varies with the level of use (i.e., time of day) and types of machinery operated (e.g., cranes, derricks, loading equipment). The open water of Newark Bay and the Federal Navigation Channels

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are east of the proposed sites, while the New Jersey Turnpike Extension and Newark Bay Railroad Lift Bridge are to the north. Primary sources of noise from these areas are boating/shipping activity, highway traffic, and railroad traffic. Commercial airplanes using Newark International Airport located to the west also contribute to noise levels in the study area.

d. The Hudson River runs through the lower Hudson River Drainage Basin. Overall, the portion of the Lower Hudson River Basin in New York State outside of New York City supports a population that approaches three million people. The Hudson River is located along the shores of one of the most industrialized and highly populated regions of the country. The Port of NY/NJ at the mouth of the Lower Hudson, is one of the largest ports in the world, which serves as a major transfer point of goods between railroads, trucks, and barges. In addition, the Hudson River is navigable as far north as Albany. As a result, water transport and navigation contributes considerably to the background noise level of the area. Recreational boaters, as well as commercial vessels, use the river and similarly contribute to noise levels.

e. The heavily urbanized and industrialized areas bordering the river contribute to ambient noise levels. The six-lane roadway borders the River to the east and an interstate highway runs to the west. Train lines run along the west shores of the Hudson River. In addition, the shores of this river boast shipyards, industrial storage, the Palisades State Park, yacht clubs, schools, and playgrounds, all of which contributes to elevated noise levels.

f. The East River is located along the shores of one of an industrialized and highly populated region. This river borders the Bronx and Queens exiting into Long Island Sound. Industry, including air, dock and vehicular traffic, all contribute to the ambient noise level of this area. Residential areas, churches, schools, and hospitals are located along the shores of these waters, serving as the principal noise receptors.

g. LaGuardia International Airport is located along the shore of the East River and contributes to the ambient noise through airplane flyovers, construction and vehicular traffic noise. The Navy yard is located along the shore of the East River Park as well as the East River Park, playground, and amphitheater. The East Side expressway runs along the river contributing additional vehicular noise. (Jersey City, NJ-NY Topographic Quadrangle (1981).

4.3.3.13 Aesthetics

a. The current aesthetic viewscape for this study area can be described as the visible surrounding land and water current use. For establishing the aesthetic environment in the Upper Bay study area, specific consideration is given to the

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direct view of the aquatic project site from the surrounding public and private access shoreline points and scenic viewpoints. The National Weather Service, Northeast Regional Climate Center, records daily visibility from the Newark Airport (Essex County, New Jersey), the J.F. Kennedy Airport (Queens County, New York), LaGuardia Airport (Queens County, New York), and Central Park (Manhattan, New York). The recorded visibility data for these stations range from "limited" visibility (less than one-quarter mile distance viewscape) to greater than ten miles. The visibility on average is recorded as greater that ten miles from these four stations (Schultz 1998). The Upper Bay study area is visible from Union and Hudson County shoreline regions in New Jersey and from Richmond, Queens, Kings, New York, and Bronx County shoreline regions in New York State. Offshore visibility may be diminished during the spring months due to fog created by warm moist airflows passing over cold ocean water.

b. Scenic viewpoints and public access shoreline points encompassing the Upper Bay study area can include a variety of community facilities. These facilities include such as schools, churches, libraries, community centers, parks, designated federal or state wild and scenic rivers, historic or recreational facilities, designated scenic viewing areas, wildlife areas, public foot trails, fishing piers, boat docks, boat access ramps and other designated open spaces. Additionally, consideration may be given to the residential zones and all roadways or rail systems in relation to the project vicinity (New York Environmental Conservation Law 1987; Conner et al. 1979; and USACE 1996).

c. Consideration may also be given to the viewscape from the aquatic study area by the recreational fishermen and boaters using the Upper Bay aquatic region. General aesthetic degradation of the New York Bight region is a major concern to this group (Conner et al. 1979). The Bays and waterways in the Upper Bay study area are used extensively by boat, barge, and freighter traffic of commercial and recreational interests. The waterways around Richmond County, New York are used by tourist cruise liners. Those individuals using the waterways in the Upper Bay aquatic study area may be in view of the Upper Bay disposal sites.

d. The viewscape of the Upper Bay study area (from either the shoreline or the waterway) includes heavily traveled waterways, heavy air traffic, and heavily developed commercial shorelines; Verrazano Narrows Bridge (The Narrows); Ellis Island, Governor's Island, and Liberty Island (Upper Bay); Brooklyn Bridge, Manhattan Bridge, Williamsburg Bridge, Queensboro Bridge, Route 278 Bridge, Riker's Island, Bronx-Whitestone Bridge, and the Throg's Neck Bridge (East River); and George Washington Bridge (Hudson River).

4.3.3.14 Recreation

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4.3.3.14.1 Upper Bay

a. The variety of recreational activities for the Upper Bay portion of the study area is limited due to the industrial character of its shoreline and its role as a major Port for New York and New Jersey. The Hudson River Park from the Battery to 59th Street that is currently under development allows access points to the water. The most popular recreational activity that takes place in the Upper Bay is boating. However a large number of boaters use the bay mainly as a passageway to more recreational waters such as the Hudson River and Atlantic Ocean.

b. The biggest draw to the Upper Bay is the Statue of Liberty and Ellis Island National Monument. Approximately 4.2 million people visit this National Monument annually (National Park Service 1998). National Park rangers give tours and the monument offers exhibits about the construction of the statue and the history of immigration in America. Visitors have the opportunity to view the New York and New Jersey harbor after a climb to the Statue's crown.

c. Fishing opportunities in the Upper Bay are occasionally impaired due to low water quality. The New York State Department of Environmental Conservation recommends eating no more than one meal a month of striped bass and no more than one meal a week of any other fish taken from the Upper Bay. This general advisory is to protect against eating large amounts of fish that have not been tested or may contain unidentified contaminants (NYSDEC 1996, 1998).

4.3.3.14.2 Arthur Kill/Kill Van Kull/Newark Bay

a. The portion of the Upper Bay Complex area that encompasses the waterways of the Arthur Kill, Kill Van Kull, and the Newark Bay offer limited opportunities for recreation. The highly industrialized nature of the area and lower water quality hinders many uses such as swimming and fishing. The New Jersey Department of Protection has detected high levels of PCBs, dioxin and mercury, and certain pesticides in fish taken from these waters (NJDEP 1995). As a result, the State of New Jersey has issued advisories on recreational fishing and recommendations to limit consumption of fish taken from these waters.

b. The majority of shoreline for these waterbodies is occupied for industrial use. A small number of municipal parks border these waterbodies, however, only very limited access to the water for recreational activities exists. Many of the waterfront industries have built their facilities bordering on the waters edge which restricts the public's access to these waterways (USGS 1981).

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Another factor that limits the recreational value of these waterways is that they are major shipping lanes for freighters ships.

c. The New Jersey Department of Environmental Protection issues water use index ratings for surface waters of the state. The rating indicates relative resource values for segments of waterbodies by incorporating information on potable water supplies, freshwater fisheries, shellfisheries, and bathing beaches. The Arthur Kill, Kill Van Kull, and Newark Bay do not meet any of the listed criteria and are not viewed as prime resource waters (NJDEP 1992).

4.3.3.14.3 Hudson River

a. The portion of the Upper Bay Complex area that includes the Hudson River downstream of the George Washington Bridge supports a variety of recreational activities despite its urbanized character. The shores on both banks are almost completely lined with boat docks and piers along this section of the river, but access to the water is severely restricted except to owners of watercraft (USGS 1979 and 1981). However three parks are located along its shore allowing access to the river for such activities as boating, kayaking, fishing, and bird watching (McKinney 1998) and ferries also provide services for transport and recreation.

b. Riverside Park in Manhattan allows access to the river for kayakers and recreational boaters, and maintains 110 slips for use by transient and recreational boaters. A number of small cruise lines and charter boats offer short scenic cruises along the Hudson River and around Manhattan. There are also several vessels that take schoolchildren and other groups on educational tours of the river (McKinney 1998).

c. Many people fish the Hudson River from boats and from the piers along both riverbanks. Sportsmen land a number of species from the Hudson including American eel, white perch, striped bass, and bluefish. The detection of contaminants in these fish reveals the degraded nature of the fishery in this portion of the Hudson as well as its future potential if containment levels can be reduced. High levels of PCBs and certain pesticides have been detected in fish taken from this portion of the Hudson River. As a result, the New Jersey Department of Environmental Protection and the New York Department of Environmental Conservation have issued advisories on recreational fishing and recommendations to limit consumption of fish taken from these waters (NJDEP 1995; NYSDEC 1998).

4.3.3.14.4 East River

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a. The East River portion of the Upper Bay Complex area offers a limited variety of opportunities for recreation. High turbidity, strong currents, and low water quality in this section of the river hinders many uses such as swimming and scuba diving (NJSD 1998).

b. Seven parks border the East River shoreline; however, water based recreational activities are limited to fishing (New York City Department of Parks and Recreation 1998; Boden 1998). Boat docks and waterfront industries (USGS 1979) occupy the remainder of the shoreline, thus limiting access to the water for the general public on this section of the river. Due to this limited access and the urban nature of the shoreline, recreation activities for the East River consist mostly of boating and fishing.

c. Many people fish the East River from the park and piers along both riverbanks and from boats within the river. Fishermen land a number of species from the East River including American eel, white perch, and striped bass. High contaminant levels found in these fish also reveal the degraded nature of this fishery, as well as its potential. The New York Department of Environmental Conservation has issued advisories on recreational fishing in the East River, and recommends limiting consumption to no more than one a month for fish taken from the East River (NYSDEC 1998).

d. Boating is the most popular activity on the East River from the Whitestone Bridge to the Throgs Neck Bridge (~2 miles in length). This is evident by the number of docks and piers along the banks (USGS, 1979) as well as the number of yacht clubs in the area. A number of small cruise lines and charter boats offer short scenic cruises along the East River and around Manhattan. There are also several vessels that take schoolchildren and other groups on educational tours of the New York Harbor.

4.3.4 Upland

a. Only one upland site is under consideration for inclusion in the DMMP as a containment facility at this time. That site is at Belford Harbor, Monmouth County, New Jersey. This site has been used in the past for placement of dredged material from the local area and is contemplated for this use again for containment and possibly remediation. A regional dredged material rehandling facility is under consideration along the Hudson River in New York State.

b. The Belford Harbor site is currently being developed by the county planning department, but may be available as a Federal Disposal site, or as a county site that will be made available for dredged material from Federal project sites, including the deepening of Belford Harbor itself.

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c. A rehandling facility is a possibility that can be pursued. Processed dredged material would then be transported via railcars to Pennsylvania for mine reclamation. No sites have been finalized. If a site is selected it would be the subject of a NEPA level evaluation.

d. Since upland resources potentially impacted by management options are highly dependent on site-specific conditions, no attempt will be made to develop a generic description of resources. The potential area in which a disposal site and/or treatment or remediation site could be located is far too expansive and diverse to accomplish a meaningful or comprehensive analysis at this time.

e. The NYD prepared a feasibility report for flood control and shoreline protection for the Belford site. In New Jersey, the State Guidance Manual, entitled "The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters," provides procedures for the evaluation of the potential impact of upland management of dredged material to surface and groundwaters. The manual also sets forth requirements for New Jersey site-specific NEPA documents, including Belford.

f. What follows below is a generic description of the type of resources that may have to be considered when assessing potential uplands impacts at sites outside the areas already discussed.

g. These potential impacts include both surface and groundwater sources including the water column, and impacts to plant and animal communities, including wetlands and endangered and threatened species.

4.3.4.1 Water Column

a. The state of the water column would vary depending on any given upland site chosen. Those sites located close to or continuous with, the waters edge would have the most potential effect on the water column.

b. The water column contiguous to the Belford, NJ site fluctuates with the tide cycle. During the stage of the tide when water is present it will contain phyto and zooplankton, of various species and densities, at different times of the year. Invertebrates would include larval forms of many of the bay fauna including several species of crabs, and mollusks.

4.3.4.2 Benthos

a. As is the case with the water column the benthos close to any upland site would be most affected and the biota of the sites would vary depending on the water regime which could range from a salinity of 0 ppt to 30 ppt. This would affect the species composition present along with other factors such as, general ambient water quality, and constituency of sediment currently at the site.

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b. Since both potential sites are contiguous to water, the typical forms of species found in these water bodies are addressed. The area contiguous to the Belford site contains dredged material from former dredging efforts. Just to the northwest of the site is a tidal mud flat with a small channel. Water is present on this flat at high tide, thus it is considered intertidal. Typical Mudflat consists of alga and bacterial mats, which provide primary productivity. Invertebrates can include various species of mollusks such as clams and snails, and marine worms (polychaeta).

4.3.4.3 Fish and Megainvertebrates

a. Like the benthos, the species of fish and megainvertebtrates vary according to the site. Salinity would be a very important component driving the species composition.

b. The area contiguous to the site at Belford contains a mud flat that at high tide would be expected to be inhabited by killifish (*Fundulus* sp), silversides (*Menidia* sp), bay anchovy (*Anchoa mitchilli*), and predatory fish such as smaller individuals of striped bass (*Morone saxatilis*), bluefish, and weakfish (*Cynoscion regalis*).

4.3.4.4 Amphibians and Reptiles

a. Amphibians of the area are mainly toads and frogs, although some species of salamanders do occur. The amphibians are especially sensitive to environmental conditions. Their presence in areas will be greatly influenced by the past and current uses of any given site.

b. Amphibians at the Belford site will most likely consist of several species of toad (*Bufo*), and perhaps frogs (*Rana*). Reptiles-turtles and snakes are sensitive to the environment and would vary in density and species present depending on the past and current uses of the site.

c. The Belford site has been disturbed by humans. Currently, the Belford site is covered by vegetation, mainly Phragmites. It provides some minimal habitat and as a result, some species of reptiles may be found, with the most likely being the garter snake (*Thamnophis siratalis*) and Northern brown snake (*Storeria dekayi*).

4.3.4.5 Birds

a. Among land vertebrates, birds are the most numerous in terms of potential species that might be present at a given site. Since a substantial percentage of birds migrate short to very long distances; their presence will vary seasonally. Some species will overwinter in an area, others will breed there, while other will use it during their north/south migration for rest and feeding. Their presence as

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with the other preceding classes of vertebrates will vary by the habitat present. Urban tolerant species such as starling, house sparrow, house finch, rock dove are most likely to be encountered. Areas that have remained unused for a long time may have seen the return of some floral diversity. In these instances bird diversity will increase depending upon the recolonizing plants. If a given site is large enough and floral diversity great enough, a substantial number of species of birds can utilize the area.

b. Because so much Phragmites is present at Belford, the number of species utilizing the area is restricted both for nesting and migratory passage species. Besides some urban tolerant species, species such as the red-winged blackbird (*Agelaius phoeniceus*), marsh wren (*Cistothorus palustris*), and common yellowthroat (*Geothlypis tricas*) may nest there.

4.3.4.6 Mammals

a. Since all species have certain habitat needs associated with critical life requisites, sites will vary according to the past and present use. As with other forms of life, mammals will respond to the diversity or lack of diversity of plants present.

b. At Belford, mammals associated with the marsh and tidal edges would be expected to be present, but likely in reduced numbers due to the floristic nature of the area. These species would be expected to include, shrew (*Sorex* sp.), raccoon (*Procyon lotor*), mustelids such as weasels (*Mustela* sp.), canids such as red fox (*Vulpes fulva*) and feral dogs, and several types of rodent such as meadow vole (*Microtus pennsylvanicus*), black rat (*Rattus rattus*), and Norway rat (*Rattus norvegicus*).

4.3.4.7 Endangered Species

4.3.4.7.1 Flora

a. Sea beach amaranth (*Amaranthus pumilis*) and sandplain *geradia (Agalinis acuta*) are two species that can occur along the New Jersey shore, but not along the Hudson River in New York. Since upland sites are disturbed by the past or present actions of humans, there is little likelihood of these species being affected.

4.3.4.7.2 Fauna

a. The short-nosed sturgeon is less likely to occur in the vicinity of the sites where salinity exceeds 3 ppt and where sufficient depths for overwintering are absent such as at Belford. The presence of the shortnosed sturgeon is much more likely on the Hudson River in New York; a facility sited

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upstream along the Hudson would require consultation with resources agencies and the State of New York.

4.3.4.7.3 Amphibians

a. Amphibians-None known from either site.

4.3.4.7.4 Sea Turtles

a. The use and distribution of the areas contiguous to the upland study areas would vary from site to site. Estuarine areas contiguous to upland disposal such as at Belford would have a moderate likelihood of having sea turtle being occasionally present. The upstream site on the Hudson River would be well out of these turtles range.

4.3.4.7.5 Birds

4.3.4.7.5.1 Peregrine Falcon

a. The peregrine falcon does nest within the study area and some 15 aeries have been discovered and monitored primarily on bridges and buildings. The nesting adults stay in the vicinity of the Bight during winter. Further, the New York/New Jersey metropolitan area is important, in that it is along the migratory route for the highly migratory subspecies (*tundrius*) which nests in Canada and Alaska. At Belford the most likely occurrence would be brief visits by migrating peregrines.

4.3.4.7.5.2 Bald Eagle

a. The bald eagle does not nest in the study area. Both subspecies of the bald eagle do migrate through the area, and the northern subspecies, occasionally overwinters in the Bight area, although its most important over wintering site near the study area is along the Hudson River and Catskill Reservoirs (USFWS 1997). The northern subspecies continues to rebound.

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4.3.4.7.5.3 Piping Plover

a. The piping plover (*Charadrius melodus*) coastal population is currently listed as Federally threatened. They nest on Sandy Hook and the Rockaway Point peninsula. This species has not been reported in the vicinity of the Belford, NJ or any potential NY sites.

4.3.4.7.5.4 Roseate Tern

a. Roseate tern (*Sterna dougallii*) nesting in the study area is rare. The likely areas are Sandy Hook and at Rockaway Point peninsula.

4.3.4.7.6 Marine Mammals

a. Great whales are not found landward of the baseline with the possible exception of a rare visit of the humpback whale. No effects on these cetaceans are anticipated for any upland site.

4.3.4.8 Cultural Resources

a. Cultural resource studies have not yet been conducted as part of the DMMP project for any of the proposed upland options. As a potential study area it is far too large, and specific sites have not been proposed yet to narrow the investigation to a manageable size. The New York/New Jersey area has been occupied for approximately 10,000 years and has been subject to significant development for centuries. The remains of this occupation may be encountered in many forms throughout the region and may include standing historic structures, prehistoric and historic archaeological sites and historic landscapes. In general, the upland disposal areas may contain a variety of potentially significant resources depending upon the historic land use of the properties and on current site conditions. The need for a cultural resource investigation in connection with each option, and the scope of that survey will have to be assessed in more detail as DMMP options and specific sites are determined.

b. The potential for the implementation of Contaminant Reduction methods to encounter significant cultural resources is low. Cultural resources that may be encountered would include historic industrial structures and sewer plants. "Hot spots," proposed to be capped, most likely represent a disturbed areas that would not contain intact resources.

c. The present site at Belford, New Jersey is under consideration for a proposed upland confined disposal facility, although the most recent information indicates the site will be used as a stock-pile area for material to remediate a nearby landfill. A number of cultural resource studies have been undertaken in Belford and the surrounding area. While recent cultural resource studies in this area have failed to recover any prehistoric materials the authors Harris and Reyes (1991) have stressed that the shoreline around Raritan Bay is sensitive for Native

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American materials. An early study of the marsh adjacent to Ware Creek, in the vicinity of the proposed disposal area, found the deposits to be heavily disturbed (Kraft 1977).

d. The fishing community at Belford, on Comptons Creek, was one of the earliest on Raritan Bay. Belford is now one of the last remaining vestiges of "baying," a term applied to this traditional way of life and Belford has been determined eligible for the National Register of Historic Places as the Belford Historic District (Harris and Reyes 1991). The Earle Naval Weapon Pier, in the vicinity of the proposed upland site is potentially eligible for the NRHP. Other impacts such as to the viewsheds of significant properties will have to be evaluated.

4.3.4.9 Socio-Economic Factors

4.3.4.9.1 Shipping

a. Shipping is not directly affected by this upland disposal, as presently contemplated.

4.3.4.9.2 Commercial and Recreational

a. Commerical and recreational use would not be directly affected. Benefits would be likely, by keeping the nearby marina and channels at sufficient depth for navigation.

4.3.4.10 Water Quality

a. Surface Water. Surface fresh water is an important consideration where present on potential upland sites. According to the NJDEP, the most common water quality problems occurring in the State's freshwater rivers and streams include total fecal coliform bacteria (in 81% of the freshwaters), nutrients (also 81 percent), depressed dissolved oxygen levels, siltation, road salts, and oil and grease. Other types of known or suspected water quality problems found statewide include thermal modifications/elevated stream temperatures, habitat alternations, pH fluctuations and rising chloride and sodium levels (NJDEP 1994). See Table 4.10, Significant Statewide Water Quality Trends.

b. Areas with higher than recommended levels of PCB's and pesticides include New Jersey/New York interstate waters and rivers in the urbanized northeast part of the state.

c. In general, knowledge of the presence and overall impacts of toxic substances in the state waters is limited. A clear understanding of the presence of heavy metals within the environment is clouded by evidence that indicates that a percentage of the historical record for metals may contain inflated values.

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d. Surface water resources shown on the Sandy Hook quadrangle for the immediate project area includes Compton Creek and Ware Creek. Both creeks flow into the Sandy Hook Bay. Pews Creek is one and one-half miles to the northwest and Wagner Creek is about one mile to the southeast of the site. No stream specific water quality data could be obtained for these streams, however watershed specific water quality data was available through the New Jersey Department of Environmental Protection (NJDEP 1988). Major watersheds in Monmouth County include the Navesink River watershed and the Atlantic Coastal basin. Table 4.11, Water Quality Index of Categories, Components and Criteria for Assessing New Jersey Rivers and Streams Monmouth County, New Jersey (Belford Harbor).

e. The Atlantic Coastal Basin is situated in Monmouth County with the Navesink River watershed being the largest in this segment, draining an area of 95 square miles. The Shrewsbury River drains an area of 27 square miles and the Shark River an area of 23 square miles. Tributaries to these rivers include the Swimming River, Yellow Brook, Big Brook, Mine Brook, and Willow Brook to the Navesink; Parkers Creek, Oceanport Creek, and Little Silver to the Shark River (10 miles). Small tidal streams drain Northern Monmouth County directly to Raritan Bay. There are many small ponds in this area, as well as Swimming River Reservoir and the Glendola Reservoir - both major potable water impoundments. The waters in this region have been classified FW-2 Trout Maintenance, FW-2 non-trout, and SE-1.

f. Water Column analyses show aluminum, copper, iron, lead and phenol to be parameters of concern. Iron values greater than the assessment criteria occur in all of the samples collected, 75% of the lead results exceed the criteria. Copper values greater than the criteria also occur in a high percentage of the samples. Forty seven percent of the aluminum results exceed the criteria. Phenol values greater than the criteria occurred in 19% of the samples. In thirteen volatile halogenated organic samples, none of the results for any of the 27 organic substances exceeded the criteria. Chloroform was detected once, but the level was well below the assessment criteria.

4.3.4.11 Groundwater

a. Groundwater provides approximately 50% of the State of New Jersey's potable water with the majority, 39%, coming from public-supply wells and 11% from domestic-supply wells. In addition, groundwater provides baseflow to streams and is closely related with the ecology of the state's wetland systems. Groundwater in the state is divided into three classifications in order to protect its designated uses. Class I groundwaters are waters of special ecological significance. This classification includes the groundwaters within FW1 surface watersheds and those within the Pinelands area as delineated by the Pinelands

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Protection Act. Class II groundwaters represent waters for potable water supply. Class III groundwaters are waters with uses other than water supply. This includes waters that due to natural compositions (such as high chloride levels) are not suitable for potable water supplies (NJDEP 1995).

b. Monmouth County and portions of Middlesex County are located in the coastal plain physiographic province of New Jersey. This is the largest physiographic province in New Jersey, covering an area of 4,689 square miles. During the formation of the coastal plain, a multi-layered aquifer system consisting of 1 major unconfined aquifer and 4 major confined aquifer systems developed (NJDEP, 1995). The U.S. Environmental Protection Agency has designated the New Jersey Coastal Plain Aquifer System underlying Monmouth County as a sole source aquifer (USEPA 1988).

c. The Englishtown aquifer, Wenonah-Mount Laurel aquifer, and confining beds and minor aquifers are the principal aquifers found in Monmouth County. The portion of Middlesex County located within the coastal plain is underlain primarily by the Potomac-Raritan-Magothy aquifer (USGS, Internet). In 1995, Monmouth County had a total water withdrawal of 29,966 million gallons of which 9,992 million gallons was derived from groundwater. In Middlesex County the largest quantity of water, 11,754 million gallons, is withdrawn from the Potomac-Raritan-Magothy aquifer. Of that, 7,681 million gallons is derived from the upper Potomac-Raritan-Magothy aquifer and 4,073 million gallons is from the lower Potomac-Raritan-Magothy aquifer (NJDEP 1995). Overpumping in some of the coastal plain aquifers has resulted in water level declines. This has impacted the Mount Laurel and Englishtown aquifers in Monmouth County and the Old bridge and Farrington aquifers of the Potomac-Raritan-Magothy system in the South River/Raritan Bay area. These areas are characterized by extensive cones of depression in the regional flow field deep enough to cause saltwater encroachment from nearby saltwater bodies. In addition, there is increased recharge from adjacent aquifers due to the lower hydraulic head in these areas (NJDEP 1995).

d. The State of New Jersey has a Saltwater Monitoring Network that has been in existence since 1923. This network is comprised of over 400 wells located along the Atlantic Ocean, Raritan Bay, and Delaware Bay. The network provides an early warning system for saltwater intrusion into the groundwaters of the State (NJDEP, 1992). Overpumpage of the Coastal Plain aquifers has resulted in the development of large regional cones of depression; the most extensive of which is in the Potomac-Raritan-Magothy aquifer system. Within this aquifer system the heads have declined as much as 23 ft from 1978 through 1983. Although the overall cones of depression were not as great as in the Potomac-Raritan-Magothy aquifer system, heads declined as much as 29 ft in the Englishtown aquifer system

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during the same time period. Declines were as much as 52 ft from 1983 to 1988 for the Englishtown system. Due to the availability and use of the Manasquan (Reservoir) water and the State imposed cut back on the use of public supply wells, water levels within the Englishtown and Mount Laurel aquifers have risen dramatically during the early 1990's (NJDEP 1994).

e. Historically, aquifers in Brooklyn and Queens, New York have had problems with saltwater intrusion. By 1947 all wells within Kings County, New York had been shut down due to saltwater contamination. In response, groundwater withdrawal increased in Queens County, until salt-water intrusion also became a problem in that county. In 1974 all wells in Queens were shut down, with the exception of those belonging to the Jamaica Water Supply Company (Cartwright 1998).

f. Typically, the shallow groundwaters of Staten Island proceed seaward, toward the saline groundwater that surrounds the island. With the exception of the shallow wells near the shores and wells screened deeper than 40 ft below sea level for each foot of head in the well above sea level, all groundwater on Staten Island is good for most of New York City's permitted uses. Groundwater has not been used for public drinking supply since 1970. A 1953 study of 14 wells on the island found that chloride concentration was low to moderate (8 to 70 mg/l). These wells were within 1 miles of the shoreline, with most of the wells located within 1/2 mile of the shoreline. Twelve of the study wells tapped glacial deposits ranging from 22 to 180 ft in depth. Water from a well located 0.2 miles from shore and 180 ft deep contained a chloride concentration of 1,550 mg/L (chloride above 250 mg/L is considered excessively salty). Two of the wells tap the Raritan formation and are located at depths of 135 ft and 230 ft. These wells contained the lowest chloride concentrations at 10 and 2 mg/L respectively (USGS 1988).

4.3.4.12 Air Quality

a. The land placement portion of the study area (UP-1) is located in Monmouth County, New Jersey. The State of New Jersey monitors for the six specific air pollutants that are part of the NAAQS as well as Meteorological Parameters (MET); Acid Precipitation (AP); Smoke Shade (SS); Total Suspended Particulates (TSP); and Other Trace Metals (cadmium, chromium, copper, iron, magnesium, manganese, nickel, and zinc). Air quality for Monmouth County New Jersey has been previously discussed under the New York Bight Apex-Ocean Section 4.08.01.

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4.3.4.13 Noise

a. The Monmouth County site is zoned for industrial uses. A private airstrip is located in the vicinity. The land to the west of the site is used for light industry and residential uses. To the east of the site is a military installation and coastal wetland areas. Sandy Hook Bay, a water treatment pond, a sewage treatment facility, and a potential fertilizer company are located to the north of the site. A small trucking company and residential property are located south of the site. There are no parks, recreational or wildlife areas within a two mile radius of the site. Land uses by residential, religious, educational, convalescent, and medical facilities are more sensitive to noise than commercial and industrial uses. Land use to the west of the site is residential and light industry. A military installation and wetland are located to the east of the site. North of the site is a water treatment pond, a sewage treatment facility, a potential fertilizer company, and Sandy Hook Bay. There is a potential for rare and endangered species to occur on-site or in the vicinity of the site (Dames & Moore 1996). Based on local road maps, there are no hospitals within 2 miles of the site. Review of the Sandy Hook, NJ-NY USGS quadrangle indicates that there is a church and a school within a 1/2 mile of the site. There are 2 churches and 1 school within 1 mile of the Belford Harbor site.

4.3.4.14 Aesthetics

a. Aesthetic resources of the upland study areas can be defined as the perceived view of a particular upland disposal site by the surrounding population. Federal laws which apply to aesthetic resources include the Coastal Zone Management Act of 1972 (Sections 302b, 303b), the National Environmental Policy Act of 1969 (Section 101b), the Water Resources Planning Act of 1965 and the "amenities" criteria of the Marine Research, Protection and Sanctuaries Act of 1972. New York State laws which apply to aesthetic resources include Section 617.21 Appendix B of the New York State Environmental Quality Review Act (SEQRA), which can be used to collect relevant visual resource data for impact analysis (New York Environmental Conservation Law 1987).

b. The perceived aesthetic viewscape for this study area can be described as the visible surrounding land and/or water use. For establishing the aesthetic environment on land, consideration may be given to adjacent community facilities such as schools, churches, libraries, community centers, parks, designated federal or state wild and scenic rivers, historic or recreational facilities, wildlife areas, public foot trails, or other designated open spaces. The viewscape from popular public or designated scenic viewpoints and/or attractions may also be considered when establishing the aesthetic surrounding environment. Additionally, consideration may be given to residential zones and all roadways or rail systems in relation to the project vicinity (New York Environmental Conservation Law 1987; Conner et al. 1979; and USACE 1996). For upland disposal sites located along a shoreline,

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the aesthetic view of the shoreline from fishermen and boaters using offshore waterways may also be described and considered.

c. The surrounding land use of the Belford Harbor region in Monmouth County supports commercial and recreational fishing, commercial businesses, light industrial and residential land uses. Approximately five miles from the site is the Twin Lights of Navesink State Historic Site (Jersey Shore Guide, 1998). The public may climb 200 ft to the top of the towers to view the surrounding landscape. The site may be visible from this scenic viewpoint and other elevated locations. There are no parks, recreational or wildlife areas within two miles of the site from which to view the site (USACE, 1996). However, the site may be visible across the Sandy Hook Bay from the west shore of the Sandy Hook Gateway National Recreation Area.

4.3.4.15 Recreation

a. Monmouth County contains many parks and recreation areas that offer a large variety of activities for both residents and tourists (Table 4-12). The county is home to the Sandy Hook Unit of the Gateway National Recreation Area, Allaire and Monmouth Battlefield State Parks, as well as 34 county parks, and three state wildlife management areas. Acreage for the amount of open space and parks totals over 20,000 acres. Not included in this total are the many beaches maintained by shore towns along Raritan Bay and the Atlantic Ocean.

b. The Sandy Hook Unit of the Gateway National Recreation Area covers 4,169 acres at the northernmost point of the New Jersey shoreline (Scott 1998) and is approximately 4 miles east of the Belford site. The National Park Service maintains the park for multiple uses. Hiking, fishing, bird watching, and beach combing are popular activities throughout the year. In the summer, swimming and sunbathing are the most popular activities at swimming areas along the park's six miles of ocean beaches. The public can also visit Historic Fort Hancock with exhibits and tours of the historic building including America's oldest lighthouse (National Park Service 1998).

c. The State of New Jersey maintains two parks and three wildlife management areas in Monmouth County. Both parks are historical landmarks that also have facilities for recreational activities including camping, hiking, canoeing, biking, hunting, and fishing. The three wildlife management areas are primarily maintained for hunting but allow other uses such as hiking and bird watching (NJDEP Department of Parks and Forestry 1998).

d. Although there are no marinas located in Belford proper, located nearby is the Monmouth Cove Marina in the bordering town of Port Monmouth. The Leonardo

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State Marina is located to the southeast in Leonardo. The Monmouth County Marina is a county run marina.

e. Monmouth County maintains a system of 34 parks and recreation areas totaling over 10,000 acres (Kirkpatrick, 1998). The parks are set up for year round use and for a variety of recreational activities including golfing, hiking, fishing, horseback riding, picnicking, tennis, ice skating, cross country skiing, and camping. Total attendance for Monmouth County parks exceeded three million for 1997 (Monmouth County Parks Department, 1998).

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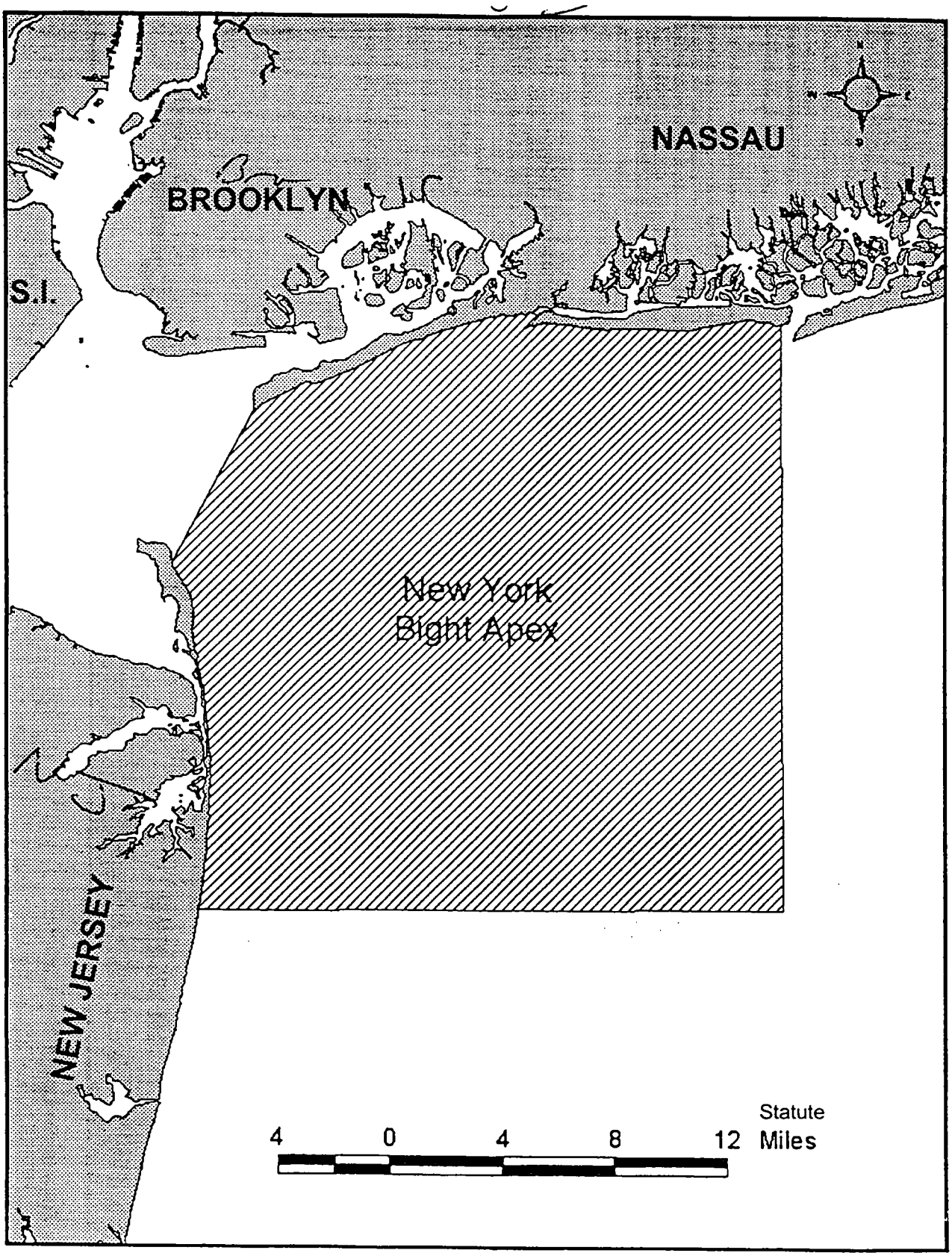


Figure 4-1. Area of the New York Bight Apex

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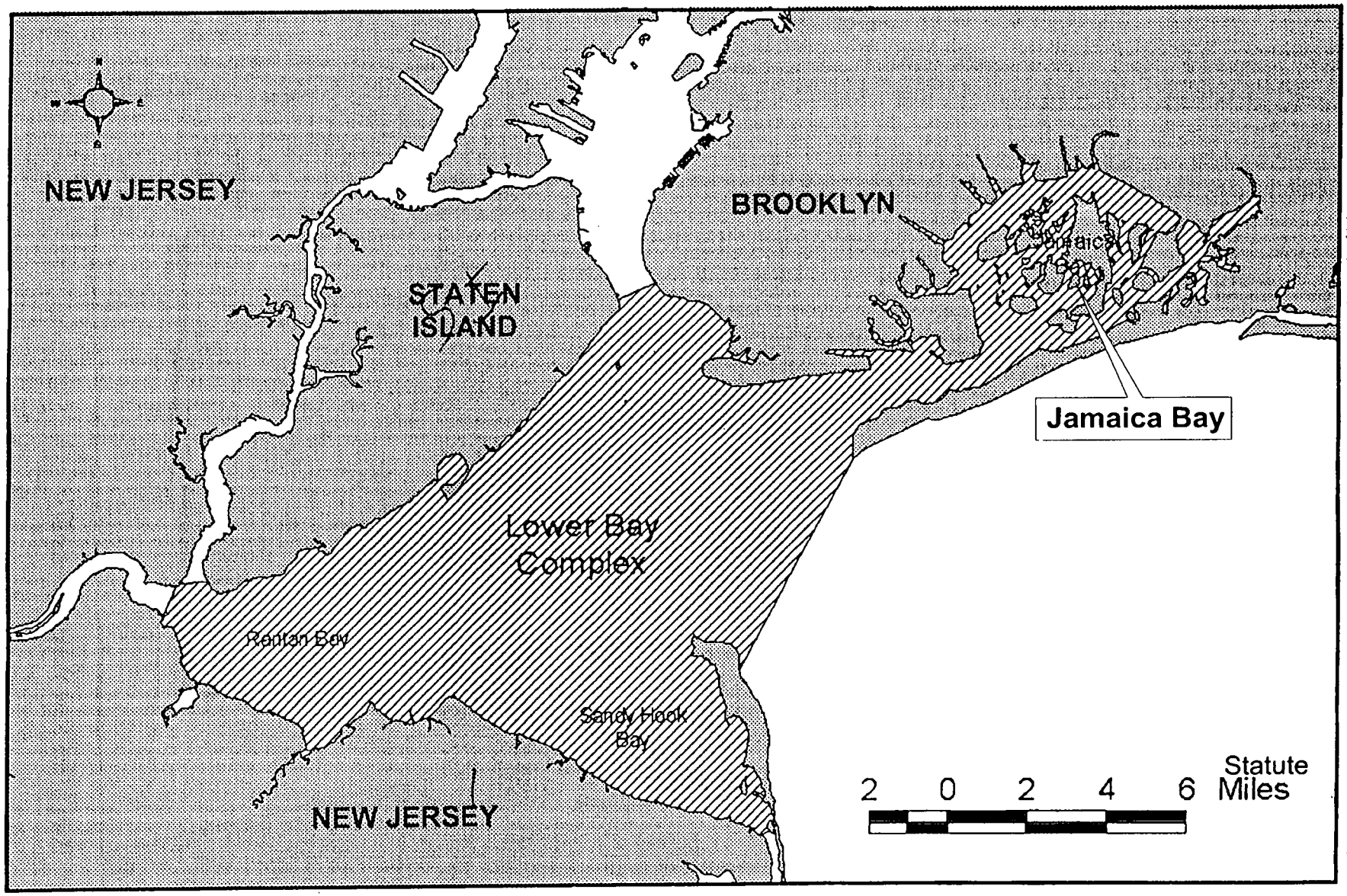


Figure 4-2. Area of the Lower Bay Complex

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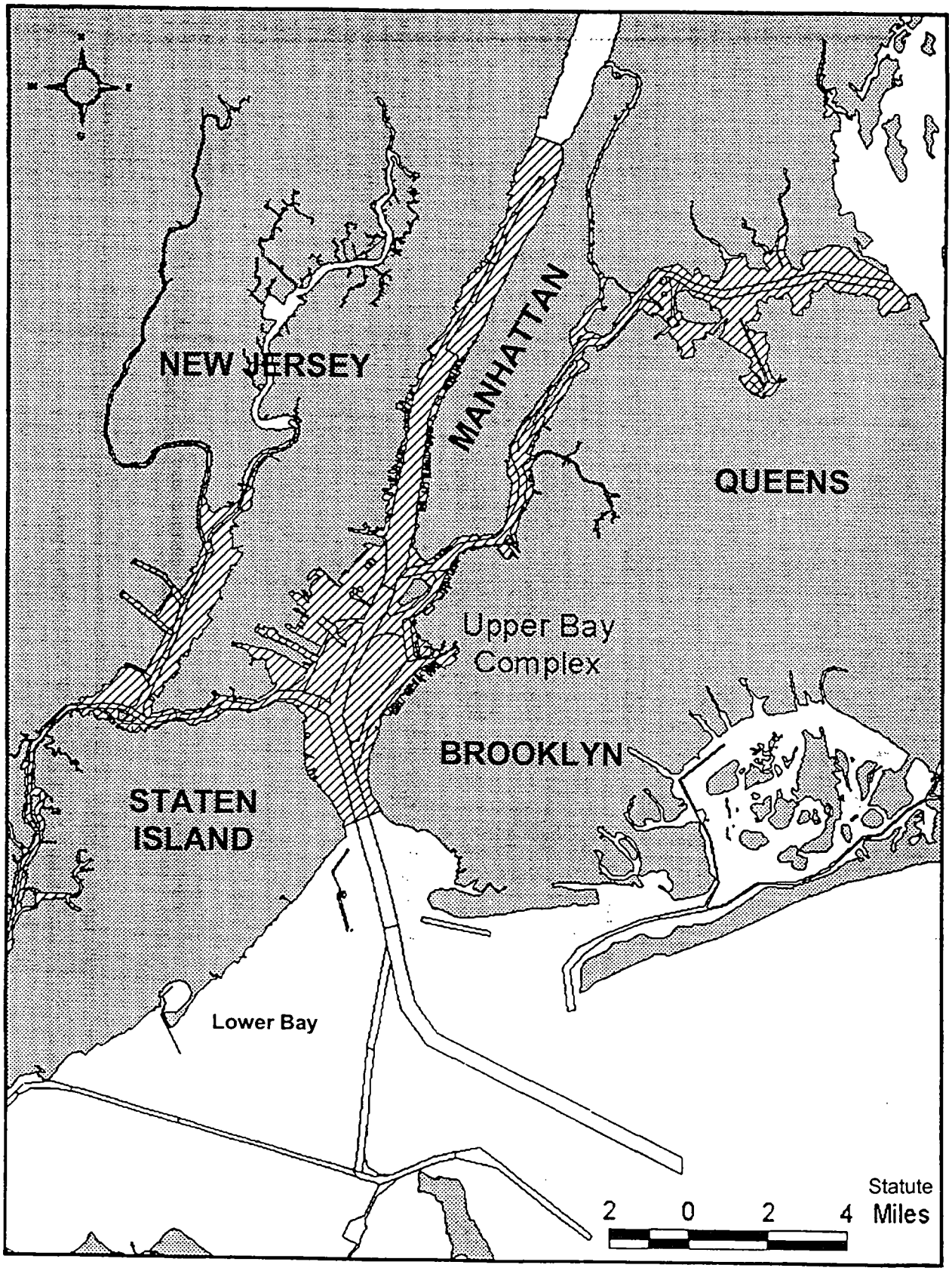


Figure 4-3. Upper Bay Complex

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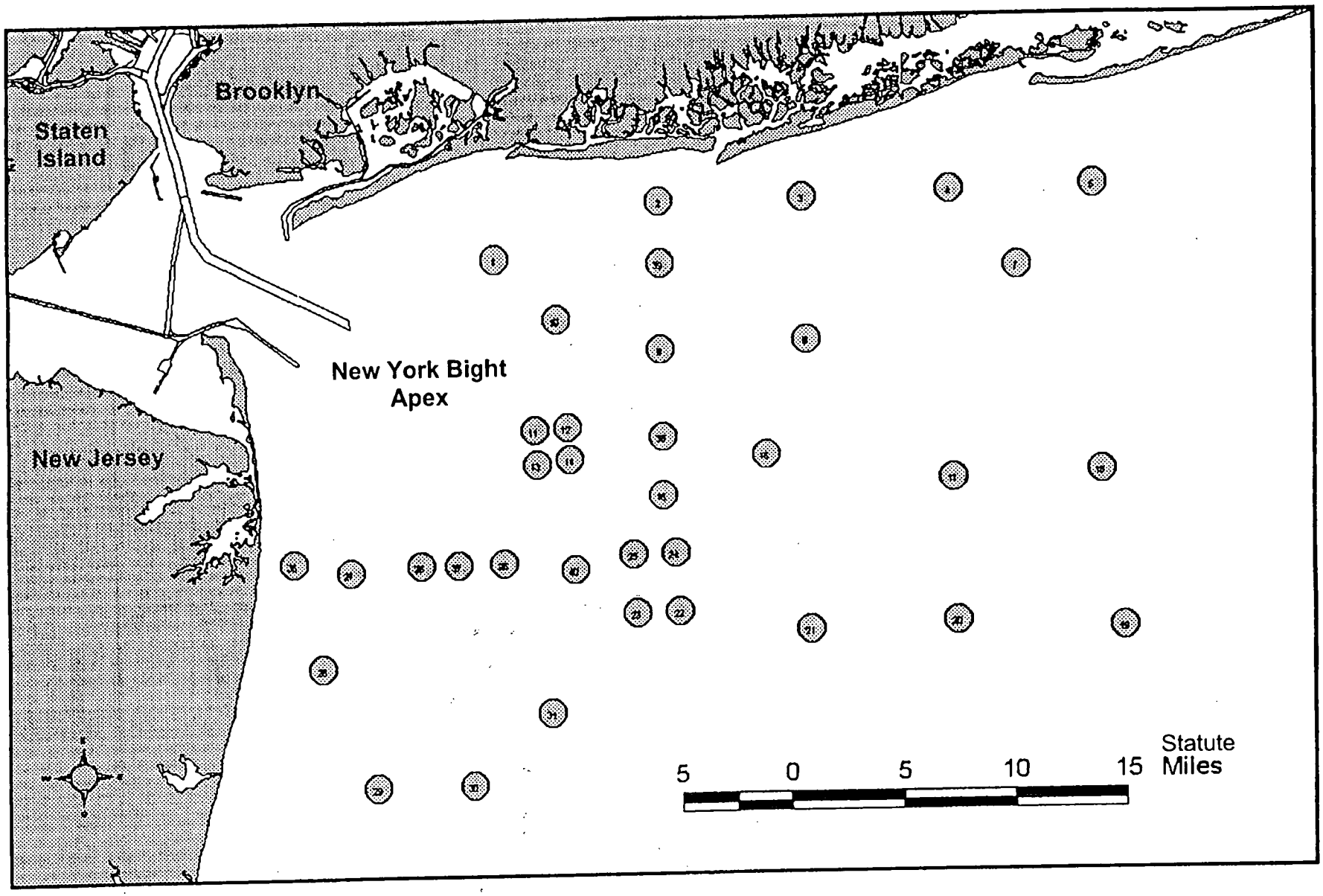


Figure 4-4. Sampling Stations for Sediment/Benthic Sampling in the N.Y. Bight Apex

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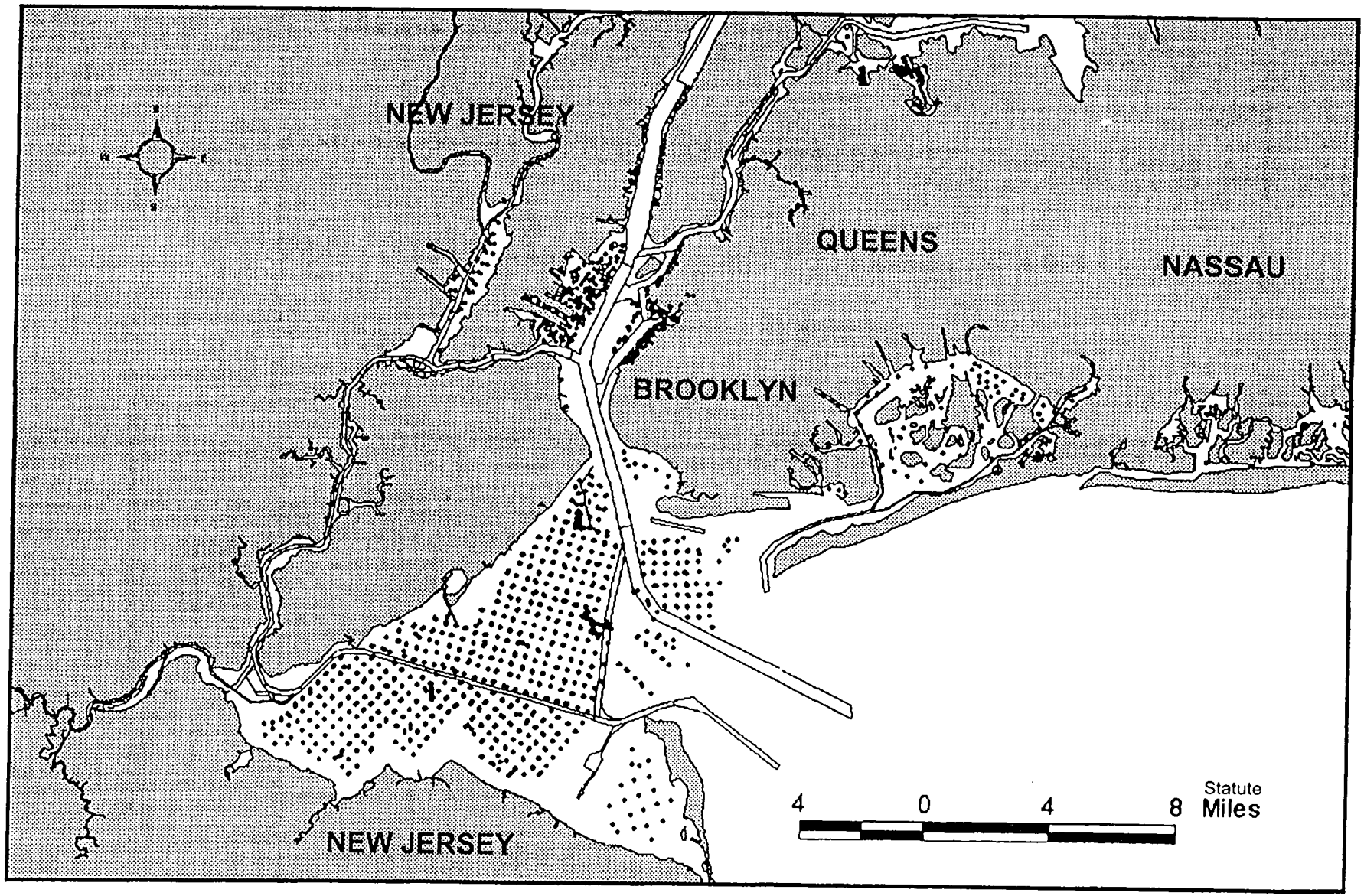


Figure 4-5. SPI/Shipec Sampling Stations in Lower and Upper Bay Complexes

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Table 4.1 Taxonomic listing and frequency of occurrence in the New York Bight Apex macroinfauna study area, sampled September 6-8, 1995.

TAXA	PHYLUM	CLASS	NO. INDIVIDUALS	DENSITY (no./m²)	% TOTAL	CUMULATIVE	STATION OCCURRENCE †	% STATION OCCURRENCE
Polygordius (LPIL) *	A	Arch	21144	211440	42.9	42.9	36	100.0
Nucula proxima	M	Pele	8194	81940	16.6	59.5	32	88.9
Pseudunciola obliquua	Ar	Mala	2470	24700	5.0	64.5	30	83.3
Cirratulidae (LPIL)	A	Poly	2069	20690	4.2	68.7	34	94.4
Exogone hebes	A	Poly	1498	14980	3.0	71.8	26	72.2
Ampelisca verrilli	Ar	Mala	1237	12370	2.5	74.3	13	36.1
Oligochaeta (LPIL)	A	Olig	1167	11670	2.4	76.6	31	86.1
Prionospio steenstrupi	A	Poly	725	7250	1.5	78.1	12	33.3
Tellina agilis	M	Pele	671	6710	1.4	79.5	32	88.9
Magelona papillicornis	A	Poly	599	5990	1.2	80.7	15	41.7
Tanaissus psammophilus	Ar	Mala	596	5960	1.2	81.9	28	77.8
Monticellina dorsobranchialis	A	Poly	573	5730	1.2	83.1	26	72.2
Rhepoxynius hudsoni	Ar	Mala	561	5610	1.1	84.2	16	44.4
Levinsenia gracilis	A	Poly	513	5130	1.0	85.2	6	16.7
Spisula solidissima	M	Pele	510	5100	1.0	86.3	30	83.3
Aricidea catherinae	A	Poly	484	4840	1.0	87.3	33	91.7
Euclymene sp.D	A	Poly	421	4210	0.9	88.1	4	11.1
Echinarachnius parma	E	Echi	404	4040	0.8	88.9	27	75.0
Caulleriella sp.J	A	Poly	395	3950	0.8	89.7	26	72.2
Rhynchocoela (LPIL)	R		392	3920	0.8	90.5	33	91.7
Scoletoma impatiens	A	Poly	347	3470	0.7	91.2	15	41.7
Goniadella gracilis	A	Poly	330	3300	0.7	91.9	15	41.7
Tharyx acutus	A	Poly	316	3160	0.6	92.5	23	63.9
Maldanidae (LPIL)	A	Poly	289	2890	0.6	93.1	14	38.9
Spio setosa	A	Poly	282	2820	0.6	93.7	8	22.2
Unciola irrorata	Ar	Mala	277	2770	0.6	94.3	17	47.2
Ostracoda (LPIL)	Ar	Ostr	276	2760	0.6	94.8	29	80.6
Leptocheirus pinguis	Ar	Mala	272	2720	0.6	95.4	7	19.4
Lumbrinerides acuta	A	Poly	218	2180	0.4	95.8	14	38.9
Ninoe nigripes	A	Poly	191	1910	0.4	96.2	5	13.9
Scoletoma acicularum	A	Poly	169	1690	0.3	96.5	17	47.2
Protohaustorius wigleyi	Ar	Mala	161	1610	0.3	96.9	11	30.6
Spiophanes bombyx	A	Poly	159	1590	0.3	97.2	25	69.4
Ampharetidae (LPIL)	A	Poly	139	1390	0.3	97.5	10	27.8
Phoxocephalus holbolli	Ar	Mala	139	1390	0.3	97.8	16	44.4
Ampelisca (LPIL)	Ar	Mala	125	1250	0.3	98.0	13	36.1
Aricidea wassi	A	Poly	117	1170	0.2	98.2	19	52.8
Glycera dibranchiata	A	Poly	111	1110	0.2	98.5	20	55.6
Aricidea (LPIL)	Ar	Mala	104	1040	0.2	98.7	15	41.7
Byblis (LPIL)	A	Poly	94	940	0.2	98.9	6	16.7
Parapionosyllis longicirrata	Ar	Mala	93	930	0.2	99.1	7	19.4
Paraonis pygoenigmatica	A	Poly	89	890	0.2	99.2	16	44.4
Byblis serrata	A	Poly	80	800	0.2	99.4	8	22.2
Unciola serrata	Ar	Mala	78	780	0.2	99.6	3	8.3
Pherusa affinis	Ar	Mala	77	770	0.2	99.7	5	13.9
Nephtys picta	A	Poly	73	730	0.1	99.9	10	27.8
Echinoidea (LPIL)	E	Echi	72	720	0.1	100.0	12	33.3

TAXA KEY
A = Annelida
Arch = Archiannelida
Poly = Polychaeta
Olig = Oligochaeta
Ar = Arthropoda
Mala = Malacostraca
Ostr = Ostracoda
E = Echinodermata
Echi = Echinoidea
M = Mollusca
Pele = Pelecypoda
R = Rhynchocoela

* (LPIL) = Lowest Practical Identification Level
† Occurrence by a taxon is determined by the presence of at least one individual in one replicate collected at each station.

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Table 4.2 Assemblage statistics for the New York Bight Apex macroinfauna stations, sampled September 6-8, 1995.

Station	Total No. Taxa	Total No. Individuals	Mean Density (no/m²)	Density (std. dev.)	H'	J'	D
1	47	3334	16670	1259	1.66	0.43	5.67
2	36	568	2840	523	1.47	0.41	5.52
3	31	465	2325	573	1.83	0.53	4.88
4	28	455	2275	290	2.15	0.64	4.41
5	30	135	675	50	2.65	0.78	5.91
7	35	883	4415	3033	1.39	0.39	5.01
8	40	7488	37440	9970	0.65	0.18	4.37
9	46	1761	8805	6017	2.25	0.59	6.02
10	47	1375	6875	2878	1.66	0.43	6.36
11	45	519	2595	544	2.55	0.67	7.04
12	56	1414	7070	7354	1.69	0.42	7.58
13	35	606	3030	3182	2.03	0.57	5.29
14	32	925	4625	7	1.13	0.33	4.54
15	33	673	3365	2298	1.98	0.57	4.89
16	34	2334	11670	170	0.92	0.26	4.26
17	47	828	4140	3493	2.15	0.56	6.85
18	67	1414	7070	6251	2.38	0.56	9.10
19	70	773	3865	742	3.16	0.74	10.38
20	58	569	2845	856	3.07	0.76	8.99
21	73	2077	10385	2128	3.02	0.70	9.43
22	24	175	875	516	2.48	0.78	4.45
23	35	534	2670	184	2.41	0.68	5.41
24	39	401	2005	1591	2.66	0.73	6.34
25	26	255	1275	163	2.13	0.65	4.51
26	65	4042	20210	3069	1.63	0.39	7.71
27	56	3363	16815	6880	1.25	0.31	6.77
28	53	4146	20730	12685	1.56	0.39	6.24
29	54	600	3000	1032	2.82	0.71	8.29
30	60	949	4745	346	2.77	0.68	8.61
31	53	1527	7635	92	2.02	0.51	7.09
35	50	1179	5895	5070	1.57	0.40	6.93
36	48	1062	5310	240	1.84	0.48	6.75
37	53	2686	13430	6491	2.12	0.53	6.59
38	42	655	3275	2128	2.19	0.59	6.32
39	62	778	3890	57	3.26	0.79	9.16
40	38	1208	6040	721	1.13	0.31	5.21

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TABLE. 4.3 List of Managed Species Designated for Essential Fish Habitat (Source NMFS 1999)

NEW ENGLAND MANAGEMENT COUNCIL	
Atlantic sea scallop	Placopecten magellanicus
Atlantic herring	Clupea harengus
Atlantic salmon	Salmo salar
Atlantic cod	Gadus morhua
Pollock	Pollachius virens
Haddock	Melanogrammus aeglefinus
Red hake	Urophycis chuss
Spotted hake	Urophycis regius
White hake (whiting)	Urophycis tenuis
Silver hake	Merluccius bilinearis
Offshore hake	Merluccius alibidus
Winter flounder	Pleuronectes americanus
Windowpane	Scophthalmus aquosus
Witch flounder	Glyptocephalus cynoglossus
Yellowtail flounder	Limanda ferruginea
Atlantic halibut	Hippoglossus hippoglossus
American plaice	Hippoglossoides platessoides
Goosefish (monkfish)	Lophius americanus
Ocean pout	Macrozoarces americanus
Redfish	Sebastes marinus

Mid-Atlantic Fisheries Management Council	
Surf clam	Spisula solidissima
Ocean quohog	Arctica islandica
Longfinned squid	Loligo pealei
Short finned squid	Illex illecebrosus
Spiny dogfish	Squalus acanthias
Atlantic Butterfish	Peprilus triacanthus
Atlantic mackerel	Scomber scombrus
Black sea bass	Centropristis striata
Bluefish	Pomatomus saltatrix
Scup	Stenotomus chrysops
Summer flounder	Paralichthys dentatus
Tilefish	Lopholatilus chamaeleonticeps

South Atlantic Fisheries Management Council	
Cobia	Rachycentron canadum[2]
Golden crab	Chaeceon fenneri[1]
King mackerel	Scomberomorus cavalla[2]
Spanish mackerel	Scomberomorus maculatus[3]
Red drum	Sciaenops ocellatus[2]

(1)This species does not inhabit the New York Bight Apex
(2)These species are rare in the New York Bight Apex.
(3)This species is uncommon in the New York Bight Apex.

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TABLE. 4.3 (continued)

National Marine Fisheries Service Highly Migratory Species

Sharks	
Atlantic angel	Squatina dumerili[1]
Tiger	Galeocerdo cuvieri
Scalloped hammerhead	Sphryna lewini
Sandbar	Carcharhinus obscurus
Dusky	C. plumbeus
Silky	C. falciformes[1]
Shortfin mako	Isurus oxyrhincus
Longfin mako	I. Paucus[1]
Porbeagles	Lamma nasus[2]
White	Carcharodon carcharias[2]
Sand tiger	Odontaspis tausus
Atlantic sharpnose	Rhizoprionodon terraenovae[1]
Thresher	Alopias vulpinus
Blue	Prionace glauca
Basking	Cetofhinus maximus[1]
Tuna	
Albacore	Thunnus alalunga
Bigeye tuna	Thunnus obesus
Bluefin tuna	Thunnus thynnus
Yellowfin tuna	Thunnus albacres
Swordfish	Ziphias gladius[2]
Blue marlin	Makaira nigricans[2]
White marlin	Tetrapturus albidus

(1) These species do not inhabit the NY Bight Apex.
(2) These species are rare in the NY Bight Apex.

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TABLE 4.4. Federally Listed Species in the New York Bight Watershed (USFWS, 1997)

Common Name	Scientific Name	Federal	NY State	NJ State
Invertebrates				
Dwarf Wedge Mussel	Alamidonta heterodon	E	E	E
Northeastern beach tiger beetle	Cicindela dorsalis (dorsalis)	T	U	E
Karner Blue Butterfly	Lycaeides melissa samuelis	E	E	NA
Vertebrates				
Shortnosed sturgeon	Acipenser brevirostrum	E	E	E
Loggerhead turtle	Caretta caretta	T	T	E
Green sea turtle	Chelonia mydas	T	T	T
Leatherback sea turtle	Dermochelys coriacea	E	E	E
Hawksbill sea turtle	Eretmochelys i. Imbricata	E	E	E
Atlantic (Kemp's) ridley	Lepidochelys kempii	E	E	E
Peregrine falcon	Falco peregrinus	E	E	E
Bald eagle	Haliaeetus leucocephalus	T	E	E
Piping plover	Charadrius melodus	T	E	E
Roseate tern	Sterna dougallii	E	E	E
Indiana bat	Myotis sodalis	E	E	E
Blue whale	Balaenoptera musculus	E	E	E
Finback whale	Balaenoptera physalus	E	E	E
Sei whale	Balaenoptera borealis	E	E	E
N. right whale	Eubalaena glacialis	E	E	E
Humpback whale	Megaptera novaeangliae	E	E	E
Sperm whale	Physeter catodon	E	E	E
Knieskern's beak rush	Rhynchospora knieskrnii	T	NA	E
Swamp pink	Helonias bullata	T	U	E
Small whorled pogonia	Isotria medeoloides	E	U	E
Seabeach amaranth	Amaranthus pumilus	T	U	E
Sensitive joint-vetch	Aeschynomene virginica	T	NA	E
Northern wild monkshood	Aconitum noveboracense	T	T	N/A
Sandplain gerardia	Agalinis acuta	E	E	N/A
Chaffseed	Schwalbea americana	E	U	E

E=Endangered, T= threatened, U undetermined, NA not applicable

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TABLE. 4.5 Recent Total Metal Concentrations Measured in the Water Column of the New York Bight Apex and HARS (Concentrations in ug/l).

Year/ Location	Ag	As	Cd	Cu	Ni	Hg	Pb	Zn
1988/ Bight Apex	NA	NA	0.034-0.087	0.39-2.3	0.35-1.9	0.0011-0.010	0.045-0.87	1.7-9.
1991/ Bight Apex	0.0004-0.012	1.4-1.7	0.025-0.087	0.37-0.70	0.25-0.29	0.005-0.009	0.046-0.11	1.0-2.
1992 HARS	NA	NA	NA	0.33-0.51	0.30-0.39	NA	NA	NA

Table taken from EPA HARS (1997)

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TABLE 4-6 Fish and Megainvertebrates of the Lower Bay Complex collected during the 1992-1997 NMFS survey and comprised~90% of the catch by numbers and weight.

Invertebrates	
Atlantic Rock Crab	Cancer irroratus
Blue crab	Calinectes sapidus
Lady Crab	Ovalipes ocellatus
Longfin Squid	Loligo pealei
Fish	
Clearnosed Skate	Raja eglanteria
Little Skate	Raja erinacea
Skate	Raja ocellata
Alewife	Alosa pseudoherengus
Atlantic herring	Clupea harengus
Bay Anchovy	Anchoa mitchilli
Silver hake	Merluccius bilinearis
Red Hake	Urophycis chuss
Spotted hake	Urophycis regia
Northern Searobin	Prionotus carolinus
Striped Searobin	Prionotus evolans
Striped Bass	Morone saxatilis
Black Sea Bass	Centropristis striata
Bluefish	Pomatomus saltatrix
Scup	Stenotomus chrysops
Weakfish	Cynscion regalis
Spot	Leistomus xanthurus
Tautog	Tautoga onitis
Butterfish	Peprilus tricanthus
Summer Flounder	Paralicthys dentatus
Windowpane	Scophthalmus aquosus
Winter Flounder	Pleuronectes americanus

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TABLE. 4-7 Vehicular Noise Levels - Middletown Township, Monmouth County, NJ
(Sound level in dBA at 50 feet from center line of vehicle travel)

	Speed Limit		
Vehicle Class	35 mph or less	Over 35 mph	Stationary
Motor carrier vehicle of 10,000 lbs or more Engaged in interstate commerce	86	90	86
Motor vehicles of 10,000 lbs or more	86	90	
Any motorcycle	82	86	
Any other motor vehicle combination or vehicles towed by any motor vehicle	76	82	

TABLE. 4-8 Water Quality Concentrations in the Kill Van Kull at Shooters Island

Parameter	Value	1991	1992	1993	1994
DO	mg/l	5.o	5.9	8.5	7.0
TSS	mg/l	15		2.0	13
Secchi disk	ft	4.4	4.8	5.0	4.3
Dissolved ammonia	mg/l	0.54	0.49	0.49	0.50
Nitrate & nitrite nitrogen	mg/l	0.49	0.57	0.68	0.55
Total phosphorus	mg/l	0.23	0.17	0.18	0.20
Ortho phosphate	mg/l	0.16	0.16	0.12	0.15
BOD 5-day	mg/l	1.3	1.4	1.5	1.2

Source NYCDEP (1993, 1994, 1995)

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TABLE. 4-9 Waterbody Locations Where Toxics are Suspected of Impairing Waters Based Upon Discharges From Point Sources

WATERBODY NAME	WATERBODY DESCRIPTION
Hackensack River	From the Oradell Reservoir to the confluence with Newark Bay. (Reach #:02030103001)
Upper New York Bay	From the confluence of the East River to the confluence with the Kill Van Kull.
Newark Bay/Arthur Kill	From the confluence with the Passaic and Hackensack Rivers to the confluence with the Rahway River and the confluence with the Upper New York Bay. (Reach #: 02030104002)
Arthur Kill	From the confluence of the Rahway River to the confluence with the Raritan River Bay. (Reach #: 02030104003)
Raritan Bay	From the confluence of the Arthur Kill/Raritan River to the confluence with the Waackaack Creek. (Reach #: 02030104005)
Lower Millstone River	From the confluence with the Bedens Brook to the confluence with the Raritan River. (Reach #: 02030105026)
Mid Millstone	From the confluence with the Stony Brook to the confluence with the Bedens Brook. (Reach #: 02030105028)
Lower Pequest River	From the confluence with Bear Creek to the confluence with the Delaware River. (Reach #: 02040105013)
Whippany River	From the headwaters to the confluence with the Rockaway River. (Reach #: 02030103024)
Passaic River	From the confluence of the Dead River to the confluence with the Whippany River. (Reach #: 02030103025)
Raccoon Creek	From the confluence with the South Branch Raccoon Creek to the confluence with the Delaware River. (Reach #: 02040202004)
Kings Creek	From the headwaters to the confluence with the Rahway River.
Hudson River	From the New York/New Jersey State boundary to the confluence with the East River. (Reach #: 02030101005 and 02030101009)

Note: Toxic discharges defined here are based upon USEPA's has as 126 "priority pollutants". Use impairment in these waters are currently only suspected; these are not necessarily waters with known problems. This list is based upon violations of USEPA's federal acute toxicity criteria as observed in Discharge Monitoring Reports in concert with ambient monitoring water quality data from the receiving water in questions.

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TABLE. 4-10 Significant Statewide Water Quality Trends Over 11 Year (1976-1986), and 7 Year (1980-1986) Period For NJ Waters.

Parameter	11 Year	7 Year
Nitrogen, Total	▲▼	▼▲
Dissolved Oxygen	▲	▲
Nitrogen, Organic		▼
Organic Carbon, Total	▼	
Phosphorus, Total	▼	▲▼
Ammonia, Total	▲	▼
Fecal Streptococcus	▼	▲
Fecal Coliform	▲	▲▼
Alkalinity	▲	
Specific Conductance	▲	▲
Lead, Total	▼	
Calcium, Dissolved	▲	▲
Magnesium, Dissolved	▲	▲
Sodium, Dissolved	▲	▲
Chloride, Dissolved	▲	▲
Sulfate, Dissolved	▲▼	▲▼
PH	▲▼	▲▼
Solids, Dissolved		▲
Potassium, Dissolved	▲	▼
Floride, Dissolved	▲	▼
Trace Metals	▼	▼

Legend:

▲: General Statewide Increases
▼: General Statewide Decreases
▲▼: Parameter Exhibited Both Increases and Decreases
▲▾: Parameter Exhibited Mostly Increases
▼▲: parameter Exhibited Mostly Decreases

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TABLE. 4-11 Water Quality Index Categories, Components, and Criteria for Assessing New Jersey's Rivers and Streams.

Criteria Category	Component	(Index Value of 20)
Temperature	Temp. Cold-water fishery	19 C
	Temp. Warm-water fishery	28 C
Oxygen	Dissolved oxygen-Trout Production	7 mg/l
	Dissolved Oxygen-Trout Maintenance	5 mg/l
	Dissolved Oxygen-Non-trout	4 mg/l
PH	DO Saturation	80,120 %
	pH-Non-acidic waters	6.6 – 8.5 SU
	pH-Pinelands naturally acidic	3.5 – 5.5 SU
	pH-Non-Pineland naturally acidic	4.5 – 7.5 SU
Bacteria	Fecal Coliform	200 MPN/100ml
	Total Coliform	2400 MPN/100ml
Nutrients	Total Phosphorus-Free flowing waters	10 mg/l
	Total Phosphorus-Above impoundment	0.05 mg/l
	Total Kjeldahl Nitrogen	2.5 mg/l
	Total Inorganic Nitrogen	2.0 mg/l
Solids	Total Dissolved Solids	500 mg/l
	Conductivity	750 micromhos
Ammonia	Un-ionized-Warm waters	0.05 mg/l
	Un-ionized-Trout waters	0.02 mg/l
Metals	Total Lead	50 ug/l
	Total Copper	50 ug/l
	Total Mercury	0.50 ug/l
	Total Cadium	4.0 ug/l
	Total Chromium	50 ug/l

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TABLE 4-12 Acreage for Parks in Monmouth County, New Jersey

Park	acres
Federal	
Gateway National Recreation-Sandy Hook Unit	4169
State	
Allaire	3080
Monmouth Battlefield	1812
State Wildlife Management Areas	
Assunpink	5600
Manasquan	753
Turkey Swamp	2457
County	
Conservation Area	
Fisherman's Cove Conservation Area	52
Golf Courses	
Pine Brook Golf Course	61
Bel-Aire Golf Course	78
Shark River Golf Course	176
Hominy Golf Course	183
Howell Park Golf Course	306
Charleston Springs Golf Course	615
Linear Parks	
Henry Hudson Trail	95
Manasquan River Linear Park	657
Recreation Area	
Wolf Hill Recreation Area	91
Sunnyside Recreation Area	129
Dorbrook Recreation Area	512
Telegraph Hill	
Regional Park	
Bayshore Waterfront Park	130
Huber Woods Park	258
Holmdel Park	338
Big Brook Park	378
Clayton Park	409
Thompson Park	665
Shark River Park	725
Hartshorne Woods Park	736

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Table 4-12 (continued) Acreage for Parks in Monmouth County, New Jersey	
Turkey Swamp Park	911
Crosswicks Creek Park	1011
Special Use Area	
Longstreet Farm	9
Monmouth Cove Marina	10
Mount Mitchell Scenic Overlook	12
Seven Presidents Oceanfront Park	36
Walnford-Historic	36
Deep Cut Gardens	52
East Freehold Park & Showgrounds	81
Manasquan Reservoir	1204
Unclassified	
Baysholm Tract	71
Durand Tract	90
Weltz Park	165
Tatum Park	368
TOTAL	28,521

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5 IMPACT ASSESSMENT

5.1 Introduction

a. The DMMP is an evolving process designed to address an existing environmental problem through comprehensive, long-term (2000-2040) management in which dredged material is used, to the extent possible, as a resource for beneficial environmental applications. In recognition of the uncertainties associated with future sources of dredged material, and uncertainties regarding the availability of some of the management options, the plan also provides for contingency disposal only options that have minimal environmental impact.

b. The plan goes beyond dredged material management in that many beneficial options address other environmental problems or use dredged material to create, enhance or restore valuable habitats. In addition, the plan includes a program to reduce sediment contaminant levels that are a limiting factor for some management options. This is in keeping with the dual goals of the DMMP planners to maintain the Port and protect the estuary. It is important to recognize that because of the progressive approach taken in the DMMP beneficial impacts become paramount in this assessment.

c. The feasibility, potential availability and siting information for the options considered for inclusion in the DMMP vary widely, thus the assessments cannot be taken to the same level of detail for each option type or site (when applicable). However, because this is a programmatic EIS, there is sufficient information to compare the basic options types to develop an environmentally acceptable recommended course of action (see the DMMP main report and Technical Appendix for additional information on developing the recommended course-of-action.). There is a very large existing information base on dredging and dredged material management that provides support for this Port of NY/NJ Harbor specific planning function. The plan is designed to be flexible in recognition of the changing status of options, changing environmental priorities and the potential for reductions in sediment contaminant levels in the future.

d. Initially, a large number of dredged material management options were identified in an Interim Report (NYD 1997) for their applicability to the needs of NY/NJ Harbor (see Section 1.5 of the DMMP). The potential list of options and sites was reduced as presented in a DMMP Progress Report (1997). The Progress Report included comments from state officials in New York and New Jersey, the Port Authority, the Dredged Material Management Integration Work Group (DMMIWG) of the Harbor Estuary Program and from the public through eight public meetings. A Senior Executive Review Group (SERG) had the task of reviewing the remaining options and assigning a preference ranking (see DMMP Table 2-2) to each option, as well as a status ranking which defines the options current availability. The availability of an option was based on

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its status with respect to permits, overall sponsor approval, engineering status and technical/environmental feasibility.

e. The options are grouped into alternatives which are potential courses of action for dredged material management. Grouping of the options is needed because no single option can provide for all of the dredged material that will be produced during the 40 year planning period. The alternatives reflect the dual goals of the plan, the need for flexibility and the desire to achieve environmental benefits from the management of dredged material. Four alternatives were developed for consideration:

- No Action
- Recommended Course of Action
- Environmentally Preferred Alternative
- Base Plan (Economically Preferred Alternative)

f. These alternatives are described in detail in Chapter 3 of the DMMP. Because management options are grouped in the alternatives, the assessment of the alternatives is presented in the cumulative impact section (5.6 Cumulative Impacts of Alternative Plans). The Recommended Course of Action alternative includes near term (2000-2010) and long-term (2011-2040) time periods, which generally reflect the period in which substantial new navigation work may occur in the harbor as well as maintenance dredging (near term) and a period when the majority of dredged material is from maintenance of facilities in place by 2010 (long-term).

g. This PEIS is not the final step in the environmental review process for implementing dredged material management options. The DMMP provides a guide to options and sites where implementation could occur in an environmentally sensitive manner. Site-specific applications of selected options would include permitting at Federal, state, and local levels (as required) with an associated environmental review. This review would include information developed from site-specific surveys and analyses, as appropriate for the magnitude of anticipated impacts and would be presented in subsequent NEPA documents.

h. The DMMP is a comprehensive, long-term plan that evaluates options over a broad potential impact area. With its emphasis on beneficial use, the DMMP will become a focal point for environmental management in the harbor.

i. Section 5.2 begins with a discussion of general impact considerations that are common to the options and provides perspective on the assessments. The potential impacts of the option types are addressed successively as they are presented in Chapter 3. This is followed by a section on environmental justice. The assessment includes options that are in the "not preferred" category to provide a complete comparison of impacts and to show the basis for this status designation.

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j. The temporal and spatial boundaries for this assessment are defined by the scope of the planning function. The DMMP has a planning horizon of 40 years, but a relatively near-term horizon of 10 years. The availability associated with options varies from existing and permitted options to others for which feasibility is still under study. For those option types in a pilot study stage, results would be available within the near-term horizon. For the sediment contaminant reduction option, a long-term program of pollution reduction spanning the 40-year planning horizon is anticipated. Significant reductions in contaminant levels are expected within the DMMP planning horizon.

k. The plan has been formulated so that it has sufficient capacity to allow shifting among the options as sites reach capacity and new options become available, fail to be operational as planned, or are shown to be infeasible. The disposal-only contingency options provide a fallback position that can be applied on an as needed basis if beneficial uses cannot meet placement capacity needs. In summary, the temporal boundary for impacts can only be described in broad terms, with the timing of specific activities dependent upon the pace of harbor dredging activities and the changing availability and cost of management options.

l. The spatial boundary for the assessment spans the potential location of all possible option sites. Fig. 5.1 shows the study area and major aquatic subareas that were the basis for planning evaluations and the description of the affected environment. The upland subarea boundaries are indefinite in that individual sites are spread across a broad area and could include a number of distant sites if the mine remediation option proves to be feasible and practical. There are many potential candidate sites in the upland section that may develop within the near-term horizon. Fig. 5.1 shows the Seaboard and Bayonne land remediation sites because they are currently permitted sites in this category.

m. Temporal and spatial boundaries are not critical to this assessment because options would not be implemented until they are shown to be feasible and environmentally acceptable at a specific site. For many of the beneficial use applications, the site is selected on the basis of the need for remediation, thus the spatial boundary would be dictated by the needs of the site. Where siting considerations could be important with regard to potential environmental impacts, they are discussed with each option type.

5.2 General Impact Considerations

a. Large areas of aquatic habitat in NY/NJ Harbor have been dedicated to navigation facilities for many years. Sedimentation in channels and berthing areas requires regular dredging to maintain these facilities. Much of the sediment contains contaminants from various sources past and present in the harbor watershed. Despite the repeated physical disruption of habitat associated with dredging, and the presence of contaminants, the harbor maintains important aquatic resources, which have increased in abundance and expanded their distributions in response to improved water quality conditions in the past several decades. There is a general trend of decreasing contaminant levels and less

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habitat disruption in the harbor on a gradient from the Upper Bay Complex, to the Lower Bay Complex and to the New York Bight Apex. The effects of habitat disturbance and contaminants are generally widespread in the Upper Bay Complex and localized in the Lower Bay Complex and New York Bight Apex. These observations are important for the selection of the recommended course-of-action and sites from among the available choices.

b. The approach taken in the DMMP is to minimize new impacts to the aquatic resources of the harbor by utilizing dredged material in beneficial applications, primarily the remediation of degraded aquatic and upland sites. The major sites in the recommended course of action (HARS, brownfields, landfills) are sources of contaminants that are adversely affecting the aquatic environment, and in the case of the upland sites, they are of concern with regard to human health and other ecological receptors. Thus, the DMMP approach has the dual purpose of managing dredged material and remediating existing degraded habitats. The DMMP minimizes the spread of contaminants to unimpacted areas and confines the habitat disturbance associated with dredged material management to already disturbed areas. This is sound environmental planning that produces general ecological benefits.

5.3 Assessment Of Option Types

a. The options to be evaluated are presented in the DMMP and briefly summarized in Chapter 3 of this EIS (cross reference summary table). They include general option types and a large number of sites involving a variety of activities depending on the basic option type under consideration. Because this is a programmatic EIS, this assessment will address only the option types with some consideration of individual sites in the case of existing facilities or where substantial data and analyses are available.

b. Among the option types, the depth of the assessment will vary depending on the level of development and the availability of information. The depth of assessment will range from a qualitative discussion to an assessment of specific environment issues that are relevant to the option type. There will, however, be sufficient level of evaluation to compare among the various options with respect to option impacts and overall impacts of the alternative plans (combinations of options).

c. Because there is a large number of option types and sites, tabular summaries of the potential impacts of option types have been prepared to permit comparisons among related options and to condense the information for convenient reference (Tables 5-1, 5-2, and 5-3). Summary tables were prepared for Contaminant and Sediment Control, Beneficial Uses and Confined Disposal Facilities, including Confined Aquatic Disposal Facilities. The groupings of option types in these summary tables generally follows the major groupings in the DMMP. Within Beneficial Uses, ocean remediation, habitat creation, enhancement, and restoration, and land and mine remediation are the option types summarized.

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d. In the Confined Disposal Facilities (CDF) summary, confined aquatic disposal facilities although different than a CDF, are included with island, nearshore and upland CDF's because of their similarity to these option types and the value of comparing them.

e. In the process of outlining this assessment and in the development of the summary tables, it became evident that there was little or no potential impact for some of the environmental issues typically addressed in an EIS. Cultural resources, air quality, noise, and aesthetics will be discussed as a group for each option type and any potential site-specific concerns will be presented in that discussion. With respect to air quality, options which would involve a transportation component there would be an evaluation of compliance with State Implementation Plans (SIP) under EPAs general conformity rule (40 CFR 93.150 et seq.).

f. Socio-economics is discussed for the DMMP as a whole because all of the option types share the common goal of maintaining a viable Port, in an environmentally sound and often in a mutually complementary manner, in keeping with the dual goals of the DMMP. Where there are option types with specific socio-economic impacts they will be discussed in the corresponding section for the option type.

5.3.1 Sediment Contaminant Reduction

a. The presence of contaminants was a major factor in the decision to develop and implement a DMMP. Sediment contaminant reduction is included as an option in the DMMP because future dredged material management choices will depend, in part, on the contaminant status of the sediments. The adverse environmental effects of contaminants and the added costs associated with managing contaminated sediments is a strong incentive to control sources. Because the estuary and near-shore ocean waters are the collecting points for an urbanized and industrialized area, the sediments in these waters contain a variety of contaminants with the potential for adverse effects on living resources. Under these circumstances, it is appropriate to use dredged material management as a focal point for programs to reduce contaminants at their source (Table 5-1).

b. The DMMP discusses the uncertainties associated with predictions of future contaminant levels in harbor sediments. Reliable predictions of trends in contaminant levels would be valuable for the ongoing management of dredged material, but such predictions are not needed to assess the impact of contaminant reductions.

c. While upland source control is the primary approach to reducing contaminant levels, the management of existing in-water contaminants is a companion part of the program. The dynamic nature of estuarine sediments causes the redistribution of in-place contaminants throughout the harbor. Maintenance dredging and some of the proposed new channel work represents a removal mechanism which, in combination

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with the proposed beneficial use options, will lower contaminant levels in the short-term. In the case of HARS, land remediation, brownfields and landfill, some control of the in-water and upland sources of contamination will be achieved. With source control gradually reducing inputs and maintenance of new work dredging successively removing in-place contaminants there would be a long-term trend toward clean sediments.

d. An additional companion to contaminant reduction from among the DMMP options is the development of decontamination technologies. A primary use of decontamination would be to treat the sediments from in-water sites with very high contaminant levels. These sites, while containing relatively small volumes of sediment, represent major sources of contaminants for the harbor. Decontamination would be an important component of a coordinated regional program for contaminant reduction.

e. The sediment contaminant reduction option is exclusively a beneficial impact with regard to this planning function. All resource categories benefit from or are unaffected by contaminant reduction. The activities associated with the control of sources or remediation of specific sites could involve important issues related to the safe handling of contaminants and other site-specific factors. This EIS does not evaluate site-specific remediation plans because they are not yet available for most sites. The site-specific assessment of impacts would occur as part of the permitting process sites. It is assumed that the site-specific assessments would identify and provide for management of any potential local adverse effects related to control of source inputs. This process has already occurred with regard to the existing Seaboard and Bayonne sites. Remediation plans were reviewed by state and Federal environmental agencies and mitigation requirements were applied to these sites for impacts related to wetlands.

5.3.2 Sediment/Dredging Reduction

a. The goal of this option is to reduce the need for dredging to the extent possible. A primary factor in dredged material management is the large volume of sediment that eventually consumes beneficial use options or disposal sites, requiring the development of new sites on a continuous basis. Reduction in sedimentation in the navigation channels has the direct benefit of diminishing the dredged material management problem as well as the benefit of potentially eliminating the effects of dredging, or reducing the frequency of dredging (Table 5-1).

b. The methods available for sediment dredging reduction as outlined in the DMMP and described in Chapter 3 (Section 3.3.2) include watershed sediment reduction control, channel design optimization, advanced maintenance dredging and structural modifications. These methods would be applied almost exclusively in the Upper Bay Complex subarea. The application of the methods could involve large areas of harbor

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substrate (channel design optimization, advanced maintenance dredging, sedimentation basins) or small areas, primarily at berthing facilities (pneumatic barriers). The area over which a specific method would be employed and the number of applications within the harbor would be significant factors in the level of impacts.

c. Some of these methods are being evaluated for use in the harbor now. The Office of New Jersey Maritime Resources is currently conducting a pilot study of a pneumatic sediment suspension system at the IMTT facility in Bayonne. A second system has been permitted for the Tosco facility in Linden and will be installed later this year. The current New York & New Jersey Harbor Navigation Study is taking into consideration channel design optimization and other sediment control methods in the areas that past modeling has suggested may benefit from their application (see Section A-2 of the Technical Appendix).

d. With the exception of the proposed projects discussed above for berthing areas, sites for the potential application of the available methodologies cannot be identified at this time. The following discussion addresses only the potential generic impacts of this option type.

e. A significant benefit of this option is the reduction in future dredging costs. Over the 40 year life of the DMMP, it is estimated that contaminant reduction could reduce dredging costs by 850 million dollars. This estimate is based on the assumption that non-HARS material costs $25/cy more on the average to manage than HARS material.

5.3.2.1 General Conditions

a. This option type would entail both beneficial and adverse impacts distributed over a wide area and extensive time frame if the methodologies being considered attained widespread use. Benefits accrue from the elimination of or reduction in the frequency of dredging and its disruption of the benthos and water column, and the associated reduction in dredged material disposal needs. In that this can occur in areas that are naturally scoured by realigning channels there would be no loss or change of habitat. Adverse impacts would occur primarily through substrate disturbances or changes in substrate type, that occur from options that alter natural conditions, such as channel optimization, barriers and basins. These changes could translate into effects on benthos and possibly fish that feed on the benthos. With regard to the reduction in the need to dredge, there is the potential that in shifting sedimentation away from selected locations (berthing areas primarily) there would be an increase in the need to dredge other areas. For example, if a series of berths along a channel were utilizing a scour method to maintain a desired depth, the adjacent channel may fill more quickly. In such a case the need to dredge may not be reduced and could possibly be increased depending on local sedimentation patterns in the channels. This serves to

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emphasize the need to model or otherwise assess the nearfield and farfield effects of these options on a site-specific basis before implementing them on a large scale.

5.3.2.2 Water Quality

a. Water quality impacts of this option will generally be very small because the proposed activities would not add or remove chemical constituents and the change in sedimentation rate would be a very slow process in most cases. The initial use of scour methods in an area containing a build-up of sediments could create a short-term resuspension of fine-grained material containing contaminants. This effect, however, would be limited in duration and areal effect, essentially keeping material already in suspension moving for the brief time period needed to carry the suspended particles beyond the area being protected. Pneumatic devices for sediment suspension may also increase dissolved oxygen in the water column.

b. An important perspective regarding water quality effects is the fact that the sediments and any associated contaminants that would be influenced by the methodologies in this option type are already in the aquatic habitat of the harbor. The proposed methodologies would cause a redistribution of sediment in areas where sedimentation is generally high and contaminants are widespread. Under these circumstances, there would be no significant adverse impacts.

5.3.2.3 Benthos

a. Benthic invertebrates, both in-fauna and epibenthos would experience primarily indirect effects from sediment reduction activities. Wherever sedimentation patterns are changed a substrate change can be expected in both the treated area and sites receiving increased or reduced sedimentation. A change in substrate (including grain size, depth, current regimes) would be followed by site-specific changes in the benthic community because these factors have a major influence on community structure. Whether such changes would be beneficial, adverse or neutral depends on the type of change and the size of the affected area. These are site-specific question that would be answered in site specific NEPA documents. However, existing information on harbor benthos can provide perspective on this question.

b. Fine grained sediments are widespread in the harbor and generally contain a benthic community that is low in diversity but relatively high in productivity. The community is dynamic, experiencing natural and man-induced changes that disturb the substrates. The community has been found to recover quickly from disturbances. Low levels of contaminants are widespread in the harbor, thus the benthic community is constantly exposed to these contaminants. Based on these considerations a redistribution of sediments caused by dredging reduction options would not have a significant adverse impact on benthos, possibly allowing for the

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expansion of communities living in fine grained material to areas that do not have to be dredged.

5.3.2.4 Other Living Resources

a. This subsection addresses living resources other than benthos. The potential for impacts on these resources is limited by the types of changes potentially induced by the methodologies in this option type. The redistribution of sediments would mimic natural processes and existing disturbances such as dredging and the propwash of ships. These factors have been a feature of the harbor environment for many years and the existing aquatic community has adjusted to their presence. This option type does not introduce a new factor that would significantly alter harbor habitats. The placement of physical structures in the water (dikes, sills, detention basins) would represent a small area of habitat loss which limits any adverse effects. However, if structures were applied on a widespread basis or to large channels or anchorage areas, or if substantial channel optimization occurred the impacts associated with construction and operation would have to be evaluated on both a project specific basis as well as cumulatively, because of the large area of habitat potentially affected.

5.3.2.5 Essential Fish Habitat

a. The potential impacts on essential fish habitat (EFH) is very limited because the application of these methodologies is restricted to areas that have been previously disturbed when the facilities were developed. The Upper Bay Complex is the only area that would be affected by this option. Some channels and berthing areas may have important seasonal uses, such as wintering habitat for fish and crabs. Habitat value could be reduced or enhanced depending on the direction of the change associated with the activity. EFH is not expected to be adversely affected by several of the techniques that could be employed such as silt screens at berths. Channel straightening could directly affect eggs or larvae of several species such as winter flounder or windowpane. Indirect effects by the loss of feeding habitat for juveniles and adults could occur on the side slopes that were lost due to the straightening. However, other sections of the former channel that would be filled could eventually become feeding sites. Since the sites that might be straightened are not expected to be extensive, substantial adverse impacts are not expected. Maintaining deep water in berthing areas (interpier basins) may enhance habitat for juvenile striped bass, and shifting substrate from silt to sand may enhance wintering habitat for crabs. Habitat changes that went in an opposite direction (loss of depth and a shift to silt substrate) would represent and adverse effect for these species. As with benthos; the actual effect on fish habitat would depend on the spatial extent of the changes.

5.3.2.6 Summary

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a. Sediment dredging reduction incorporates a wide range of physical modifications to reduce the build-up of sediments in selected areas. Applications of these techniques in a small number of berthing areas would have little impact on aquatic resources. However, as the number of applications increased, or if there was an attempt to control sedimentation in a large area, site-specific evaluations including cumulative assessments, would be needed. The planned small scale projects will provide a baseline of information on applications of scour techniques to berthing areas. Additional studies would be needed for any large scale applications of sediment reduction options that might be recommended under the NY/NJ Harbor Navigation Study. These options have little or no potential for adverse effects related to cultural resources, air quality, noise levels or aesthetics, with the exception of channel modifications. Large-scale changes would modify the aquatic habitats on the channel slopes and possibly disturb buried cultural resources.

5.3.3 Beneficial Uses

a. Table 5-2 summarizes the major option types in the beneficial use category. The table contains a concise statement of the approach and a brief description of the option type. A more detailed summary of this approach and the options is presented in Chapter 3, and more detailed descriptions are provided in the DMMP and its technical appendix. The potential impact on selected environmental areas of concern are presented in a comparison format. Beneficial use contains the options that are preferred based on the progressive approach taken in the DMMP.

b. With regard to Essential Fish Habitat, since the goal of the beneficial uses of dredged material is to do no harm and indeed most techniques would be used to improve habitat, adverse impacts to EFH from employment of any of the beneficial uses are generally not expected, for applications such as ocean remediation, creation of shellfish habitat, and reefs. Sites would generally be selected based in part to support the goals of EFH. Once sites are identified, EFH impacts would then be specifically addressed under a site-specific NEPA review.

c. While the following sub-options are categorized as beneficial uses, some of their applications at selected locations could have adverse impacts but the net effect would be positive. The following assessments are generic except where specific site or environmental issues are clearly defined by the information at hand.

5.3.3.1 Ocean Remediation

a. This option type is presently limited to the Historic Area Remediation Site (HARS) in the New York Bight Apex subarea. The history of the use of this site for dredged material disposal, documentation of existing contaminants, the decision to close and redesignate the site and a site management plan along with analysis of impacts are reported in a Supplemental Environmental Impact

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Statement (SEIS) (EPA 1997). It was concluded that the benthic habitat could be restored and the loss of contaminants controlled by capping the site with clean material. The information on this site is too voluminous to summarize here, but as a fully permitted site, it represents the primary zone for placement of dredged material that meets the criteria for ocean placement. With a minimum capacity on the order of 40 MCY (full site cap 1 meter thick) and the potential to increase capacity by adding to the cap, this site will be an important element for the DMMP throughout the near-term horizon and possibly for the longterm.

b. The beneficial impact of remediating the site was established in the SEIS, and monitoring is in progress to document changes in substrate conditions and the aquatic life community as remediation takes place. The management plan contains provisions to control remediation to avoid placement of inappropriate dredged material. The management plan in conjunction with the monitoring would allow refinements to the remediation program should monitoring reveal unexpected problems.

c. HARS is the first attempt at ocean habitat remediation in the United States, thus it has value as a test of this concept. There are other waste dumping sites in the Bight Apex that could be remediated in a manner similar to HARS. The monitoring at HARS would contribute to the evaluation of these other ocean remediation sites. HARS monitoring would also provide useful information on the potential habitat recovery if existing pits or other degraded areas in the Lower Bay subarea were considered for restoration. Although the filling of a pit or other restoration option may be a somewhat different concept for managing dredged material, the information on the recovery of benthic habitat at an open water site would be applicable.

5.3.3.2 Habitat Creation Enhancement and Restoration

a. This option type includes a wide variety of approaches with a common goal of creating desirable habitats or improving habitat conditions in degraded areas (Table 5-2). The role of dredged material would be to modify physical conditions of selected sites so that the site can be designed for a specific habitat type. The dredged material may be used as the final cover or as a base on which additional covering would be added depending on the site objectives. Sites selected would generally be of low value in their existing condition, but siting could include functioning habitats which would be converted into rare habitats or other more valuable habitats than existing conditions. A recent study conducted in support of the DMMP provides a summary of information on this option type, including descriptions of selected applications, evaluation of potential sites for some applications and the potential benefits and impacts associated with each application (BUA 1999, draft).

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b. This option addresses the dual goals of the DMMP directly in that it achieves dredged material disposal and restoration of harbor habitats at the same time. Land remediation provides a comparable approach for upland areas. However, the use of dredged material for aquatic habitat restoration is untested in NY/NJ Harbor. A rigorous, phased test program could be undertaken to select sites and evaluate results before there is widespread application of this approach. The testing would involve before, during, and after sampling of physical, chemical, and biological parameters. Among the factors likely to be studied would be depths, currents water quality, sediment chemistry, benthic communities and fish. Modeling could be used to evaluate potential changes followed by field data to verify the models. This type of sampling and analysis would provide a basis for using models along with field sampling for assessing impacts of larger applications of this option.

c. Applications of this option type occur primarily at aquatic sites in the study area, but upland applications for bird or other wildlife habitats are among the possibilities under consideration. Much of the restoration work would be at sites which have been previously identified as being degraded, of low value, or abundant in order to justify conversion to more valuable or less abundant habitat types. Creation and enhancement sites have been evaluated on a preliminary level for some options, but a site selection process would be needed to refine these and identify sites for other options.

d. A significant impact consideration of this option type is that most applications involve habitat trade-off issues, replacement of an existing habitat with another. There should be reasonable expectation of habitat quality improvement either directly by creating new habitat or improving existing habitat, or indirectly by confining contaminated sediments or improving water quality. Some applications would involve the use of non-HARS material for initial fill to adjust the site elevations before it is capped and isolated from the biota. The initial placement would cause temporary and very limited exposure to contaminants during construction, and the end product would be a higher value habitat in an area that was previously degraded itself, and may have contributed to the degradation of other areas. All projects that use non-HARS material will look to contain the material, whether by capping or some other means. Best management practices such as berms to confine the placed material, limitations on the timing of disposal events in relation to tidal conditions and controls on the positioning of the dump scows to maximize the confinement of placed material will be used to minimize effects outside the site during construction.

e. All habitat restoration projects must result in an improved environment, thus by definition, they will not cause significant adverse impact on the environment. Those options may have some short term negative environmental impacts but if

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the overall benefits exceed impacts they may still be justified. Created or restored habitats which are in limited supply in the study area or those that could support species of concern would increase the probability of a net habitat improvement. If it could not be reasonably demonstrated that habitat improvement would result, a project would not be justified.

f. Habitat improvements are not restricted to this option type. At sites where land remediation is the primary objective, the future use of the remediated site could include habitat creation for selected species or habitat types. Landfill capping in the Meadowlands or elsewhere may be part of a habitat creation program. Mine land reclamation has the potential to restore habitat over very large areas. An ocean island and/or nearshore confined disposal facilities could also be sites for habitat development when the fill is completed, but this would be mitigation, not restoration.

g. The following subsections address the generic impacts of habitat creation, enhancement and restoration. Section 5.3.3.3 is specific to habitat restoration at existing degraded pits because of the potential significance of this option for managing large volumes of dredged material and restoring large areas of habitat in Lower Bay and Jamaica Bay.

5.3.3.2.1 Surface and Ground Water Quality

a. Impacts associated with habitat related creation, enhancement or restoration would be site specific, but would share the common goals of providing adequate water quality for the ultimate habitat function. Some temporary, localized adverse impacts would occur during the placement of dredged material, primarily increases in turbidity. Where stabilized dredged material is used, the loss of contaminants would be very small because the contaminants are chemically bound in the production of the fill material. Where untreated material is used it would be capped to contain and isolate contaminants from biota. Construction effects on water quality are controllable through various techniques, such as silt curtains, berms and management practices that limit placement to specific tide stages or other conditions that minimize the spread of material. The presumption is that habitat projects would include water quality protection as a condition in their permitting. Linings of plastic or earthen material will be considered on a case-by-case basis. Where wetlands are constructed, they may provide a water quality benefit in that the wetland can filter suspended solids from overland runoff.

b. Where dredged material is used to fill existing pits, documented by studies to show degraded conditions, there would be a long term improvement in water quality in the project areas. These sites may utilize stabilized dredged

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material to accomplish the fill or untreated non-HARS material that is capped. Capping of the fill with clean material could be used to isolate the fill material from the surrounding surface water and groundwater, as necessary.

5.3.3.2.2 Benthos

a. Much of the in-water habitat options would involve aquatic sites where there would be some benthic community present but the community would be surveyed to establish its actual value and filled only if it was of limited value. Surveys could include sediment profile imagery, benthic grabs, and overhead photographs to verify the former findings. Water chemistry and turbidity could also be measured. Surveys would be performed before, during, and after placement of dredged material. Changes to the physical habitat would generally eliminate the existing degraded benthic community because the placement of dredged material is the initial step in these habitat improvement applications. This loss would be replaced by a higher value benthic community in the new habitat which would have cleaner sediments and improved water quality. The substrate characteristics would be chosen to create a new community that would be of higher value than the original, although it may be of a substantially different type and substrate. The new benthic community would be characteristic of the habitat type that was selected to replace the existing community because of its higher value or greater rarity, (enhanced or restored). For example, a reef constructed of rock in an area of sandy substrate would eliminate the benthic community in the sand and replace it with a benthic community adapted to attachment on hard surfaces and to living in the interstices (spaces) of the reef.

b. The new benthic community would be appropriate for the new habitat and the fish expected to utilize the reef. This same process would apply to such habitat options as shellfish beds, oyster habitat, wetlands and mud flats. The sites selected for habitat applications would not be high value benthic communities.

5.3.3.2.3 Fish and Megainvertebrates

a. All of the aquatic habitat options would have a beneficial impact on fish and megainvertebrates if site development creates a net improvement in habitat value. The type and magnitude of beneficial effect will vary among the options and could be life stage specific. Wetland creation would benefit primarily juvenile fishes, while reefs would benefit many life stages depending on species. Some options could include elements that favor selected species, such as the design of reef elements to favor species which prefer small interstices in the rock.

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b. Temporary, localized adverse impacts would be associated with construction at the habitat improvement sites. Existing habitat value would be lost and eventually replaced by higher value habitats. Some of the options have been applied with success (reefs and wetlands) in the local area, while others have been demonstrated elsewhere (shellfish beds, oyster habitat, mud-flats) or are in a developmental stage. One concern regarding shellfish bed creation is that some areas of the harbor are not certified for harvesting. Shellfish bed creation in these areas could become an attractive nuisance if the shellfish were illegally harvested. For all of the options that are not a proven technique for habitat improvement, proper site selection and use of a trial site test would precede any widespread applications. The selection process would be important to ensure that sites with high existing value are avoided and those with a high potential for successful conversion are used. Monitoring after treatment would provide information for possible refinements to avoid adverse effects, to maximize value, and to plan for additional restorations.

5.3.3.2.4 Terrestrial Wildlife

a. Applications involving shorebird habitat and wetland developments could influence terrestrial wildlife. Birds would make use of most habitat sites to some extent, while terrestrial habitat use but other wildlife could be limited by the surrounding land uses. The magnitude of beneficial impact would be highly site specific and may be controlled to some extent by the project objectives. Habitats designed to enhance specific life history needs of species of concern would attain high value if they were successful. As with all options in this category, projects would not be undertaken unless there was a reasonable probability that the project would produce increased habitat values.

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5.3.3.2.5 Endangered and Threatened Species

a. This option has the potential for beneficial impacts on selected species in the study area and very low potential for adverse impacts. There is a substantial database on the occurrence of and habitat use by endangered and threatened species in the study area. Habitat development projects would be sited to avoid existing habitats for these species and construction work would be limited as needed for seasonal occurrences or breeding activity of these species. Transient species such as migratory birds, marine mammals and sea turtles generally occur in very low numbers and for short periods of time at any given location. Their potential for interaction with a habitat development project would be very small.

b. Projects would avoid known habitat for endangered and threatened species unless the projects were designed specifically to enhance or restore habitat for one of these species. Piping plover nests in sandy areas such as Sandy Hook and Rockaway Point and roseate tern currently nests at Rockaway Point and possibly could nest at Sandy Hook. There is potential to expand breeding areas for these species through habitat development at Hoffman-Swinburne Islands and Floyd Bennett Field and other areas.

c. The peregrine falcon is a species which could benefit indirectly from habitat improvement projects using dredged material. The peregrine nests in urban areas and utilizes open spaces for feeding such as the Hackensack Meadowlands. Because this species is found in the subarea which has the highest concentrations of contaminants in the water and on adjacent land areas (Upper Bay Complex), habitat improvements which also reduced potential contaminant exposure may be beneficial. Capping landfills in the Meadowlands and other sites in the study area (Penn and Fountain Avenue in Brooklyn) could reduce exposure, while providing habitat for other species. Because the peregrine is a top predator it could be attracted to these new habitats to feed on an expanding wildlife population. Land fill capping which includes future habitat development should include provisions to isolate existing contaminants.

5.3.3.2.6 Essential Fish Habitat

a. Changes to EFH for life stages of several of fish are possible as a result of implementation of benefical use applications. Generally, change would, in the long-term, be of benefit although some short-term disturbance such as increase in turbidity could occur. In another instance certain species of botto dwelling EFH species would lose habitat to promote a vertical structure community which would benefit several other EFH designated species.

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b. Areas of rock placement would be at state (NY or NJ) designated sites where reef sites have been permitted because they have been found to have relatively low species diversity. Thus, the establishment or additional building of a rock reef community would provide net benefit to the area.

c. Another example would be creation of an oyster reef. The deposition of material would displace species at the site, and change habitat. The new habitat would eventually provide conditions that produce greater diversity and provide a net benefit to EFH species.

5.3.3.2.7 Cultural Resources

a. Wetland creation, enhancement and restoration proposed for areas around Jamaica Bay are of concern because this area is considered sensitive because it is likely to have prehistoric resources and an archaeological survey may be required. A geomorphologic study may be necessary to determine the potential for sites in locations now inundated or filled. A survey for historic resources such as piers, bulkheads and wharves may also be required. The scope of cultural resource investigations in connection with each technique will have to be assessed, as wetland creation, enhancement and restoration locations are determined.

b. The implementation of oyster reef and shellfish bed creation techniques, possibly in Raritan Bay, may require a remote sensing survey to ascertain if any historic resources, such as shipwrecks, may be impacted by the proposed project. The need and scope of a cultural resource survey will be determined as project locations are defined.

c. Mudflat, Bird Habitat, and Wetlands developments are possible at sites in the Upper Bay Complex. These could affect cultural resources in the area and studies would be needed as part of the planning process for specific sites.

d. No further cultural resource surveys will be needed for borrow pit restoration if project actions are limited to the borrow pit itself. Cultural resource tasks would be subject to coordination with the appropriate State Historic Preservation Office. If undisturbed areas around the pit will be impacted by proposed project actions, then additional cultural resource work will be required. This work may include remote sensing and geomorphologic studies.

e. Facilities such as piers and wharves lining the shores and derelict vessels of the Upper Bay will have to be evaluated within any project areas proposed. Many studies have been undertaken along these shores for the NYD and these studies may provide sufficient data to preclude further

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cultural resource work or may serve as a basis for determining what additional studies need to be undertaken.

5.3.3.2.8 Other Impact Issues

a. Habitat improvement projects would have little or no impact on aesthetics, air quality or noise levels. Habitat development could entail increased noise and air emissions associated with construction, but these effects would be temporary and insignificant. Wetland and upland habitats would generally improve local aesthetics compared to the degraded condition.

5.3.3.3 Habitat Restoration at Existing Pits

a. Existing pits in Jamaica Bay and several in Lower Bay have degraded conditions due to poor water quality resulting from poor water circulation. Conditions in the degraded pits may improve seasonally during winter, but bacterial mats and a very limited benthic community occur for extended periods of time.

b. An Environmental Impact Statement on the use of existing pits in the Jamaica Bay and Lower Bay (USACE-NYD, 1991) provides a detailed evaluation of impacts associated with pit use. The generic potential impacts of dredged material disposal in existing pits are discussed below for major impact issues.

c. Habitat restoration at existing pits using dredged material would follow a phased approach in which small scale projects would precede any widespread use of this option. Studies would initially use HARS suitable material in a small easily monitored pit in the confined waters of Jamaica Bay. The study of dredged material placement would be preceded by a study to confirm the degraded condition of the pits.

d. The development of habitat restoration at existing pits would follow a well defined testing sequence. HARS suitable material would be placed in Norton Basin to enhance habitat conditions. A post-placement study would be conducted to document the results. If the dredged material was placed with minimal adverse impact on surrounding habitats and if habitat conditions were enhanced, then a second placement with non-HARS material would be conducted at Little Bay. If both placement tests in Jamaica Bay produced positive results with regard to retaining material on site and habitat enhancement, a second pair of tests could be conducted at the north and south pits at Hoffman-Swinburne Islands. These pits provide small open water tests of pit reclamation. At Hoffman-Swinburne there would be sequential testing of HARS suitable material at the north pit, followed by a non-HARS material test at the south pit,

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but only if the north pit test was successful. As with the testing in Jamaica Bay, all phases of the test sequence at Hoffman-Swinburne would involve pre- and post-placement monitoring of water quality, benthos, and physical conditions at these sites. An option which could be exercised would be to begin dredged material placement at Grassy Bay, if initial survey confirmed degraded conditions at this site and the tests at Norton Basin and Little Bay were successful with regard to placement of material, containment and habitat enhancement.

e. An issue of concern for the use of existing pits is the potential loss of dredged material during placement due to erosion. These important issues would be studied as part of the project (see Section 5.3.3.3.1, below). Modeling studies show that there would be very little loss of material during placement and after a pit is capped. The initial projects would permit testing of the assumptions associated with the modeling and provide empirical data in the potential for losses.

f. The Boston Harbor Navigation Improvement Project (BHNIP) is an ongoing, joint project between the USACE and the Massachusetts Port Authority. This program provided insight into how dredged material behaves when placed in subchannel pits, but they are not proposed as substitutes for site-specific studies and monitoring. This project provides background information on the use of CAD facilities. The project involves both maintenance and improvement dredging at several locations within Boston Harbor. Improvement dredging includes deepening of three tributary channels and two areas in the Main Ship Channel, as well as several berth areas. The BHNIP also includes the construction of in-channel disposal cells. The USACE determined that all surficial sediments from channel and berth project areas were unsuitable for unconfined ocean disposal. Following a comprehensive review of disposal options (which included oceanic borrow pits, aquatic fill sites, and upland sites) in-channel disposal cells with capping were determined to be the least environmentally damaging alternative. The project was originally designed to include 54 cells occupying 116 acres located within portions of the channel to be dredged. They were to be constructed as deeply as possible, depending on the firmness and stability of the parent material. Two to nine cells were expected to be open and active at any time.

g. In Phase One of the Boston Project, surficial sediments were dredged using an environmental (clamshell) dredge. Dredging of the surficial sediments over the entire cell was completed within 24-hrs. Surficial sediments were held on a barge pending cell completion. Parent material (clay) was excavated using an open toothed bucket. Dredging of parent material required 12 days using 24-hr dredging operations. Approximately 26,500 CY of surficial sediments (3,500 from the cell footprint, 23,000 from the berth deepening) were disposed of in the

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Inner Confluence disposal cell. Disposal events were limited to the period 1-hr prior to 2-hrs following a high tide. Disposal activities were followed by a bathymetric survey to monitor conditions within the disposal cell and verify placement of the discharged sediments.

h. Capping operations in Boston began ten days after the last disposal event, and took twelve days to complete. Capping material was placed with a split hull scow. The scow opening was restricted to allow gradual discharge of the sand to minimize disruption of the silty sediments contained within the cell. Although scows were placed at 8 locations over the cell, bathymetric surveys at completion indicated that there was a central mound of sand. A sweep bar and dredge bucket were used in an attempt to evenly distribute the sand over the cell. An additional scow of sand was placed in the cell afterwards. Dredged material consolidation from late July to October totaled at least 1 to 2 ft in some locations, and was highest in areas below the thickest sand layers. Total consolidation from the final disposal event early July 1997 to October 1997 was approximately 20 to 40%.

i. After performing a post cap monitoring survey at the Boston project, the following recommendations were made for future capping operations:

- Maximization of consolidation before capping procedures. The actual waiting period will depend on the geotechnical character of the dredged material as it is placed, and could take up to 2.5 months.
- Scows should be maneuvered along designated lanes in order to cap more efficiently.
- Physical disturbance after placement of cap should be avoided.

j. The Newark Bay Confined Disposal Facility has been operating since 1997 and is approximately 40% full. This is a shallow water facility with a short connecting channel to the adjacent navigation channel. Monitoring of disposal operations in this facility has shown no loss of material outside the pit when dredged material is released from the scows. Monitoring at this facility will continue and provide information on the dispersal of material during placement (PANY/NJ 1998).

5.3.3.3.1 Surface and Groundwater Quality

a. There would be a significant beneficial impact from filling pits which have degraded water quality. Filling would reestablish bottom contours similar to the surrounding bottom, thereby eliminating the depression which created the poor water circulation. There would be a temporary, localized adverse impact to the area surrounding the pit during filling due to increases in turbidity. Because the pit would be filled slowly, there would be a gradual

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improvement in water quality as the decreasing depth of the pit would permit better circulation with the bay water.

b. The placement of contaminated sediments in the pits has the potential to cause short-term, local increases in contaminant levels. Best management practices, such as limiting disposal events to selected tidal conditions and positioning of the dump scow to maximize settling time over a pit, would minimize the loss of material during placement. Another technique to retain sediments is to limit the fill level in a pit to maintain a basin that helps retain suspended materials or to create a berm around a shallow water pit to serve the same purpose. When completed the berm could be removed and its material used to cap the site. Studies of the fate of dredged material discharged from barges has shown the vast majority of material remains as a well defined mass with little dispersion of the material as it descends in the water column (Schroeder in prep.). The pit would represent a confining mechanism for the material when it reaches the bottom. As the pit fills, the potential for loss of material would increase. This loss could be minimized by not filling the pit to capacity, which is likely to be the case because there would be room at the surface for a cap.

c. A generic water quality concern for pits is the release of pore water as the placed material consolidates in a pit. Experiments conducted by the Waterways Experiment Station (USACE 1987) show that the pore water contains few contaminants. This is because the contaminants remain tightly bound to the sediment particles.

d. Groundwater is not likely to be adversely affected by the use of pits in the Lower Bay. However, pits located near shore in Jamaica Bay would need to be evaluated because they may be close to groundwater resources.

5.3.3.3.2 Benthos

a. For restoration to be a viable goal, a pit would have to be shown to have low habitat value under existing conditions so that filling would have minimal adverse impacts on benthos and ultimately would have a beneficial impact through the development of a healthy community on the HARS suitable material or cap where used to isolate a filled pit. Benthic surveys have shown such degraded conditions exist in some of the pits. More detailed surveys would be needed to confirm this. The type of habitat that would develop on the HARS suitable material cap would depend on the material used for capping, local hydrographic conditions, and the surrounding benthic community. The establishment of an environment that more closely resembles the historic environment should result in a higher value benthic community.

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b. The use of existing pits in Jamaica Bay would involve an additional benthic habitat impact in that access channels to accommodate the dredge scows may be needed. The dredging associated with deepening these channels would cause a local adverse impact. The channels created may be maintained at or near the dredged depth to maintain flushing. Hydraulic modeling and field sampling would be conducted to evaluate the need to maintain these channels. Recovery of the benthic community in these channels would be expected, especially given the potential for water quality improvement from filling the pits.

5.3.3.3.3 Fish and Megainvertebrates

a. Impacts on fish and megainvertebrates would involve temporary localized adverse effects associated with the filling of existing degraded pits. Increased turbidity and contaminant loss into the water column would be the affects associated with filling. Because the habitat is degraded, fish use would be low thus minimizing adverse effects related to the filling operations. The poor habitat quality in pits selected for restoration would be replaced by a healthy community after filling and capping was completed. Filling would return the elevations in the pits to approximately the historic depths before the pits were excavated. Recovery of the benthic community in degraded pits would be followed by increased use by fish and megainvertebrates, with concurrent reduction in the level of contaminant uptake and magnification through the food chain.

b. The filling of existing pits that have high quality habitat could lead to a long-term adverse impact in that the new habitat of the filled cell may not be as high quality as the existing conditions. For this reason, existing pits that have data indicating high quality habitat are not under consideration for being filled. Currently this includes the large and small East Bank Pits and possibly the CAC pit. The remaining pits in Lower Bay continue to be under consideration and would have to be surveyed to establish the quality of the existing habitat.

c. Fish and megainvertebrates may be exposed to contaminants if they feed in an active pit where contaminated dredged material is being placed. The dredged material may contain food organisms from the dredging location and rapid recolonization adjacent to undisturbed areas could provide sufficient food resources to attract fish. If a pit were filled slowly or used intermittently there would be time for food resources to develop. The significance of this impact would depend on the contaminant types and concentration in the dredged material and the food pathways that may develop. The exposure of fish and megainvertebrates could be reduced to

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some extent by using interim caps or by planning the disposal operation so that a pit is filled and capped in a continuous operation, after allowing sufficient time for consolidation of the material so it can support a cap.

5.3.3.3.4 Other Living Resources

a. The potential impacts on other aquatic related living resources from using degraded existing pits are likely to be minimal in the open-water areas of Lower Bay. The open-waters of Lower Bay are not known to have high numbers of organisms such as diamondback terrapins and birds that could be adversely impacted by the filling operations. Jamaica Bay on the other hand has concentrations of birds and diamondback terrapins that may be in relatively close proximity to the CAD operations. Additional studies are needed in this area in relation to site-specific pit locations where a CAD approach may be used. Special management practices may be needed to protect the wildlife of Jamaica Bay, including seasonal restrictions or avoidance of areas important to wildlife use.

5.3.3.3.5 Endangered and Threatened Species

a. Among the endangered and threatened species that occur in the study area, sea turtles would be exposed to CAD operations in Lower Bay proper and birds, primarily the peregrine falcon, may be affected in Jamaica Bay. The potential for adverse effects on these species would be from contaminant exposure during the filling operations. The extent to which sea turtles may feed in an open CAD facility is difficult to predict, but food resources would be limited, unless the facility remained open and unused for an extended period of time.

b. The peregrine uses portions of Jamaica Bay for hunting prey, which may include shorebirds. While there is the possibly of food web transfers of contaminants from dredged material placement in pits in Jamaica Bay, it is not likely to occur. The pathways that would transfer contaminants from sediments to a top predator such as a peregrine are not direct because the peregrines do not have a direct pathway from the sediments in deep water. Once the CADs in Jamaica Bay are capped (including the potential use of interim caps), the contaminants would be isolated and would not represent a source for food web transfers.

5.3.3.3.6 Special Habitats

a. The Lower Bay Complex includes essential fish habitat (EFH) for many designated species (see Section 4.3.2.8, Chapter 4) and Jamaica Bay contains the Jamaica Bay Wildlife Refuge. Essential fish habitat is designated for selected species over broad areas of coastal and estuarine habitat. It does not indicate the importance of specific areas within the much larger general grid

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area designations. Site-specific sampling is needed to evaluate the potential for a CAD facility to significantly affect habitat for a species and life stage. Therefore, existing pits would be investigated to determine their current level of use and value to EFH-list species prior to use for dredged material disposal. A showing of a high use level for EFH species would establish that restoration is not needed and filling would not be undertaken.

b. In the Jamaica Bay Wildlife Refuge, the use of contaminated sediments in CAD facilities has the potential for adverse impacts associated with habitat disturbance. This concern would not exist where HARS suitable material is used. Contaminants are the primary issue of concern because if habitat restoration were accomplished using contaminated sediments, the benefits of habitat restoration could be outweighed by the adverse impacts associated with the contaminants. However, if it can be shown that the contaminants can be adequately contained during placement and isolated in the long-term filling the pits would not represent a significant adverse impact to these special habitats.

5.3.3.4 Landfill, Brownfield and Mine Remediation

a. Land remediation would use contaminated dredged material that is stabilized by adding portland cement, fly ash, or other additives that bind contaminants to the sediment so they are not moved off-site and taken-up by local biota. In general, sites chosen or under consideration for land remediation have been developed for human use activity. They include landfills, former industrial facilities, mine lands, and abandoned quarries. These sites have been adversely impacted by their former use and hence provide little habitat value at the present time. All of the sites have a common problem in that they are the source of contaminants that are spreading into adjacent areas by surface or groundwater flow. The objective of remediation is to contain the existing site contaminants to benefit adjacent aquatic resources and to prepare the site for future use. Development of a remediated site could include commercial development, recreation, or establishment of a productive habitat.

b. Generally, impacts on aquatic resources from site remediation work would be short-term and end with the remediation of the site. Adverse impacts to aquatic resources could include, loss of dredged material during off-loading, loss of material stockpiled at a remediation site, effluent from dewatering, and leachate of contaminants from stockpiled material with contaminants. If the dredged material is decontaminated/treated before movement to the site, any potential impacts associated with contaminant migration would be greatly reduced or eliminated. Each site would be the subject of a remediation plan that would seek to minimize adverse impacts associated with the remediation activities.

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c. There would be substantial beneficial impacts from land remediation in that sources of contamination would be controlled. Existing landfills and industrial sites are significant sources of contaminants and cumulatively represent a major factor in the widespread occurrence of contaminants in the waters of the study area. Control of these sites would minimize human exposure concerns and protect many ecological receptors which are currently exposed directly or through food web transfers and biomagnification. In addition this option removes existing contaminants from the aquatic ecosystem, thereby contributing to harbor restoration.

d. The sites proposed for land remediation (see DMMP Table 2-2) are all in the upland subarea.

5.3.3.4.1 Surface Water and Groundwater Quality

a. Temporary, localized adverse impacts may occur during the transport and processing of dredged material. Processing sites would be handling large volumes of dredged material with a variety of techniques, including in-barge and landside processing. Dewatering of sediments and stockpiling of material may be needed as part of the processing. Siting considerations and best management practices applied to the processing operation should minimize any water quality effects. The practices may include impermeable linings for raw material storage areas, covers over storage areas to prevent runoff and settling basins to collect runoff before it enters adjacent waterbodies. Permitting of the processing facilities would include requirements for these facilities to meet water quality standards.

b. The placement of stabilized dredged material requires time for the material to cure and site development may require a gradual build-up of material to meet site stability criteria. Although the stabilized material is highly impermeable, some surface erosion may occur while the material is exposed. Sediment runoff control would be applied to these sites to minimize any loss to adjacent water bodies. After the initial cover layer is completed, these sites would receive a final covering of clean material related to the proposed use of the site. This may be in the form of physical structures (building, parking lots, etc.) or various vegetative covers depending on the habitat objectives. These final covers would prevent erosion and runoff from the stabilized dredged material after filling is completed.

c. There would be a significant beneficial impact on water quality from the control of runoff from the sites selected for remediation. Stabilized dredged material would be used primarily to create an impermeable cover over the remediation sites to isolate the in-place contaminants from precipitation. In

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the case of mine reclamation, the stabilized material may be used to seal deep shaft mines as well as cover strip mined areas. The use of dredged material at these sites would be as part of a comprehensive site remediation program, which could include other techniques such as slurry walls and leachate collection systems. The cumulative effect of remediating sites in such areas as the Hackensack Meadowlands and at NYC landfills would be a substantial reduction at the source of the contaminants which are currently in the harbor sediments. There would also be beneficial impacts for terrestrial wildlife through reductions in exposure to contaminants. Additionally, benefits to wildlife could occur if rare habitat types (e.g., grasslands) are established and managed.

5.3.3.4.2 Aquatic Resources

a. There would be an indirect beneficial impact on aquatic resources throughout the study area from the remediation of upland sites. The control of contaminants from these sites would contribute to the long-term improvement in water and sediment quality in the study area. This improvement would reduce the levels of contaminants in aquatic biota and the human exposure that occurs when aquatic life is consumed for food. Food web transfers and subsequent biomagnification would be lessened by a general decline in contaminant levels. The improvement is a cumulative effect that increases in significance as more sites are remediated. A direct beneficial impact may occur in localized areas where contaminated discharges from land sources are causing toxic effects on biota in the near vicinity of these sites. Acid mine drainage, for example can cause direct adverse effects on biota in receiving waters, and in some cases for substantial distances downstream. Remediation at such sites would eliminate these toxic effects. The loss of material into areas not intended for remediation could occur during handling and transfer that would be part of land remediation operations. However, those losses can be controlled and kept to a minimum, through best management practices, particularly runoff control.

5.3.3.4.3 Upland Resources

a. There would be significant beneficial impacts on upland resources from the remediation of contaminated sites. Human and ecological receptors would no longer be exposed and the movement of contaminants off-site would be prevented by a surface cover. Upland sites which contain contaminants are generally degraded in terms of wildlife habitat value, but because many of these sites have been abandoned for long periods, new habitats attractive to wildlife may have developed. The remediation of sites requiring an extensive cap would generally result in the loss of any existing habitat. This loss of habitat may be a temporary adverse impact if the sites are redeveloped as habitat following remediation. If the site is not

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redeveloped as habitat, the loss of existing habitat would be permanent. The significance of such a loss should be balanced against the substantial beneficial effect of eliminating direct human and wildlife exposure, and the indirect benefits of eliminating off-site effects. Where the existing on-site habitat value is relatively high, mitigation for the loss would be appropriate. However, these sites typically have poorly developed communities due to previous effects and thus would require little mitigation to compensate for losses of habitat.

5.3.3.4.4 Endangered and Threatened Species

a. Endangered and threatened species and other species of concern would generally benefit from remediation of contaminated upland sites. The significance of these beneficial effects would depend on the potential interaction of these species with the sites under remediation. These species would not be expected to be found at degraded sites, but exceptions, such as foraging by peregrine falcons in urban areas, can occur. In such a situation, the cumulative effect of the remediation of many contaminated sites could be significant and beneficial. Remediated landfills that are returned to wildlife habitat could be used as feeding areas for peregrines.

b. There would be no significant impact on these species from the stabilized dredged material while it is in place at the remediation site. This material is not suitable medium for the development of vegetation, thus a living community would not develop prior to the placement of a final clean cover.

5.3.3.4.5 Air Quality

a. Volatilization of contaminants from dredged material has become an issue of concern. Volatilization is the process whereby a compound passes into the air from a solid or liquid surface. For dredged material from NY/NJ Harbor, volatile contaminants of concern include PAHs, PCBs, dioxin, and some metals. Volatile organic compounds (VOC) may potentially be found in significant levels at berthing areas. VOCs include benzene, carbon tetrachloride, and tetrachloroethene. Contaminants may volatilize at varying degrees during every step of a dredging operation: dredging, barge transport, storage, dewatering/processing, and during and after placement.

b. The Waterways Experiment Station and Louisiana State University have developed laboratory procedures to obtain experimental data on the volatile emissions from exposed sediment (WES 1997, 1998). These investigations are being used to develop and validate predictive volatile emissions models. To date, a limited number of lab studies have been conducted. One such study was recently completed on composite sediment samples from NY/NJ

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Harbor (WES, 1998). A flux chamber was used to measure volatile emissions of PCBs, PAHs, pesticides, and dioxins from sediment samples. Rewetting sediment was also tested for its effects on volatile losses. Preliminary results indicated very low emission rates for all the parameters tested. Flux rates were typically highest during initial sediment placement (up to 1-2 days) and plummeted thereafter.

c. During handling and before the solidification/stabilization process is completed, some loss of contaminants (SVOCs) may occur. The solidification/stabilization process would immobilize many of the contaminants and thereby reduce volatilization. However, once all sediment placement is completed and the site capped with clean material, further volatile loss from the sediment would be contained. Ongoing and future studies will monitor volatilization at active and completed land remediation sites.

d. Actual air concentrations resulting from sediment contaminant fluxes are site specific and are affected by atmospheric conditions such as wind speed, mixing, and the location of the receptor. To illustrate the impact of sediment contaminant fluxes upon air concentrations, WES calculated air concentrations of a cubic meter of enclosed air overlying a square meter of exposed sediment. These calculated air concentrations are probably orders of magnitude higher than would be expected in the field, due to the conservative assumptions associated with the calculation. Even so, they still show the relatively low impact of sediment SVOC fluxes on air concentrations (WES In Prep.).

e. Several measures can be undertaken to reduce volatile emissions from dredged material. During dredging and transport, reduction of sediment resuspension during dredging and maintenance of a water cover on the dredged material in the barge will minimize volatilization. For land remediation, the key factor in minimizing volatile emissions is the efficacy of the solidification/stabilization process and minimization of reworking prior to capping with clean fill.

f. Currently, New Jersey Maritime Resources, Rutgers University, the New Jersey Institute of Technology, and Stevens Institute of Technology are sponsoring an air quality monitoring program at the OENJ site in Elizabeth where remediation is completed and commercial development is in progress. This study will evaluate potential impacts on human health in the region that may result from the management of dredged material at this site and identify corrective measures, if needed.

5.3.3.4.6 Cultural Resources

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a. There is the potential to identify significant cultural resources at land remediation sites, specifically historic industrial structures and abandoned mine facilities. Cultural resources studies will be undertaken as sites are proposed for further work.

5.3.3.4.7 Socio-Economics

a. There would be significant direct and indirect beneficial impacts associated with land remediation. These beneficial impacts would be cumulative as more sites are remediated in the study area. The socio-economic benefits include the elimination of costs associated with the adverse effects of contaminants, as well as the economic gains associated with the redevelopment of land into viable commercial sites. The costs related to human health effects of the environmental contaminants are difficult to estimate and cannot be addressed in detail in this assessment. However, these costs are generally believed to be significant. There are additional costs associated with the loss of the availability of resources (fishing closures) and the need to monitor and protect contaminated sites.

b. The commercial development of brownfields sites can be significant for local economics. The cumulative effect of the redevelopment of these sites can be regionally important. In addition there is an indirect environmental benefit in that the brownfields development offsets the potential loss of existing undeveloped land. The effects of new development are limited to areas that were previously impacted, and the development is done in a more environmentally sensitive manner than the original site development.

c. The revenue generated from the fee charged for dredged material disposal provides an economic incentive to remediate contaminated sites. This has environmental benefits in that more sites will be remediated more quickly than if this incentive were lacking. Many of the potential brownfields and landfill remediations in the study area are contributing contaminants to the harbor. The spreading of contaminants in the environment can be curtailed if major sources can be eliminated as quickly as possible.

d. If remediation of these sites is delayed, more contaminants will continue to accumulate in the harbor. The costs for dredged material disposal would decrease as sediments become cleaner. Thus, there is also an economic benefit from remediating these sites as soon as possible.

5.3.3.4.8 Other Impact Issues

a. Land and mine remediation options may have temporary localized adverse impacts on noise levels. The equipment associated with dredged

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material processing (if done at the remediation site) and heavy equipment for the transport and placement of material may generate relatively high noise levels beyond the site boundary. These effects would be site specific and management of adverse effects would require site planning. Most mines are sufficiently far from residential areas to have no effect on noise levels. The permitting for individual sites would address this issue.

b. There would generally be beneficial impacts with regard to aesthetics. A remediated site can be expected to be more attractive than an environmentally degraded site, even if the site is a commercial development in the future. Commercial redevelopments would generally occur in existing commercial zones, but the redeveloped site would be subject to the current siting standards, which generally exceed those of the past. Local zoning ordinances would play a major role in the aesthetics of a commercial redevelopment.

5.3.3.5 Other Uses

a. Two additional beneficial use options have been proposed for managing dredged material that is suitable for ocean placement are for sandy materials, construction aggregate and beach nourishment. Both uses would be dependent upon the suitability of the sand for the intended purposes. Sand obtained from the NY/NJ Harbor, primarily from Lower Bay and Ambrose Channel, have been used for these purposes in the past. In fact, sand mining is the source of the existing pits in Lower Bay and Jamaica Bay. The placement of sand obtained from dredging is not expected to be associated with substantial adverse impacts and any impacts that occur would be temporary. The dredging that would produce the sand would cause short-term increases in turbidity and disturbance tot he benthos, but the impacts would not be substantial because: 1) turbid conditions caused by disturbance of sand (large particles) would settle out quickly, and 2) the sand community from the surrounding area would recolonize the area quickly. The incorporation of these uses of sandy dredged material in the DMMP is expected to be beneficial because the use of these options would decrease the volume of sandy material that may need to be obtained elsewhere in the estuary. This could not only potentially decrease the current cost of obtaining suitable sandy material for these uses, but also it would decrease the adverse environmental impacts associated with dredging other areas of the estuary to obtain these materials.

b. Beach nourishment involves the placement of clean sand on existing beaches which have experienced erosion. Sand from harbor dredging would be pumped onto the selected beaches to replace losses and maintain the beach. The sand placement would have minor, temporary adverse impact to the community of organisms using the existing beach due to burial and alteration of the physical

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substrate. Beach nourishment has been used for many years to maintain area beaches with no observable long-term impacts on natural resources.

5.3.4 Decontamination Technologies

a. Decontamination technologies seek to reduce contaminant concentrations, contaminant mobility, or toxicity of contaminated dredged material by treatment with mechanical, chemical, physical, or biological processes. This treated material is then available for beneficial use and has potential market value. A number of pilot scale demonstration projects have recently been completed and based on these results commercial scale demonstrations of sediment washing and thermochemical treatment will take place in 1999. Other demonstrations of decontamination facilities are in progress.

b. Decontamination is a land-based option with sites generally expected to be adjacent to the shoreline in the Upper Bay complex. However, the discussion includes potential generic impacts to aquatic resources. Sites for land remediation may be suitable for siting decontamination facilities. This assessment addresses impacts from the decontamination process and facility.

c. Siting is a significant consideration for these facilities because this option type may deal with sediments having relatively high levels of contaminants. Because these facilities will be in the upland subarea, they may handle contaminants in relatively close proximity to human populations. In addition, these facilities may require stockpiling of sediments for efficient operation, and they may produce air emissions and effluents to an adjacent waterbody.

d. The sites selected would be expected to be between 10-40 acres. Potential sites thus far identified have been impacted by human activity, and include landfills, brownfields, or currently used industrial sites. These areas have greatly reduced habitat value for plants and animals. Abandoned sites not yet identified that have not been redeveloped may provide some wildlife value. These sites unless actively managed, usually provide only reduced capacity for wildlife as compared to natural settings.

e. Full-scale decontamination facilities are essentially industrial facilities in that they process a raw material (dredged material) into marketable product with beneficial use applications. The dredged material would be brought to these sites in raw form which would require careful handling to prevent spills as the material is off-loaded and moved through the process. Permitting of these facilities would address the specifics of each process.

f. The use of brownfields sites combined with process specific control techniques would substantially reduce the potential for adverse impacts. The following subsections address specific impact issues that are relevant to decontamination. The

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discussions focus on the upland and Upper Bay Complex subareas because there are no facilities planned for other areas.

5.3.4.1 Aquatic Resources and Surface Water Quality

a. The potential impact of decontamination technologies on aquatic resources is limited to the effects of the processing facilities. Spills from dredged material handling, spills of processing chemicals (if used), runoff from storage piles (raw dredged material or finished product) and an effluent to the waterbody are potential sources of adverse effects on aquatic resources. Spills and runoff are controllable through best management practices and on-site treatment systems, which would be stipulated in site permits (see Section 5.3.3.4.1). Based on the currently projected volumes of material being processed at these facilities, if spills were to occur, effects would generally be localized. Any chemicals used in the processing should be evaluated for their potential effect on aquatic life, including their potential to leach from the finished product.

b. Effluent to the water could produce adverse effects well beyond an individual facility. Any potentially harmful material in the effluents could be widely distributed by tidal currents. Effluents must meet existing water quality standards and it is assumed that monitoring would be required with appropriate controls and treatment as needed for the overall operation and the decontamination facilities as specified in each site specific permit. With these controls, the potential for adverse impacts on aquatic resources is small.

c. Adverse effects to Essential Fish Habitat (EFH) as a result of implementation of the decontamination option are not expected. The use of control technologies and careful management and handling at facilities will help insure against impacts to EFH.

5.3.4.2 Upland Resources

5.3.4.2.1 Groundwater Quality

a. A stockpile of dredged material for a processing facility has the potential to adversely impact groundwater because contaminant levels in the material could be relatively high. Potential effects would be site-specific and depend on many factors. Where such an effect could occur, an impermeable liner under the stockpile area, a stockpile cover and a runoff collection system could be employed to protect the groundwater.

5.3.4.2.2 Biota

a. The potential for exposure of upland biota to a decontamination facility is very limited because these would be contained facilities, with the exception of any material stockpiles. Raw dredged material could be

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attractive to foraging birds, such as gulls or doves, which may in turn be attractive to predators such as peregrine falcon. The dredged material may contain relatively high levels of contaminants so that a protective covering over the stockpile may be needed. Given the reported scale of dredged material to be processed it should be feasible to cover the material. This would also control runoff from the stockpile.

b. The potential for the interaction of endangered and threatened species with a decontamination facility is very small. With the exception of peregrine falcon mentioned above, there would not be conditons at these facilities to attract protected species. Siting, which is likely to be in a developed area, is a factor in limiting the exposure of endangered and threatened species. Because these facilities may process sediments with relatively high levels of contaminants, they should probably not be sited in undeveloped areas where unexpected problems could release contaminants to unimpacted habitats.

5.3.4.2.3 Air Quality

a. Air quality could be adversely affected by volatilization of contaminants in the dredged material brought to the site for processing and by effluents from thermal processing where fuel is burned in the process. Volatilization is addressed in Section 5.3.3.4.5 and is believed to be of low-risk, but site-specific studies would be undertaken prior to site permitting and controls imposed, as needed. Air emissions from fuel burning would be subject to air quality standards and it is assumed that a facility would be built with appropriate air emission control devices, as required in the site permits.

5.3.4.2.4 Other Impact Issues

a. Siting decisions for decontamination facilities would be critical with regard to other potential effects. Siting of these facilities in previously impacted areas would minimize potential adverse effects on cultural resources, noise impacts and aesthetics. Noise levels may be a problem but there is currently no information on noise levels at the demonstration facilities. Cultural resources and aesthetics would be issues if a facility was sited in a relatively underdeveloped area.

5.3.5 Confined Aquatic Disposal Facilities

a. This option type is an in-water disposal-only option involving the placement of dredged material in pits or cells below the level of the surrounding bottom. The placed material may be HARS suitable or non-HARS suitable, but the most valuable use of this option type would be for contaminated material because the facilities can be designed to provide long-term, secure confinement. The Newark Bay Confined Disposal Facility (NBCDF) is the only operational confined aquatic disposal (CAD)

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facility in the study area. Additional new facilities have been considered for construction in open water sites or in the bottom of existing navigation channels and berthing areas (Table 5-3). CAD pits are the option selected for contingency disposal in the recommended course-of-action.

b. Potential new CAD sites have been identified in the Upper Bay Complex and the Lower Bay Complex subareas (Figs. 3-4 and 3-5). Subchannel CAD facilities would be located exclusively in the Upper Bay Complex. The following assessment of this option type is limited primarily to new CAD facilities in open water, and new subchannel facilities. Existing pits are being considered as restoration options where appropriate, and are covered in more detail in Section 5.3.3.3.

c. The potential impacts of CADs are summarized in Table 5-3 with other approaches to the confinement of contaminated dredged material (islands and nearshore fills). Because of the in-water locations of CADs, the disturbance of the substrate associated with their construction and impacts on benthic habitats and associated aquatic food web effects are the primary impacts of concern. The use of these facilities for contaminated materials raises concern for the potential redistribution of contaminants in the aquatic environment during and after placement and potential effects on living resources.

d. Pits have received substantial attention in the development of the DMMP because of their large potential disposal volumes. In recognition of the importance of effects on benthic habitats, the NYD has undertaken major habitat surveys and mapping of the Lower Bay Complex and portions of the Upper Bay Complex (Wilber in prep.). These studies are supported by selected sampling of existing pits to establish their habitat value.

e. For each of these CAD types there is a different emphasis with regard to impacts on benthic resources. Existing pits that have been shown to have relatively high quality habitat are no longer under consideration as a disposal option. For new open water facilities, the selection of sites from among areas with different habitat types is important for minimizing impacts. Subchannel facilities would be located in areas that were previously disturbed and receive recurring disturbance during maintenance dredging. Although the channels are disturbed areas, some may have important habitat values such as wintering areas for fish and crabs. For all CAD types, the recovery of benthic habitat is an important impact consideration.

5.3.5.1 New CAD Facilities

a. The following assessments address open-water CAD facilities in the Upper Bay Complex and Lower Bay Complex. The evaluations address issues specific to these subareas, but do not repeat the individual impact issues addressed in the preceding subsection on existing pits. A significant difference between existing

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pits and new CAD facilities is that the new facilities would be sited and designed for dredged material disposal, whereas existing pits lack these refinements. In addition, in the process of constructing new facilities, particularly in Upper Bay, contaminated surficial sediments may be excavated and confined (beneficial use or aquatic confinement, effectively removing a relatively small quantity of contaminants from exposure in the environment). Capping of new CAD facilities would be done to promote the recovery of benthic habitat in the project area, because natural sedimentation rates may be very low. This would reestablish preexisting conditions or enhance the conditions if the original surficial sediments were degraded.

b. In general, new CAD facilities would have a temporary adverse impact on Essential Fish Habitat because it would disrupt the bottom during construction and placement. Because the area would be capped and the bottom returned to a similar substrate after use, full recovery would be expected.

5.3.5.1.1 Upper Bay Complex

a. New CAD facilities could involve shoal areas on the east side of Newark Bay and at Constable Hook. In addition, there are permitted CAD sites (areas 2S and 2N) in shoals on the west side of Newark Bay that were evaluated as part of the permitting for the NBCDF.

b. Shoal areas of Upper Bay have been adversely affected by contaminants, but they have not been disturbed by channel construction and maintenance dredging. CAD construction in these areas would disturb previously undisturbed habitat (or habitat undisturbed for long periods of time), which may contain substantial quantities of contaminants that have accumulated throughout this century.

c. An in-depth assessment of contaminants at shoal sites is needed to determine the constituents and volumes present to evaluate the desirability of disturbing these areas for CAD construction. The use of areas 2S and 2N in Newark Bay, for example, may not be advisable because of contaminant levels and because adjacent channel areas provide sites for CAD facilities with less contamination.

d. Shoal areas would generally require the construction of an access channel to the facilty that would enlarge the area of habitat disturbance. The extent of this impact would depend on the proximity to existing channels. The NBCDF required a very small access channel.

e. CAD facilities in shoal areas have the advantage of providing a more complete enclosing structure that would tend to minimize the loss of

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sediment during disposal compared to such facilities in deep water. The shallow water means that during a disposal event the dredged material would pass through a short segment of water column before entering the confines of the pit. In contrast, CAD's in deep water such as channels, would require the dredged material to fall through as much as 40 ft of water column before entering the pit. Monitoring at the NBCDF has shown virtually no loss of sediment from the facility (PANY/NJ 1998). However, the loss of sediments during disposal is small under any circumstances and can be controlled by limiting releases to specified water levels and tidal current conditions.

f. The effects on biota of new CAD facilities in Upper Bay would be limited by the spatial and temporal extent of the facility. The construction activity would temporarily eliminate the existing benthic community in the footprint of the facility and thus the area would be lost as a feeding area for fish. However, Upper Bay habitats generally have higher levels of contaminants and have experienced more disturbance than the other portions of the DMMP study area. When the facility is full, the site would be restored to existing contours and recolonization would restore the benthic community. Hydrographic conditions in the vicinity of the facility would be the same as before facility construction so that habitat conditions should return to pre-project conditions.

g. Among the sites considered for CADs in shoal areas are Bay Ridge flats and Constable Hook flats. Based on limited sediment profile imagery and grab sampling, the western side of the Bay Ridge flats has high quality benthic habitat, while Constable Hook and the east side of Bay Ridge has lower quality habitat. Site selection for new CAD facilities in the Upper Bay would consider the relative habitat value and contaminant levels if this disposal option is selected for implementation.

5.3.5.1.2 Lower Bay Complex

a. The primary impact issue for new CAD facilities in Lower Bay involves siting the facility to minimize adverse effects on the benthic communities there. Benthic habitat mapping (Wilber et al. In prep., Vittor 1998) provides a basis for placing new facilities in areas with relatively low habitat value (see Chapter 4). *Ampelisca* mats and shellfish beds provide high quality habitat, while sandy substrates have relatively low benthic habitat value. Higher value habitats were found adjacent to shipping channels, while lower value habitats were found outside the channels. Based on the habitat mapping and other factors related to depth of sand and the potential for shoreline erosion and flooding, a Zone 2 in Lower Bay has been identified as the most likely area for new pits (see Fig. 3-4).

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b. The effects of construction and use of new CAD facilities are similar to those described for existing pits. Habitat loss in the footprint of the facility would be followed by habitat recovery after closure. New CAD facilities in Lower Bay have the disadvantage of introducing contaminated sediments from the inner harbor into an area where contaminant levels are generally low. Although CAD facilities can be designed to isolate the contaminated sediments, their movement from Upper Bay to Lower Bay would be done cautiously and only after studies have shown that CADs can successfully confine the placed material. For these reasons CADs in Lower Bay are relegated to a least preferred option status (see DMMP Table 2-2).

5.3.5.2 Subchannel CAD Facilities

a. Subchannel CAD facilities use existing navigation channels for the placement of dredged material below the elevation of the channel bottom. Sedimentation occurs continuously in the channels, thus there is a need for maintenance dredging which recreates a recurring habitat disturbance Capping and/or natural sedimentation would bring the bottom elevation back to the original channel depth. Site-specific studies of sedimentation would be conducted to evaluate the need to cap in addition to the natural sedimentation. Channel deepening is underway in some areas and being evaluated for others. Subchannel CAD facility design would have to take channel deepening into account to avoid disturbing placed material in the future. This option is limited to the Upper Bay Complex, with potential sites in Newark Bay, Port Jersey and Bay Ridge/Red Hook Channel.

- Maximization of consolidation before capping procedures. The actual waiting period will depend on the geotechnical character of the dredged material as it is placed, and could take up to 2.5 months.
- Scows should be maneuvered along designated lanes in order to cap more efficiently.
- Physical disturbance after placement of cap should be avoided.

b. Locating CAD facilities in navigational channels has the advantage of keeping contaminated sediments in areas of previous and ongoing disturbance. The construction and filling of these facilities would be similar to other CAD facilities, but there are some impact issues unique to subchannel locations.

c. The propwash from ships operating in channels could disturb sediments and cause their redistribution beyond the CAD facility. This potential problem could become more acute with the introduction of larger ships to the harbor, although deepening of channels to accommodate these ships may offset their larger size. This potential adverse impact could be controlled by placing a cap on the placed

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material and by site selection which does not place facilities in areas where ships are under full power.

d. The placement of material in a subchannel CAD facility requires that the material pass through a greater depth of the water column in the channel before entering the confining walls of the facility than a CAD facility built in the shallows outside the channels. The passage through the water column would provide more opportunity for material to disperse. Studies of dredged material discharge from a scow show that the material stays in a discreet mass with a small loss of material as it descends (Schroeder in prep.). Currents can deflect the mass, but the vast majority of material will contact the bottom. Once within the confining walls of the facility, the loss of material from the channel would be minimal (PANY/NJ 1998).

e. Modeling of harbor sediments by WES (Schroeder in prep.) has shown a loss rate of 1.5% or less of the dredged material under worst case conditions. However, because the material is fine-grained it could contain a larger portion of contaminants than the coarser sand component. Positioning of the scow and adjusting the timing of release relative to tidal currents are techniques that can be employed to minimize losses of sediment during disposal. The use of physical control devices such as tremie tubes, diffusers, and silt curtains would not generally be applicable to deep channel areas with ship traffic, but the use of physical controls would be evaluated for each potential CAD site to determine if they would be feasible and offer a more practical approach than limitations on the timing of disposal operations to minimize sediment loss.

f. The construction of subchannel CAD facilities would have a temporary, local adverse impact on benthic life and associated fish fauna similar to other types of CADs. The existing community would be lost during construction and eventually replaced by a recolonizing community after CAD closure. The community would be expected to be the same as before facility construction because sedimentation would reconstitute the same substrate type. The adverse impact of constructing a CAD facility would be no worse than maintenance dredging except that the bottom would be disturbed longer than during the maintenance work. The construction of a subchannel CAD facility would, in fact, substitute for maintenance dredging in that the accumulated sediments above the elevation of the authorized channel would be removed as part of the facility construction. In contrast with new CAD facilities in shoal areas and Lower Bay, subchannel CAD facilities would confine benthic impacts to areas where disturbances are a repeating pattern for the habitat.

g. Subchannel CAD facilities could have an adverse impact on habitat use by fish and megainvertebrates during the winter. Channel sampling in Newark Bay

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(Wilk 1997) revealed an abundance of striped bass juveniles and winter flounder. In addition, blue crab are abundant in the channel at times, although recent unpublished data suggests that this area is not an important wintering area for them. CAD facility construction and use would span a full seasonal cycle at a minimum, thus although the timing of construction may avoid winter concentrations of fish, some short term disruption of winter habitat would occur.

h. The significance of habitat disruption would be limited by the extent of the area occupied by the CAD facility in relation to the total channel habitat. CAD facilities would be constructed on an as needed basis. It is unlikely that more than two facilities would be in operation at one time. After facility closure, the habitat would recover rapidly providing available habitat in the channel before more facilities (if needed) are constructed. Siting surveys to avoid prime wintering areas for fish and blue crabs would be important to minimize this adverse impact.

i. Sub-channel CAD facilities would affect Essential Fish Habitat, but in most instances the habitat is currently adversely impacted by ship traffic and its associated prop wash, especially in channels most in need of dredging. Thus, while excavating the channel will cause disruption, the effects to EFH would be expected to be temporary.

5.3.5.3 Other Impact Issues Related to CAD Facilities

a. The potential for adverse impacts related to air quality, noise and aesthetics are minimal. The potential sites are away from shore and the construction and operation of these facilities does not require any equipment that is not commonly used in harbor dredging and maintenance operations. The air quality and noise impacts of this equipment would represent intrusion in the local area, but where the facility is away from shore or where the site is an industrial area, there would be no significant impact.

b. Recent surveys conducted for the DMMP indicate that CAD facilities may impact both prehistoric and historic resources (LaPorta, Sohl, and Brewer 1999; Cox 1998). The potential for submerged cultural resources in the harbor would require site-specific surveys of any area that has not been surveyed. A recent survey of the potential for buried cultural resources undertaken by the Corps can provide guidance for sensitive areas of the study area.

5.3.6 Confined Disposal Facilities (CDFs)

a. A confined disposal facility (CDF) uses dikes or other retention structures to contain dredged material. The three types of CDFs that were considered for the NY/NJ Dredged Material Management Plan were upland, nearshore, and island CDFs, which are created by building dikes on land, in water adjacent to

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land, or in open water, respectively. Once filled, a CDF is typically capped with clean material to permanently isolate the dredged materials from the environment. The capped CDF can then be used to create habitat for wildlife or other beneficial uses. All three types of CDFs have been used successfully in the U.S. and other countries for the disposal of dredged material. Similar to the CAD option type, the CDF option type can accept both HARS and non-HARS material, although the most valuable use of this option in this region would be for non-HARS material because CDFs are designed to provide long-term, secure confinement of the disposed material. Table 5-2 summarizes the potential impacts of CDFs and includes CAD pits for comparison

b. The upland and island CDF options are no longer under consideration (preference 5, DMMP, Table 2-2) for the reasons discussed below. Several potential sites for a nearshore CDF exist in the Upper Bay Complex, but refinements of the location(s) is not complete. Because the nearshore CDF option type would be located in an aquatic environment, the major effects of concern include loss of benthic and aquatic habitat where the structure would be physically located and alterations to the current and sedimentation patterns in the vicinity of the structure that could adversely impact shorelines by creating changes in erosions and accretion patterns.

5.3.6.1 Upland CDFs

a. The upland CDF option is no longer under consideration based on a preliminary screening by the Corps (NYD, 1996) and comments received from the public, local officials and state representatives. The lack of support for this option would present major difficulties for siting and permitting of these facilities.

5.3.6.1.1 Surface and Groundwater Quality

a. Upland CDFs could adversely affect surface and groundwater quality through runoff from the placed material and infiltration of water containing contaminants from the placed material. An upland CDF would require special facilities to contain the dredged material and provision to collect and treat water from the dredged material and from precipitation collecting on the facility. The discharge of treated water would require permitting and limitations on the discharge. An impermeable liner in the facility may be needed to isolate the sediments from contact with the ground to prevent infiltration. With well maintained facilities it should be possible to minimize the impacts to surface and groundwater. After the site is filled, a permanent protective cover of clean material would be placed which would prevent runoff in the long term.

5.3.6.1.2 Aquatic Resources

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a. Other than the potential for runoff from an upland CDF to an adjacent waterbody there would be no effects on aquatic resources. This impact would be addressed by installation of appropriate controls, as outlined above, to meet permit standards.

5.3.6.1.3 Upland Wildlife

a. It is assumed that an upland CDF would be constructed in an area where the existing upland habitat had low value because loss of high value habitat due to facility construction could probably not be compensated for by habitat restoration after the facility was completed. If, in fact, the existing habitat value was low, habitat enhancement/restoration after facility completion could result in a net gain in habitat value.

b. During the placement of dredged material at an upland CDF, terrestrial wildlife may be attracted to the site with the potential for exposure to contaminants. A CDF could take a substantial time to complete, thus a vegetative community may develop on the dredged material which may be attractive to wildlife. Interim covers of clean material may be needed to minimize the exposure of wildlife to the dredged material.

5.3.6.1.4 Endangered and Threatened Species

a. It is assumed that known habitats for endangered and threatened species would be avoided in siting an upland CDF. Transient species, which would be almost exclusively birds, may be attracted to feed at an upland CDF if a vegetative community developed. Protecting an upland CDF to prevent exposure of local wildlife should provide the protection needed for endangered and threatened species.

5.3.6.1.5 Special Habitats

a. It is assumed that special upland habitats would be avoided in the siting of upland CDF's. Siting considerations should include the habitats adjacent to an upland CDF to minimize the potential for adjacent high quality habitat to become a source of individuals attempting to use whatever habitats develop in the CDF on an interim basis.

5.3.6.1.6 Air Quality

a. The placement of raw or treated dredged material has the potential for adverse impacts on air quality. Raw dredged material could be the source of odors to surrounding areas and a source of contaminants due to volatilization (see Section 5.3.3.4.5 for a discussion of the potential impacts due to volatilization). The control of unpleasant odors could be very difficult because relatively large quantities of dredged material would have to be exposed to the air during transport, handling, and placement prior to the development of a

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final clean cover. The most practical approach may be to site upland CDF's a sufficient distance from humans to avoid odor problems. Once the site were covered and closed this potential problem would not exist.

5.3.6.1.7 Other Impact Issues

a. Upland CDFs would be a potential source of high noise levels from the heavy equipment needed to handle the dredged material. Depending on its location, an upland CDF may create traffic problems if material is hauled to the site by truck. Upland CDFs are not likely to impact cultural resources if the sites selected were previously disturbed. If an undeveloped site were proposed for an upland CDF, a cultural resources survey would be needed prior to development.

5.3.6.2 Nearshore CDFs

a. A nearshore CDF can be located in a number of sites of varying sizes throughout the Upper Bay. If any of the potential Port expansion sites utilize dredged material, or if any new CDFs are proposed specifically for dredged material disposal, these would have to undergo a second tier NEPA review that would include a site-specific assessment of the impacts identified in this section. This is similar to the requirement that most of the alternatives in this report would have to follow before any are implemented.

b. Creation of a nearshore CDF entails certain recognizable permanent impacts to the coastal environment. One impact that is particularly clear-cut is that there will be a permanent loss of existing Upper Bay bottom within the footprint of the CDF and the loss of the water column above it.

5.3.6.2.1 Surface and Groundwater Quality

a. Suspension of contaminants in the dredged material is a potential effect associated with the nearshore CDF option, which is especially true because the smallest sediment particles are the ones that would be suspended, and they are also the ones most likely to have contaminants adsorbed to them. However, dispersal of dredged material could be prevented by placement of dikes (or other enclosing mechanism) before use of the CDF.

b. Dredged material placed in a confined disposal facility undergoes sedimentation with a resultant effluent (dewatering). This effluent may contain suspended solids that did not settle out and to a lesser extent dissolved contaminants. This effluent could also impact the water column surrounding a CDF. Therefore, effluent would be tested and treated as necessary to meet applicable standards before release into the water column.

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c. With regard to groundwater quality, a nearshore fill, which would extend from slightly above sea level to well below sea level could only effect local groundwater because the flow gradient in the groundwater would be toward the sea. If site specific studies showed a potential for localized effects, lining of the CDF with low permeability material would address this concern.

5.3.6.2.2. Benthos

a. Impacts to benthos would be related to the specific sites where a nearshore CDF would be constructed. For instance, a CDF in a highly polluted deadend basin which has been found to contain little habitat for most benthic species would have little direct or indirect impacts. Water quality, depth, size and sediment content all contribute to the potential for a CDF to have impacts.

b. If a nearshore CDF were proposed for waters where data indicate the potential for use by benthic fauna, direct impacts to the benthos are associated with the permanent loss of the area within the footprint of the near shore CDF, as discussed above. Species that are not mobile and occupy the area of the footprint would also be lost due to construction of a near shore CDF.

5.3.6.2.3 Fish and Megainvertebrates

a. The use of nearshore areas by fish and megainvertebrates would be site specific depending on existing habitat quality. The shoreline areas proposed as potential nearshore fills have been highly modified for shipping or other uses, which generally entails bulkheading, pier construction and dredging. In addition, these areas may have poor water circulation or receive combined sewer overflows which may create localized poor water quality. Despite these habitat limitations, interpier basins and other modified shoreline areas have been found to provide seasonally important habitat for such species as striped bass and winter flounder. Underpier habitat has been studied in the Hudson and East Rivers These studies have shown fish use of this specialized habitat type, but these areas were not of great significance. Studies sponsored by Empire State Development Corporation are currently underway to assess fish habitat and evaluate mitigation sites for nearshore CDFs in New York.

b. The use of nearshore areas for dredged material disposal would eliminate aquatic habitat. Little potential for in-kind mitigation of the loss has been identified. Given the extensive loss of shoreline habitats which have occurred in the harbor over the long-term, additional losses should be viewed as significant adverse impacts, particularly where there is a potential for an improvement in habitat conditions in the future. For sites where studies show the habitat is highly degraded and has little potential for recovery in the future, filling for dredged material disposal would be less determinetal, particularly if the fill eliminate a source of pollution to the harbor.

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5.3.6.2.4 Other Living Resources

a. The potential sites for nearshore fills are located in the Upper Bay Complex in industrial areas or among existing shipping facilities. The potential for interaction with terrestrial wildlife is minimal and the aquatic habitat would not be attractive to species other than the commonly occurring aquatic life in the harbor.

5.3.6.2.5 Endangered Species

a. There is very little potential for the interaction of endangered species with the potential sites for nearshore fills. The aquatic species of concern originating in ocean waters, sea turtle, and whales, are seldom seen Upper Bay and the shallow structure dominated habitat would not be inviting to these species. Sturgeons, Atlantic, and shortnose, occur in the Hudson River, and are species of concern or are endangered in NY and NJ. Neither of these species has been collected in the extensive sampling of interpier basins or shoreline areas around the harbor.

5.3.6.2.6 Essential Fish Habitat

a. A number of species have essential fish habitat (EFH) ranges which includes the Upper Bay Complex (see Table 4-3). The nearshore habitat that would be used for fills represents very small areas and is generally low quality habitat within the larger overall habitat grids that are used to define essential fish habitat ranges for these species. The loss of this habitat would not be expected to be substantial with regard to EFH, but as discussed above the existing habitats may have important value for non-EFH species and other aquatic life.

5.3.6.2.7 Other Impact Issues

a. The use of nearshore fills for dredged material disposal has little potential for impacts on air quality, noise levels, and aesthetics. There is significant potential for impacts to cultural resources. Air quality and noise levels would only be effected while heavy equipment is operating at the fill site. The potential for cultural resources of significance is high due to the presence of historic industrial structures potentially eligible for the National Register of Historic Places. Future redevelopment of a nearshore fill area may actually improve local aesthetics if, for instance, the existing site is an abandoned shipping facility that is deteriorating.

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5.3.6.3 Island CDFs

a. This option is not preferred (preference 5), either in the NY Bight Apex or within the Lower Bay Complex. The islands are not part of the recommended course of action. The analysis that follows is provided as part of the requirements to assess impacts of potential options so that decision-makers and the public may consider them as part of the selection of options process.

b. Creation of an island CDF entails certain recognizable permanent impacts to the marine environment. One impact that is particularly clear-cut is that there will permanent loss of existing ocean bottom within the footprint of the CDF. Preliminary design estimates show that an island CDF would range from 300-750 acres depending on its design method and proposed capacity. The island would be designed so that the area of bottom that would be lost has been minimized, but cannot be entirely avoided. Because of its smaller overall size Lower Bay would experience a greater percentage on habitat impact from an island than an ocean site. Because of this unavoidable habitat loss, the difficulty of mitigating for it, and the availability of lower impact options, island CDF's are no longer considered for inclusion in the DMMP recommended plan.

c. A potential island CDF would eliminate the water column displaced by construction and dredged materials. This loss, while permanent, represents only a minimal loss to the entire water column of the bay or ocean. The loss, while adverse, is not considered substantial, but would be proportional to the size of the island CDF that would be selected and inversely proportional to the size of the waterbody in which it would be placed.

d. Modeling by the Waterways Experiment Station (WES, 1998c) has determined that the placement of an island CDF in the New York Bight Apex (Zone 3) outside of three miles from the coast will not adversely impact the shoreline. The placement of an island CDF in the Lower Bay Complex would cause changes in wavefields, and thus may effect shoreline littoral movement. This was one of the factors used in selecting Zone 2, since it was determined that the effects of coastal storms would be reduced in this zone. Before this option could ever be implemented, more site-specific modeling to determine local effects and methods to offset erosion would be needed.

5.3.6.3.1 Surface and Groundwater Quality

a. Suspension of non-HARS material by placing it inside an island CDF is a potential effect associated with this CDF option. This is especially true because the smallest sediment particles take longer to settle and generally are more likely to have contaminants adsorbed to them. However, dredged material would not be placed in a CDF until the dikes were completed thus preventing its spread to other areas of the bay.

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b. Dredged material placed in a confined disposal facility undergoes sedimentation with a resultant effluent (dewatering). This effluent may contain suspended solids that did not settle out and to a lesser extent dissolved contaminants. This effluent could also impact the water column surrounding a CDF. Therefore, effluent would be tested, and treated as needed prior to its release to the water column.

c. Based on the limited amount of data on existing groundwater resources at the island CDF siting zones (Cartwright, 1998) and the flow gradient within the New York Bight Apex and Lower Bay Complex study areas, no long term impacts from the placement of material are anticipated. A site-specific study would be needed to confirm this and to evaluate the need for a liner.

d. The potential for major storms to damage a confining dike was investigated through modeling. The preliminary design of the dikes and the siting of the structure was done to avoid this potential adverse impact.

5.3.6.3.2 Benthos

a. Direct impacts to the benthos are associated with the permanent loss of the area within the footprint of the island CDF, as discussed above. Species that are not mobile and occupy the area of the footprint would also be lost due to placement of an island CDF. The projected size of an island CDF represents only a small portion of the overall habitat available in the Lower Bay Complex and even less in the New York Bight Apex. Give the historical loss of habitat in the harbor, the loss due to an island would likely have cumulative affects beyond the area lost, especially in Lower Bay. Offsetting this loss, some vertical structural habitat would be created at the submerged periphery of the island CDF, which would create a unique benthic community different from what currently exists on the bottom.

b. Loss would be minimized to the greatest extent practicable by excavating an interior pit to increase the capacity and reduce the overall size of the island CDF in the bay. This would minimize the direct loss of benthic habitat. A loss may also be minimized by the use of modular island CDF construction/ operation techniques. The sheltering effect on wave climatology that an island CDF could have in the Lower Bay may also effect the benthic communities in the downfield site of the island CDF site. This effect would need to be further evaluated in the currently unlikely event of this option receiving further consideration.

c. A benthic survey conducted in the bay (Chapter 4 subsection 4.3.2.2.1) was used as part of a comprehensive screening process that led to the selection of

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Zone 2 as the most appropriate location for an island CDF in the bay (USACE 1998). The main feature of this zone was a sandy sediment that is characterized by lower abundance and diversity of benthic organisms than that of the more sheltered areas to the south (Wilber in prep.). Placement of an island CDF in Zone 2 would have potentially less adverse effects on the more productive and potentially valuable *Ampelisca* and shell habitat. Regarding the ocean placement of an island CDF, the nature of the substrate and benthic fauna currently suggest that the ocean zone (Zone 3) in which the potential island CDF would be built is not unique and does not currently contain substantial vertical structure.

5.3.6.3.3 Fish and Megainvertebrates

a. Fish and mobile megainvertebrates would evacuate a construction area during building of an island CDF, thus minimizing direct loss to these species. However, direct impacts would be expected for species that are immobile or slow moving. Indirect impacts to fish and megainvertebrates would also occur due to a permanent loss of water column habitat that would be physically displaced by the facility. Although these impacts would be permanent, it would not involve a substantial portion of the water column compared to the overall habitat area of the Lower Bay Complex and even less of the New York Bight Apex. Therefore, this loss, while adverse, is not considered substantial but would be proportional in size to the CDF.

b. Invertebrate species affected would include the various species of bivalves associated with the footprint of the island CDF. Fish species that would be adversely affected by an island CDF include flatfish such as summer flounder (fluke), winter flounder, and windowpane (sundial) as well as scup (porgy) which utilize the "flats" at various times of the year, although not in as concentrated groups as when using the channel. These areas are purportedly used for feeding and would be permanently lost with the building of an island CDF. To minimize the direct and indirect losses, as with the invertebrates, the zones that were selected for potential placement of any island CDF were chosen in part to avoid areas of highest fish abundance based upon data from Wilk (1998). However, some loss would be unavoidable.

c. Similar to the benthic analysis above, a small amount of vertical habitat would be gained in the hard structure associated with the periphery of the CDF. This structure would allow a different macrobenthic community to be established that may be characterized by barnacles, sea anemone, hard mussels and perhaps American lobster. Some fish species that are attracted to hard structures and thus would populate the border of the facility include tautog (blackfish), black sea bass, and cunner (bergal).

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5.3.6.3.4 Other Living Resources

a. In the Lower Bay Complex, the diamondback terrapin could be affected by the project, although terrapins generally are found closer to marsh and creek areas at the edge of the Lower Bay Complex where they nest and feed. These populations are considered stable at present (USFWS, 1997). No other (non-endangered) or threatened reptiles are expected to be affected by an island CDF.

b. Direct and indirect effects on passerine birds (e.g., land birds) would not be expected either because they would not frequent the island CDF or would spend only a brief period of time there. For example, during migration, a weather front might push them offshore and they may seek refuge on the first land mass available, but would resume their migration as soon as rested, especially if no vegetation/food were available. Most water birds such as ducks, grebes and loons would also avoid the site since it does not provide for their needs. In the remote chance that a CDF island were considered further, the site design and final closure could, however, be planned to provide habitat for the needs of some birds.

c. Members of the order *Charadriiformes* (gulls, terns and shorebirds) are potentially at risk. Shorebirds pose a concern because many pass through the area on their north and southbound migrations. Use of barrier beaches, especially during storms, by migrating shorebirds has been observed as a common behavior, and it is likely that they would use the island CDF during such events while migrating. This presents the problem of potential contamination while using the site for refuge. Further, if muddy sediment is present on the CDF, they may attempt to feed, because many species normally use this substrate when feeding. In addition, several species of shorebirds are known to nest in the study area vicinity, including American oystercatcher, willet, killdeer, piping plover, and spotted sandpiper. Therefore, it is possible that these species might attempt to nest on an island CDF while dredged material is being placed. Gulls and terns may also roost on an island CDF, and overwintering by gulls of several species is also possible.

d. The presence of food and amount of disturbance would determine if and what bird species might attempt to nest and feed on an island CDF. Precautions to prevent feeding and nesting during operation of the facility may be required to prevent uptake of any contaminants by these birds. Such steps could include the use of netting and maintaining the majority of the site at water depths greater than 12 inches. Capping and other management measures could be used to isolate contaminants in selected areas and provide useful habitat, positively affecting these species. Use after the island CDF or cell of

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the island CDF were completed and capped would not have an adverse effect on birds.

e. The only types of mammals that would potentially be affected by an island CDF are marine mammals. In the ocean (New York Bight Apex), marine mammals potentially affected include great whales (covered below in section 5.3.6.3.5, endangered species), small cetaceans, and seals. Seals are usually found close to land, but the small cetaceans such as the bottlenosed dolphin, common dolphin, and the harbor porpoise may be transients and feed in the area. In the Lower Bay Complex, potentially affected marine mammals include the harbor seal and, to a lesser extent, the gray seal and harbor porpoise. Direct effects on marine mammals would likely be minimal since they could easily flee the area of construction. Indirect effects could include the permanent loss of potential feeding habitat for these species, but the loss would be expected to have minimal effects given the size of the water body left undisturbed and the relative infrequency that these areas are utilized by these species. Furthermore, it is possible that species such as seals could use the structure of an island CDF for hauling out, thus providing additional resting area for these species.

5.3.6.3.5 Endangered Species

a. Among the endangered species that live in the areas being considered for an island CDF, sea turtles could be exposed to adverse effects associated with this option type. Four species of sea turtles occupy the area, mainly during the warmer months. They are the Federally endangered Kemp's Ridley, and leatherback sea turtle, and the threatened green and loggerhead sea turtles. The main concern is possible death or injury to individual turtles from mechanical means associated with construction of the island CDF since they would easily avoid the area after it was built. However, such direct impacts are unlikely since these species could flee the area during construction. Studies have shown that only hopper dredges have been associated with mortality to sea turtles. Monitoring of a hopper dredge operation off New Jersey found very few turtles taken in by the dredge. Indirect impacts would include the potential loss of feeding areas where the island CDF is constructed, although such a loss would be small in relation to the total feeding area available to these turtles. Loss would be expected to be minimized because the zones for possible new island CDFs were chosen, in part, based upon the lower biological productivity of these areas, including the crabs fed upon by the Kemp's Ridley and loggerhead sea turtles.

b. Peregrine falcons also nest in the study area. Currently, at least three nests are within 10 miles of the center of Zone 2 of the Lower Bay Complex. One of these, at the Verrazano Bridge, is 5 miles from the center of Zone 2. In the

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New York Bight Apex (Zone 3), only one nest site exists within 5 miles of the proposed location for an island CDF. The next closest nest is located 11 miles away.

c. The use of an island CDF by local peregrine falcons, especially those nesting closer to the proposed sites, would be possible because these birds will travel some distance to capture prey, especially to feed their young. Peregine falcons could be exposed to contaminants via ingestion of shorebirds that use the site during operation and ingest contaminated prey during feeding. Additionally, migrating peregrines could be attracted to the site if shorebirds were present in the area. Measures exist to avoid/minimize use of the island CDF by these prey species before it is capped which would eliminate this contaminant pathway.

d. The bald eagle does not nest in the study area, but both subspecies do migrate through the area. However, its most important overwintering site near the study area is along the Hudson River and Catskill Reservoirs (USFWS, 1997). Occasionally, an individual of the northern subspecies overwinters in the Bight area. In the Lower Bay Complex, the closest likely roost site is at Sandy Hook about four miles from the center of Zone 2. Bald eagles could potentially be exposed to contaminants associated with an island CDF via ingestion of contaminated fish and waterfowl. The probability of this would be low for a variety of reasons. First, contaminants would be confined by a cap that would be placed over the dredged materials after each cell is full. Second, the sites that were proposed for construction of an island CDF are located in relatively deep water where fishing by bald eagles would be expected to be diminished. Third, the number of individuals that would likely occupy the area is low, and last, stays of bald eagles would be short in duration. All of these factors would limit potential uptake of contaminants by the bald eagles, thus limiting potential impact to this species associated with construction and operation of an island CDF.

e. The piping plover and roseate tern also inhabit the areas surrounding the sites that were under consideration for placement of an island CDF. No direct impacts would be expected to occur to these species, but migrating birds could stop at the island CDF during their traverse of the area. The roseate tern consumes fish and thus could be exposed to contaminants via ingestion of contaminated fish. In addition both of these species could potentially nest on an island CDF and thus be exposed to contaminated sediment and prey. The island could provide isolated habitat for these species after it was capped to isolate any contamination. Precautions to prevent feeding and nesting during operation of the facility would be required to prevent uptake of any contaminants by these birds. Coordination with USFWS would continue in the

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remote chance that this option would be considered further. Use after the island CDF is capped would not have an adverse effect on these birds, and measures could be used to provide useful habitat, thus positively affecting these species.

f. No whale species are expected to be present in the Lower Bay Complex. However, some species may frequent the New York Bight Apex. No direct impacts to whales would be expected since they can easily avoid the construction area. Indirect effects on migration patterns of these species are not fully documented, but the likelihood of adverse effects would be low since whales are capable of adjusting for any localized changes.

5.3.6.3.6 Essential Fish Habitat

a. An island facility in the ocean (Bight Apex) would have adverse impacts on Essential Fish Habitat since a total of 32 species of fish and invertebrates with EFH designation are located in the grids of the Bight study area. An island CDF in the Lower Bay Complex would also have adverse impacts on EFH. Permanent loss of bottom habitat, and thus EFH, would occur in both the ocean and bay areas. Careful placement of the facility could reduce some impacts on some species, but avoidance of impacts on all life stages of all species would be highly unlikely. Mitigation would need to be 'out of kind' and thus would not be likely to directly address the EFH losses.

5.3.6.3.7 Other Impact Issues

a. An island CDF would not be expected to have impact on air quality and aesthetics. Recent surveys conducted for the DMMP indicate that island CDFs may impact both prehistoric and historic resources (LaPorta, Sohl, and Brewer 1999; Cox 1998). Any impact potential would be reduced with a location in the New York Bight Apex compared to a location in Lower Bay. The surface of the island would represent potential upland habitat which could be designed to provide habitat for selected species.

5.4 Risk Assessment

a. A screening-level ecological and human health risk assessment was performed on selected dredged material disposal options (Menzie-Cura & Associates In 1998). Being a screening-level assessment, it was scoped using worst case assumptions for the levels of contaminants, the exposure pathways and potential receptor organisms. The options selected for evaluation included several that are no longer under consideration in the DMMP, or are options that are not in the preferred category in the recommended DMMP. Because this risk assessment does not apply to the preferred options in the DMMP, a detailed summary of the results of the assessment are not presented here. Risk evaluations on selected preferred options have been and are being performed to better

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characterize the pathway risks of those options. As results of these studies are completed, they will be used by the relevant regulatory agencies in making their permit determinations and by the implementing organization to address concerns raised by involved groups and the public.

5.5 Environmental Justice

5.5.1 Introduction to Environmental Justice

a. On February 11,1994, President Clinton issued Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The Executive Order requires each agency to identify and address, as appropriate, "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Attached to the Executive Order was a Memorandum to the heads of departments and agencies within the Federal government that specifically recognized the importance of procedures under the National Environmental Policy Act (NEPA) for identifying and addressing environmental justice concerns. The Memorandum particularly emphasized the importance of public participation in the NEPA process and stated that potential effects and mitigation measures should be identified in consultation with affected communities. To understand how Executive Order 12898 relates to NEPA, a basic understanding of the principles of NEPA is necessary. The principle goals of NEPA include:

- To assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.
- To attain the widest range of beneficial uses of the environment without degradation, risk to health or safety or other undesirable and unintended consequences.
- To preserve important historic, cultural and natural aspects of our natural heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice.
- To achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.

b. The Council on Environmental Quality (CEQ) has developed a guidance document to assist the affected agencies in identifying and addressing environmental justice concerns. The guidance document was used for the DMMP study to address environmental justice issues. According to the CEQ guidance, the Executive Order emphasized four issues that are pertinent to the NEPA process. Two of these issues

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are particularly applicable to the DMMP study: 1) the collection, maintenance, and analysis of information on patterns of subsistence consumption of fish, vegetation, or wildlife, and 2) ensuring effective public participation and access to information.

c. The CEQ identifies six general principles that should be followed in addressing environmental justice concerns. In summary, these principles are:

- Consider the composition of the affected area to determine whether minority populations, low-income populations, or Indian tribes are present in the area affected by the proposed action. If present, determine whether the action disproportionately affects these populations.
- Consider relevant public health and industry data related to the potential for multiple or cumulative exposure, and historical patterns of exposure.
- Recognize the interrelated cultural, social, occupational, historical, or economic factors that might amplify effects of the proposed actions.
- Develop effective public participation strategies.
- Assure meaningful community representation.
- Seek tribal representation, if applicable.

5.5.2 Public Meetings

a. Guidance related to public participation in the NEPA process is provided throughout the CEQ guidance for NEPA (40 CFR 1500). Agencies are required, to the fullest extent possible, to encourage and facilitate public participation in agency decisions that affect the quality of the human environment. Agencies must also request comments from the public on environmental impact statements before the final decision has been made and must make diligent efforts to involve the public in preparing and implementing NEPA procedures.

b. The EIS for the DMMP is being prepared in accordance with those guidelines, including those sections related to public participation. Public meetings have been held throughout the planning process to inform the public about the status of the project and to solicit input regarding the alternatives, strategies, options, and sub-options that are being considered for the management of dredged materials. Most recently, a public scoping session was held by the Army Corps of Engineers in April 1998. Additional public meetings will continue to be held at important junctures in the development of the DMMP EIS including public meetings on the PEIS approximately 30 days after its Notice of Availability in the Federal Register. Public input received during these meetings will be taken into consideration when making a final decision regarding the management of dredged materials. Additional information about public involvement can be found in Chapter 6.

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5.5.3 Environmental Justice Issues Specific to Each Dredged Material Management Option Type

5.5.3.1 Contaminant Reduction and Sediment Reduction

a. Two strategies that are not likely to be associated with environmental justice issues are the contaminant reduction and sediment reduction management strategies. These strategies are watershed-based management approaches and are not associated with specific facilities or locations. Furthermore, since these strategies comprise management goals that are applicable across large landscapes (i.e., watersheds), the geographic locations associated with these strategies are likely to encompass many different socioeconomic classes, including low, middle, and high-income groups, minorities, and non-minorities. Therefore, it is not possible to evaluate environmental justice issues with respect to these watershed-based strategies, but the breadth of socioeconomic classes effected indicates that these options are unlikely to raise environmental justice issues.

5.5.3.2 Beneficial Use

a. The beneficial use strategy encompasses three options: 1) remediating the Historic Area Remediation Site (HARS), 2) land remediation, and 3) habitat creation, enhancement, and restoration. These options are discussed below with respect to environmental justice issues.

5.5.3.2.1 HARS Remediation

a. Similar to the Contaminant Reduction and Sediment Reduction discussed above, using dredged sediment to remediate the HARS is not likely to be associated with environmental justice issues because the HARS is located in an open water environment and thus is not associated with or adjacent to areas that are inhabited by humans.

5.5.3.2.2 Land Remediation

a. The land remediation option encompasses using non-HARS dredged material to remediate degraded lands, including landfills, brownfields, quarry sites, and abandoned mines. A variety of sites have been identified as potential candidates for such remediation. For example, a brownfield/landfill site in Bayonne, NJ has been identified for potential land remediation. The Bark Camp Mine Reclamation Laboratory is an abandoned mine in Clearfield County, PA that is being used as a demonstration project for this type of remediation technology. Upon successful completion of this project, the Lehigh Anthracite Mine in Pennsylvania has also been identified as a potential candidate for mine reclamation using dredged materials. These and similar facilities are often located in areas with disproportionately high numbers of minorities and low-income families. The likelihood of exposure to

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contaminants in the dredged material by populations residing near these facilities is low since the dredged material would first undergo a solidification/stabilization process during which contaminants would be immobilized. Such facilities may also be located in areas that require transportation of treated and/or untreated dredged material through communities that comprise primarily low-income or minority families. However, the likelihood that low-income and minority communities would be adversely affected by the transportation of dredged materials through these communities is difficult to predict. Finally, the land remediation alternative would probably be accompanied by one or more dredged material processing and rehandling facilities. This type of facility could potentially be located near or among communities with disproportionately high numbers of low-income families and minorities. Such a facility could also be located in an area that would require transport of treated and/or untreated dredged material through areas with disproportionately high numbers of low-income families and minorities. Since a site for such a processing/handling facility has not been proposed, it is not appropriate to address specific environmental justice issues associated with it in this PEIS. However, given site design and operational controls described in Section 5.3.4, no impacts are expected in general.

b. Land remediation is expected to decrease the amount of contamination associated with abandoned mines and landfills. Acid mine drainage is expected to decline at abandoned coal mines that are filled with stabilized dredged material. For landfills, the use of stabilized dredged material as a low permeability cap reduces the infiltration of rainwater into the historic fill thereby significantly reducing the leaching of contaminants from these facilities. After abandoned lands are filled with dredged material, they will be covered by 3 ft of clean material that can be colonized by vegetation or used for development. The reduction in contaminants leaching from these facilities, the increase in aesthetic value, and the restoration of these lands to beneficial uses are outcomes that together are expected to outweigh any negative impacts that land remediation might have on low-income or minority families inhabiting nearby communities.

5.5.3.2.3 Habitat Creation, Enhancement, and Restoration

a. This option includes using dredged materials in a variety of ways: as fill for existing borrow pits or dead-end basins; for upland habitat enhancement; for wetland/mudflat habitat creation or treatment; for oyster/clam habitat restoration; as landfill cover for creation of upland habitat; or to create wetlands for leachate infiltration. It should be noted that in many cases, non-HARS contaminated material would not be used for habitat creation, enhancement, and restoration unless treated since the contaminants in the sediment could potentially degrade wildlife habitat and thus be counterproductive. Since

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HARS (clean) material is expected to be frequently used for this option, environmental justice is less of an issue because exposure to contaminants would be unlikely and thus there would not be a disparity in exposure to contaminants between different socioeconomic groups.

b. Some of the sub-options under the habitat creation, enhancement, and restoration option would be located in open water areas and thus would not likely be associated with environmental justice issues. Examples of this are oyster/clam restoration in the Lower Bay, use of sediment for remediation of the HARS, and use of sediment as fill for existing borrow pits especially those in Lower Bay.

c. For the sub-options that would not be located in open water environments, specific locations have been proposed. For example, for the upland habitat enhancement sub-option, sites that have been proposed include Hoffman Island, Swinburne Island, Prall's Island, Shooter's Island, south Brother Island, and Floyd Bennett Field. All five of the areas are not residential areas for humans and thus would not have environmental justice issues associated with them. Floyd Bennett Field, which is part of the Gateway National Recreation Area, is used by a variety of people including visitors to the recreation area that could potentially be adversely affected if this area were used for dredged material disposal. Information about the socioeconomic classes of individuals who visit this park on a regular basis is not currently available. Therefore, environmental justice concerns would be difficult to evaluate with respect to this location. Nevertheless, as discussed above, non-HARS contaminated material is unlikely to be used for this type of habitat enhancement sub-option. Therefore, any negative impacts to low-income or minority groups who may use this park on a regular basis would most likely be outweighed by the benefits of improving the aesthetic and ecological value of these lands.

d. A similar point can be made with respect to the locations that have been proposed for the filling of dead-end basins and wetlands/mudflats habitat creation or treatment. Three potential locations have been identified for the filling of dead-end basins: Newtown Creek, the Gowanus Canal, and Bowery Bay. Four locations have been proposed for wetlands/mudflats habitat creation or treatment: Jamaica Bay, the Arthur Kill, Newark Bay, and the Raritan River. Two pit sites (Norton Basin, Little Bay) have been identified for restoration sites, with other pits further in the interior of the bay also under consideration. These proposed locations are in areas that may contain a disproportionate number of low-income families and minorities. However, as discussed previously, it is expected that only clean HARS dredged material will be used for these sub-options, or if contaminated (non-HARS) material were used for these sub-options, it would be capped with clean material and

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therefore block exposure routes to neighboring communities. Furthermore, since these sub-options are in aquatic environments, they would not require ground transportation of dredged material and thus would not impact communities through which dredged materials would otherwise be transported. Therefore, any negative impacts to low-income and minority communities that are near sites where dredged materials will be used to create or restore wetland/mudflat habitat and fill dead-end basins or existing pits should be outweighed by the benefits of improving the aesthetic and ecological value of these areas.

e. For the landfill cover and creation of wetlands for leachate infiltration sub-options, no specific locations have been proposed, although it is possible that these management sub-options could be established in areas with a disproportionately high number of low-income or minority communities. However, because contaminated non-HARS material is not likely to be used for these sub-options, or if used will be buried by a non-contaminated cap, any negative impacts to minority or low-income populations should be outweighed by the positive benefits of creating upland wildlife habitat and/or wetlands.

5.5.3.3 Decontamination

a. A variety of decontamination technologies have been proposed that will remove contaminants from dredged material not suitable for HARS placement via chemical, thermal, biological and/or physical treatment. These technologies include both low- and high-end processes. The low-end processes typically include solidification/stabilization, and manufactured topsoil production. High-end processes include solvent extraction, sediment washing, and thermal processing.

b. An environmental justice issue that is associated with the decontamination strategy is the fact that the facility could potentially be located in an area that is dominated by minorities and low-income families. A variety of demonstration projects are currently underway using the various technologies, but specific sites for such full scale facilities have not been proposed. Analysis of specific environmental justice issues associated with this strategy would be undertaken in the next tier of the NEPA process. A general discussion is provided. In general, communities surrounding such a facility could potentially be exposed to contaminated sediment that is lost during transport or loading/off-loading of dredged materials. In addition, ground transportation may be required to haul dredged materials and other supplies and processing chemicals to the facility and clean materials and waste products from the facility. Trucking routes could potentially go through low-income and minority communities that might be adversely impacted by truck noise, emissions, and traffic volume, as well as potential spills.

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c. Another issue associated with decontamination is the waste product that would be generated as a result of such technology. In some cases, especially for the high-end processes such as sediment washing and solvent extraction, a highly concentrated toxic byproduct is expected. This byproduct will require disposal at a facility that could also potentially be located in a minority and low-income community. Furthermore, the trucking routes to transport the byproduct from the decontamination facility to a disposal facility could potentially be through minority and low-income communities, resulting in potential adverse impacts to these communities similar to those mentioned above. All of these considerations indicate that environmental justice is an issue of concern with regard to the decontamination strategy and thus should be considered in more detail once specific sites are designated for each of these technologies.

5.5.3.4 Confined Aquatic Disposal (CAD)

a. This strategy is not likely to be associated with environmental justice issues. Due to the location of this type of facility in open water, it is not expected to be associated with or adjacent to areas of human habitation. This strategy also would not require ground transportation of dredged material and thus would not impact communities through which dredged material would otherwise be transported. It is possible that humans could be exposed to contamination from the CAD via consumption of contaminated fish. This would require further analysis in the next tier of NEPA documentation.

5.5.3.5 Confined Disposal Facilities (CDFs)

5.5.3.5.1 Island CDF

a. Since an island CDF would be located in an open water environment, it too is not expected to be associated with environmental justice issues since it would not be located in areas of human habitation.

5.5.3.5.2 Upland CDF

a. No specific sites are currently under consideration for the upland CDF option. Therefore, discussion of specific environmental justice issues associated with this option cannot addressed in this document. However, if an upland CDF were to be situated in or near a community with a disproportionately high number of low-income families and minorities, these groups may be adversely impacted by a decrease in aesthetic value of the land. In addition, these groups could potentially be exposed to contamination in the sediment due to a loss of dredged materials during off-loading operations, although the probability of large volumes of dredged materials being lost during off-loading is low due to the intended management and operation of the facility that would minimize such losses. An upland CDF may also require

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ground transportation of dredged materials to the facility. Such transportation could potentially be through low-income and minority communities that might be adversely impacted by truck noise, emissions, and traffic volume, as well as potential spills.

5.5.3.5.3 Nearshore CDF

a. Several potential sites for construction of a nearshore CDF have been identified throughout the NY/NJ Harbor. These include Long Slip Canal, Hoboken, NJ, River Terminals, Kearny, NJ, and South Brooklyn Piers, Brooklyn, NY. These and many other near-shore environments located in the NY/NJ harbor are potentially located in or near low-income or minority-dominated communities. If a near-shore CDF were situated in or near such a community, low-income families and minorities may be disproportionately and adversely impacted by this option, although the likelihood of this is low. The aesthetic value of the land could either improve or worsen depending on the current condition of the site (prior to construction of the facility) and the planned end use of the facility. These communities may be exposed to contaminants in the sediment due to losses of sediment during off-loading operations. Fish that are exposed to this sediment can also accumulate contaminants and thus result in exposure of humans consuming contaminated fish. Effects would need to be evaluated during the next tier of NEPA review. Nevertheless, the probability of large volumes of dredged materials being lost during off-loading operations is low due to the management and operation of the facility.

5.5.3.6 No-Action

a. The selection of the no-action alternative would likely result in the NY/NJ harbor continuing to be dredged, but the dredged materials would not be handled according to an established management plan. Such an uncoordinated effort could result in the use of dredged material disposal alternatives for which environmental justice issues were not considered. Prediction of whether low-income or minority communities would be disproportionately and adversely affected by the no-action alternative is problematic. However, since fewer controls would be placed on the use of disposal alternatives that would adversely impact low-income and minority communities, it is a distinct possibility that the no-action alternative could potentially have negative impacts on low-income and minority communities.

5.6 Cumulative Impacts of Alternative Plans

a. The impacts of the various dredged material management options types were discussed in section 5.3. However, no single option type will be able to meet all the needs of the Port. In addition, many uncertainties exist with regard to actual dredging needs, the future quality of sediment from different parts of the Harbor, and the cost

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effectiveness of a number of newer management options. The challenge is then how best to combine the various options to meet the short and long-term needs of the Port while balancing the economic and environmental advantages and disadvantages associated with each option type. The traditional USACE approach would be to select an alternative based on proven solutions and lowest cost. However, this traditional approach would not sufficiently consider the environmental benefits associated with the options and thus would not meet the dual goals of the DMMP. In addition, the plan must be flexible enough to adapt to changes in the future. The time frame agreed upon by stakeholders for this DMMP is 40 years. This allows significant time for the development and demonstration of evolving technologies that are not currently feasible, but could be considered in the future.

b. Four alternatives are currently under consideration for the comprehensive DMMP: 1) the No-Action alternative, 2) the Recommended Course-of-Action, 3) the Environmentally Preferred Alternative, and 4) the Base Plan (Economically Preferred Alternative). The alternatives were presented in Chapter 3 Tables 3-1 and 3-2 of the DMMP. Each of these alternatives is described below, together with their associated cumulative impacts. With the exception of the No-Action plan, the alternatives are combinations of options that together would produce the desired outcome (e.g., best overall, or best environmentally or best economically). Thus, the impacts of each alternative are the sum of the impacts of the option types that are included with that alternative and any cumulative effects that accrue from combining the option types. For the three alternatives other than No-Action, the impacts associated with the management option that were combined to form each alternative were described previously for each option type (Section 5.3). The cumulative impacts for each alternative are summarized here to provide a comparison of the impacts of the four alternatives currently under consideration.

5.6.1 No-Action Alternative

a. The No Action Alternative is defined as a lack of a comprehensive plan for dredged material management in the NY/NJ Harbor. The lack of a plan would leave in place the current process in which dredging and disposal takes place on a project by project basis with the Corps reviewing permit applications for consistency with existing environmental regulations. Each project sponsor (including Federal agencies) would present a plan for dredging and disposal based on the most economical disposal option available that meets environmental requirements. Existing options (HARS for ocean suitable material; NBCDF, Bayonne and Seaboard for non-HARS material) provide only a short-term alternative for dredged materials. While other sites are on the horizon, they may not be developed if there is uncertainty regarding the future of the Port for waterborne commerce. This is especially true for some of the more costly but desired beneficial use options.

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b. The DMMP, in addition to the coordinated planning it provides, is a statement that a commitment has been made by the stakeholders that the NY/NJ Harbor will be maintained as a competitive location for waterborne commerce, as well as a viable habitat for fish and wildlife. The planning for future navigation improvements is dependent upon the DMMP because the improvements identified in the DMMP will generate large volumes of dredged material requiring placement sites. The lack of a DMMP would likely result in little or no navigation improvements and a decline in waterborne commerce in the harbor. Without navigation improvements existing commerce and facilities would decline with an associated reduction in the need for dredging and disposal. The lack of a unified DMMP would also likely result in a reduction in the overall efforts to restore the ecosystem.

c. A decline in the need for dredging and disposal would have both adverse and beneficial impacts on environmental resources. The DMMP emphasizes the development of beneficial use options by viewing dredged material as a resource. A decline in dredging would limit the availability of this resource and the impetus for implementing the more costly beneficial uses associated with land remediation, landfill capping, and habitat creation, enhancement and restoration. The beneficial effects of these option types are cumulative in that as more sites are remediated, enhanced, and restored, the combined effects represent far-reaching comprehensive improvements to the harbor environment. Thus, although dredging and disposal are generally regarded as activities with potential adverse impacts, in this case where dredged material is a resource for environmentally beneficial uses, the lack of a DMMP would result in a reduced opportunity for beneficial impacts.

d. The lack of a DMMP and the expected decline in the need for dredging and disposal, would result in a reduction in the adverse effects associated with dredging. However, assuming that waterborne commerce would remain at a reduced level, there would be a need to maintain most existing channels and many berthing areas. The overall reduction in dredging would be difficult to estimate, but because dredged areas recover their habitat value relatively quickly, the beneficial effect of reduced dredging would be small.

e. The lack of a DMMP and its implied commitment to maintaining the Port could result in a severe adverse economic impact to the region served by the harbor. There could be a direct impact in the loss of jobs associated with shipping and significant indirect impacts in the loss of jobs related to shipping. In addition, a decline in shipping could result in an increase in the price of consumer goods which would no longer come directly through the harbor, but would have to be transported to the region from other ports.

f. The lack of a DMMP may also inhibit the development of long-term and innovative programs for dredged material management and those programs which are

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currently in a demonstration phase may not be advanced to full scale facilities. Dredging represents an opportunity for the removal of in-place contaminants, or the confinement of contaminants depending on the option type implemented over time. Reduced dredging levels would reduce this benefit. Decontamination techniques may provide an opportunity to remediate in-water sites (hot spots) which have very high levels of contaminants. Removal and confinement in combination with sediment contaminant reduction should result in cleaner sediments which would have long-term cumulative beneficial impacts for aquatic life and human exposure to contaminants. Again, while dredging is generally regarded as an activity having adverse impacts, when dredging of contaminated sediments occurs in the context of a comprehensive plan for dredged material management it can result in cumulative beneficial impacts. The No Action Alternative would minimize the opportunity to implement option types which can provide cumulative benefits, thus No Action has adverse impacts on environmental resources.

5.6.2 Recommended Course-of-Action

a. The recommended course of action was developed to meet the dual goals of the DMMP, that is to keep the Port open for waterborne commerce and to restore the environment of the estuary. These goals would be accomplished by cleaning up existing and future sediments and finding beneficial uses for dredged materials thereby minimizing long-term impacts and producing many positive benefits to the estuary as a whole. The plan is broken down into two time periods, 10 years (2000-2010) and 40 years (2011-2040). The plan for the next 10 years takes into consideration all the planned and underway deepening projects as well as the anticipated maintenance volumes to keep the existing or improved channels/berthing areas open. The 10-year plan relies exclusively on preferred options (Table 2-2 of DMMP, see table for volumes and duration of option use). The selection process stressed beneficial uses of dredged material, especially those with environmental restoration potential. The 10-year plan uses environmentally acceptable disposal only options as a contingency. The contingency options are confined aquatic disposal facilities at various locations. While the contingency options will continue to be developed they would only be implemented if a more beneficial use option is not available. The options selected for the recommended course-of-action are:

- HARS Suitable Material
  - Ocean Remediation (HARS)
  - Habitat Creation, Enhancement and Restoration
  - Land Remediation (untreated)
  - Beach Nourishment
- Rock Material
  - Fish Reefs
- Non-HARS Material

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- Habitat Creation, Enhancement and Restoration
- Land Remediation: Landfills, Brownfield and Mine Remediation
- Sediment Processing for Beneficial Use (NJ Facility)
- Decontamination

b. The 2040 plan covers the Port's needs for the thirty years following completion of the majority of the channel/berthing areas and other Port improvements. It is primarily aimed at managing the maintenance-related dredged materials. This plan assumes that contaminant reduction programs will have been implemented, thus reducing the volume of non-HARS material produced from maintenance dredging. Similar to the 2010 plan, the 2040 plan relies heavily on beneficial uses such as land remediation, decontamination methods, and remediation of the HARS. The availability of the HARS could diminish rapidly after 2011, especially as contaminant reduction becomes effective and more of the dredged material is suitable for HARS. Opportunities may surface to expand the HARS capacity through consolidation and use of thicker caps, but some time in the future, if HARS remediation continues to be successful, the concept may be considered for expansion to other degraded ocean sites.

c. The test projects, such as mine land reclamation have the potential to be expanded into the 2040 time frame after evaluation of the initial phase of study. The beneficial uses involving habitat restoration/creation would only be executed at sites that are already permitted for the chosen activity (e.g., HARS, fishing reefs), or at sites where scientific data (e.g., sediment profile imaging) indicate degraded or low use habitats and the general consensus among the stakeholders and resource agencies suggests they could be improved.

d. Because the primary options of the recommended course of action rely only on the beneficial use options the cumulative impacts of the recommended course-of-action are expected to be beneficial. Remediation of the HARS is expected to isolate existing contaminants from the surrounding water column and restore or maintain healthy benthic habitat conditions. After the site is restored to a productive benthic habitat, associated food web benefits are expected to occur, including the colonization of the area by fish and a decrease in contaminants accumulating in the food chain. Similarly, the use of clean (HARS-suitable) dredged material to cap the Newark Bay CDF would also isolate contaminated material from the water column and return the facility footprint to productive benthic and fish habitat.

e. Environmental benefits would also be attained from the creation, restoration, and enhancement of habitat. Filling and capping degraded pits such as those in Jamaica Bay is expected to improve water quality and restore the area to one that can support fish and other organisms, provided the degraded nature of the pits can be confirmed and the initial filling at the smaller pits shows it can be safely and effectively

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accomplished. The creation of oyster, shellfish, and bird habitat all would have a beneficial impact on these organisms as well as potential socioeconomic benefits by increasing invertebrate and fish populations for recreational and commercial fisheries. These beneficial impacts are cumulative in that as more sites are restored and enhanced the overall environmental conditions in the harbor for aquatic and upland wildlife are improved.

f. The use of land and mine remediation/reclamation options are also expected to provide net benefits in that they confine and thus decrease the release of contaminants into the environment. This will result in a decrease in the volume of such contaminants that enter the food chain as well as a decrease in exposure to these contaminants by humans. In addition, remediated and reclaimed landfill and mine sites have the potential to be converted to viable wildlife habitat or other beneficial uses (such as recreation or commercial uses) in the future. These outcomes are expected to have ecological, human health, and socioeconomic benefits. In the case of brownfields, the use of these sites for commercial developments may offset the adverse impacts of using existing undeveloped land.

g. The use of suitable sandy dredged materials for construction aggregate and beach nourishment is an existing practice. Benefits from these types of uses are expected because the incorporation of these options in the DMMP would preclude the need to use materials mined from other parts of the harbor, thus decreasing the adverse impacts associated with such mining. The recommended course-of-action would restore the degraded habitat from previous mining operations (borrow pits) and avoid the excavation of new ones, while providing materials currently mined or dredged for construction and beach nourishment.

h. Of all the options included in the recommended course-of-action, treatment of dredged material at the NJ processing facility and decontamination are two options that are associated with the potential for adverse impacts. These facilities would be handling large volumes of contaminated dredged material that would require transport and handling, and may require stockpiling of the sediments, as well as any chemicals needed for processing. The processing may have air emissions, liquid effluents and solid wastes. These potential sources of pollution can be controlled with conventional techniques which can minimize any adverse effects from these facilities. In addition, these facilities would likely be sited in existing industrial areas or at brownfields sites. Many environmental benefits are expected as a result of using sediment processing and decontamination. After decontamination, the clean end product can be used in less restricted applications, such as the beneficial use applications discussed above. Treatment at the NJ processing facility will convert the dredged material into a marketable end product such as clean soil or blended cement that has socioeconomic benefits as well as helping to defray their cost. Because the potential impacts associated with the decontamination and treatment options will be

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minimized by the use of appropriate controls, the adverse potential impacts would be outweighed by the benefits associated with the use of the end products.

i. In the event that the beneficial use options do not meet disposal needs due to the uncertainties associated with this planning function, the recommended course-of-action includes a disposal only option as a contingency. The preferred contingency option is confined aquatic disposal (CAD pits) sited in the same subarea of the harbor from which the dredged material is produced. However, flexibility in siting is needed because it may be desirable to place relatively clean material from Lower Bay in Upper Bay. This approach confines the associated contaminants to an already contaminated location. As discussed in Section 5.3.5, CAD pits in areas such as Newark Bay or Upper Bay would cause temporary, localized adverse impacts to aquatic resources. The existing NBCDF, which is currently at 40% of capacity, is operating as planned with no unexpected environmental problems. There would be no long-term adverse impacts to aquatic resources or other environmental resources from the use of CAD pits, which would be capped with clean material when full, returning the area to original bathymetry and sediment quality within a year or two.

j. The CAD pits preferred for contingency development are located in Upper Bay and would be developed on an as needed basis in discrete units that would be sited to minimize the temporary adverse impacts. This approach fits with the flexibility of the DMMP in that the number of CAD pits would be limited to the number needed to meet a short-term shortfall in beneficial use disposal capacity. Because the CAD pits have only temporary adverse impacts they do not diminish the cumulative beneficial impact of the recommended course-of-action and they provide assurance that the economic goal (Port viability) of the DMMP will be met. Because they provide a secure containment area for dredged material they help remove the contaminants from surface sediments and isolate them from the environment.

k. The recommended course-of-action would achieve both the economic goal (maintain Port facilities) and the environmental goal (restore estuarine environments) of the DMMP. The recommended course-of-action protects remaining significant upland and aquatic habitats, and provides opportunities to reduce contaminant levels, restore and enhance upland and aquatic habitats, while achieving the economic goal of the DMMP. The plan has cumulative beneficial impacts in that both the regional economy and the estuarine environment would accrue benefits greater than the sum of the individual components of the plan.

5.6.3 Environmentally Preferred Alternative

a. The environmentally preferred alternative is based solely on environmental benefits to the estuary, irrespective of cost, proven reliability, or local support. This alternative focuses solely on options such as beneficial uses and habitat restoration and does not include any containment disposal options. Compared to the

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recommended plan of action, this plan assumes that restoration options, such as filling of degraded pits are feasible and relies on them more heavily in lieu of contingency disposal options, such as new CAD pits. This alternative also maximizes the use of decontamination technologies. Therefore, it is less costly than the recommended course of action. However, this alternative is based on newly emerging methods of habitat improvement and thus the expected environmental benefits from these options, and the economic goal of the DMMP (port viability) may not be attained. The options that together comprise the environmentally preferred alternative are as follows:

- HARS Remediation
- Contaminant Reduction
- Decontamination
- Remediation of hot spots
- Land remediation (treated and untreated)
- Construction uses
- Creation/restoration of oyster, shellfish and bird habitat
- Filling existing degraded pits

b. As discussed in Section 5.6.2 above, decontamination is associated with some potential adverse impacts, such as release of contaminants into the air and water, resulting in potential exposure of both wildlife and humans. Pollution control technology would minimize these potential adverse effects, as would careful facility siting. The benefits derived from the beneficial uses of the materials obtained from decontamination processes are expected to outweigh the minimal adverse impacts associate with this option.

c. Remediation of off-channel hot spots would be performed using dredged materials that have either undergone sediment stabilization or more likely high-end decontamination despite its potentially higher cost. The identification of potential hot spots for remediation and their effects on the likely recovery of the ecosystem has not been determined. Therefore, the environmental impacts of this option would need further evaluation. However, it is assumed that remediation of hot spots in the Port will effectively isolate highly contaminated areas from the water column and thus decrease or eliminate the exposure of aquatic organisms to contaminants. This would have obvious beneficial impacts by decreasing the amount of contamination that enters food webs in the harbor.

d. As discussed in Section 5.3.3.3 above, land remediation is also expected to provide net benefits in that a reduction in the release of contaminants into the environment is expected. In addition, remediated landfill sites have the potential to be converted to viable wildlife habitat or other beneficial uses in the future. These outcomes are expected to have ecological, human health, and socioeconomic benefits.

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e. The use of suitable dredged materials for construction aggregate has been a common practice in the harbor for many years. (See Sections 5.6.2 and 5.3.3.4 for a discussion of impacts.)

f. Filling and capping degraded pits such as those in Jamaica Bay is expected to improve water quality and restore the areas to ones that can support fish and other organisms. Testing which confirmed these benefits would overcome much of the oppositions to this option and permit widespread use. Additional ecological and socioeconomic benefits would be realized from the creation and restoration of oyster, shellfish and bird habitat.

g. The environmentally preferred alternative is expected to have cumulative environmental benefits greater than those expected from the recommended course-of-action assuming that all potential uses provide the expected benefits. This is not surprising since the environmentally preferred alternative only considers those options that provided environmental benefits without consideration of cost. However, the environmental benefits expected to be obtained from some of the uses incorporated in this alternative need further evaluation. Therefore, some of the benefits derived from this alternative are less certain than those associated with the recommended course-of-action including the economic benefit related to maintaining and improving the Port. Nonetheless, the environmentally preferred alternative is expected to be the most environmentally beneficial of the four alternatives under consideration.

5.6.4 Base Plan (Economically Preferred Alternative)

a. The Base Plan (economically preferred alternative) identifies the least cost, environmentally acceptable plan as required by the Corps planning guidance. This alternative serves to determine what, if any, added costs would have to be incurred to implement an alternative approach, such as the recommended course-of-action identified above.

b. The primary difference between this alternative and the recommended course-of-action is the reliance on new pits in Newark Bay and on further restoration of degraded pits in Jamaica Bay, which is an unproven restoration technique. The options that constitute the economically preferred alternative are as follows:

- Contaminant reduction
- HARS remediation
- Additional ocean remediation
- Filling/restoration of existing degraded pits in Jamaica Bay
- Construction aggregate
- Capping of the Newark Bay CDF (NBCDF)

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- New CAD facilities in Upper Bay
- Treatment at the NJ processing facility
- Remediation of upland NJ sites
- Decontamination
- Marsh creation in NJ

c. The base plan's reliance on restoring haibtat at degraded pits in Jamaica Bay and new CAD pits in Newark Bay for significant disposal capacity diminishes the availability of dredged material for beneficial use applications. The potential impacts of CAD pits was addressed in Sections 5.3.5 and in Section 5.6.2 with regard to contingency options. The potential impact of new CAD pits could involve pits in shallow water (Newark Bay 2S, 2N, east channel sites and Constable Hook in Upper Bay) which would have greater potential impacts than pits in subchannel areas. Shallow water pits would disturb previously undisturbed substrate (some shallow areas may have been disturbed in the past, but have not been disturbed recently) and extend the temporary impacts beyond the channels where regular maintenance dredging now occurs. In addition, the shallows may contain higher contaminant levels due to long-term accumulation during the peak of effluent discharges into the watershed. The channels, on the other hand, may be less contaminated because maintenance has removed the contaminated sediments on a regular basis. Although much of the channel sediments from past dredging have been deposited at HARS, this area would be remediated as part of all alternatives.

d. A reliance on new CAD pits in shallow and subchannel areas would increase the substrate area of the harbor that would be disturbed at any one time and would extend the temporary impacts over a greater period of time than if CAD pits were only a contingency option. Thus, while the adverse impact of individual new CAD pits is temporary and localized, there would be a long-term adverse impact in that more pits would likely be in operation over a longer period of time under the base plan. Eventually the footprints of the new CAD pits would recover to usable habitat for benthos and fish, although more area of the bay bottom is likely to be impacted at any given time.

e. The base plan increases the area of harbor substrate that would be disturbed and increases the dispersal of existing contaminants compared to the other alternatives. Although, with precautions, these impacts may be environmentally acceptable, they occur at the expense of some of the environmental benefits of the recommended course-of-action. The DMMP addresses the costs associated with the alternatives, but the value of the environmental benefits of the alternatives is difficult to quantify. It is important in comparing alternatives to recognize that the effects of the base plan includes both temporary adverse impacts, as well as diminished environmental benefits.

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5.7 Mitigation

a. A consideration of the need for mitigation is a required part of an environmental impact statement. With regard to this planning function mitigation can be addressed only in general terms because the details of most plan components have not been developed at this time. For those plan components which are existing, mitigation was addressed as part of the permitting process of those facilities. For example, the Bayonne and Seaboard land remediation sites were required to mitigate for small wetland losses even though these sites will have significant beneficial impacts through remediation of contaminated upland areas. All components of the plan that are not currently in the permitting process would be evaluated for the need for mitigation if they are implemented after finalization of the DMMP. These mitigation plans, as needed, would be part of the second tier of NEPA review for specific sites and techniques. Generally, the options identified for the various alternatives seek to minimize adverse impacts, thus the need for mitigation is expected to be minimal, if any at all.

b. The DMMP includes many options which represent mitigation for past adverse impacts which were not mitigated at the time they occurred. Filling degraded pits, landfill closure, land and mine remediation and habitat creation, enhancement and restoration are needed to address existing environmental problems. Minor adverse impacts could be associated with these options, such as the example discussed above. Other minor impacts could include dredging of access channels for filling degraded pits, construction activities associated with sediment processing and decontamination facilities, and the need to apply best management practices to CAD facilities.

c. The need for major mitigation actions has been avoided by the rejection of options which could have significant adverse impacts. Ocean and bay island CDFs, and extensive nearshore fills are no longer being considered because of the permanent loss of aquatic habitat associated with these options, among other concerns. Because of the magnitude of the impacts associated with these options and the design of the options, on-site, in-kind mitigation could not be applied as agreed to by Federal resource agencies. In addition, because of the extensive shoreline development in the study area and the high value of shoreline property, it is unlikely that enough off-site mitigation area could be found for these options, making their use even less tenable given the environmental improvement goal of the DMMP.

5.7 List of Preparers

The preparers of the PEIS are listed in Table 5-4.

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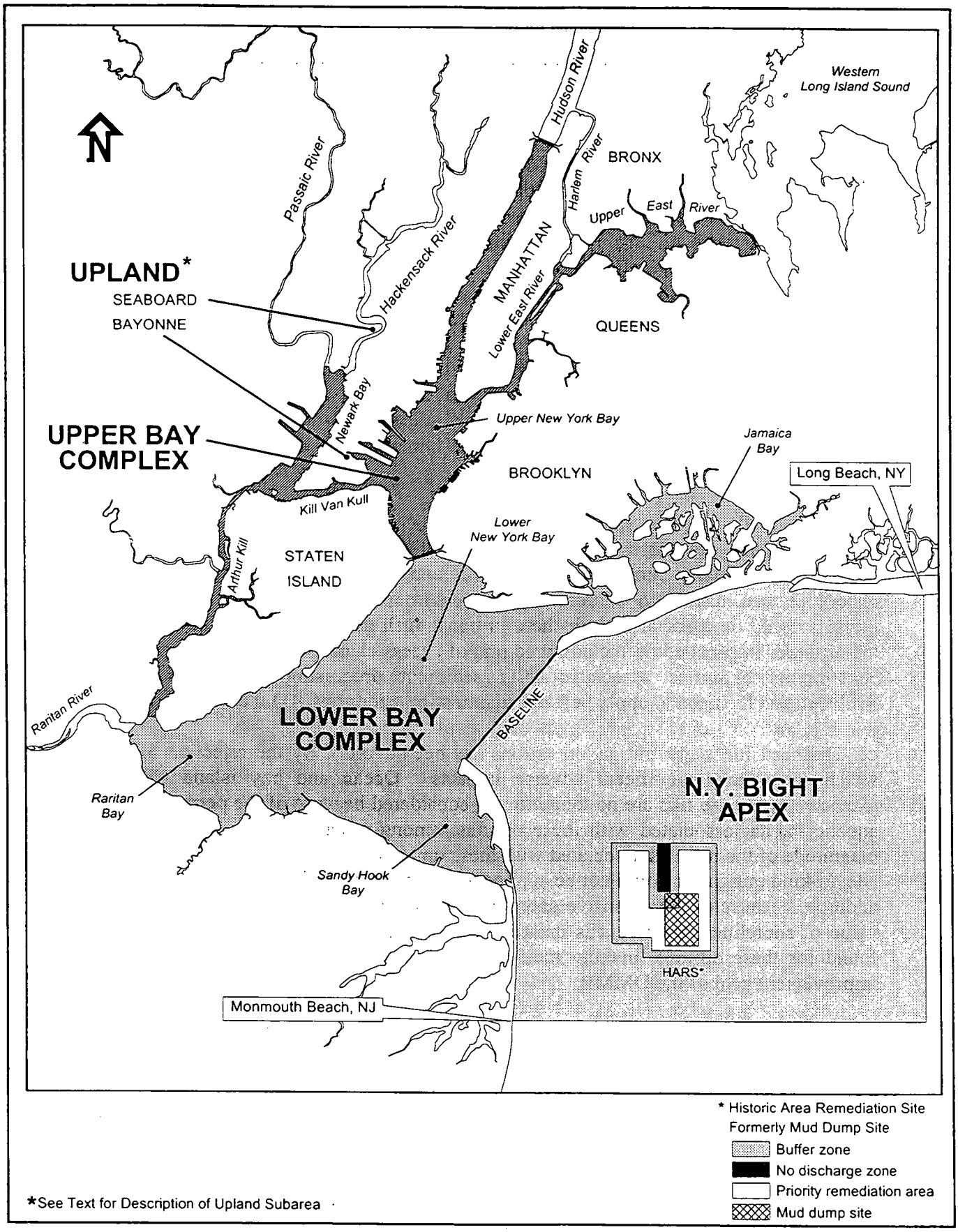


Figure 5.1

U.S. Army Corps of Engineers — **Study Area Showing Aquatic Subareas**

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TABLE 5- ,ge 1 of 2)

Contaminant/Sediment Control Methods

These options include activities which reduce contaminant levels or the need to dredge. Most of the techniques in these option types are in a demonstration stage (sediment reduction and decontamination) or site specific plans (contaminant reduction) have not yet been developed. They are among the preferred option types in the DMMP because they can provide long term beneficial changes to dredged material management by reducing disposal needs and creating opportunities for use of dredged material as a resource by eliminating contamination.

	CONTAMINANT REDUCTION	SEDIMENT REDUCTION	DECONTAMINATION
GENERAL DESCRIPTION	Watershed-wide actions to reduce point and non-point sources of contaminants; land remediation option type is important part of this option in that brownfields and landfills will be eliminated as contaminant sources.	Includes various mechanical (Turbo-Scour), physical approaches (dikes, sills, channel re-alignment) and pneumatic suspension systems to minimize sediment build-up. Mechanical approaches would be applied primarily at berthing areas, while physical modifications would be applied at channels and anchorages. Mechanical approaches in demonstration stage by private entities.	Includes various techniques which physically, chemically, thermally or biologically treats sediments to reduce the harmful effects of contaminants. These approaches would require the construction of a treatment facility for full scale processing; sites for such facilities have not been identified.
PHYSICAL CONDITIONS	No impact; physical conditions in harbor unchanged with reduction in contaminants.	Beneficial impact; reduced dredging means, less habitat disruption; could cause increased dredging needs in local areas.	Significant beneficial impact; reduction in contaminants has ecosystem-wide benefits.
SURFACE WATER QUALITY	Significant beneficial impact.	Small beneficial impact; less turbidity with dredging reduction.	No direct impact. Contaminant removed from environment.
GROUNDWATER QUALITY	Significant beneficial impact.	No impact.	No Significant impact, controls on facility operations.
BENTHOS	Significant beneficial impact; reduced exposure and accumulation in body tissues.	Beneficial impact; reduced habitat disruption due to reduced need to dredge.	Beneficial impact; minimize spreading of contaminants and exposure.
FISH AND MEGAINVER-TIBRATES	Significant beneficial impact; primarily through reduced food chain transfers and bioaccumulation.	Beneficial impact; reduced habitat disruption due to reduced need to dredge.	Beneficial impact; primarily through reduced food chain transfers and bioaccumulation.
OTHER LIVING RESOURCES	Beneficial impact; reduced food chain transfers and bioaccumulation.	Beneficial impacts; reduction in frequency of dredging	Beneficial impact; reduced food chain transfers and bioaccumulation.
ENDANGERED/ THREATENED SPECIES	Beneficial impact; reduced food chain transfers and bioaccumulation.	Beneficial impacts; reduction in frequency of dredging	Beneficial impact; reduced food chain transfers and bioaccumulation.
SPECIAL HABITATS AND EFH	Beneficial impact; general reduction in contaminants.	Beneficial reduction in frequency of dredging	Beneficial impact; general reduction in contaminants.
SOCIO-ECONOMIC	Beneficial impact; improved general health of environment, all aquatic resources available for human use. More areas potentially open to commercial and recreational fishing and shellfishing. Also decreased costs for dredged material management	Beneficial impact; reduced costs for dredging.	Beneficial impact; improved general health of environment, more aquatic resources available for human use. Potential impacts from siting and operation of a decontamination facility must be addressed on a site-specific basis.

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TABLE 5-1 (Page 2 of 2)

Contaminant/Sediment Control Methods

	CONTAMINANT REDUCTION	SEDIMENT REDUCTION	DECONTAMINATION
CULTURAL RESOURCES	Potential impacts survey needed	Potential impacts surveys needed	Potential impacts surveys needed.
AIR QUALITY	Beneficial impact; some reduction in contaminants release to air when sediments are disturbed during dredging.	No impact.	Potential adverse impact from decontamination facility with air effluents. SIP compliance required.
NOISE	No impact.	No impact.	Potential adverse impact from decontamination facility
AESTHETICS	No impact.	No impact.	Potential adverse impact from decontamination facility

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BENEFICIAL USE

Beneficial use is the most diverse strategy among the approaches evaluated for dredged material management. It differs from the disposal only approach of CDF's in that dredged material is used as a resource for applications most of which benefit the environment. The strategy includes both in-water and upland sites, and utilizes both untreated and stabilized material. Applications of untreated material are limited to dredged materials meeting the criteria for ocean placement except in cases where they can be used as fill to restore or raise bottom elevations under a cap of cleaner materials. Upland sites use material unsuitable for ocean placement which is stabilized to sequester any existing contaminants before its beneficial use application. The potential applications in this strategy span the entire study area and could include distant upland sites for mined land remediation. The strategy includes sites which are currently permitted and others which are in a developmental or demonstration stage. The options in this strategy are generally the preferred options among all the options considered for dredged material management.

	OCEAN REMEDIATION	HABITAT CREATION ENHANCEMENT AND RESTORATION	LANDFILL, BROWNFILED AND MINE REMEDIATION	BEACH NOURISHMENT AND CONSTRUCTION MATERIAL
GENERAL DESCRIPTION	The Historic Area Remediation Site (HARS) is the focus of this option. HARS suitable material will be used to cap in-place contaminated sediments. Confinement of contaminants and therefore restoration of a viable benthic community is the goal of this option. This option is in use and monitoring data are available. Additional ocean remediation sites are possible pending completion of HARS remediation establishing a need with no other practicle alternatives available.	This category includes many options with diverse objectives. Creating important habitat which is in short supply and enhancing or restoring degraded habitats is the common theme. All potential sites have some existing value, thus selection of these options must show a net gain in habitat value. This option includes small scale, and localized sites.	This category includes three primary approaches • remediation of contaminated former industrial sites (brownfields) • capping existing landfills • remediation of surface and deep shaft mines which are sources of acid drainage (coal mines) Brownfields applications are in progress. Mined land remediation is in demonstration stage.	This category includes the use of clean sand for nourishment of beaches or as a source of supply as construction aggregate. The use of sand for these purposes is dependent upon the sand meeting physical criteria for these applications. These uses have been successfully employed in the past. Because the source would be from channel dredging projects, the adverse impacts of the mining of this material are avoided.
PHYSICAL CONDITIONS	Beneficial impact; substrate is primary physical condition of concern. Clean placed material will, to extent possible, match habitat conditions across the site, while isolating benthos from contaminants in buried deposits.	Beneficial impacts; highly variable depending on conditions at candidate sites. Each option is designed to alter existing conditions to achieve habitat objective, generally by changing substrate and/or elevation, or capping exposed contaminants.	Beneficial impact; physical conditions at these sites are generally highly modified by former use. Remediation would include reestablishment of physical conditions suitable for brownfields development or habitat creation/enhancement	Sources of sand would be permitted dredging projects, primarily channels and anchorages; use of sand is secondary to the dredging projects.
SURFACE WATER QUALITY	Beneficial impact; contaminants confined, eliminates loss to surrounding water. Water column effects during disposal would be localized and temporary.	Beneficial impact; degraded in-water sites would eliminate poor water quality conditions, through improved flow, reduced sedimentation or wetland filtration.	Significant beneficial impact; loss of pollutants from leachate or erosion of existing site prevented by remediation and capping.	Minor temporary impacts on turbidity during placement for beach nourishment.
GROUNDWATER QUALITY	No Impact.	No impact; clean dredged material and water sites limit potential for groundwater effects. Use of non HARS material would employ techniques to confine contaminants.	Significant beneficial impact; remediation would curtail groundwater pollution, a common problem at these sites.	No impacts.

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TABLE 5-2 (Page **2** of **2**)

BENEFICIAL USE

	OCEAN REMEDIATION	HABITAT CREATION ENHANCEMENT AND RESTORATION	LANDFILL, BROWNFILED AND MINE REMEDIATION	BEACH NOURISHMENT AND CONSTRUCTION MATERIAL
BENTHOS	Significant beneficial impact; site restored to productive benthic habitat with associated food web benefits.	Potential beneficial impact; in-water sites may enhance benthic habitat by improving water quality, surficial sediments or isolating contaminants.	No impact.	Minor temporary impact during placement for beach nourishment.
FISH AND MEGA-INVERTIBRATES	Beneficial impact; habitat conditions restored and food chain transfers of contaminants from benthos would be eliminated.	Potential beneficial impact; in-water sites, such as mudflats, shellfish beds and intertidal wetlands, may enhance fish and invertebrates habitat through restored water quality, isolating sediments and reductions in food chain uptake and biomagnification.	No impact.	Minor temporary impact during placement for beach nourishment.
OTHER LIVING RESOURCES	Beneficial impact; confinement of contaminants prevents food chain transfer and bioaccummulation.	Beneficial impact; general ecosystem enhancement through maintenance of habitat diversity; possible enhancement of habitat for selected species of concern.	Beneficial impact; confinement of contaminants prevents food chain transfer and bioaccumulation human health concerns ameliorated.	Minor temporary impact during placement for beach nourishment.
ENDANGERED/ THREATENED SPECIES	Beneficial impact; marine mammals and turtles protected from exposure to contaminants.	Potential beneficial impact; possible enhancement of habitat for protected species	Beneficial impact; contaminant exposure eliminated.	Minor temporary impact during placement for beach nourishment.
SPECIAL HABITATS	Indirect beneficial impact	Indirect beneficial impact	Indirect beneficial impact	Minor temporary impact during placement for beach nourishment.
SOCIO-ECONOMIC EFFECTS	No impact.	Potential beneficial impact by increasing habitat for wetland species and increased opportunities for wildlife observation. Other potential benefits include aesthetic improvement and recreational use.	Significant beneficial impact through elimination of associated human health effects and reestablishment of viable commercial sites. Landfills and mine sites have potential to be converted to viable wildlife habitat and increase opportunities for wildlife observations.	Beach nourishment helps maintain important recreational resources without imposing the adverse effects of mining for new sources of sand.
CULTURAL RESOURCES	Potential impacts. Survey needed	Potential impacts. Survey needed	Potential impacts. Survey needed	Potential impacts. Survey needed

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TABLE 5 (Page 1 of 2)

CONFINED DISPOSAL FACILITY

Confined disposal facilities (CDF's) are disposal only options that do not use the material as a resource. CDF use would be exclusively for contaminated dredged material. They have in common potential impacts on aquatic resources, but very limited potential upland impacts because they are located primarily in aquatic or in industrial areas. Their design varies by location, but they all involve placement of dredged material within a confining structure such as dikes in an upland area, a pit in the bottom, an enclosing island or a nearshore structure such as an interpier area modified to contain the material. In any of the possible configurations, the design may include a provision for lining the structure (groundwater protection) or capping a completed CDF with clean material to prevent erosion. Potential impacts of concern for CDF's include habitat disruption and loss associated with the construction of the facility, and the loss of contaminants as the dredged material is placed in the facility or after it is capped. Nearshore CDF's may use stabilized (processed) material which would limit the potential for contaminant release during placement. With the exception of the existing Newark Bay CDF, the CDF options are considered fallback, least preferred, or of uncertain status among all of the options evaluated. An advantage of pits or subchannel cells is that they can be constructed as discrete units on an as needed basis and implemented in a relatively short period of time providing safe containment of non-HARS material while other options are brought on line. Use of existing pits can selectivity enhance locations where water quality and habitat is degraded.

	PITS AND CAD FACILITIES	ISLAND CDF	NEARSHORE CDF	UPLAND CDF
GENERAL DESCIPTION	Many possible configurations: • pits or cells in shallow water • subchannel cells • utilize existing pits Size, shape and depth variable; local geology important in design. Upper Bay Complex is primary subarea for shallow water pits and subchannel cells. Lower Bay Complex is primary subarea for existing pits or new open water pits.	New islands designed to contain sediments. Lower Bay Complex and New York Bight Apex are subarea locations. Large volume option; design could include a pit in footprint of island to maximize capacity and minimize size. Design includes features to provide stability to resist ocean storms. Size and shape variable depending on site features and capacity needs.	Fill degraded habitats to create usable land for expansion of shipping facilities or to enhance habitat such as wetlands. Size and shape dependent on configuration of existing shoreline and structures.	Upland placement of untreated dredged material within dikes/confining structures in areas selected for their low existing habitat value; size, shape and capacity would be site specific. Siting would be important to minimize impacts to adjacent land owners. Facility would include provisions to control/treat runoff; site would ultimately be capped to create selected habitat type and isolate sediments.
PHYSICAL CONDITIONS	Variable impact; new pit or cells would cause temporary change in currents and sedimentation patterns; filling existing pits would restore original depths and bottom configuration; restoring physical conditions when filling is completed.	Significant adverse impact; aquatic habitat lost to new structure. Current and sedimentation patterns effected in vicinity of structure, which would permanently alter benthic habitats and cause flood/erosion impacts to the shore. Some shore areas may experience less storm damage.	Significant adverse impact; likely aquatic habitat lost to filling. Current and sedimentation patterns altered in vicinity, but existing nearshore, structures would have already modified these physical factors. Benefits could include improvement to existing wetlands, but benefits would be limited.	Minimal adverse impact from construction if site selected was of low habitat value; potential for long term beneficial impact if site was restored to relatively high value habitat.
SURFACE WATER QUALITY	Temporary adverse impact; localized turbidity increase during construction and disposal; small contaminant loss during disposal, particularly for pits or cells in deepwater. Losses are controllable by various management measures and suitable pit locations.	Temporary adverse impact; localized turbidity increase during construction; confining dike structure would eliminate loss during disposal.	Temporary adverse impact; localized turbidity increase during construction; confining structure would eliminate loss during disposal. Effects can be controlled by lining fill area with impermeable material.	Potential adverse impact from runoff from placed material; runoff control through settling basins and, if needed, treatment of water discharged to adjacent drainages would minimize surface water effects.
GROUNDWATER QUALITY	Potential for adverse groundwater effects, but situation is site-specific depending on local subsurface geology. Effects can be controlled by lining pit or cell with impermeable material.	Potential for adverse groundwater effects, but situation is site-specific depending on local subsurface geology. Effects can be controlled by lining pit or cell with impermeable material.	Potential for adverse groundwater effects, but situation is site-specific depending on local subsurface geology. Effects can be controlled by lining pit or cell with impermeable material.	Potential for adverse impacts if placed material contained contaminants; potential impacts avoided if disposal site is protected with impermeable liner; if needed.
BENTHOS	Variable impacts; temporary loss of benthic community during construction and filling of new pits or cells; enhancement of benthos by filling existing pits which have degraded benthic habitat. All pits or cells designed to restore substrate to productive benthic habitat when project is completed.	Significant adverse impact due to loss of benthic habitat in footprint of structure; potential offset to this loss through new substrate of the confining structure in the water column which provides habitat for attaching species. Adverse impacts to benthic habitat may extend to adjacent area due to changes in currents and sedimentation patterns. No "in kind" mitigation is possible, but "out of kind" may be feasible.	Significant adverse impact likely due to loss of benthic habitat in footprint of structure; confining structure likely to be vertical wall with little benthic habitat potential.	No impacts.

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CONFINED DISPOSAL FACILITY

	PITS AND CAD FACILITIES	ISLAND CDF	NEARSHORE CDF	UPLAND CDF
FISH AND MEGA-INVERTIBRATES	Temporary adverse impact due to disturbance of substrate in footprint of pit or cell for new sites. Enhancement of existing pits after filling is completed. Restoration of benthic habitat would ensure recolonization by fishes and reduce contaminant uptake. Water column effects during disposal operations would be localized and temporary; no adverse impact on movements and migrations.	Significant adverse impact due to loss of aquatic habitat and water column; new rocky substrate in water column would be attractive to some species, but would be a significant change from existing benthic conditions. The productivity exchange would be difficult to assess. Island CDF could be a focal point of recreational fishing and provide habitat for species that are attracted to vertical structure. No "in kind" mitigation is possible, but "out of kind" may be feasible.	Significant adverse impact likely could occur due to loss of aquatic habitat; new confining structure would not provide significant habitat for species that use vertical structure or crevices. If wetlands are created benefits would accrue to juvenile and spawning adult fish and invertebrate.	No impacts.
OTHER LIVING RESOURCES	Limited potential effects on diamondback terrapins and upland habitat for birds due to disturbances during site work if Jamaica Bay is used.	Island surface could provide habitat for seabirds/shorebirds. Habitat development would require clean cap and design features selected for habitat objectives. Bird use would develop with or without habitat planning.	No effects. Potential sites are next to existing industrial areas. Wetland development may have limited value because they are isolated from other wetlands and adjacent natural uplands.	Dredged material may be attractive to upland wildlife immediately after placement if it contains food resources; potential adverse impacts if dredged material contains contaminants; capping needed to isolate material if contaminants are present; site could ultimately be restored to usable habitat.
ENDANGERED/ THREATENED SPECIES	No adverse effects anticipated. Transient marine reptiles and mammals may pass near work area. NMFS, USFWS would be coordinated with for Federally listed species.	Island CDF may be attractive to some species, particularly birds, which may expand limited habitat. Provision to prevent attraction during active use would be used.	No adverse effects anticipated. Transient marine reptiles and mammals may pass near work area. NMFS and USFWS would be coordinated with for Federally listed species.	Same impact potential as for "other living resources" if these species are in the vicinity or transient species (migratory birds) use the site; potential to develop habitat for species of concern, but this opportunity would be site specific.
SPECIAL HABITATS AND EFH	Potential temporary adverse impacts, but careful siting, disposal techniques, and permit conditions can minimize effects. Habitat recovers after facility is completed.	Significant adverse impact due to loss of aquatic habitat to CDF structure. Siting considerations could reduce level of effects, but habitat will be lost and adjacent habitat changed. Loss of EFH.	Potential adverse impact, but permit conditions can minimize construction effects. Existing habitat is impacted but some important uses may occur. Significant adverse impact could occur where there is special localized use (i.e., striped bass wintering).	No impacts to aquatic special habitats; siting would avoid impacts to upland special habitats.
CULTURAL RESOURCES	Potential impacts. Surveys needed.	Potential impacts. Surveys needed.	Potential impacts. Surveys needed.	Potential impacts. Surveys needed.

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TABLE 5-4

LIST OF PREPARERS

NAME	DISCIPLINE/EXPERTISE	EXPERIENCE	ROLE IN PREPARING PEIS
Leonard Houston, M.S. Chief, Technical Support Section Environmental Analysis Branch	Marine biology	23 years in Planning Division of NYD	Existing Pits and CAD Pits
Bryce Wisemiller DMMP Study Team Leader	Environmental/Civil Engineering	10 years in Planning Division of NYD	Plan Formulation, Island CDF
Robert J. Kurtz, M.S. Environmental Impact Statement Coordinator	Biology/Marine Biology	21 years in Planning Division of NYD, 2 years Private Consultant	Fish and Wildlife Resources
Robert J. Will, M.S. Biological Studies Coordinator	Marine Biology	23 years in Planning Division of NYD, 1 year Public Health, 2 years Private Consultant	Fisheries and Benthic Resources Beneficial Use
Doug Clark, Ph.D.	Marine Biology/Marine Ecology	15 years at USACE (Waterways Experiment Station), 4 years Private Consultant	Pit Biological Characterization Biological Modeling Studies
Pace Wilber, Ph.D.	Marine Ecology	3 years at NOAA, 5 years at USACE (Waterways Experiment Station)	Benthic Ecology Beneficial Use
David Yazoo, Ph.D.	Marine Ecology	2 years at USACE (Waterways Experiment Station), 1 year private	Beneficial Use
Karen Vanderwall, M.S.	Environmental Science/Pubic Outreach	3 years in Planning Division of NYD 5 years State of Maryland	Beneficial Use Upland Disposal
Kerwin Donato, M.S.	Environmental Engineer	3 years Planning Division of NYD, 4 years in EPA, 4 years Private Consultant	Land Remediation Decontamination Technologies
Lynn Rakos, M.A.	Archaeology	4 years Planning Division of NYD, 8 years Private Consultant	Cultural Resources
James Lodge, M.S.	Oceanography	1 year in Planning Division of NYD, 3 years Private Consultant	Contaminant Reduction Sediment Reduction
Heather Bittner,M.S.	Oceanography/Geology	1 year in Planning Division of NYD	Coastal Zone Management

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6 PUBLIC INVOLVEMENT

6.1 Cooperating Agencies

a. The following agencies have agreed to cooperate with the NYD in the preparation and review of this EIS in accordance with NEPA guidelines: USEPA, USFWS, NMFS, NYSDEC, NYSDOS, NJDEP, NJMR, and the PANY/NJ. As cooperating agencies they have provided technical input and reviewed the document for their areas of expertise and jurisdiction.

b. The Dredged Material Management Integration Work Group (DMMIWG) was formed to bring together the various dredging working groups that are part of the Harbor Estuary Program (HEP). It is composed of Federal resource agencies, the States of New York and New Jersey, the Port Authority of New York/New Jersey, Port users, and environmental organizations including the Environmental Defense Fund, Clean Ocean Action and the Bay Keeper. This format provides the opportunity for this diverse group of stakeholders to have input in HEP's Comprehensive Conservation and Management Plan (CCMP) for the harbor and bight. The DMMIWG is a formal operating group under HEP. The CMMP has been signed by all major agencies that are responsible for the Port of New York and its environment. The DMMIWG has also served as a cooperating entity providing review input to the DMMP as well as other technical reports related to dredged material management.

c. In addition to the formal monthly DMMIWG meetings, meetings are also held on a monthly basis with Port planners that include the Port authority, NYD and the States of New York and New Jersey and EPA. These are held to discuss the future of the Port, its needs, and placement and management options for the long term. Additionally, other meetings were held with working groups assembled by the borough presidents of Brooklyn and Staten Island.

6.2 Scoping

a. Scoping is used to inform the public and other agencies, of a contemplated Federal action and potential consequences of the action(s) and subsequently to receive public responses and incorporate that input into the document, and publication of the NOI to prepare the PEIS in the Federal Register (including a copy of the EIS Scope).

6.2.1 Scoping Process and Meetings

a. Meetings were held to inform the public and other agencies of the DMMP, including contemplated Federal action, areas of concern and potential consequences of the action(s) that would be addresses in the PEIS. Eight public meetings, in the form of poster sessions, were held from October 1996 to April 1997 to discuss the various options and the overall planning process identified in the Interim Report

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(USACE 1997). Scoping meetings that included posters on the scope of the EIS, and taped question/answer periods for the public were held during April 1998 after release of the Progress Report, and publication of the NOI to prepare the PEIS in the Federal Register (including a copy of the EIS Scope).

6.2.2 Documents

a. Two reports were circulated prior to the public meetings, the Interim Report (October 1996) and the Status Report (December 1997). Written comments on these reports were considered, along with verbal comments from meetings held on the revised EIS scope. The components from the public governmental agencies have been incorporated in the DMMP and PEIS where appropriate.

6.3 Public Concerns

a. Results from the meetings following the Interim Report and the EIS scoping meetings indicate that there is a high level of public concern about the dredged material composition (i.e., contaminants), and those areas where the material will be placed, as well as the methods used for placement. These views were expressed to NYD personnel at the poster sessions and in writing after the 1996 - 1997 meetings, and again at the meetings held in 1998 that included verbal and written statements. The statements included those of elected officials, most of whom supported the need to keep the Port of New York/New Jersey as a viable major destination for shipping. They also reflected the concerns of their constituency regarding the issues surrounding siting, various potential management options, and their impact on environmental and human health.

b. There was a public misperception regarding the nature of the dredged material. Dredged material was incorrectly characterized as "toxic sludge". This material can no longer be placed in the ocean because it fails to pass current tests for ocean placement due to concerns regarding toxicity or bioaccumulation in marine ogranisms and this limits the management options that can be applied to use or place this material. However, this does not mean the material is of immediate threat to humans.

c. The remainder of this section provides a list of written comments and that have been considered in the preparation of this programmatic EIS:

- What steps would be needed to place a dredged material island CDF in the ocean and what is the status of the dredged material placed there (i.e., Should an ocean island CDF be constructed, would dredged material used to fill the facility be considered ocean disposal?)
- What is amount of benefits from capping sub-channel CAD pits.
- What kind of mitigation would be needed/appropriate, including the 'out of kind' mitigation that might be necessary for aquatic alternatives, especially an island CDF?

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- Can groundwater contaminants be released by moving through the filled CAD pit?
- The dredged material placed into CAD pits will consolidate with time. Will contaminants be released into the water column along with the pore water that is expelled from the sediment?
- What is the potential for contaminants to be carried from a CAD pit into aquifers?
- How can contaminants in fine-grained portion of dredged material be prevented from being lost during disposal, especially into pits and spreading to other areas that are less contaminated?
- How can habitat values of an existing pit be demonstrated to be degraded enough to justify filling it?

d. A variety of statements were made at the various public meetings ranging from condemnation to strong support. A sample of the more representative views are presented below:

- I prefer the disposal of dredged material at an upland site.
- An island CDF in the Apex could be used as a station for ship pilots.
- The Port must be kept open.
- I don't want New Jersey's dredged material dumped in New York State waters.
- I don't want New York's dredged material dumped in New Jersey State waters.
- Why move the stuff around and contaminate new areas?
- I don't believe that covering borrow pits with clean sand will work because wave-action associated with storms will eventually destroy the cap, releasing contaminants.
- I am concerned about currents and storms releasing contaminated material from the pits and about erosion caused by/to CAD pits.
- Toxic materials should not be dumped into our waterways.
- You will kill the fishing if you put this stuff in our waterways.
- The waters are becoming cleaner; the dredging will cause harm.
- Filling pits will destroy the good fishing there.
- The costs displayed on the posterboards options seem too low.

e. One of the major themes of the public's comments was that the material should be kept at or near the place of origin (e.g., Newark Bay material should be kept there). Another concern was that the Lower Bay complex (e.g., Lower Bay, Raritan Bay) should not be used for the placement of dredged material, especially in an island CDF or existing pit because those using the complex have noticed a return of fish and shellfish species. These individuals were also concerned with a loss of habitat associated with an island. This was a special concern of the citizens of Staten Island and the New Jersey communities along the shoreline of Raritan Bay.

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f. General support was expressed for decontamination/treatment technologies, land remediation, and pollution prevention as the best options for the management of dredged material. The public recognized the need to reduce contaminant levels in sediment in the future. Comments were directed primarily at the potential management options with comments directed to the EIS Scope.

6.4 Coordination of This Draft Programmatic Environmental Impact Statement

6.4.1 Federal Elected Officials and Agencies

a. U.S. Senator Lautenberg
b. U.S. Senator Moynihan
c. U.S. Senator Shumer
d. U.S. Senator Toracelli
e. Congressman Ackerman
f. Congressman Crowley
g. Congressman Engel
h. Congressman Fossella
i. Congressman Franks
j. Congressman Gilman
k. Congressman Holt
l. Congresswoman Kelly
m. Congressman King
n. Congresswoman Lowey
o. Congresswoman Maloney
q. Congresswoman McCarthy
r. Congressman Meeks
s. Congressman Menandez
t. Congressman Nadier
u. Congressman Ownes
v. Congressman Pallone
w. Congressman Pascrell
x. Congressman Payne
y. Congressman Rangel
z. Congressman Rothman
aa. Congressman Serrano
bb. Congressman Smith
cc. Congressman Towns
dd. Congressman Valazquez
ee. Congressman Weiner
ff. United States Coast Guard
gg. United States Department of Commerce

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National Oceanographic and Atmospheric Administration
National Marine Fisheries Service
National Ocean Survey

hh. United States Department of Interior
Fish and Wildlife Service
Mineral Management Service
National Park Service

ii. United States Department of Transportation

jj. United States Environmental Protection Agency

6.4.2 New York State Elected Official and Agencies

a. Governor Pataki
b. Secretary of State Treadwell
c. Commissioner of NY Department of Environmental Conservation
d. Executive Director, Empire State Development Corporation

6.4.3 New Jersey State Elected Official and Agencies

a. Governor Whitman
b. Commissioner of NJ Department of Environmental Protection
c. Office of New Jersey Maritime Resources (NJMR)

6.4.4 Bi-State and Other State Agencies and Organizations

a. Port Authority of New York and New Jersey
b. Bi-State Clean Ocean and Shore Trust
c. Pennsylvania Department of Environmental Protection

6.4.5 County and New York City Elected Officials and Agencies

a. Monmouth County Executive
b. Middlesex County Executive
c. Union County Executive
d. Essex County Executive
e. Hudson County Executive
f. New York City Department of Environmental Protection
g. Borough President of Staten Island (Richmond)
h. Borough President of Brooklyn (Kings)

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6.4.6 Environmental Groups, Private Organization, General Public

a. American Littoral Society
b. Bay Keeper
c. Clean Ocean Action
d. DMMIWG
e. Concerned Inviduals
f. Mailing of previous reports and the PEIS to anyone who provided written comments in the past, or specifically requested copies of the PEIS. The letter of NOA was also mailed to all attendees at prior meetings (Leonardo, Newark, Manhattan, Brooklyn, Middletown)

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DRAFT

FISH AND WILDLIFE COORDINATION ACT SECTION 2(b) REPORT

ASSESSMENT OF THE DREDGED MATERIAL MANAGEMENT PLAN FOR THE PORT OF NEW YORK AND NEW JERSEY

Draft

FISH AND WILDLIFE COORDINATION ACT
SECTION 2(b) REPORT

ASSESSMENT OF THE DREDGED MATERIAL MANAGEMENT PLAN FOR THE PORT OF NEW YORK AND NEW JERSEY

Prepared by:

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

August 1998

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Draft
FISH AND WILDLIFE COORDINATION ACT
SECTION 2(b) REPORT

ASSESSMENT OF THE DREDGED MATERIAL MANAGEMENT PLAN FOR THE PORT OF NEW YORK AND NEW JERSEY

Prepared for:

U.S. Army Corps of Engineers
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August 1998

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EXECUTIVE SUMMARY

The U.S. Fish and Wildlife Service (Service) reviewed project plans and other information supplied by the U.S. Army Corps of Engineers (Corps) regarding the Dredged Material Management Plan (DMMP) for the Port of New York and New Jersey. Presented herein is the Service's Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401; 16 U.S.C. 661 *et seq.*), Section 2(b) report regarding the fish and wildlife resources and supporting ecosystems in the project area.

This FWCA report is based on project plans and other information provided by the Corps and the results of fish and wildlife studies in the project area. This report documents the fish and wildlife resources in the project area, provides an assessment of the effects of the proposed project on fish and wildlife resources, and provides recommendations to mitigate adverse impacts to those resources.

The goal of the DMMP is to provide a regionally supported, comprehensive plan to economically meet the dredged material management needs of the New York - New Jersey Harbor estuary (Harbor estuary) while also protecting and supporting the restoration of the estuary. The DMMP consists of the following options for the management of dredged material: disposal of "clean" (Category I) dredged material at the Historic Area Remediation Site; pollution prevention / contaminant reduction; sediment reduction; decontamination and treatment of contaminated dredged material; beneficial uses of dredged material; disposal in confined upland sites; disposal in contained aquatic pits; disposal in nearshore containment areas; and, disposal in island confined disposal facilities (CDF) located within the Harbor estuary or within the New York Bight Apex.

Beneficial uses of dredged material include a number of options such as: creating or enhancing wetlands, shellfish beds, fish reefs, and bird habitat; filling dead-end basins and other areas of poor water circulation; creating wetlands in inter-pier or similar poorly flushed areas to improve water quality; and, filling bathymetrically disturbed areas (e.g., existing borrow pits) of the harbor to improve water circulation and aquatic habitat quality. Less-traditional beneficial uses proposed for dredged materials are the closure of landfills (e.g., capping) and the remediation of contaminated lands known as "brownfields."

The Harbor estuary and adjacent New York Bight Apex support a wide diversity of valuable fish and wildlife resources. Species groups of management concern in the Harbor estuary include: fisheries; waterfowl; shorebirds; wading birds; raptors; passerine birds; and species designated as threatened or endangered at the federal or State level. The Service has identified areas of the Harbor estuary that support concentrations of these species groups or that support rare or unique vegetation communities and mapped these areas as Regionally Significant Habitat Complexes (Habitat Complexes). In addition, significant fish and wildlife resources exist within the Harbor estuary and the New York Bight Apex outside of the Service-identified Habitat Complexes. For example, many areas of the Harbor estuary support commercially viable finfish and shellfish. The National Marine Fisheries Service (NMFS) is also in the process of designating, pursuant to the Magnuson - Stevens Fishery Conservation and Management Act, (P.L. 94-265) Essential Fish Habitat (EFH) for 31 species

A) managed by the Fishery Management Council. Essential Fish Habitat may be designated within the DMMP study area. Additionally, 19 federally listed species and 34 State-listed species, including whales, marine turtles, birds, fish, and plants are known to occur within the Harbor estuary and its adjacent marine and upland habitats.

The Service previously determined (letter of February 3, 1998 (Appendix C)) that the disposal of dredged material containing elevated levels of environmental contaminants at the Koppers Coke, Kearny, New Jersey and the OENJ Bayonne landfill / golf course, Bayonne, New Jersey sites could adversely affect the federally listed (endangered) peregrine falcon (*Falco peregrinus*) via dietary exposure to bioaccumulating environmental contaminants such as dioxins, polychlorinated biphenyls, and organochlorine pesticides. The Koppers Coke and OENJ Bayonne landfill / golf course sites are identified by the Corps as potential landfill / brownfield remediation sites. The peregrine falcon could be adversely affected by other dredged material disposal options especially if these are located within documented peregrine falcon foraging areas.

Based on a literature review and coordination with other federal and State agencies, the Service has identified a number of data gaps that could be addressed by future studies. Identified data gaps include: (1) the long-term fate of contaminants in stabilized / solidified dredged material; (2) an assessment of the shellfish stock (no assessment has been completed within the Harbor estuary within the last 14 years); (3) the feasibility of creating / enhancing shellfish beds using dredged material; (4) identification of the sources of sediment being deposited within the Harbor estuary; (5) the reasons for fish concentrating within channel areas of the Harbor estuary; (6) the value of upland disposal site UD-7 to birds; and, (7) determination of the loss of primary productivity that would result from constructing island CDFs in both the Harbor estuary and marine portions of the study area.

The Service has determined that, due to the scope of the DMMP and the significant fish and wildlife resources that occur within the study area, significant adverse impact to these resources, including federally listed species, could occur as a result of project implementation. However, at this time it is not possible to quantify project-related impacts because specific project activities have not been selected. Therefore, the Service is able to provide only general recommendations for mitigating adverse impacts to fish and wildlife resources. Throughout the report, the Service provides 31 recommendations regarding the DMMP, which are summarized in the Conclusions and Recommendations section. Key recommendations include the following:

- Coordinate with the U.S. Environmental Protection Agency and State regulatory agencies to ensure coordinated and effective implementation of existing federal and State laws aimed at controlling point and non-point sources of pollution to the aquatic environment. Evaluate the feasibility of reducing sediment loading into the Harbor estuary via protection of remaining natural areas that are threatened with development.

- Determine areas of the watershed that release high amounts of sediments to the Harbor

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- Determine areas of the watershed that release high amounts of sediments to the Harbor estuary and evaluate the feasibility of reducing the sediment load through activities such as stream restoration within the Harbor estuary watershed.

- Consider realignment of channel segments and structural alterations to channels and adjacent areas only if significant impacts to fish and wildlife resources, including shellfish, can be avoided.

- Ensure that decontamination facilities are constructed only in degraded areas, such as brownfields, that have low potential for restoration to productive fish and wildlife habitats and study the long-term fate of contaminants in stabilized dredged material, should such material be considered for uses that could expose fish and wildlife to environmental contaminants.

- Continue to coordinate with federal and State agencies and the private sector to identify appropriate end uses for stabilized and decontaminated dredged material that would minimize the potential for contact between such materials and the aquatic environment.

- Continue to coordinate with the Service, NMFS, and affected State agencies to identify sites and develop plans for the beneficial use of dredged material and develop monitoring plans for beneficial use sites.

- Construct wetlands only in areas with degraded benthic communities and attempt shellfish bed creation only in areas where losses to existing benthic communities would be minimal. Construct grassland bird habitat only in areas that do not currently provide important habitats for wildlife.

- Incorporate recommendations to eliminate potential adverse impacts to the peregrine falcon (as listed in the Corps Biological Assessment of June 18, 1998) as conditions of any Clean Water Act, Section 404 permit issued for the disposal of dredged material at the OENJ, Bayonne Landfill site. Ensure that any Section 404 permit issued for disposal of dredged material at the Koppers Coke site in Kearny, New Jersey incorporates the Service's recommendations (Appendix C) to avoid adverse impacts to the peregrine falcon. Continue Section 7 consultation with the Service and NMFS throughout planning and implementation of the DMMP.

- Conduct bird surveys and a baseline Habitat Evaluation Procedures study at the upland disposal site UD-7 to determine the value of the site to migratory birds if this site receives further consideration for the disposal of dredged material.

- Consider Service-identified Habitat Complexes as exclusionary criteria regarding the citing of CDF islands, incorporate Essential Fish Habitat designations as exclusionary criteria for disposal site options, and exclude known commercial fishing and shellfishing areas as potential disposal sites.

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- Consider the construction of CDF islands to be the dredged material disposal option of last resort.

- Conduct a shellfish stock assessment of the Harbor estuary and adjacent New York Bight Apex to facilitate the citing of dredged material disposal options away from areas with high-quality benthic communities.

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I. INTRODUCTION

The Port of New York and New Jersey is located within the New York - New Jersey Harbor estuary (hereafter referred to as the Harbor estuary or Harbor). The Harbor estuary, as defined by the National Estuary Program for the Harbor, extends from its juncture with the New York Bight Apex at the Sandy Hook - Rockaway Transect north up the Hudson River to Piermont Marsh (Figure 1). It includes all tidally influenced portions of rivers flowing into the Harbor including the Hackensack, Passaic, Raritan, Shrewsbury, and Navesink Rivers and the East River from the Battery to Hell Gate (U.S. Fish and Wildlife Service, 1996).

The development and operation of port facilities constitute a substantial portion of the human influence on the Harbor estuary ecosystem. The Port of New York and New Jersey is one of the busiest cargo ports in the United States, requiring large amounts of land for mooring facilities and cargo storage / handling areas, as well as an extensive transportation network. Additionally, due to the shallow nature of the Harbor (the average natural depth of the Harbor is 18 feet), substantial dredging is required to establish and maintain navigation channels adequate to accommodate modern shipping (most modern vessels require at least 45-foot channels for safe navigation) (U.S. Army Corps of Engineers, 1996). The U.S. Army Corps of Engineers (Corps) currently maintains approximately 240 miles of navigation channels in the Harbor, which (in addition to the maintenance of non-federal channels and port facilities) requires removal of approximately 6 million cubic yards of material per year to maintain adequate depths for safe navigation (U.S. Army Corps of Engineers, 1996). Additionally, much of this sediment is contaminated with a variety of compounds including dioxins, polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT), other pesticides, and heavy metals. The large dredging requirements generate a need for sites to dispose of dredged material and the level of contamination in much of the sediments complicates the task of locating suitable disposal sites.

Historically, most of the material dredged from the Harbor was disposed of at the Mud Dump Site, located in the Atlantic Ocean approximately 6 miles east of Sandy Hook. However, recent changes in sediment testing requirements resulted in most of the dredged material emanating from the Harbor to be classified as unsuitable for ocean disposal. Additionally, as of September 1, 1997, the Mud Dump Site has been officially closed as a disposal site. As a result, only uncontaminated dredged material may now be deposited at the Mud Dump Site (now renamed the Historic Area Remediation Site or HARS) for the purposes of covering areas with high levels of contamination. The changing criteria for ocean disposal and the closure of the Mud Dump Site have greatly increased the need to identify a long-term disposal plan to meet the dredged material management needs of the Port of New York and New Jersey.

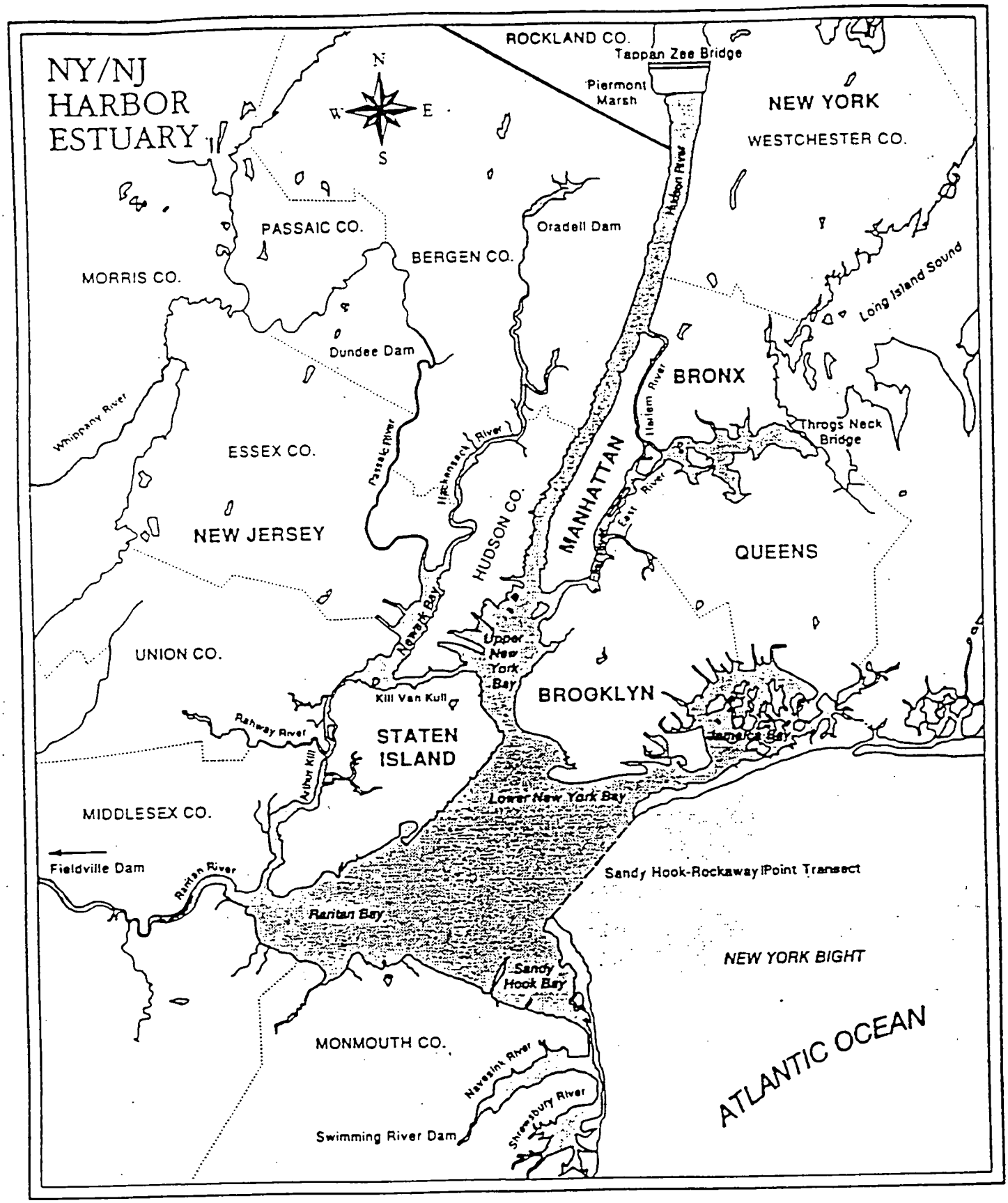


Figure 1. Location (shaded area) of the New York - New Jersey Harbor estuary (not to scale) (New York - New Jersey Harbor Estuary Program, 1996).

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The U.S. Fish and Wildlife Service (Service) has reviewed project plans and other information supplied by the Corps regarding the Dredged Material Management Plan (DMMP) for the Port of New York and New Jersey. This is the Service's Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, 16 U.S.C. 661 *et seq.*), Section 2(b) report on the fish and wildlife resources and supporting ecosystems in the project area. This report is provided in accordance with a Fiscal Year-1998 scope-of-work agreement with the New York District of the Corps.

II. METHODS

The information and findings presented in this FWCA report are based on review of previous Service reports regarding the project area and project plans and other information provided by the Corps. The content of this report is also based on review of Service files and library material, and coordination with the New Jersey Department of Environmental Protection, Division of Fish, Game and Wildlife (NJDFG&W); the New York Department of Environmental Conservation (NYDEC); and, the National Marine Fisheries Service.

III. PROJECT DESCRIPTION

A. OVERVIEW

The DMMP is intended to provide a comprehensive long-range plan for the management of dredged material originating from the Harbor. In addition to identifying a range of options for disposing of dredged material, the DMMP is intended to identify strategies for reducing the need for maintenance dredging through sediment reduction programs and strategies for reducing the amount of contaminated dredged material through pollution reduction / contaminant reduction programs and sediment decontamination technologies. Options for the disposal of dredged material include: remediation of the HARS (uncontaminated material only); upland Confined Disposal Facilities (CDF); Confined Aquatic Disposal (CAD) pits; nearshore containment areas; island CDFs; and, beneficial uses such as structural fill, landfill closure, and creation of fish and wildlife habitats (U.S. Army Corps of Engineers, 1997, 1996). The following sections provide brief descriptions of each of these strategies.

B. HISTORIC AREA REMEDIATION SITE

Decades of use of the Mud Dump Site for the disposal of dredged material has left certain areas of the site with levels of contamination that are higher than considered acceptable (U.S. Environmental Protection Agency, 1997). The area has been re-designated as the HARS with the intent of using Category I (dredged material allowed for ocean disposal without restrictions (U.S. Environmental Protection Agency, 1997)) dredged material to cap

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contaminated areas. Based on current conditions, the HARS is expected to have sufficient capacity to accept suitable dredged material for approximately 25 years (U.S. Army Corps of Engineers, 1997).

C. POLLUTION PREVENTION / CONTAMINANT REDUCTION

Part of the strategy for the long-term management of contaminated dredged material is to reduce the input of contaminants (i.e., lessen the future amount of contaminated material). According to the Corps (1997), if pollution prevention initiatives could annually transform one percent of dredged material from a classification of unacceptable to the classification of acceptable with regard to ocean remediation (disposal at the HARS), approximately 60 million cubic yards of material would be reclassified over the next 50 years.

This component of the DMMP would primarily be implemented through increased enforcement of pollution abatement laws. Although other agencies have a more direct role in enforcing pollution abatement laws, the Corps can play a role in this strategy through components such as: data management; historical contaminant database development; GIS data creation and mapping; contaminant visualization and volume prediction; and, toxicant modeling (U.S. Army Corps of Engineers, 1997).

D. SEDIMENT REDUCTION

A component of the strategy for the long-term management of dredged material is to reduce the amount of sediment that enters channels and berthing areas. The three strategies being studied related to sediment reduction are: Channel Design Optimization; Advanced Maintenance Dredging; and, Structural Modifications.

Channel design optimization would include activities such as realigning channels to decrease the sedimentation rate as well as examining the economic need to dredge channels. Advanced maintenance dredging would result in dredging below the desired channel depth to reduce the frequency of dredging. Structural modifications either within or outside of channel boundaries would be designed to keep sediment moving through the harbor and channels thereby minimizing the amount of sediment that enters channels.

E. DECONTAMINATION AND TREATMENT

Decontamination and treatment technologies work by reducing contaminant concentrations, contaminant mobility, and / or the toxicity of dredged material by means of mechanical, chemical, thermal, or biological processes, or combinations thereof. Decontamination is commonly interpreted as the removal or destruction of the bulk of contaminants in dredged sediments. Treatments include processes that immobilize contaminants within dredged material, thereby reduce the likelihood of contaminants moving into the environment. Dredged material that has undergone treatment may be acceptable for beneficial uses.

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Various small-scale (up to 25 cubic yards) decontamination and treatment technologies are being tested by federal agencies and private companies. The full-scale implementation of decontamination and treatment technologies would require the expansion of promising technologies and the development of accessible facilities.

F. BENEFICIAL USES

The Corps has identified two categories of beneficial uses of dredged material: beneficial uses that focus on creation and enhancement of habitats for fish and wildlife; and, beneficial uses that focus on the rehabilitation of contaminated sites. Beneficial uses that focus on creation and enhancement of fish and wildlife habitats include: creating and enhancing wetlands; creating and enhancing shellfish beds; creating and enhancing fish reefs; creating and enhancing bird habitat (primarily upland habitat); filling dead-end basins and other areas of poor water circulation to improve water quality; creating wetlands in inter-pier or similar poorly flushed areas to improve water quality; and, filling bathymetrically disturbed areas (e.g., existing borrow pits) of the harbor to improve water circulation and to improve aquatic habitat quality.

The second category of beneficial uses (remediation of contaminated sites) being considered by the Corps includes the closure of landfills (e.g., capping) and the remediation of contaminated lands known as brownfields. Additionally, the Corps is investigating the feasibility of using dredged material in the reclamation of abandoned coal mines. For example, acid mine drainage resulting from coal mining operations has polluted hundreds of miles of streams throughout Pennsylvania.

G. CONFINED DISPOSAL FACILITIES

Confined disposal facilities would be used to dispose of dredged material that is too contaminated to be used beneficially (U.S. Army Corps of Engineers, 1997). Additionally, dredged material classified as suitable for beneficial uses may be placed in confined disposal facilities when transporting the material to beneficial use sites is not logistically feasible. Two basic types of confined disposal facilities are envisioned: upland and aquatic.

1. Upland

Upland disposal involves the construction of dikes or other retention structures on land to contain dredged material and allow the discharge of effluent from the disposal site. Upland disposal would require testing the effluent discharged from the disposal site as well as monitoring adjacent surface and groundwater quality.

Although a number of upland disposal sites had been identified in the Interim Report (U.S. Army Corps of Engineers, 1996), most of these sites have been eliminated from further consideration due to lack of support from States and local communities. Only one site, designated UD-7 and located in Belford, Monmouth County, New Jersey, is still being

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considered by the Corps for upland disposal. Site UD-7 lies adjacent to Ware Creek and is approximately 160 acres; a portion of the site has been used in the past for the disposal of locally derived dredged material. If site UD-7 is used, it is expected that dredged material from local sources would be disposed of on the portion of the site previously used for dredged material disposal.

2. Aquatic

a. Contained aquatic disposal pits

The CAD option involves the placement of dredged material into a pit dug into the bottom of a water body, including bays, channels, or berthing areas. Pits would be dug, with excavated material used beneficially if appropriate, then filled with Category II or III dredged material and capped with clean (Category I) material. Category II material is allowed for ocean disposal with restriction (i.e., capping) and Category III material is prohibited from ocean disposal (U.S. Environmental Protection Agency, 1997). It is expected that in some areas CAD pits would be dug in series, placing any contaminated surface sediment from a new pit into the previously dug pit, and then capping the older pit with clean material from the new pit. The Corps postulates that pits, if dug in areas likely to have contaminated sediments in their upper layers, may serve to remediate these areas over time by replacing contaminated surface sediments with a cap of clean sediment.

Additionally, the Corps expects that CAD pits could be dug within the confines of existing channel and berthing areas, below authorized or maintained depths (Figure 2). The use of existing channels and berthing areas for the construction of CAD pits could be beneficial by reducing the aerial extent of disturbance within the harbor, optimizing dredging operations, and reducing costs. Reduced dredging costs could result from reducing dredged material transport distances and by creating advanced maintenance catch basins, which could extend the dredging cycle of a given section of channel. Areas currently being evaluated for within-channel CAD pits include: Port Jersey; Port Newark; Port Elizabeth; South Elizabeth; and, Port Newark and Port Elizabeth Pierhead channels. Additionally, channels in the areas of the Hudson River, Wards Point Bend Reach, Newark Bay, and Bay Ridge / Red Hook federal channels are being further evaluated. Finally, Red Hook and Wards Point anchorages are being evaluated for CAD pits (U.S. Army Corps of Engineers, 1997).

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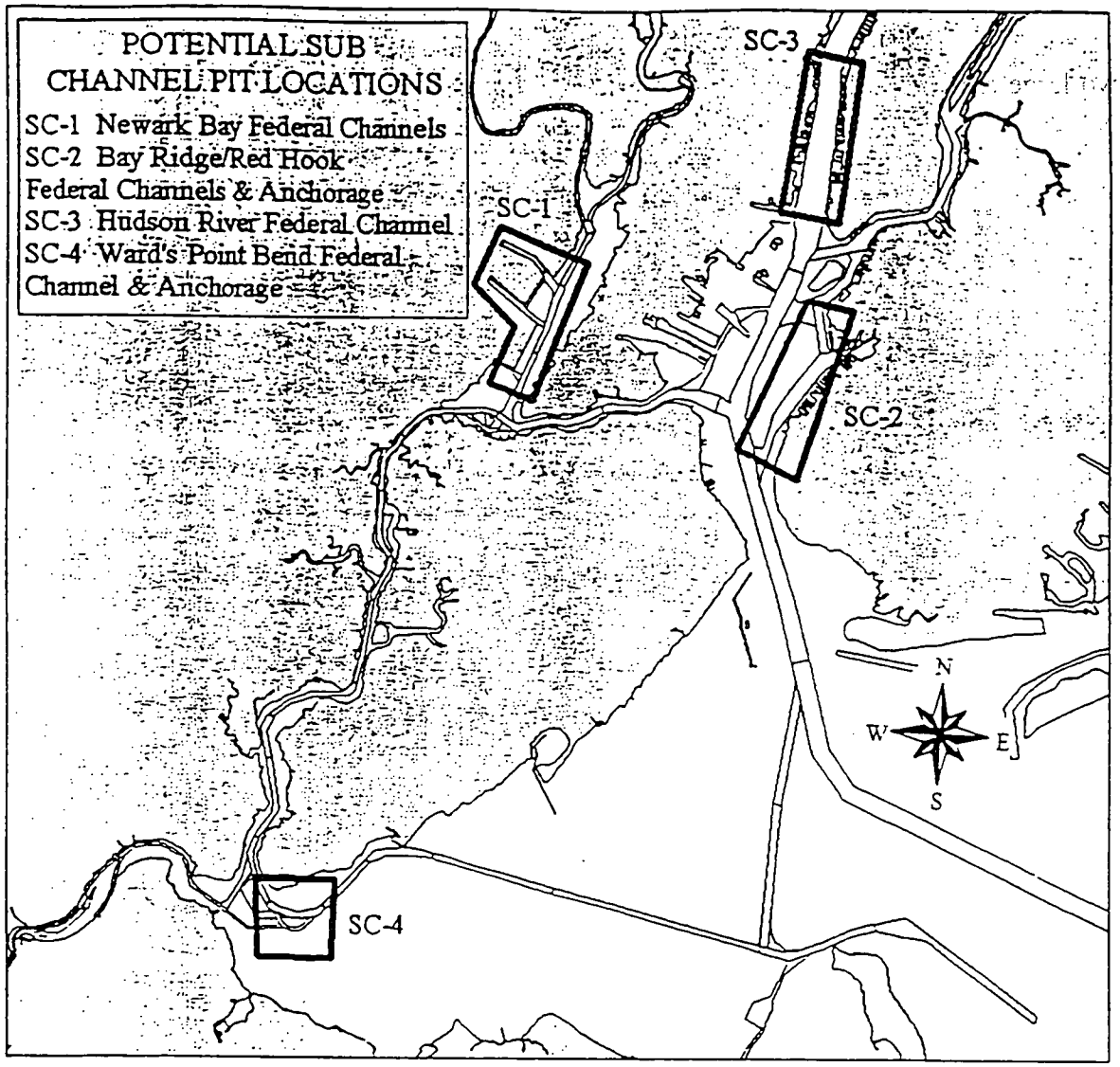


Figure 2. Potential confined aquatic disposal pit locations beneath authorized berthing areas and channels (not to scale) (U.S. Army Corps of Engineers, 1997).

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Two large areas outside of existing channels and anchorages known as Zone 1 and Zone 2 (Figure 3) have also been identified by the Corps as possible locations for CAD pits (U.S. Army Corps of Engineers, 1997). Zone 1 is located in Raritan bay and Zone 2 is located in Lower New York Bay. Additional smaller areas that are being considered for CAD pits include locations within Lower New York Bay, Newark Bay, and near Constable Hook and Bowery Bay.

The Corps expects that sub-channel pits could provide short-term and more immediate disposal capacity for dredging channels with the greatest need, while pits constructed in Zones 1 or 2 could provide a mid- to long-term solution to dredging needs (U.S. Army Corps of Engineers, 1997).

b. Nearshore containment areas

Nearshore containment facilities (NCF) would be constructed in aquatic habitats and have one side abutting land. When filled and covered, NCFs would produce a "containment peninsula." Although the Corps has evaluated sites for this disposal option throughout the Harbor area, only one site in the Atlantic Basin is still being considered. Other potential sites have been eliminated due to limitations such as size, location, environmental considerations, and degree of site contamination (U.S. Army Corps of Engineers, 1997). New sites will continue to be evaluated for this disposal option.

c. Island confined disposal facilities

Island CDFs would be engineered structures that extend from the ocean or harbor floor to above the water surface, creating enclosed areas that would then be filled with dredged material. Once filling is complete, the structure would be capped with clean fill material, resulting in newly created land that could be used for a variety of purposes. Currently two areas are being considered for island CDFs: the central part of Lower New York Bay (Zone 2) (Figure 4), and the north-central part of the New York Bight Apex, near Diamond Hill / Ambrose Light (Zone 3) (Figure 4).

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Figure 3. Potential confined aquatic disposal pit locations outside of existing berthing areas and channels (not to scale) (U.S. Army Corps of Engineers, 1997).

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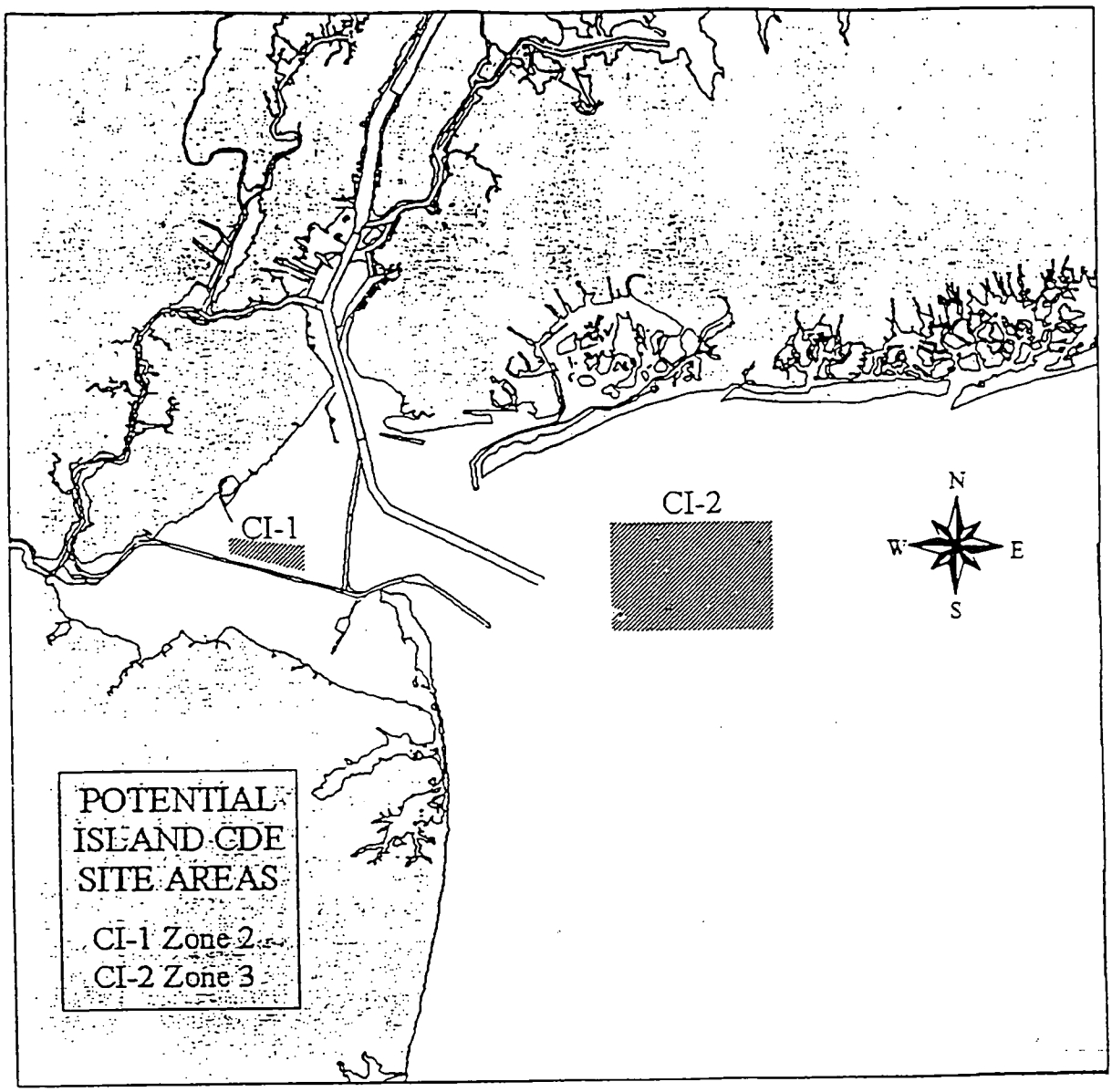


Figure 4. Potential island confined disposal facility locations (not to scale) (U.S. Army Corps of Engineers, 1997).

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IV. PHYSICAL ENVIRONMENT

The landforms surrounding the Harbor estuary have been shaped by complex geological, and physiographic processes. Three physiographic provinces converge at the Harbor, including the Atlantic Coastal Plain, the Piedmont Province, and the New York - New Jersey Highlands and the Manhattan Hills extensions of the New England Province. This convergence of physiographic provinces provides a great diversity of landforms and ranges, from the sands, gravels and clays of the Atlantic Coastal Plain, to the sandstones, shales and igneous intrusions of the Piedmont, to the metamorphic crystalline rock ridges of the New England Province. This mix of landforms is further complicated by the presence of terminal moraine from the Wisconsin glacial advance. The moraine is a linear and ridge-like landform of gravelly, stony, and bouldery materials that forms the lengthwise spine of Long Island extending southwest to the southern tip of Staten Island and then trending northwest into the New York - New Jersey Highlands. Glacial till and glacial lake sediments are found north of the moraine and glacial outwash sediments occur immediately south of the moraine.

In addition to the complex geology and ecological diversity of the area, the Harbor estuary is one the most densely populated and heavily industrialized areas in the world. This dominating human presence has dramatically altered the ecology of the Harbor estuary, resulting in the near elimination of many upland plant communities and the loss of approximately 300,000 acres of tidal wetlands and shallow water habitat (U.S. Fish and Wildlife Service, 1996). In addition to the direct loss of habitat due to urban development, the human influence on the area has resulted in massive degradation of remaining habitats through industrial effluent and sewage discharges, chemical and oil spills, stormwater runoff, air pollution, and the introduction of invasive, non-native plants and animals.

Currents in Raritan Bay generally circulate counter-clockwise (Figure 5). Ocean water enters from the east and travels west along the coast of Staten Island toward the Raritan River. Raritan River water enters from the west and travels east along the southern shore of the estuary. This circulation pattern influences other physical and chemical characteristics of the bay (e.g., salinity gradients, dissolved oxygen, water clarity, sediment dynamics). Little information was found by the Service on the circulation patterns of the study area outside of Raritan Bay and Sandy Hook Bay.

Raritan Bay appears to be relatively well-mixed, as indicated by similarities in physical and chemical data (e.g., dissolved oxygen, temperature, salinity, nitrate, nitrite, phosphate, and iron) between surface and bottom waters (Draxler *et al.*, 1984). Thorough mixing is facilitated by a combination of factors: the shallowness of the bay; a long fetch from most directions; and, turbulent mixing of tides, river discharge, and wind. Additionally, the bay completely flushes within 60 tide cycles or 28 days (Jefferies, 1962).

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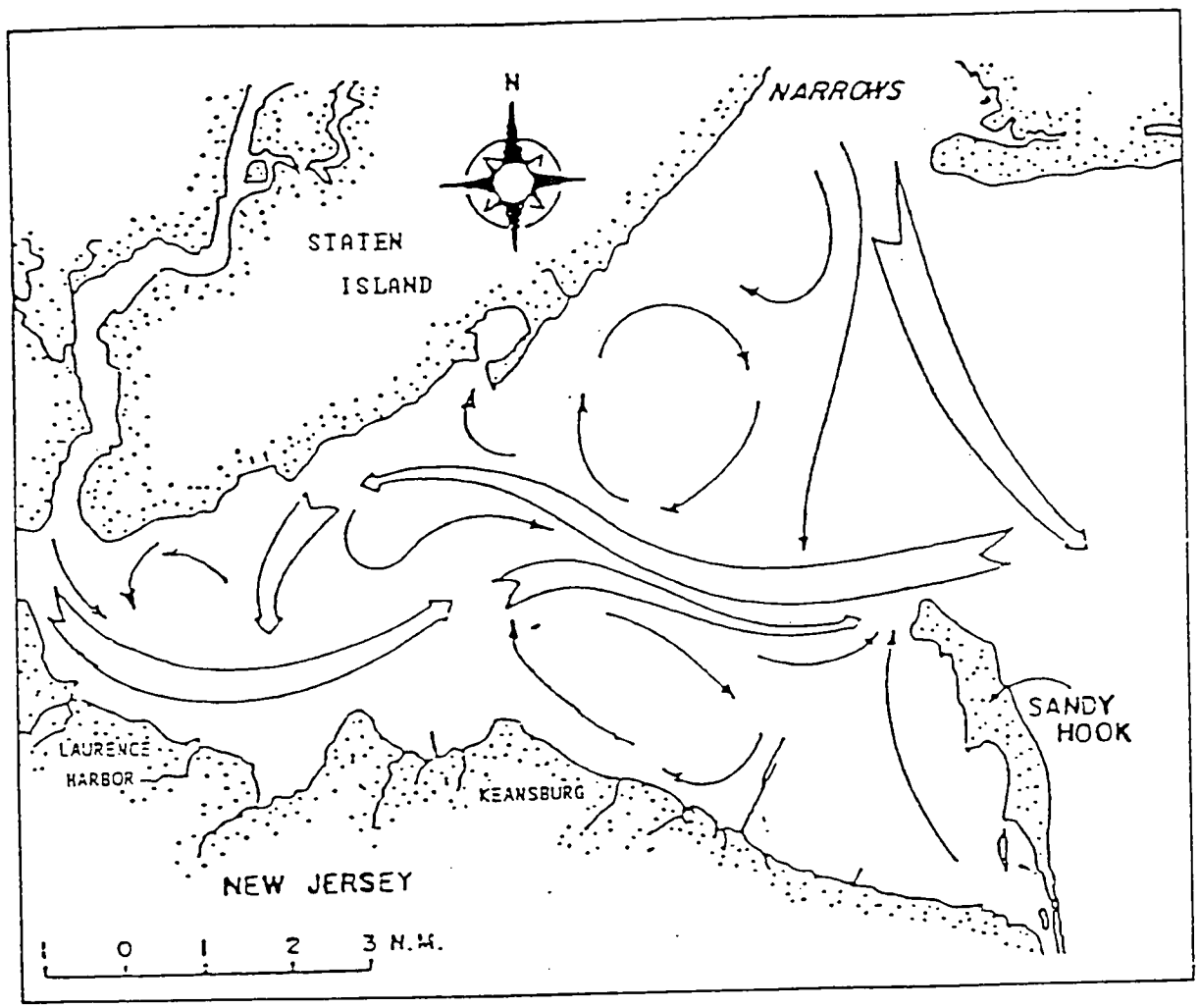


Figure 5. Circulation patterns of Raritan Bay (Jefferies, 1962).

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The Hudson Plume is an important feature of the New York Bight. The Hudson plume is a discharge of low density water from the estuary into the New York Bight. River plumes are generally important features of coastal marine systems because they regulate the exchange of sediments, nutrients, pollutants, and organisms between the estuarine and marine environment (Wilber and Will, 1994). When Hudson River discharges are high and winds are light, the plume usually flows south along the New Jersey coast. When discharges are low and winds to the northeast, the plume can flow directly into the New York Bight Apex beyond the Mud Dump Site (Wilber and Will, 1994).

The composition of surface sediments within the Harbor estuary is currently being studied by the Corps. However, preliminary results indicate that significant areas of Raritan Bay north of the Raritan Bay Reach Channel and west of the Chapel Hill Channel are dominated by sandy sediments; although there are some areas of silty sediments. Sediments to the south of the Raritan Bay Reach Channel generally seem to be finer (e.g., sandy silts and silts). Some small areas of Raritan Bay appear to have shell bottoms. These results appear to be consistent with previous sediment sampling done in Raritan Bay.

Multer *et al.* (1984) found that surface sediments in the western section of Raritan Bay are dominated by silt and clay. Fine-grained sediments dominate the head of the bay primarily because the area is far from the open ocean (hence turbulent mixing is minimal) and because fine sediments drop out of the water column where water velocity slows substantially as it enters the estuary. A fine-grained sediment plume originating from the Raritan River flows through the deeper, center area of the bay almost to Sandy Hook (Multer *et al.*, 1984).

V. NEW YORK AND NEW JERSEY HARBOR ESTUARY ECOSYSTEM

A. OVERVIEW

Despite extensive human-induced alterations, the Harbor estuary continues to support an impressive diversity of habitats and a rich diversity and abundance of fish and wildlife resources, including many federal trust resources. The Harbor estuary supports fisheries and shellfisheries resources of commercial, recreational, and ecological importance. Additionally, the Harbor estuary provides migratory, wintering, and breeding habitat for a large variety of migratory birds including waterfowl, wading birds, shorebirds, raptors, and passerines.

The Service has conducted a number of studies of the Harbor estuary's fish and wildlife resources. As part of the National Harbor Estuary Program, the Service identified species groups and ecological communities of management concern and compiled existing information regarding the distribution of these resources (U.S. Fish and Wildlife Service, 1996). The species groups identified by the Service as being of management concern in the Harbor estuary included fisheries, waterfowl, shorebirds, wading birds, raptors, passerine birds, and species designated as threatened or endangered at the State or federal level. As part of this effort the Service also identified areas of the Harbor estuary that support

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concentrations of these species groups or rare or unique vegetation communities; the Service mapped these areas as regionally significancant habitat complexes. Section B below describes the various cover types that make up the components of the Harbor estuary ecosystem. Section C below identifies the Regionally Significant Habitat Complexes (Habitat Complexes) that are of particular importance to the long-term maintenance of the Harbor's fish and wildlife resources. Sections D and E identify resources of concern that are outside of Habitat Complexes. Section F identifies federally listed and candidate species as well as State-listed species that are found in the Harbor estuary.

B. ECOSYSTEM COMPONENTS

1. Marine

Within the study area, marine habitats are extensive. Cowardin, *et al.* (1979), define the marine system as the open ocean overlying the continental shelf and its associated high-energy coastline. Marine habitats are exposed to the waves and currents of the open ocean and water regimes are determined primarily by the ebb and flow of oceanic tides. Salinities exceed 30 parts per thousand with little or no dilution except outside the mouths of estuaries. Marine systems extend from the outer edge of the continental shelf shoreward to the landward limit of tidal inundation, including the splash zone from breaking waves, and the seaward limit of the estuarine system, which is discussed below.

2. Estuarine

Cowardin *et al.* (1979) consider estuarine systems as consisting of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partially obstructed, or sporadic access to the open ocean. Ocean water is at least occasionally diluted by freshwater runoff from the land. The estuarine system extends upstream and landward to where ocean-derived salts measure less than 0.5 ppt during the period of average annual low flow and to an imaginary line closing the mouth of a river, bay, or sound.

3. Palustrine Wetlands

Cowardin *et al.* (1979) define palustrine systems as including all non-tidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is less than 0.5 parts per thousand. Within the study area, palustrine wetlands primarily occur adjacent to streams and rivers beyond the limit of tidal inundation. Additionally, palustrine wetlands occur as isolated wetlands within upland areas.

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4. Uplands

Upland systems within the study area have, for the most part, been significantly altered by human activity. Many areas within the study area have been intensively developed and now provide few habitats for fish and wildlife resources. Due to the paucity of undeveloped uplands (e.g., forests, grasslands) within the study area, remaining undeveloped areas often provide valuable habitats for many species, especially migratory landbirds.

C. REGIONALLY SIGNIFICANT HABITAT COMPLEXES

Within the study area, and the above-mentioned cover types, the Service has identified Habitat Complexes (Figure 6) (U.S. Fish and Wildlife Service, 1996). As discussed above, these areas have been identified by the Service because of their ecological importance.

1. Jamaica Bay and Breezy Point

Jamaica Bay is located on the southwestern tip of Long Island in the boroughs of Brooklyn and Queens, New York City and the Town of Hempstead, Nassau County, New York (Figure 6). Breezy Point is the western tip of the Rockaway barrier beach to the south of Jamaica Bay and Rockaway Inlet (Figure 6). Jamaica Bay is a saline to brackish, eutrophic (nutrient rich) estuary covering about 25,000 acres, with a mean depth of 13 feet. The bay is connected with Lower New York Bay and the Atlantic Ocean via Rockaway Inlet.

Jamaica Bay has been disturbed by dredging, filling, and development, including the construction of Floyd Bennett Field and John F. Kennedy Airport. About 12,000 acres of the original 16,000 acres of wetlands in the bay have been filled, mostly around the perimeter of the bay (U.S. Fish and Wildlife Service, 1996).

Eighty-one species of fish were found to use Jamaica Bay in a survey conducted by the National Park Service in 1985 (National Park Service, 1991). The majority of the fish collected were juveniles using the bay as a nursery area. Winter flounder (*Pleuronectes americanus*) was the most important commercial and recreational fish to use the bay in great numbers during all life stages; the bay is also believed to be a significant breeding area for this species. Forage fish species with high abundances that form a prey base for other fish and birds that use the area included Atlantic silverside (*Menidia menidia*), bay anchovy (*Anchoa mitchilli*), mummichog (*Fundulus heteroclitus*), Atlantic menhaden (*Brevoortia tyrannus*), and striped killifish (*F. majalis*). Some of the other common species in surveys and recreational landings include: scup (*Stenotomus chrysops*); bluefish (*Pomatomus saltatrix*); windowpane (*Scophthalmus aquosus*); tautog (*Tautoga onitis*); weakfish (*Cynoscion regalis*); black sea bass (*Centropristis striata*); summer flounder (*Paralichthys dentatus*); American eel (*Anguilla rostrata*); and, searobin (*Prionotus spp.*). Anadromous species that use the area include blueback herring (*Alosa aestivalis*); Atlantic sturgeon (*Acipenser oxyrhynchus*); alewife (*A. pseudoharengus*); American shad (*A. sapidissima*); and striped bass (*Morone saxatilis*).

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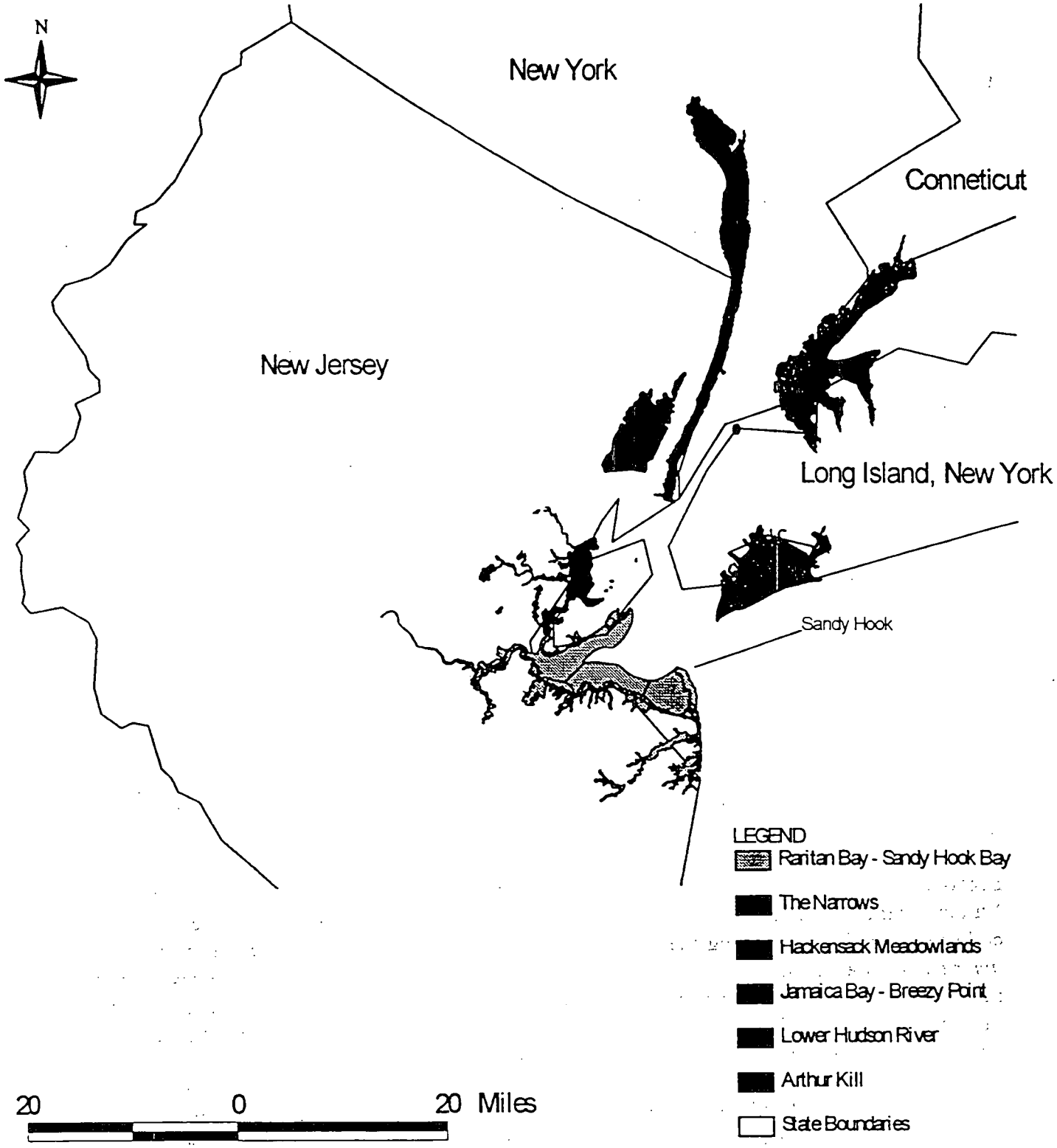


Figure 6. Location of Significant Habitat Complexes within the New York - New Jersey Harbor estuary (U.S. Fish and Wildlife Service, 1996).

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Shellfish species that are know to occur within the Jamaica Bay complex include the intertidal soft-shelled clam (*Mya arenaria*), hard-shelled clam (*Mercenaria mercenaria*) and the Atlantic surf clam (*Spisula solidissima*) occupying the nearshore and inlet area. The blue mussel (*Mytilus edulis*) attaches to structures, especially piers and jetties.

Jamaica Bay has significant wintering waterfowl concentrations, with mid-winter ground counts over the period from 1980 to 1992 averaging about 11,000 birds with a peak of 36,000 birds (U.S. Fish and Wildlife Service, 1996). The most abundant waterfowl during this survey period were greater scaup (*Aythya marila*), American black duck (*Anas rubripes*), brant (*Branta bernicla*), Canada goose (*B. canadensis*), bufflehead (*Bucephala albeola*), canvasback (*Aythya valisineria*), mallard (*Anas platyrhynchos*), ruddy duck (*Oxyura jamaicensis*), red-breasted merganser (*Mergus serrator*), snow goose (*Chen caerulescens*), and American wigeon (*Anas clypeata*). Jamaica Bay supports some of the largest wintering populations of greater scaup and American black duck in New York State (U.S. Fish and Wildlife Service, 1996). Regularly occurring waterfowl in lesser numbers include horned grebe (*Podiceps auritus*), green-winged teal (*Anas crecca*), gadwall (*Anas strepera*), northern shoveler (*Anas clypeata*), and common goldeneye (*Bucephala clangula*).

Breezy Point supports some of the highest concentrations of beach-nesting birds in New York State and in the entire New York Bight coastal region. Breezy Point consistently supports one of the largest nesting sites in the entire New York Bight coastal region of the federally listed (threatened) piping plover *(Charadrius melodus)*, with an average of 22 pairs and a maximum of 33 pairs during the period 1985 to 1995. The area also supports one of the largest concentrations of least terns *(Sterna antillarum)*, with and average of 340 nesting pairs from 1985 to 1995.

Jamaica Bay is one of the most important migratory shorebird stopover sites in the New York Bight region, especially during fall migration (July to November) (U.S. Fish and Wildlife Service, 1996). The shorebirds utilize much of the bay, but tend to focus on the intertidal areas during low tide and move to East and West Ponds on Ruler's Bar Hassock during high tides. During the period of 1981- 1990, the most abundant shorebirds identified in the east and west ponds included: black-bellied plover (*Pluvialis squatarola*); semipalmated plover (*charadrius semipalmatus*); greater yellowlegs (*Tringa melanoleuca*); ruddy turnstone (*Arenaria interpres*); sanderling (*Calidris alba*); semipalmated sandpiper (*Calidris pusilla*); least sandpiper (*Calidris minutilla*); dunlin (*Calidris alpina*); and, short-billed dowitcher (*limnodromus griseus*).

2. Raritan Bay - Sandy Hook Bay

Raritan Bay and Sandy Hook Bays form the southeastern portion of the New York - New Jersey Harbor between the southern shoreline of Staten Island, Richmond County, New York, and the northern shoreline of Monmouth County, New Jersey (Figure 6). The boundary includes the nearshore portions of Raritan and Sandy Hook Bays, adjacent tidal wetlands, and small remnant freshwater wetlands and forest on the New Jersey and Staten Island shorelines.

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Over 90 species of fish have been reported in various fisheries investigations of the Raritan Bay - Sandy Hook Bay Complex (U.S. Fish and Wildlife Service, 1996). The most abundant are some of the estuarine species that use the lower salinity areas as their permanent residence, in particular, mummichog, white perch *(Morone americans),* and hogchoker *(Trinectes maculatus).* The bay complex supports recreational fisheries for weakfish, bluefish, winter flounder, summer flounder, striped bass, sea bass (*Centropristis striata*), tautog, scup, and spot *(Leiostomus xanthurus).* Commercial fisheries exist for American shad. American eel and American lobster *(Homarus americanus)* are landed in pot fisheries, and blue crab *(Callinectes sapidus)* and horseshoe crab *(Limulus Polyphemus)* are taken in a dredge fishery. Although the bays are closed to direct market harvest of shellfish due to pollution, there are commercial quantities of northern quahog and soft-shelled clam, which are harvested for deputation or relay. There are also areas of blue mussel and common oyster *(Crassostrea virginica)* beds as well as a surf clam beds in the deeper waters north of Sandy Hook.

The migratory and mid-winter concentrations of waterfowl in the Raritan Bay / Sandy Hook Bay complex are especially significant, with 20-year midwinter averages of over 60,000 birds. The combination of geographic location and configuration coupled with productive wetlands, flats, and waters make it an important migratory staging area for many species of waterfowl on the Atlantic Flyway, with peak migration occurring in late October. November aerial counts in New Jersey waters average nearly 45,000 birds. The number of horned grebes as well as common and red-throated loons (*Gavia stellata*) during migration is regionally significant. Especially notable are the overwintering scaup concentrations, primarily greater scaup, which have increased in this area recently and comprise an important component of the Atlantic Flyway population. Other significant species populations include Canada goose in the Raritan River and the Navesink system, American black duck, *canvasback,* mallard, and brant, along with lesser numbers of bufflehead, oldsquaw (*Clangula hyemalis*), mergansers, red-breasted merganser *(Mergus serrator),* common goldeneye, and American wigeon. These waterfowl are not evenly distributed but, rather, tend to concentrate along the southern Raritan Bay and Staten Island shorelines and in the Shrewsbury and Navesink Rivers. Moderate sized flocks of scaup and American black duck and smaller rafts of brant occur along the Staten Island shoreline. The mouth of the Raritan River and the area around Perth Amboy and South Amboy is especially important for canvasback. The south shore of Raritan Bay is important for American black duck and scaup. The ponds and creeks of the Shrewsbury and Navesink system are extremely important in the winter for dabbling ducks, canvasbacks, and scaup, with bufflehead and brant throughout the system. Double-crested cormorants *(Phalacrocorax auritus)* also occur in large numbers, as well as notable numbers of great cormorant *(Phalacrocorax carbo)* in the winter.

The shorelines of Raritan Bay, both the south shore in Monmouth County, New Jersey, and the Staten Island, New York shoreline, concentrate migratory shorebirds and Neotropical migrant landbirds. Shorebird surveys done in the early 1980s have indicated the importance of the greater Raritan Bay for spring and fall shorebird migration with seasonal totals of over 20,000 birds based on weekly surveys (Burger, 1983). The peak months are June and August, and the primary concentration areas are Great Kills on Staten Island, the flats inside Sandy

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Hook, and the south shore between Chingora Creek and Conaskonk Point; three species, sanderling, ruddy turnstone, and semi-palmated sandpiper *(Calidris pusilla),* make up about 85 percent of the total of migratory shorebirds using this area.

Sandy Hook (Figure 6) is the only undeveloped barrier beach area on the northern end of the New Jersey coastline north of Island Beach State Park, which is located 34 miles to the south. Sandy Hook is an important nesting area for the federally listed (threatened) piping plover. There has been a steady increase in the number of nesting pairs of piping plovers at Sandy Hook from 8 in 1985 to 43 in 1995, with 40 nesting pairs occurring in 1997. Over 600 least terns nested along with the piping plover at the five Sandy Hook sites in 1995, the largest number of least terns in New Jersey that year. Common tern *(Sterna hirundo)* also nest at one site, and black skimmer (*Rynchops niger*) have recently nested at another beach site.

3. Hackensack Meadowlands

The Hackensack Meadowlands is a large wetland complex dominated by intertidal and intermittently flooded common reed *(Phragmites australis)* marshes and lesser areas of the following wetland types: shallow tidal bay / mudflat; low salt marsh dominated by low marsh cordgrass *(Spartina alterniflora);* remnant high salt marsh dominated by high marsh cordgrass *(Spartina patens);* brackish impoundments; freshwater impoundments; and remnant palustrine forest dominated by pin oak *(Quercus palustris),* red maple *(Acer rubrum),* and swamp white oak *(Quercus bicolor).* Grassland, shrubland, and early successional forest are the upland habitat types on landfills, with small undeveloped uplands scattered around the edge of the Meadowlands.

In the 1600s, the Hackensack Meadowlands were predominantly a freshwater tidal river system, with Atlantic white cedar (*Chamaecyparis thyoides*) swamps occupying much of the wetland system and northern bogs occurring in other areas. However, since then, the Hackensack Meadowlands has been continuously impacted by human activities such as installation of tide gates, ditching, diking, and filling. In 1922, a dam was constructed on the Hackensack River in Oradell, cutting off most of the freshwater flow to the Meadowlands and allowing brackish water to intrude further upriver. In recent decades, filling of wetlands in the area has reduced their extent from about 20,000 acres to about 8,400 acres.

Counts of waterfowl from midwinter aerial surveys over the Meadowlands average over 2,000 birds, including significant numbers of Canada goose, American black duck, mallard, and canvasback, with lesser numbers of greater scaup, gadwall, and American coot *(Fulica americana).* Green-winged teal have recently been noted as abundant in Mill Creek and Cromakill Creek and other small creeks during boat surveys in the fall and winter (U.S. Fish and Wildlife Service, 1996). Breeding waterfowl and waterbirds in the Meadowlands include Canada goose, mallard, American black duck, gadwall, green-winged teal, blue-winged teal *(Anas discors),* ruddy duck, pied-billed grebe, American coot, common moorhen *(Gallinula chloropus),* black-crowned night-heron, yellow-crowned night-heron, least bittern *(Ixobrychus exilis),* American bittern *(Botaurus lentiginosus),* and green heron *(Butorides striatus).* A few

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freshwater ponds that have formed on top of the landfills, totalling about 1.6 hectares (4 acres) have become important shorebird and waterfowl habitat, and are especially productive waterfowl habitat for gadwall; one pond had a count of 144 gadwall ducklings in 1990 (U.S. Fish and Wildlife Service, 1996).

Small mammal populations occurring on landfills and marshes support owls and hawks, including northern harrier (*Circus cyaneus*), rough-legged hawk *(Buteo lagopus),* red-tailed hawk *(Buteo jamaicensis),* American kestrel *(Falco sparverius),* short-eared owl (*Asio flammeus*), and long-eared owl (*Asio otus*) throughout the year, and especially in winter. Primary prey for the owls are house mouse *(Mus musculus)* and meadow vole *(Microtus pennsylvanicus).* Important roosting and feeding areas for raptors include Berry's Creek, Kearny Marsh, and Sawmill Creek.

The tidal mudflats and impoundments in the Meadowlands are important habitats for thousands of shorebirds, both in spring and fall migrations, and for wintering and summering waterfowl. The Kingsland freshwater and brackish impoundments managed by Hackensack Meadowlands Development Commission are important waterfowl production and wintering areas. In July 1994, over 2,000 birds were counted, including Canada goose, gadwall, and mallard. Shorebird surveys conducted in the fall (July to November) during the period 1971 to 1980 at the Kingsland impoundment tidal flat totalled 31 species of shorebirds. The most abundant species were semipalmated sandpiper, lesser yellowlegs (*Tringa flavipes*), short-billed dowitcher, and dunlin. Maximum daily counts of sandpipers exceeded 5,000 birds during most years. The Meadowlands is one of the most important sites in the region for shorebirds during fall migration.

The Hackensack River and the marshes in the Meadowlands regularly support 34 species of fish, and provide important nursery habitat for both anadromous and marine species. The Hackensack is a polluted tidal river with high sediment concentrations of contaminants and low levels of dissolved oxygen in the summer and so, not surprisingly, the dominant fish are the resident estuarine fish tolerant of fluctuations in salinity and water quality. The most abundant fish is the mummichog, which makes up about 90 percent of the total fish caught in trawls and traps. Other common resident fish include striped killifish, inland silverside *(Menidia beryllina),* Atlantic silverside, white perch, brown bullhead *(Ictalurus nebulosus),* white catfish *(Ictalurus catus),* carp *(Cyprinus carpio),* pumpkinseed *(Lepomis gibbosus),* bay anchovy, and the catadromous American eel. Anadromous fish using the Hackensack River and marshes in the spring include alewife, blueback herring, American shad, Atlantic tomcod *(Microgadus tomcod),* and striped *bass,* and marine fish such as Atlantic menhaden and bluefish. These species are absent or found in low numbers in the summer but return in the fall, along with weakfish and winter flounder.

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4. Arthur Kill Complex

The Arthur Kill complex includes the northwestern corner of Staten Island in New York City, adjacent portions of the Arthur Kill and Kill Van Kull in both New York and New Jersey, and tributaries and wetlands feeding into the Arthur Kill from Union and Middlesex Counties, New Jersey (Figure 6). The Arthur Kill complex is located in the Townships of Clark, Carteret, Elizabeth, Linden, Rahway, Scotch Plains, Union, Westfield, and Woodbridge in Middlesex and Union Counties, New Jersey as well as Staten Island, Richmond County, New York.

The overall boundary of this complex consists of a contiguous area on the northwest corner of Staten Island, the entire length of the Arthur Kill from its junction with Newark Bay south to the Outerbridge (Route 440) bridge on the south, and several tributary corridors to the Arthur Kill in New Jersey. The contiguous Staten Island area is bounded by the Kill Van Kull and Newark Bay on the north, by Fresh Kills and Isle of Meadows on the south, and by several road systems on Staten Island on the east. On the western side of the Arthur Kill, the area includes: (from north to south) 7.3 miles of the Elizabeth River, 3 miles of Morses Creek, 1.6 miles of Piles Creek, 11.5 miles of the Rahway River, 1 mile of Smith Creek, and 5.4 miles of Woodbridge Creek.

Vast modifications of the physical features of the Arthur Kill have been made to serve the harbor area. The highly industrialized waterway is dredged to an average channel depth of 30 feet and much of the shoreline is bulkheaded or riprapped. However, considering the shoreline associated with the islands, 55 percent of the total shoreline still remains as natural mudflats and marshes.

Of primary significance in this area is the presence of major nesting colonies and foraging areas of herons, egrets, and ibises in a complex of closely associated natural habitats occurring within a major metropolitan area. Three island colonies, or heronries, were established in the 1970s; in 1995 these heronries collectively contained nearly 1,400 nesting pairs of colonial wading birds of special regional emphasis or management concern, including, in declining order of abundance, black-crowned night-heron *(Nycticorax nycticorax)*, glossy ibis *(Plegadis falcinellus)*, snowy egret *(Egretta thula)*, great egret *(Casmerodius albus)*, cattle egret *(Bubulcus ibis)*, yellow-crowned night-heron *(Nycticorax violaceus)*, green-backed heron *(Butorides striatus)*, and little blue heron *(Egretta caerulea)* nesting pairs. This is the largest heronry in New York State and accounts for about 25 percent of all the waders that breed in coastal New Jersey, New York, and Connecticut (U.S. Fish and Wildlife Service, 1996). The largest number of nesting great egrets, cattle egrets, snowy egrets, and yellow-crowned night herons in New York State occur at these colonies. In addition, over 1,000 herring gull *(Larus argentatus)*, 30 great black-backed gull *(Larus marinus)*, and 140 double-crested cormorant *(Phalacrocorax auritus)* pairs nested on these same sites, constituting one of the southernmost nesting areas for the Canadian sub-population of the cormorant. Adult and young herons and egrets forage extensively in the wetlands over

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this complex, feeding on rich concentrations of forage fish, particularly mummichog and Atlantic silverside, and invertebrates, particularly grass shrimp *(Palaemonetes* spp.), in the marshes, flats, and shallow waters of ponds and tidal creeks.

Nesting waterfowl include American black duck, gadwall, mallard, green-winged teal, blue-winged teal *(Anas discors),* Canada goose, and wood duck *(Aix sponsa),* and also breeding Virginia rail *(Rallus limicola),* common moorhen *(Gallinula chloropus),* least bittern, American coot *(Fulica americans),* and pied-billed grebe *(Podilymbus podiceps).* Goethals Bridge Pond is an important feeding area for migratory shorebirds, particularly black-bellied plover, red knot *(Calidris canutus),* pectoral sandpiper *(Calidris melanotos),* semipalmated sandpiper, sanderling, common tern, and least tern. Wintering waterfowl of regional importance occurring in the open waters and marshes in this complex include greater and lesser scaup (*Aythya marila* and *A. affinis*), canvasback, brant, American black duck, Canada goose, mallard, bufflehead, and American wigeon. Northern harriers forage over many of the wetland marshes of this complex, particularly in winter, as did numbers of short-eared owls until the mid-1980s.

5. Lower Hudson River

The lower Hudson River estuary is the portion of the Hudson River extending from the Battery at the southern tip of Manhattan north to Stony Point at the northern end of Haverstraw Bay. The Lower Hudson River estuary complex includes Alpine, Edgewater, Englewood Cliffs, Fort Lee, Guttenburg, Hoboken, Jersey City, North Bergen, Tenafly, Weehawken, and West New York, within Bergen, and Essex Counties, New Jersey as well as Bronx, Clarkstown, Cortland, Greenburgh, Haverstraw, Manhattan, Mount Pleasant, Nyack, Orangetown, Ossining, Peekskill, Stony Point, and Yonkers, within Bronx, New York, Rockland, and Westchester Counties, New York.

The Habitat Complex boundary for the lower Hudson River estuary follows the shores of the Hudson River from the tip of Battery Park, Manhattan, generally referred to as river mile 0, north to the Stony Point area river mile 41. The boundary of the complex includes all riverine and estuarine habitats, including open water and tidal wetlands in this stretch of the river. This section of the river includes the moderate and high salinity zones (mesohaline and polyhaline salinity zones) of the river.

The Hudson River is regionally significant as a productive estuary and is one of only a few major tidal rivers on the North Atlantic coast of the United States. The lower Hudson supports regionally significant fish populations as well as populations of wintering and migratory birds that feed on the rich fish and benthic resources. This is the primary nursery and overwintering area for striped bass in the Hudson River estuary, and striped bass from the Hudson account for an impressive portion of the total North Atlantic population.

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Shellfish species are abundant, including northern quahog, soft-shelled clam, and common oyster; however, the waters are not certified for human consumption of shellfish. The predominant crustaceans include grass shrimp, sand shrimp *(Crangon septemspinosa),* and blue crab. Early life stage blue crab larvae require high salinities and, therefore, this is a prime adult blue crab spawning region.

Many marine fish use the lower Hudson River as a nursery area; it provides an ideal habitat for the early, critical life stages of these invertebrate and fish species. The lower Hudson River estuary is ranked among the most productive systems on the northern Atlantic coast for fisheries. Marine finfish that use this area include American eel, Atlantic menhaden, fourbeard rockling (*Enchelyopus cimbrius*), bluefish, weakfish, northern pipefish (*Syngnathus fuscus*), and longhorn sculpin *(Myoxocephalus octodecemspinosus).* Estuarine fish that spawn in this stretch of the Hudson include winter flounder, bay anchovy, hogchoker, and mummichog.

The southern portion of the Lower Hudson River Complex (Manhattan upriver to Piermont Marsh) is important wintering habitat for young-of-the-year, yearling, and older striped bass between mid-November and mid-April. These fish spawn upriver of Haverstraw Bay and utilize nursery areas in Haverstraw Bay and the Tappan Zee before moving downriver to overwinter, generally feeding on the abundant invertebrates found in this area. Significant numbers of yearling winter flounder also occupy this stretch of the river in the winter. The New Jersey Division of Fish, Game and Wildlife (1984) conducted fish surveys of the Upper Bay of New York Harbor / Hudson River estuary and collected 23 fish species dominated by six species: bay anchovy; winter flounder; American shad; Atlantic tomcod *(Microgadus tomcod);* and, alewife. Fish were most abundant in the spring and summer. The area suffers from low dissolved oxygen concentrations; during the stratified spring and summer periods, bottom dissolved oxygens were 2.8 to 3.8 milligrams per liter. In the New Jersey portion of the lower Hudson River to Piermont, 40 fish species and 26 invertebrates were collected (New Jersey Division of Fish, Game and Wildlife, 1984). The abundant species collected throughout the area were alewife, American eel, American shad, Atlantic tomcod, bay anchovy, blueback herring, hogchoker, striped bass, white perch, and winter flounder. The area between Jersey City and Edgewater (river miles 1.5 to 8.8) was found to be an important overwintering habitat for striped bass.

This stretch of the lower Hudson River has significant concentrations of wintering waterfowl, especially canvasback, with lesser numbers of scaup *(Aythya* spp.), mergansers *(Mergus* spp.), mallard, and Canada goose. Bald eagles (*Haliaeetus leucocephalus*) have recently been observed overwintering along the lower Hudson reach, with a roost site in the Palisades (U.S. Fish and Wildlife Service, 1996).

Haverstraw Bay and Tappan Zee occupy the area between Piermont Marsh and Stony Point. This area is a major nursery area for striped bass, white perch, Atlantic tomcod, and Atlantic sturgeon that spawn elsewhere in the Hudson; it is, as well, a wintering area for the federally listed endangered shortnose sturgeon (*Acipenser brevirostrum*). This bay is critical habitat for

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the estuarine dependent fish that the Hudson River system contributes to the New York Bight. Waterfowl use is extensive during the spring and fall migration periods for feeding and resting. Small numbers of wintering waterfowl include mallard, American black duck, Canada goose, mergansers, canvasback, common goldeneye, and scaup. Peregrine falcons have consistently been using a nesting box on the Tappan Zee Bridge since about 1985, but have had low fledging success (U.S. Fish and Wildlife Service, 1996). A network of marshes behind Grassy Point adjacent to Haverstraw Bay is one of the few sizable marshes along the lower Hudson, but tidal circulation has been greatly reduced by the construction of roads and the marsh has been impacted by landfills and sewage treatment plants.

6. The Narrows

The Narrows constitutes the westernmost section of Long Island Sound between Hell Gate, at the convergence of the Harlem and East Rivers, and the Hempsted Sill, a major shoal area extending north and south across the sound from Matinecock Point on Long Island, near Glen Cove, Nassau County to the New York - Connecticut boundary. This complex also includes a small area of southwestern coastal Connecticut in the vicinity of Greenwich. The narrows complex lies within Greenwich, Fairfield County, Connecticut, New Rochelle, Mamaroneck, and North Hempstead, Nassau and Queens Counties, New York.

The primary boundary of this complex corresponds approximately with that of the Narrows proper, and includes most of the nearshore waters and islands of western Long Island Sound and portions of the East River within this area. Specifically included are three major bays on the north shore of western Long Island, in Nassau and Queens Counties: Little Neck Bay, Manhasset Bay, and Hempstead Harbor, which are recognized here as an interrelated complex of regionally significant fish and wildlife aquatic habitats.

Otter Creek has been designated by the U.S. Fish and Wildlife Service as a priority wetland site under the federal Emergency Wetlands Resources Act of 1986. The New York State Department of State has designated several Significant Coastal Fish and Wildlife Habitats with this complex, including Hempstead Harbor, Huckleberry Island, Little Neck Bay, Marshlands Conservancy, Playland Lake and Manursing Island flats, Manhasset Bay, Premium River - Pine Brook wetlands, and Prospect Point. Long Island Sound was designated by the U.S. Environmental Protection Agency as an Estuary of National Significance, and its comprehensive conservation and management plan completed in 1995.

A principal habitat type of significance in the Narrows Complex are: the offshore islands with colonial wading bird rookeries; rocky intertidal areas; and, tidal wetland areas consisting of various combinations of associated salt and brackish marshes, mudflats, tidal creeks, and protected open-water coves. The most important bird-breeding islands in this group are Huckleberry Island, Great Captain Island, North and South Brother Islands, and Pelican Island. These small, rocky islands are mostly covered with deciduous forest composed of

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sassafras *(Sassafras albidum)*, white oak *(Quercus alba)*, Norway maple *(Acer platanoides)*, chestnut oak *(Quercus prinus)*, black locust *(Robinia pseudoacacia)*, and tree-of-heaven *(Ailanthus altissima)*.

The three north shore bays, Little Neck Bay, Manhasset Bay, and Hempstead Harbor, are collectively among the most important waterfowl wintering concentration areas in the New York - New Jersey Harbor estuary, particularly for greater and lesser scaup, canvasback, and American black duck, along with lesser numbers of brant, Canada goose, common goldeneye, oldsquaw, bufflehead, red-breasted merganser, and American wigeon. These bays are also productive nursery and feeding areas for marine shellfish and finfish, including striped bass, scup, bluefish, Atlantic silverside, Atlantic menhaden, winter flounder, and tautog *(Tautoga onitis)*, and contain important hard-shelled clam beds. Although few in number and small in size, sand beaches in this area provide essential nesting habitat for piping plover, a federally listed (threatened) species, least tern, and northern diamondback terrapin *(Malaclemys terrapin)*. Marshlands associated with the bays are valuable feeding and nesting areas for green-backed heron, clapper rail *(Rallus longirostris)*, American black duck, and are feeding areas for several species of wading birds.

The rocky offshore islands along the mainland shoreline of Bronx, Westchester, and Fairfield Counties support colonial waterbird colonies of regional significance. In recent years, Huckleberry Island has supported as many as 114 pairs of great egret (1989), 145 pairs of snowy egret (1988), 290 pairs of black-crowned night-heron (1989), 2,405 pairs of herring gulls (1988), and 546 pairs of great black-backed gulls (1988). An increase in the population of double-crested cormorant (830 pairs in 1995) has coincided with a decrease in the populations of waders; there were 39 pairs of great egret, 64 pairs of black-crowned night-heron, and no pairs of snowy egret in 1995. The cormorants are displacing the waders, and their guano is killing nest trees. North and South Brother Islands are the site of the largest black-crowned night-heron colony in New York State, with 524 nesting pairs in 1995. These colonies also support significant numbers of snowy egret and great egret, with lesser numbers of cattle egret and glossy ibis. Small numbers of black-crowned night-heron, snowy egret, and yellow-crowned night-heron have recently nested on Goose Island, a small island in the Hutchison River (U.S. Fish and Wildlife Service, 1996).

The Service has designated other Habitat Complexes within the Hudson River watershed that have not been discussed in this report because it would seem highly unlikely that these complexes would be impacted by any dredged material disposal option proposed by the Corps.

D. NEW YORK BIGHT APEX

Marine areas within the New York Bight Apex also provide valuable habitats for numerous commercially valuable finfish and shellfish. In a study conducted by Wilk *et al.* (1992) from July 1986 to September 1989, 75 species of fish and macroinvertebrates were collected from areas in the vicinity of the now closed 12-mile sewage sludge dump site. Samples were

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collected using an otter trawl and were taken year-round during alternating months. The 11 most common fish collected were: spiny dogfish (*Squalus acanthias*); little skate (*Raja erinacea*); silver hake (*Merluccius bilinearis*); red hake (*Urophycis chuss*); ocean pout (*Macrozoarces americanus*); scup; cunner (*Tautogolabrus adspersus*); butterfish (*Peprilus triacanthus*); fourspot flounder (*Paralichthys oblongus*); windowpane; and, winter flounder.

The NJDFG&W conducts stock assessments of nearshore recreational fisheries resources for the purpose of monitoring the abundance or recreational fisheries in New Jersey coastal waters (New Jersey Division of Fish, Game and Wildlife, 1998). Sampling strata 12, 13, and 14 (Figure 7) extend into the New York Bight Apex. Sampling of each stratum has been occurring from five to six times per year since 1988 using a three-in-one trawl. The 10 most common fish captured over the entire sampling period by stratum were: stratum 12 - bay anchovy, butterfish, silver hake, Atlantic herring (*Clupea harengus*), weakfish, striped anchovy (*Anchoa hepsetus*), blueback herring, winter flounder, windowpane, and little skate; stratum 13 - butterfish, bay anchovy, scup, Atlantic herring, silver hake, winter flounder, little skate, windowpane, striped anchovy, and weakfish; and, stratum 14 - butterfish, bay anchovy, scup, Atlantic herring, silver hake, winter flounder, little skate, cunner, blueback herring, and American sand lance (*Ammodytes americanus*).

The Magnuson - Stevens Fishery Conservation and Management Act of 1996 (PL 94-265) requires that the essential habitat of any species managed by the Fishery Management Council be recognized and that attempts should be made to avoid degrading these habitats. According to the National Marine Fisheries Service (NMFS), the designation of Essential Fish Habitat (EFH) for 31 species (see Appendix A) is ongoing. If EFH is designated within the New York Bight, these areas should be considered by the Corps in the citing criteria of dredged material disposal options.

The eight most common mega-invertebrates collected by Wilk *et al.*, were: longfin squid (*Loligo pealei*); northern shortfin squid (*Illex illecebrosus*); horseshoe crab; American lobster; Jonah crab (Cancer borealis); Atlantic rock crab (Cancer irroratus); lady crab (Ovalipes ocellatus); and, starfish (Asterias sp.).

The 10 most common mega-invertebrates collected by the NJDFG&W by stratum (Figure 7) were: stratum 12 - lobed moon shell (*Polinices duplicatus*), longfin squid, lady crab, sea star, common spider crab, moon snail, surf clam, horseshoe crab, American lobster, and blue crab; stratum 13 - longfin squid, rock crab, sea star (*Stelleroidea*), northern moon shell, lady crab, horseshoe crab, American lobster, sand dollar, common spider crab, and lobed moon shell; and, stratum 14 - longfin squid, rock crab, sea star, sand dollar (*Echinarachnius parma*), American lobster, northern moon shell (*Lunatia heros*), lady crab, sea scallop (*Placopecten magellanicus*), horseshoe crab, and shortfin squid.

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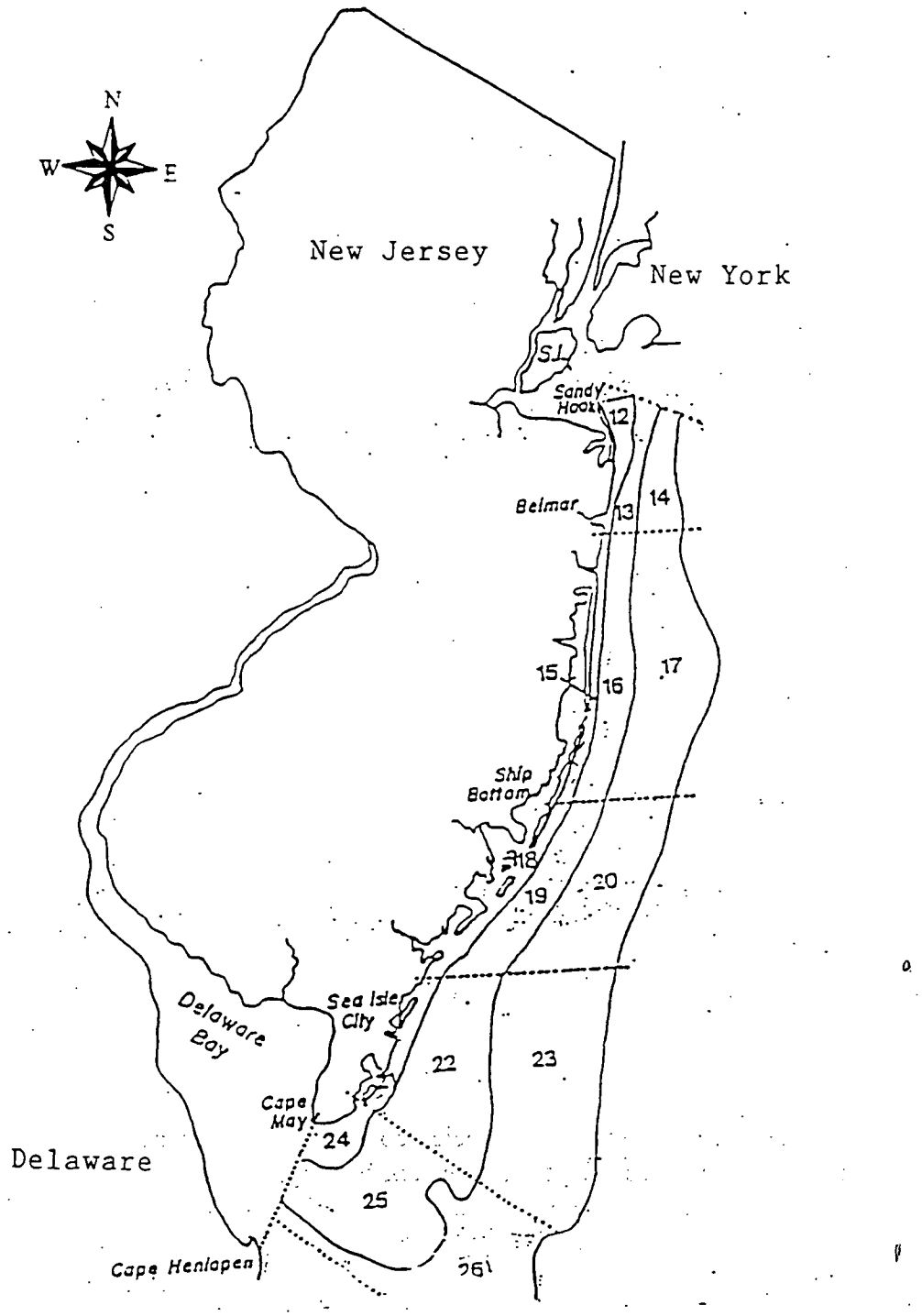


Figure 7. New Jersey nearshore recreational fisheries resources stock assessment sampling locations (New Jersey Division of Fish, Game and Wildlife, 1998).

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E. NEW YORK / NEW JERSEY HARBOR ESTUARY

Although the above-mentioned Habitat Complexes are of great importance to fish and wildlife resources within the Harbor estuary, other significant concentrations of fish and wildlife resources exist outside of these areas. For example, channels within the Harbor estuary provide important habitat for many species of fish. According to Wilk (pers. comm., 1998) the catch per unit effort, based on 8.5-meter otter trawl surveys, is always higher for channels than for shoals. Although there are numerous possible explanations for why fish are more abundant within channels, the underlying cause for this distribution has not be quantified.

The NMFS (1995) captured 47 species of fish in Newark Bay during sampling from May 1993 to April 1994. Three fish sampling techniques were employed: 8.5-meter otter trawl; 4.9-meter otter trawl; and gill nets. The 8.5-meter otter trawls were used in the navigation channels; the 4.9-meter otter trawls and experimental gill nets were used to sample the shallower areas of Newark Bay.

The five most numerically dominant fish species collected in the 8.5-meter otter trawl were: striped bass; Atlantic tomcod; white perch; weakfish, and winter flounder. The greatest numbers of these species were collected by the 8.5-meter otter trawl in the following months: striped bass - November, February, March; Atlantic tomcod - June, July, August; white perch - November, February, March; weakfish - August September, October; and, winter flounder - August, November, December.

The five most numerically dominant fish species collected in the 4.9-meter otter trawl were: bay anchovy; Atlantic herring (*Clupea harengus*); Atlantic tomcod; winter flounder; and, striped bass. The greatest numbers of these dominant species were collected by the 4.9-meter otter trawl in the following months: bay anchovy - July, August, September; Atlantic herring - May, June; Atlantic tomcod - May, June; winter flounder - May, June, July; and, striped bass - September, October.

The five most numerically dominant fish species collected by experimental gill net were: Atlantic menhaden; striped bass; bluefish; blueback herring; and, Atlantic herring. The greatest number of these species were collected by experimental gill net in the following months: Atlantic menhaden - May, October, June; striped bass - May, June, July; bluefish - May, June, September; blue-backed herring - May, June, October; and, Atlantic herring; - November, October.

It should be noted that the greatest overall numbers of fish were taken with the 8.5-otter trawl. Therefore, species listed as dominant in the 4.9-meter otter trawl and the experimental gill net sampling may not accurately reflect the species composition of fish in the shallow water areas of Newark Bay. For example, striped bass was a dominant species for each of the three sample methods; however, the 8.5-meter otter trawl had a month-high capture of 1,844 individuals, whereas the 4.9-meter otter trawl and the experimental gill nets had month-high captures of 37 and 59 individuals, respectively.

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In addition to the information on striped bass, findings from the two above-referenced studies demonstrate that a diverse community of fishes use the waters of Newark Bay. Notable are the large numbers of benthic-feeding fish in the study area, such as: Atlantic tomcod; winter flounder; summer flounder; fourspot flounder; windowpane; hogchoker; red hake; spotted hake (*U. regia*), striped searobin (*Prionotus evolans*); northern searobin (*P. carolinus*); and, northern kingfish (*Menticirrhus saxatilis*). Based on the large numbers of benthic-feeding fishes in Newark Bay, maintenance and enhancement of benthic communities should be considered during project planning, as these communities are a critical component for maintaining a healthy fishery in the study area.

The Service (U.S. Fish and Wildlife Service, 1996) reviewed available literature regarding fisheries of the Arthur Kill and compiled a list of over 60 species known to occur in the Arthur Kill including important forage species such as mummichog, grubby sculpin (*Myoxocephalus aenaeus*), and bay anchovy; as well as commercially important species including bluefish, striped bass, weakfish, and hake. The Service's review also noted an increase in fish species diversity over the past 20 years, coincident with increased dissolved oxygen levels resulting from improved wastewater treatment.

Essential fish habitat could be designated within the Harbor estuary for any of the 31 species (Appendix A) managed by the Fishery Management Council. If EFH is designated within the Harbor estuary, the Corps should consider these designations in the siting criteria for dredged material disposal options.

There are significant, commercially viable shellfish resources within the Harbor estuary, but outside of the above-identified Habitat Complexes. Unfortunately, shellfish stock assessments for the New Jersey portion of the Harbor estuary were last conducted in 1984 (Joseph, pers. comm., 1998) and have never been officially conducted for the New York portion of the Harbor estuary (Fox, pers. comm., 1998). Although official stock assessments have never been done for the New York portion of the Harbor estuary, the landings of hard-shelled clam from the New York portion of Raritan Bay account for 30 percent of New York's total production of hard-shelled clams (Fox, Pers. Comm., 1998). Within New Jersey, valuable habitats identified for hard-shelled clam, soft-shelled clam, surf clam, blue mussel, and common oyster are displayed on figures 8-10. The location of commercially valuable shellfish resources changes over time (Fox, pers. comm., 1998). Therefore up-to-date stock assessments would provide current information critical to the citing of dredged material disposal activities.

Raritan Bay is the only estuary on the east coast of the United States that supports commercial fisheries of both blue crab and American lobster (MacKenzie, 1990). A commercially viable blue crab dredge fishery has operated in Raritan Bay since at least 1889 (MacKenzie, 1990). Blue crabs are dredged in Raritan and Sandy Hook Bays from December through March from the Raritan River to the Mouth of Raritan Bay in water that generally exceeds 12 feet in depth (New Jersey Department of Environmental Protection, 1988). The harvesting of blue crabs with pots generally begins in late April or May and lasts until early November (New Jersey Department of Environmental Protection, 1988). Blue crabs may be harvested during the potting season throughout the estuary.

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Within Raritan Bay, the American lobster season extends from mid June through October (New Jersey Department of Environmental Protection, 1988). In Raritan and Sandy Hook Bays, lobstering is concentrated primarily along the edges of channels (New Jersey Department of Environmental Protection, 1988).

It is the understanding of the Service that the Corps benthic survey of Lower Bay and other selected areas of New York / New Jersey Harbor is still ongoing. Sampling techniques employed included Sediment Profiling Imagery, which uses a camera mounted on a heavy frame. A metal device on the bottom of the frame penetrates the sediments and the camera takes a cross-sectional profile photograph of the sediments. Also, a Shipek grab sampler, which takes grab samples of the bottom for analysis was used. Preliminary results from October 1994 and June 1995 surveys indicate that the three most common benthic invertebrates found within the Harbor estuary area were: *Ampelisca abdita, Streblospio benedicti*, and, *Mediomastus* in both the October 1994 sampling effort and in the June 1995 sampling effort (U.S Army Corps of Engineers, 1998).

Although the benthos of much of the project area is impaired by pollution, mean abundance of benthic invertebrates in Newark Bay is higher than other nearby nearshore areas such as Raritan Bay, Flushing Bay, Bowery Bay and much of New York Harbor (Cerrato, 1986). Cerrato (1986) sampled 30 stations in Newark Bay, including both channel and shoal areas in May (spring) and August (summer) of 1985. During the spring sampling, the spionid polychaete *Streblospio benedicti* was found to be both the most ubiquitous and most abundant species, representing 27 percent of the total fauna in terms of number of individuals collected. Other dominant species included the spionid *Scolecolepides viridis* (21 percent), the soft-shell clam (*Mya arenaria*) (15 percent), the spionid *Polydora ligni* (12 percent), the colonial polychaete *Sabellaria vulgaris* (7 percent), and the polychaete *Nereis succinea* (6 percent). *Scolecolepides viridis* was restricted to more sandy sites and soft-shell clam was more characteristic of sites with higher percentages of silt and clay.

Summer sampling by Cerrato (1986) identified the bay barnacle (*Balanus improvisus*) as the most numerically dominant species (24 percent of individuals collected). Other dominant species included the colonial polychaete *Sabellaria vulgaris* (17 percent), the spionid polychaete *Spio setosa* (15 percent), the soft-shell clam (14 percent), *Streblospio benedicti* (13 percent), and the tunicate *Molgula manhattensis* (5 percent).

Of the 9 dominant species found during Cerrato's spring and summer sampling, five have been identified as characteristic of polluted or organically enriched environments by other researchers (Cerrato, 1986). These species are: *Nereis succinea*; *Polydora ligni*; *Scolecolepides viridis*; *Streblospio benedicti*; and, soft-shell clam.

Both abundance and diversity of animals per square meter were lower in the northern portion of Newark Bay than in the southern portion (Cerrato, 1986). Additionally, Cerrato (1986) found that sandy substrates (greater than 50 percent sand and gravel) had significantly higher abundance, species richness, and diversity than areas dominated by silt and clay (greater than 50 percent silt and clay). Cerrato (1986) did not find a statistically significant association between depth and faunal association.

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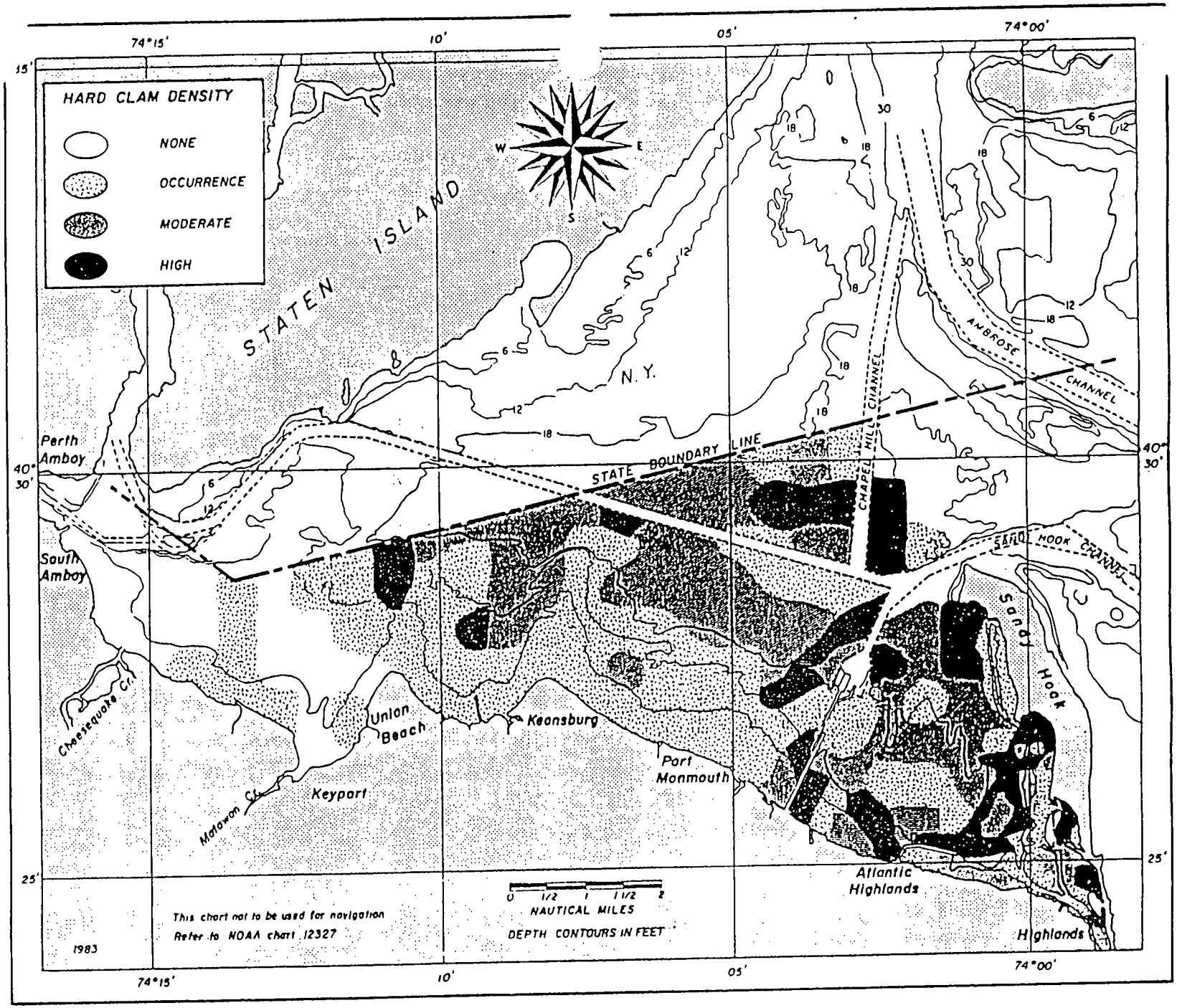


Figure 8. Hard-shelled clam (*Mercenaria mercenaria*) densities in the New Jersey portion of Raritan Bay (New Jersey Division of Fish, Game and Wildlife 1988).

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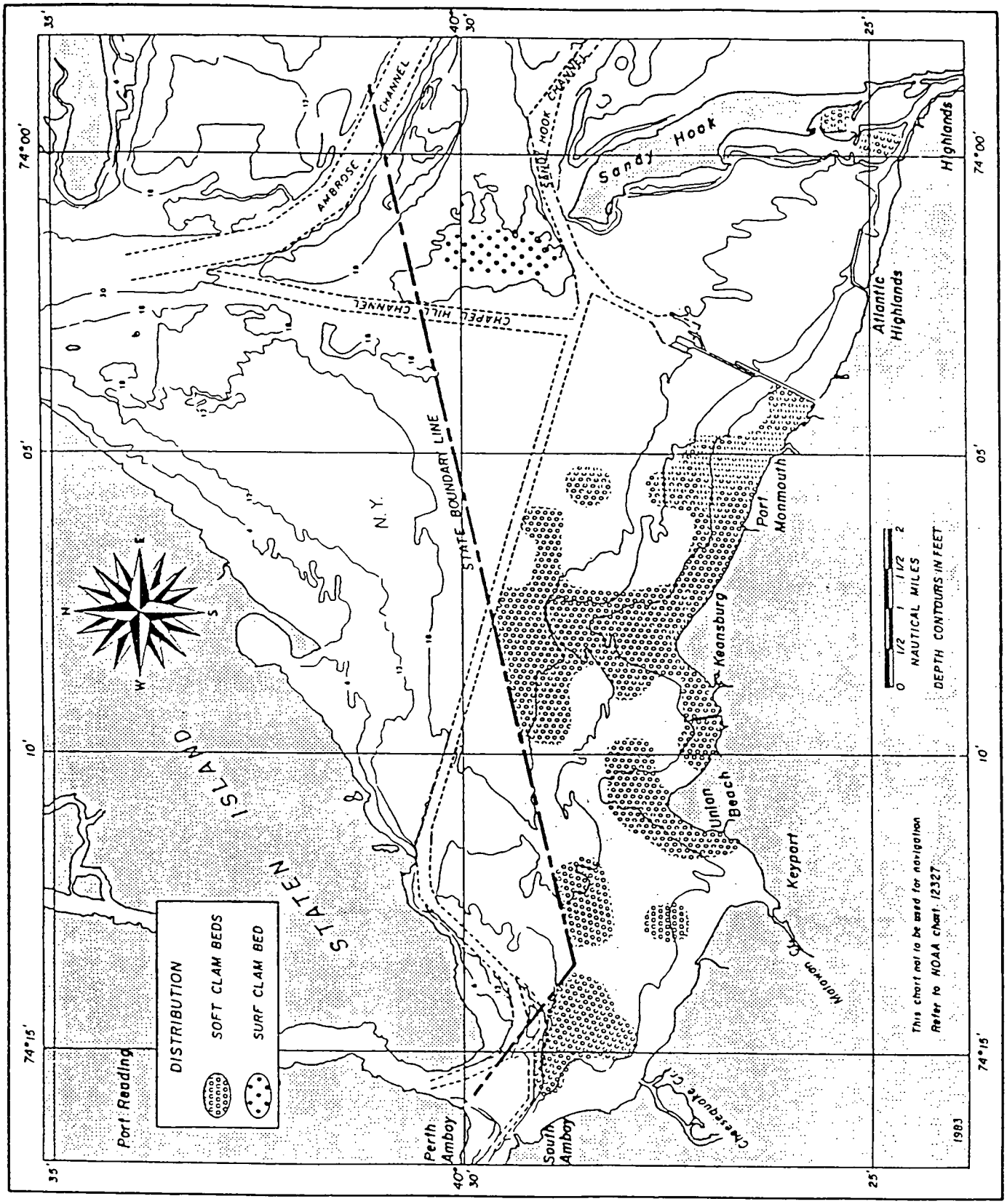


Figure 9. Soft-shelled clam (*Mya arenaria*) and surf clam (*Spisula solidissima*) distributions in the New Jersey portion of Raritan Bay (New Jersey Division of Fish, Game and Wildlife 1988).

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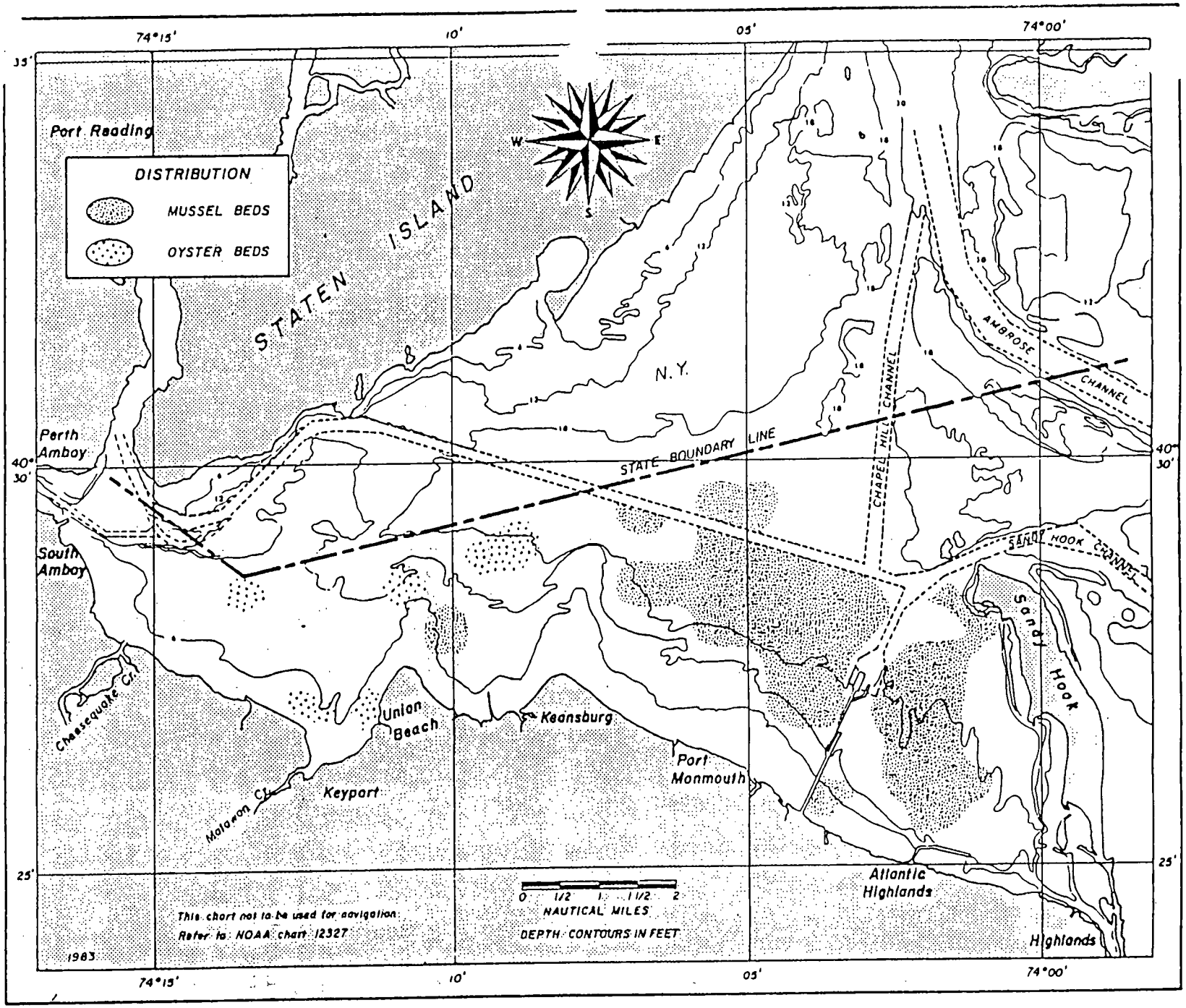


Figure 10. Distribution of blue mussel (*Mytilus edulis*) and common oyster (*Crassostrea virginica*) in the New Jersey portion of Raritan Bay (New Jersey Division of Fish, Game and Wildlife 1988).

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In a biological and hydrographical study of Newark Bay, the NMFS (1995) documented the presence of the following species of macroinvertebrates in Newark Bay: blue crab; rock crab (*Cancer irroratus*); lady crab; spider crab (*Libinia emarginata*); horseshoe crab; common oyster; soft-shell clam; longfin squid and, mantis shrimp (*Squilla empusa*).

F. ENDANGERED AND THREATENED SPECIES

1. Federally Listed Species

Federally listed endangered and threatened species (Appendix B) are known to use habitats within the study area. Endangered whale species that are expected to occur within the study area, particularly the marine environment, include: blue (*Balaenoptera musculus*); finback (*B. physalus*); humpback (*Megaptera novaeangliae*); right (*Balaena glacialis*); sei (*Balaenoptera borealis*); and, sperm (*Physeter macrocephalus*). Juveniles of these species may occasionally enter Raritan Bay.

Blue whales are rarely sighted in the New York Bight. Okeanos Foundation has documented fewer than a dozen sightings in the New York bight in the past 15 years (U.S. Fish and Wildlife Service, 1996). The sightings have occurred at least 25 miles south of Montauk Point in waters deeper than 98.4 feet. Blue whales are considered shallow feeders, feeding on krill (*Euphausids*) distributed in the ocean's surface (328 feet) layers.

The finback whale is the most abundant and widely distributed baleen whale along the Mid- and North Atlantic coasts (U.S. Fish and Wildlife Service, 1996). In the fall through early winter finback whales are more abundant in the New York Bight as they move offshore along the continental shelf near the 200 meter (656.2 foot) contour. Mid-winter through early spring, they are found within a mile of the shoreline along the eastern portions of Long Island and the New York Bight Apex, apparently feeding on high densities of herring and mackerel that occur there at this time of year. Calves are observed throughout the year, with newborn calves appearing in early July in the New York Bight region; there is speculation that calving may occur in the New York Bight.

The humpback whale is regularly found in the New York Bight; however, its abundance fluctuates widely. Humpbacks are often found in shallow water and have been observed within Long Island Sound, Block Island Sound, and Gardiners Bay for periods exceeding a week (U.S. Fish and Wildlife Service, 1996). This is one of the few whale species that has been observed frequently along western Long Island, inclusive of the New York Harbor and the surrounding shore. The greatest abundance of humpback whales in the New York Bight occurs as they feed on small schooling fish concentrations from June through September, and again in December and January. Important prey for the humpbacks in the New York Bight include sandlance, herring, and Atlantic mackerel.

The right whale is the world's most endangered large whale. Worldwide, there are about 600 individuals and current estimates indicate the occurrence of only 300 to 350 individuals in the North Atlantic Ocean (U.S. Fish and Wildlife Service, 1996). Right whales are sighted

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regularly every year in the New York Bight. Most sightings are in the months of March through June as the animals move through the region on their migration route north. Occasionally several have been observed feeding in association with large blooms of calanaid copepods. Based on data obtained from the Okeanos Foundation, the New York Bight waters appear to function mainly as a migration pathway for the right whale (U.S. Fish and Wildlife Service, 1996).

Sei whales are infrequently sighted in the New York Bight; however, they have been found occasionally in association with finback whale aggregations (U.S. Fish and Wildlife Service, 1996). Sightings in the New York Bight are principally in the months of July and August. Sei whales use the New York Bight primarily for foraging on copepods, euphausids, and a variety of small schooling fishes.

Sperm whales are almost always found in waters deeper than 200 meters (656.2 feet) (U.S. Fish and Wildlife Service, 1996). The deep waters of the New York Bight seem to be important to the various life stages of the sperm whale; a great many sightings of the sperm whale have been reported and the area has an abundance of squid, a favorite forage species.

Marine turtles are expected to occur within the marine and estuarine habitats within the study area. Endangered marine turtles expected to occur within the study area include: Atlantic Ridley (*Lepidochelys kempii*); hawksbill (*Eretmochelys imbricata*); and, leatherback (*Dermochelys coriacea*). Threatened marine turtles expected to occur within the study area include green (*Chelonia mydas*) and loggerhead (*Caretta caretta*).

The Atlantic Ridley is a relatively abundant endangered sea turtle in the New York Bight. Individuals, usually two- to five-year-old juveniles, are commonly found in the eastern part of the New York Bight from June to October (U.S. Fish and Wildlife Service, 1996). Key foraging areas for the Atlantic Ridley include Long Island Sound, Block Island Sound, Gardiners Bay, and especially the Peconic Estuary. Atlantic Ridleys are found to a lesser extent in Jamaica Bay, Lower New York Bay, and Great South Bay. In the New York Bight, Atlantic Ridleys feed primarily on green crab (*Carcinus maenas*) and spider crabs (*Libinia spp.*).

Hawksbill turtles are apparently rare to the New York Bight. They are not reported frequently in shallow, coastal systems exhibiting high turbidity and soft bottoms such as are common in the study area.

The leatherback is a common species in the New York Bight from May through November (U.S. Fish and Wildlife Service, 1996). Adult and large juveniles are both found feeding in the nearcoastal areas but rarely in bays or lagoons. Leatherback turtles are water-column feeders, feeding predominantly on a variety of soft-bodied invertebrates.

In the New York Bight, green turtle distribution is related to submerged aquatic vegetation such as *Ulva* and *Codium spp.* Green turtles are found in the New York Bight from June through October. Adult green turtles are benthic feeders, feeding on seagrasses and algae. Most of the green turtle's feeding habitat occurs in relatively shallow, protected waters.

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Loggerhead turtles are known to arrive in the New York Bight as early as late May. Juveniles are found in bays and Long Island Sound (U.S. Fish and Wildlife Service, 1996). Also, individuals are found along the south shore of Long Island up to 40 miles or farther off shore. Loggerheads are omnivorous and eat a variety of benthic and pelagic food items, including bivalve mollusks, sponges, gastropods, squids, crabs, shrimp, and a variety of sea grass species.

The federally listed (endangered) shortnose sturgeon is known to occur in the study area within the tidal portions of the Hudson River and may enter the estuarine environment. Within the study area, shortnose sturgeon regularly occur in the Hudson River from Manhattan upriver to the federal dam at Troy, New York. Shortnose sturgeon begin their spawning migration in early spring and spawn in April and May in a freshwater region of the Hudson River below Troy, New York. Newly-hatched sturgeon fry are bottom-oriented fish that are believed to be swept downriver to the rich estuarine areas.

Principal responsibility for threatened and endangered marine species, including whales, marine turtles, and the shortnose sturgeon is vested with the NMFS. Therefore, the NMFS must be contacted to fulfill consultation requirements pursuant to Section 7(a)(2) of the Endangered Species Act:

National Marine Fisheries Service
Habitat and Protected Resources Division
Sandy Hook Laboratory
Highlands, New Jersey 07732
(732) 872-3000

The federally listed (threatened) piping plover is known to nest within the study area. The piping plover, a small sandy colored shorebird, nests on coastal beaches and dunes, and feeds on marine macroinvertebrates in the intertidal beach zone as well as estuarine mudflats. The piping plover is threatened primarily due to loss of habitat to recreational development and increased disturbance of nesting areas.

Piping plovers nest on sandy beaches above the high tide line on mainland coastal beaches, sand flats, and barrier island coastal beaches. Nesting sites are typically located on gently sloping foredunes, blowout areas behind primary dunes, washover areas cut into or between dunes, ends of sandspits, and on sites with deposits of suitable dredged or pumped sand.

Food for adults and chicks consists of invertebrates such as marine worms, fly larvae, beetles, crustaceans, and mollusks. Feeding areas include intertidal portions of ocean beaches, ocean washover areas, mudflats, sandflats, wrack lines (organic ocean material left by high tide), shorelines of coastal ponds, lagoons, and salt marshes. Within the New York Bight Apex, areas with particularly high numbers of nesting plovers include Sandy Hook, Breezy Point, and Jones Beach West.

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The federally listed (endangered) roseate tern (*Sterna dougallii*) is known to occur within the study area. The roseate tern is exclusively coastal, breeding on small islands or occasionally on barrier beaches. Within the New York Bight, roseate terns arrive between late April and early May. They often nest is association with common tern colonies. In 1997 there were four confirmed nesting pairs of roseate tern at Breezy Point (Stoll, pers. comm., 1998).

The peregrine falcon (*Falco peregrinus*), a federally listed endangered species, has expanded its range and is now found nesting and feeding in urban areas. Peregrines feed on songbirds, gulls, terns, shorebirds, and wading birds. Peregrine falcons are known to nest on bridge structures in the New York / New Jersey metropolitan area and tend to prefer marshes and riparian habitats for feeding as these areas attract shorebird and passerine prey.

There are approximately 12 pairs of peregrine falcons nesting on bridges and buildings in the metropolitan New York City area. The New York Bight also provides important wintering and migratory habitat for peregrine falcons that nest in Canada.

There are no known nesting sites of the federally listed (threatened) bald eagle within the study area. However, occasional transient bald eagles are expected to occur within the study area.

Although extirpated from the area until recently, the federally listed (threatened) northeastern beach tiger beetle is now known to occur on Sandy Hook within the Gateway National Recreation area as a result of experimental re-establishments. The Service has worked cooperatively with the National Park Service on the reestablishment project.

The federally listed (threatened) plant Seabeach amaranth (*Amaranthus pumilus*) is known to occur within Kings, Queens, Nassau, and Suffolk Counties, New York. Seabeach amaranth is an annual plant that is endemic to Atlantic coast barrier islands. The plant persists in newly disturbed areas such as overwash flats and accreting ends of islands or spits and is out-competed by other vegetation in stable environments.

The federally listed (endangered) plant Sandplain gerardia (*Agalinis acuta*) is known to occur within Nassau County, New York. Sandplain gerardia appears to require periodic disturbance (e.g., fire, grazing) to maintain its dry, sandy, open habitat.

The Service recommends that the Corps continue to consult with the Service and NMFS throughout the planning and implementation of the DMMP to avoid impacts to federally listed species.

2. State-Listed Species

The Jamaica Bay and Breezy Point Habitat Complex supports a number of State-listed species (Appendix B). State-listed endangered species in New York include least tern and willow oak (*Quercus phellos*). State-listed threatened species in New York include northern harrier, osprey (*Pandion haliaetus*), and common tern. State-listed animals of special concern in New York include spotted salamander (*Ambystoma maculatum*), least bittern, Cooper's hawk (*Accipiter cooperii*), upland sandpiper (*Bartramia longicauda*), short-eared owl, common

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barn-owl (*Tyto alba*), and grasshopper sparrow (*Ammodramus savannarum*). Finally, state-listed rare plants in New York include Houghton's umbrella-sedge (*Cyperus houghtonii*), blunt spikerush (*Eleocharis obtusa* var. *ovata*), field-dodder (*Cuscuta pentagona*), smartweed-dodder (*Cuscuta polygonorum*), and Schweinitz's flatsedge (*Cyperus schweinitzii*).

The Raritan Bay - Sandy Hook Bay Habitat Complex supports many state-listed species. State-listed endangered species in New Jersey include Cooper's hawk, red-shouldered hawk (*Buteo lineatus*), northern harrier, black skimmer, least tern, meadow horsetail (*Equisetum pratense*), coast flatsedge (*Cyperus polystachyos* var. *taxensis*), and seabeach knotweed (*Polygonum glaucum*). State-listed threatened species in New Jersey include great blue heron (*Ardea herodias*), yellow-crowned night-heron, and osprey. State-listed endangered species in New York include bleeding heart (*Dicentra eximia*) and white boneset (*Eupatorium leucolepis*). Whorled mountain mint (*Pycnanthemum verticillatum* var. *verticillatum*) is State-listed as threatened in New York. Common loon (*Gavia immer*) is a State-listed animal of special concern in New York. Finally, State-listed rare plants in New York include hyssop loosestrife (*Lythrum hyssopifolia*), soapwort gentian (*Gentiana saponaria*), and blackjack oak (*Quercus marilandica*).

The Hackensack Meadowlands Habitat Complex are known to support State-listed species. State-listed endangered species in New Jersey include pied-billed grebe, Cooper's hawk, northern harrier, least tern *(Sterna antillarum)*, black skimmer, and short-eared owl. State-listed threatened species in New Jersey include great blue heron, yellow-crowned night-heron, long-eared owl, and savannah sparrow *(Passerculus sandwichensis)*.

The Arthur Kill Habitat Complex is known to provide habitats for numerous State-listed species. State-listed endangered species in New Jersey include Cooper's hawk, red-shouldered hawk, northern harrier, least tern, and short-eared owl. State listed threatened species in New Jersey include American bittern, osprey, barred owl *(Strix varia)*, red-headed woodpecker *(Melanerpès erythrocephalus)*, and bobolink *(Dolichonyx oryzivorus)*. State-listed endangered species in New York include least tern, rose pink *(Sabatia angularis)*, Virginia pine *(Pinus virginiana)*, and Nantucket Juneberry *(Amelanchier nantucketensis)*. State-listed threatened species in New York include eastern mud turtle *(Kinosternon subrubrum)*, northern harrier, American bittern, osprey, and wingstem *(Verbesina alternifolia)*. State-listed animals of special concern in New York include short-eared owl, southern leopard frog *(Rana sphenocephala)*, common barn owl (*Tyto alba*), and common nighthawk *(Chordeiles minor)*. State-listed rare plants in New York include gray-green sedge (*Carex flaccosperma var. glaucodea*), persimmon *(Diospyros virginiana)*, Stueve's or tall bush-clover *(Lespedeza stuevei)*, and blackjack oak.

The Lower Hudson River Habitat Complex is known to support State-listed species. State-listed endangered species in New Jersey include mud sunfish *(Acantharchus pomotis)* and cylindrical-headed bulrush *(Scirpus novae-angliae)*. The osprey is State-listed threatened in both New Jersey and New York. The banded sunfish *(Enneacanthus obesus)* is a State-listed animal of special concern in New York.

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The Narrows Habitat Complex is known to support State-listed species. State-listed endangered species in New York include least tern and globose flatsedge (*Cyperus echinatus*). Purple milkweed (*Asclepias purpurascens*) is State-listed as threatened in New York. State-listed animals of special concern in New York include common loon and common barn owl. Finally, State-listed rare plants in New York include Bush's sedge (*Carex bushii*) and persimmon.

The Service recommends that the Corps consult with appropriate state agencies in both New York and New Jersey regarding potential impacts of the proposed project on state-listed species.

VI. IDENTIFICATION OF PROJECT-RELATED EFFECTS TO FISH AND WILDLIFE AND POTENTIAL MITIGATIVE MEASURES

Given the above-discussed value of the Harbor estuary and adjacent marine habitats to fish and wildlife and the broad scale of the DMMP, the potential to adversely affect fish and wildlife resources is great. However, because dredged material management options and disposal sites have not been specifically identified at this point in the planning process, it is not possible to provide a definitive assessment of the magnitude of project-related environmental effects. Therefore, the following discussion addresses the general impacts associated with each of the potential management options and potential techniques of mitigating these impacts.

A. HISTORIC AREA REMEDIATION SITE

Although continued disposal of Category I material at the HARS will continue to cause localized degradation of water quality during operations, disposal is designed to cover contaminated sediments on the ocean floor that pose a risk to marine species. Therefore the Service expects continued disposal of Category I material at the HARS to have no overall, long-term adverse effects to fish and wildlife resources.

B. POLLUTION PREVENTION / CONTAMINANT REDUCTION AND SEDIMENT REDUCTION

The Service views programs targeted toward pollution prevention and contaminant reduction as essential to the viability of the DMMP. Absent such programs, the problems associated with the disposal of contaminated sediments will persist indefinitely, and disposal options will continue to become more limited over time.

Pollution prevention would be beneficial to fish and wildlife resources of the New York Harbor and New York Bight. Presumably the level of contaminants entering the Harbor estuary would be reduced, improving water quality, while reducing the amount of contaminated dredged material that would be generated by future dredging operations.

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In regard to sediment reduction, the Service notes that discussions in the Interim report and the Status report (U.S. Army Corps of Engineer, 1997) deal mostly with structural means of controlling the amount of sediment that accumulates in navigation channels. The draft DMMP must devote more attention to measures to reduce the amount of sediment that enters the Harbor estuary. It is our view that effective implementation and enforcement of existing State and federal laws regulating both point and non-point discharges into our nation's waters could substantially reduce the amount of sediment entering the Harbor; thereby reducing the long-term need for maintenance dredging. Additionally, the Service recommends identifying areas that contribute most to the sediment loading of the estuary and investigate the feasibility of stream and wetland restoration to reduce sedimentation. Further, the Service recommends that the Corps investigate potential federal or State-sponsored ownership, enhancement, and long-term management of key wetland areas (e.g., Hackensack Meadowlands).

Structural means of reducing sediment accumulation in channels could have both beneficial and adverse impacts to fish and wildlife resources. Structures could be beneficial by providing habitats for fish and sessile organisms. However, structures in areas having significant benthic resources, or structures causing the deposition of sediments in areas with high-quality benthic resources would adversely impact fish and wildlife. Additionally, should the placement of structures alter circulation patterns and cause increased rates of beach erosion, the federally listed piping plover, roseate tern, northeastern beach tiger beetle, and seabeach amaranth would be adversely affected. The Service recommends surveys of any potential benthic habitats considered for structural alternatives and recommends avoidance of channel realignments and other alternatives in areas supporting high-quality benthic communities or areas receiving high use by finfish. Studies to determine finfish use of channel areas and habitat preferences would assist in avoiding potential impacts. The Service also recommends that the Corps determine the impact that placement of structures would have on high-energy beaches.

C. DECONTAMINATION AND TREATMENT

Notwithstanding the following concerns, the Service views sediment decontamination and treatment as an important component of the DMMP. Given the need to locate decontamination facilities in the vicinity of dredging activities, the construction of such facilities could have substantial adverse impacts to the fish and wildlife resources of the Harbor estuary. The Service recommends that the Corps carefully consider the environmental impacts associated with siting decontamination facilities. Decontamination facilities should not be located within wetlands, or upland cover types that are rare within the New York / New Jersey metropolitan area.

Additionally, most of the treatment technologies mentioned in the DMMP, including those under private development, do not actually remove or neutralize contaminants; rather these technologies stabilize / solidify contaminants by fixing sediments in portland cement or similar binding agents. The treated sediments are then available for such uses as landfill cover, construction fill, mine reclamation, and capping brownfields or superfund sites. The Service is not aware of studies that have documented the long-term fate of sediments treated in this fashion, and there is some concern that contaminants bound in this manner may

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continue to be available for uptake by fish and wildlife; particularly, if the end use of the stabilized material is ground cover in or near aquatic sites. Due to this uncertainly the Service would recommend monitoring of the sites.

The Service encourages the further development of treatment technologies. One of the major benefits of sediment decontamination and treatment is that these processes offer opportunities to permanently remove contaminants from the aquatic environment. The Service recommends that the Corps continue to coordinate with federal and State resource agencies and the private sector regarding uses for decontaminated dredged material.

D. BENEFICIAL USES

The Service supports the concept of using dredged material in ways that benefit fish and wildlife resources. However, the benefits associated with using dredged material must be weighed against the any potential adverse effects on a case-specific basis.

The Service is concerned about the potential adverse impacts to fish and wildlife resources associated with the use of contaminated dredged material. Contaminants that bioaccumulate have the potential to increase in concentration through tropic transfer to harmful levels in resident biota. Therefore, the Service recommends use of clean material (i.e., Category I) for any beneficial use projects. Additionally, any beneficial uses involving habitat creation or restoration must be carefully planned and coordinated with federal and State resource agencies to consider impacts to existing resources from conversion of cover types. The development of monitoring plans and close coordination with the resource agencies are also recommended.

Although not mentioned by the Corps as a possible beneficial use, the use of dredged material for beach nourishment could impact federally listed species that rely on high-energy beaches to fulfill all or part of their life requirements. Federally listed species that could be adversely affected by beach nourishment activities include: piping plover; roseate tern; northeastern beach tiger beetle; and, seabeach amaranth.

1. Habitat Creation and Restoration

a. Wetland creation

While the Service generally supports the concept of wetland creation, it must not come at the expense of other significant aquatic resources. Therefore, the Service would only support wetland creation in areas that are currently degraded, where the net benefits of wetland creation greatly exceed any adverse impacts. Of particular concern regarding the creation of wetlands would be benthic communities.

b. Shellfish bed creation and enhancement

While the Service would not be opposed to the creation of shellfish beds, it is our understanding that shellfish bed creation from dredged material has not been clearly demonstrated to be a viable habitat creation / restoration option. Potential impacts to fish and wildlife resources to consider from this use of dredged material would be

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impacts to existing valuable benthic resources and temporary water quality impacts. Therefore, it is recommended that potential restoration sites include those sites where losses to existing benthic communities would be minimal and where conditions (e.g., suitable water quality) can be met to ensure success.

c. Fish reef creation and enhancement

The Service views the creation / enhancement of fish habitat via reef construction as a viable habitat creation option for dredged material. The Corps must ensure that any fish habitat creation projects are not sited in areas that already provide significant habitat for finfish or shellfish resources. Adverse impacts to fish and wildlife resources could result from temporary water quality impairment resulting from placement of dredged material.

d. Bird habitat creation and enhancement

The Service views the creation of grassland bird habitats within the study area as a worthy goal. However, any attempt to create grassland habitats should not come at the expense of other valuable wildlife habitats. The Service notes that dredged material used for this type of habitat enhancement may, depending on its composition, require conditioning such as the addition of organic matter to provide a suitable substrate for development of grasslands. Any attempt to create grassland habitats must be accompanied by a long-term management and monitoring program.

e. Filling of dead-end basins

The Service views this alternative as a potentially suitable option for dredged material disposal. Adverse impacts associated with this disposal option could result from filling basins that provide valuable habitats for fish and wildlife resources. The Service recommends sampling the water quality and biota of any basins considered for this option. Additionally, the Service notes that such basins could improve in habitat quality should the Pollution Prevention / Contaminant Reduction component of the DMMP prove successful and water quality were to improve within the Harbor estuary.

f. Wetland creation within inter-pier or similarly poorly flushed areas

The Service views this proposed disposal option as potentially viable provided any existing high quality habitats for finfish and shellfish are non adversely impacted. As noted above, any areas considered for this option should be sampled to determine existing water quality and to identify exiting biota. The Service notes that inter-pier areas may improve in water quality if the Corps is successful in implementing Pollution Prevention / Contaminant Reduction strategies. Improved water quality would, most likely, result in improved habitat for fish and wildlife resources. Therefore, the filling of areas that currently have little use by fish and wildlife resources could preclude these areas from supporting a more diverse and abundant community of species.

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g. Filling of bathymetrically disturbed areas

The Service views this disposal option as potentially viable, provided high-quality resources such as finfish and shellfish habitats are not adversely affected. Impacts to finfish and shellfish resources could result from temporary water quality degradation associated with the release of suspended solids. Additionally, long-term impacts could occur as a result of uptake of environmental contaminants released from contaminated dredged materials during disposal. For this reason, the Service recommends use of clean material.

2. Land Site Remediation

a. Landfills and brownfields

The Service generally supports the concept of using dredged material to close inactive landfills and remediate vacant brownfields, especially where these sites pose a continuing threat to fish and wildlife resources. However, these areas may provide valuable wildlife habitats within the heavily urbanized study area. Therefore, the use of such areas as a disposal site for dredged material may have adverse impact to fish and wildlife resources. The Corps must identify project-related impacts and means of avoiding, minimizing, and compensating for adverse impacts to fish and wildlife resources, both aquatic and terrestrial, associated with the disposal of dredged materials as part of landfill closure procedures.

The Corps has identified two brownfield locations where the disposal of dredged material is proposed: Koppers Coke in Kearny, New Jersey, and OENJ Bayonne Landfill / Golf Course in Bayonne, New Jersey. As mentioned above, the Corps must identify project-related impacts to fish and wildlife resources both (aquatic and terrestrial) associated with the disposal of dredged materials at these two sites. Additionally, the Service previously determined (letter of February 3, 1998, Appendix C) that the disposal of dredged material containing elevated levels of environmental contaminants at these two sites could adversely affect the peregrine falcon via dietary exposure to bioaccumulating environmental contaminants such as dioxins, PCBs, and organochloride pesticides. At the request of the Service, the Corps has prepared biological assessments for both of these potential disposal sites regarding the peregrine falcon.

The Service has recommended (letters dated June 2, and July 22, 1998, Appendix C) that project modifications that would avoid the likelihood of adverse impacts to the peregrine falcon at these sites be incorporated into any Section 404 Clean Water Act (33 U.S.C. 1344 *et seq.*) permits issued authorizing impacts to waters of the United States at these sites.

Upland disposal of contaminated dredged material at other locations within foraging areas of the peregrine falcon could result in adverse affects to the peregrine falcon. We recommend consultation with the Service to avoid adverse impacts to peregrine falcons with this disposal option.

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b. Coal mine reclamation

The Service views this disposal option as potentially beneficial considering the extent of the impacts to surface waters in Pennsylvania associated with abandoned coal mines. Therefore, the Service would not be opposed to this disposal option, but would request the opportunity to review and comment on individual restoration opportunities.

E. CONFINED DISPOSAL FACILITIES

1. Upland

Currently, only one upland site, (UD-7) located in Belford, Monmouth County, New Jersey, is being evaluated for disposal of dredged material. This proposed upland disposal site is adjacent to Ware Creek, and is within the Raritan Bay / Sandy Hook Bay Habitat Complex. Ware Creek and its associated wetlands provide valuable habitats for fish and wildlife resources (Kane *et al.*, 1991).

A review of recent (1995) aerial photographs revealed the site is vegetated, most likely provides valuable habitat for migratory birds, and provides a buffer that enhances the quality of the Ware Creek wetlands for fish and wildlife resources. Therefore, use of this site as a dredged material disposal option has the potential to adversely affect valuable migratory bird habitat. We recommend investigation of other upland sites and identification of existing avian resources (e.g., bird surveys; Habitat Evaluation Procedures (HEP)) if UD-7 is to be considered further.

2. Aquatic

a. Contained aquatic disposal pits

The use of CAD pits to dispose of contaminated dredged material would appear to have adverse short-term and potential long-term impacts to fish and wildlife resources. Short-term impacts would include the elimination of benthic communities at the site of CAD pit construction and degradation of water quality via suspension of solids. Long-term adverse impacts could result from the release and bioaccumulation of environmental contaminants via the resuspension of contaminated sediments. The resuspension of contaminated sediments could result from two activities: construction of CAD pits in areas with contaminated sediments and the disposal of contaminated dredged material. Additionally, the area where pits would be constructed would be disturbed for an indeterminate amount of time.

Resources that could be adversely affected by the CAD pit disposal option include finfish and shellfish, as well as higher trophic-level organisms, should environmental contaminants be released. The federally listed peregrine falcon and roseate tern could be adversely affected by bioaccumulation of environmental contaminants. It is expected that benthic communities would recolonize CAD pits after the sites have been properly capped with clean dredged material. Additionally, should CAD pits be constructed in areas with contaminated surface sediments, CAD pits could result in the

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gradual remediation of such areas, which could provide long-term benefits to fish and wildlife resources. The Corps should predict the composition and aerial extent of sediment plumes that would be released from this dredged material disposal alternative.

b. Nearshore containment areas

Currently, only one site in the Atlantic Basin is still being considered for this disposal option. While there may be beneficial effects to fish and wildlife (e.g., reducing the discharge of contaminants from a landfill) associated with this proposed disposal option, the potential adverse impacts seem great. It appears likely that this disposal option would have adverse impacts to wetlands, and shallow water communities. Therefore, the Service would support this disposal option only if it were sited within highly degraded habitats.

c. Island confined disposal facilities

Of the dredged material disposal options discussed in the DMMP, island CDFs have the greatest potential to cause serious adverse environmental impacts, as such facilities would result in the loss of several hundred acres of aquatic and benthic habitat. Adverse effects associated with the creation of island CDFs include the direct loss of benthic and water column habitat with resulting impacts to finfish and shellfish, algal and phytoplankton primary production, and icthyoplankton. Additionally, the loss of primary production would result in reduced productivity at higher trophic levels, which must be accounted for in determining the overall effects of an island CDF. While the loss of productivity associated with benthic habitat may be somewhat offset by the habitat provided by the sides of the structure, the loss of productivity from algae and phytoplankton in the water column would be unmitigated. Secondary uses of an island CDF could result in additional adverse impacts, which must be addressed in the assessment of environmental impacts prepared for the DMMP.

An additional immediate, and perhaps long-term impact associated with the construction and operation of a CDF island is degraded water quality. Significant amounts of sediments would be released into the water column as a result of island construction and filling. These sediments would degrade water quality and adversely affect finfish and shellfish. The Corps should predict the composition and aerial extent of sediment plumes in estuarine and marine habitats that would be released from this disposal option.

Long-term impacts to fish and wildlife resources could result from the release of environmental contaminants during island construction, disposal of dredged material, and leakage from the island over time. The federally listed peregrine falcon and roseate tern could be adversely affected by bioaccumulation of environmental contaminants. Additionally, significant adverse impacts to fish and wildlife resources could result if an island were to experience structural failure. Impacts associated with structural failure could include loss of benthic habitats and the release of environmental contaminants.

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Islands may also influence water circulation patterns within the study area, which could result in impacts to fish and wildlife resources. Impacts may result from factors such as altered water temperatures, distribution of sediments, changes in salinity, waveaction, and reduced oxygen content. Should altered circulation patterns affect high-energy beaches, the federally listed piping plover, roseate tern, northeastern beach tiger beetle, and seabeach amaranth could be adversely affected.

At this time, the Service cannot support the construction of an island CDF within the above-mentioned regionally significant fish and wildlife Habitat Complexes. Additionally, it is certain that the construction of an island CDF, anywhere in the Harbor estuary, would have substantial adverse environmental effects that would require considerable compensation. For these reasons, the Service recommends that the Corps consider the construction of island CDFs to be the option of last resort; an island CDF should be considered only after all other management options have been exhausted.

The Service provided comments on the criteria the Corps has developed regarding the siting of island CDFs and CAD pits in a letter dated March 23, 1998. In addition to the comments provided in that correspondence, and as indicated above, the Service's designated Habitat Complexes (Figure 6) should be considered as exclusionary criteria in terms of siting island CDFs.

VII. IDENTIFICATION OF DATA GAPS AND RECOMMENDATIONS FOR FUTURE STUDIES

The scope of the DMMP is large. When considered in the context of other projects currently under consideration, the amount of maintenance and new dredging contemplated to occur within the Harbor estuary over the next several years is truly massive. Undertakings of this magnitude demand thorough investigation and careful review. The DMMP project offers a unique opportunity to initiate the investigations that will be necessary to adequately evaluate the effects of dredged material disposal options within the Harbor estuary and the New York Bight and to sustain and safeguard fish and wildlife resources. Therefore, in order to minimize the adverse effects of this project on fish and wildlife resources, and to take advantage of the opportunities this project provides, the Service has identified the following data gaps.

1. Study the long-term fate of contaminants in treated dredged material should such sediments be considered for uses that could expose fish and wildlife to environmental contaminants. The Service is not aware of studies that have documented the long-term fate of contaminants in stabilized / solidified sediments. Contaminants bound in this manner may continue to be available for uptake by fish and wildlife; particularly, if the end use of the stabilized material is ground cover in or near aquatic sites.

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2. Sponsor a shellfish stock assessment survey. Considering that shellfish are a valuable commercial resource within the Harbor estuary, an up-to-date data stock assessment is necessary to properly cite CAD pits, CDF islands, and other disposal options. Additionally, the Corps should complete ongoing benthic studies of the Harbor estuary.

3. Study the feasibility of shellfish bed creation. Any attempt to create shellfish beds should include implementation of a Service-reviewed monitoring plan and be carried out at a site that lacks a substantive benthic community.

4. Identify areas of the Harbor estuary watershed that contribute greatly to the sediment loading. This information would be valuable in assessing methods of reducing the amount of sediment that enters the Harbor estuary. Additionally, this information would be valuable in identifying impacts of existing development or identifying areas that would contribute greatly to the sediment load of the Harbor estuary if developed in the future.

5. Determine the underlying causes for fish concentrating in channel areas. This information may be valuable for designing habitat enhancement projects as well as determining impacts associated with in-channel activities.

6. Determine the value of upland disposal site UD-7 to migratory birds. This may be accomplished by conducting bird surveys during various times of the year as well as by conducting a baseline Habitat Evaluation Procedures study of the site.

7. Determine the loss of primary productivity that would result from constructingisland CDFs in both the Harbor estuary and marine portions of the study area.

VIII. CONCLUSIONS AND RECOMMENDATIONS

The Service concludes that the Harbor estuary and the adjacent New York Bight Apex support valuable fish and wildlife resources, which have been cumulatively reduced in scope over time by development. The disposal of dredged material has the potential to significantly impact these resources by further limiting the remaining valuable habitats. However, at this conceptual stage in the Corps planning process, it is not possible for the Service to provide a detailed assessment regarding impacts to fish and wildlife resources due to the numerous disposal options that remain viable over an array of potential sites. Therefore, general recommendations regarding dredged material disposal options are presented below.

1. Consider opportunities for maintenance and enhancement of benthic communities.

2. Consider EFH designation in the siting criteria for disposal options.

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3. Conduct informal Section 7 Consultation with both the Service and the NMFS. Consultation should occur prior to finalization or authorization of funds for project implementation. Request annual updates from the Service and NMFS regarding the presence of federally listed species and candidate species within the study area.

4. Coordinate with appropriate State agencies regarding potential impacts of the proposed project on State-listed species.

5. Coordinate with the U.S. Environmental Protection Agency and State regulatory agencies to ensure coordinated and effective implementation of existing federal and State laws aimed at controlling point and non-point sources of pollution to the aquatic environment. For pollution-control programs to be effective, they must include the regulation of discharges into the Harbor estuary as well as into the Harbor estuary watershed.

6. Determine areas of the Harbor estuary watershed that release high amounts of sediments to the estuary and evaluate the feasibility of reducing the amount of sediment that enters the estuary through activities such as stream restoration within the watershed.

7. Evaluate the feasibility of preventing sediment from entering the Harbor estuary through the protection of natural areas that have a high likelihood of being developed.

8. Survey benthic sites and consider realignment of channel segments and other structural alternatives to channels and adjacent areas only if significant impacts to shellfish and other significant fish and wildlife resources can be avoided. Determine the causes for fish concentrating in channels and use this information to predict potential impacts of re-alignments.

9. Determine the impact structural alterations to channels would have on high-energy beaches within the study area.

10. Ensure that decontamination facilities are constructed only in degraded areas, such as brownfields, that have low potential for restoration to productive fish and wildlife habitats.

11. Study the long-term fate of contaminants in stabilized dredged material via monitoring, should such material be considered for uses that could result in exposure of fish and wildlife resources to environmental contaminants and coordinate review of any contaminants study results with the Service, NMFS, and appropriate State agencies.

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12. Continue to coordinate with federal and State resource agencies and the private sector to identify appropriate end uses for stabilized and decontaminated dredged material that minimize the potential for contact between these materials and the aquatic environment.

13. Use clean (i.e., Category I) material for beneficial use projects.

14. Continue to coordinate with the Service, NMFS, and affected State agencies to identify sites and develop plans for the beneficial use of dredged material; coordinate the design of specific beneficial use projects with these agencies as appropriate; and, develop monitoring plans for all beneficial use projects. Provide these plans to the Service, NMFS, NJDFG&W, and NYDEC as appropriate.

15. Construct wetlands only in areas with degraded benthic communities.

16. Attempt shellfish bed creation only in areas where losses to existing benthic communities would be minimal and which provide a reasonable opportunity for successful establishment (e.g., areas with suitable water quality). Monitoring would be necessary.

17. Site fish habitat creation projects in areas where losses to existing finfish or shellfish resources would be minimal.

18. Construct grassland bird habitat only in areas that do not currently provide important habitat for wildlife. Monitor any created grassland areas relative to established management goals.

19. Sample the water quality and biota of any "dead-end" basins, inter-pier areas, and bathymetrically disturbed areas considered for fill to eliminate impacts to any existing resources.

20. Identify any existing fish and wildlife resources prior to any landfill for brownfield closure activities to assess and, if applicable, avoid or minimize adverse impacts.

21. Incorporate recommendations to eliminate potential adverse impacts to the peregrine falcon as listed in the Corps Biological Assessment of June 18, 1998 as conditions of any Clean Water Act, Section 404 permit issued for the disposal of dredged material a the OENJ, Bayonne Landfill site.

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22. Ensure that any Clean Water Act, Section 404 permit issued, authorizing the disposal of dredged material at the Koppers Coke site in Kearny, New Jersey, incorporates the Service's recommended project modifications to avoid the likelihood of adverse impacts to peregrine falcon. The Service's letter of June 2, 1998 identifies these project modifications (Appendix C).

23. Allow the Service to review and comment on project plans and monitoring plans for any proposed coal mine restoration project.

24. Conduct bird surveys and a baseline HEP study at the upland disposal site UD-7 to determine the value of the site to migratory birds should this site continue to be considered for the disposal of dredged material.

25. Predict the composition and aerial extent of sediment plumes in estuarine and marine habitats that would be released from various dredged material disposal alternatives.

26. Ensure that nearshore containment facilities are only sited within highly degraded habitats.

27. Evaluate the loss of primary productivity that would result from constructing island CDFs in both the Harbor estuary and marine portions of the study area.

28. Evaluate the impacts of potential secondary uses of island CDFs on fish and wildlife resources.

29. Consider Service-identified Habitat Complexes as exclusionary criteria regarding the citing of island CDFs. Consider island CDFs only as a last resort option.

30. Consider the construction of island CDFs to be the dredged material disposal option of last resort.

31. Conduct a shellfish stock assessment of the Harbor estuary and adjacent New York Bight Apex to facilitate the citing of dredged material disposal options away from areas with high quality benthic communities.

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Appendix A

Species Managed by the Fishery Management Council for Which Essential Fish Habitat will be Designated

Species Managed by the Fishery Management Council for Which Essential Fish Habitat will be Designated

American lobster - *Homarus americanus*
American plaice - *Hippoglossoides platessoides*
Atlantic butterfish - *Peprilus triacanthus*
Atlantic cod - *Gadus morhua*
Atlantic halibut - *Hippoglossus hippoglossus*
Atlantic herring - *Clupea harengus*
Atlantic mackerel - *Scomber scombrus*
Atlantic salmon - *Salmo salar*
Atlantic sea scallop - *Placopecten magellanicus*
black sea bass - *Centropristis striata*
bluefish - *Pomatomus saltatrix*
haddock - *Melanogrammus aeglefinus*
long-finned squid - *Loligo pealei*
monkfish - *Lophius americanus*
ocean pout - *Macrozoarces americanus*
ocean quahog - *Arctica islandica*
pollock - *Pollachius virens*
redfish - *Sebastes marinus*
red hake - *Urophycis chuss*
scup - *Stenotomus chrysops*
short-finned squid - *Illex illecebrosus*
silver hake - *Merluccius bilinearis*
spiny dogfish - *Squalus acanthias*
summer flounder - *Paralichthys dentatus*
surf clam - *Spisula solidissima*
tilefish - *Lopholatilus chamaeleonticeps*
white hake - *Urophycis tenuis*
windowpane flounder - *Scophthalmus aquosus*
winter flounder - *Pleuronectes americanus*
witch flounder - *Glyptocephalus cynoglossus*
yellowtail flounder - *Limanda ferruginea*

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Appendix B

Federal and State-Listed Endangered and Threatened Species and Federal Candidate Species in New Jersey and New York

	COMMON NAME	SCIENTIFIC NAME	STATUS
INVERTEBRATES	Dwarf wedgemussel	*Alasmidonta heterodon*	E
	Northeastern beach tiger beetle	*Cicindela dorsalis dorsalis*	T
	Mitchell saytr butterfly	*Neonympha m. mitchellii*	E+
	American burying beetle	*Nicrophorus americanus*	E+
PLANTS	Small whorled pogonia	*Isotria medeoloides*	T
	Swamp pink	*Helonias bullata*	T
	Eastern prairie fringed orchid	*Platanthera leucophaea*	T+
	Knieskern's beaked-rush	*Rhynchospora knieskernii*	T
	American chaffseed	*Schwalbea americana*	E
	Seasitive joint-vetch	*Aeschynomene virginica*	T
	Sea-beach pigweed	*Amaranthus pumilus*	T+

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

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

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

For further information, please contact:

U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main Street, Building D
Pleasantville, New Jersey 08232
Phone: (609) 646-9310
Fax: (609) 646-0352

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FEDERAL CANDIDATE SPECIES IN NEW JERSEY

CANDIDATE SPECIES are species that appear to warrant consideration for addition to the federal List of Endangered and Threatened Wildlife and Plants. Although these species receive no substantive or procedural protection under the Endangered Species Act, the U.S. Fish and Wildlife Service encourages federal agencies and other planners to give consideration to these species in the environmental planning process.

SPECIES	SCIENTIFIC NAME
Bog asphodel	*Narthecium americanum*

Note: For complete listings of taxa under review as candidate species, refer to Federal Register Vol. 62, No. 182, September 19, 1997 (Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates for Listing as Endangered or Threatened Species).

Revised 10/97

CONFIDENTIAL MAXUS2023071



ENDANGERED AND THREATENED WILDLIFE OF NEW JERSEY

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

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

BIRDS

Endangered

Pied-billed Grebe,* *Podilymbus podiceps*
Bald Eagle, *Haliaeetus leucocephalus***
Northern Harrier,* *Circus cyaneus*
Cooper's Hawk, *Accipiter cooperii*
Red-shouldered Hawk, *Buteo lineatus* (Breeding)
Peregrine Falcon, *Falco peregrinus***
Piping Plover, *Charadrius melodus***
Upland Sandpiper, *Bartramia longicauda*
Roseate Tern, *Sterna dougallii*
Least Tern, *Sterna antillarum*
Black Skimmer, *Rynchops niger*
Short-eared Owl,* *Asio flammeus*
Sedge Wren, *Cistothorus platensis*
Loggerhead Shrike, *Lanius ludovicianus*
Vesper Sparrow, *Pooecetes gramineus*
Henslow's Sparrow, *Ammodramus henslowii*

Threatened

American Bittern*, *Botaurus lentiginosos*
Great Blue Heron*, *Ardea herodias*
Little Blue Heron, *Egretta caerulea**
Yellow-crowned Night Heron, *Nyctanassa violaceus*
Osprey, *Pandion haliaetus*
Northern Goshawk, *Accipiter gentilis*
Red-shouldered Hawk, *Buteo lineatus* (Non-breeding)
Black Rail, *Laterallus jamaicensis*
Long-eared Owl, *Asio otus*
Barred Owl, *Strix varia*
Red-headed Woodpecker, *Melanerpes erythrocephalus*
Cliff Swallow,* *Hirundo pyrrhonota*
Savannah Sparrow, *Passerculus sandwichensis*
Ipswich Sparrow, *Passerculus sandwichensis princeps*
Grasshopper Sparrow, *Ammodramus savannarum*
Bobolink, *Dolichonyx oryzivorus*

*Only breeding population considered endangered or threatened
**Federally endangered or threatened

REPTILES

Endangered

Bog Turtle, *Clemmys muhlenbergi*
Atlantic Hawksbill, *Eretmochelys imbricata***
Atlantic Loggerhead, *Caretta caretta***
Atlantic Ridley, *Lepidochelys kempi***
Atlantic Leatherback, *Dermochelys coriacea***
Corn Snake, *Elaphe g. guttata*
Timber Rattlesnake, *Crotalus h. horridus*

Threatened

Wood Turtle, *Clemmys insculpta*
Atlantic Green Turtle, *Chelonia mydas***
Northern Pine Snake, *Pituophis m. melanoleucus*

**Federally endangered or threatened

ENDANGERED AND NONGAME SPECIES PROGRAM

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY
DIVISION OF FISH, GAME AND WILDLIFE

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AMPHIBIANS

Endangered

Tremblay's Salamander, *Ambystoma tremblayi*
Blue-spotted Salamander, *Ambystoma laterale*
Eastern Tiger Salamander, *Ambystoma t. tigrinum*
Pine Barrens Treefrog, *Hyla andersonii*
Southern Gray Treefrog, *Hyla chrysoscelis*

Threatened

Long-tailed Salamander, *Eurycea longicauda*
Eastern Mud Salamander, *Pseudotriton montanus*

MAMMALS

Endangered

Bobcat, *Lynx rufus*
Eastern Woodrat, *Neotoma floridana*
Sperm Whale *Physeter, macrocephalus*••
Fin Whale, *Balaenoptera physalus*••
Sei Whale, *Balaenoptera borealis*••
Blue Whale, *Balaenoptera musculus*••
Humpback Whale, *Megaptera novaeangliae*••
Black Right Whale, *Balaena glacialis*••

INVERTEBRATES

Endangered

Mitchell's Satyr (butterfly), *Neonympha m. mitchellii*••
Northeastern Beach Tiger Beetle, *Cicindela d. dorsalis*
American Burying Beetle, *Nicrophorus americanus*••
Dwarf Wedge Mussel, *Alasmidonta heterodon*••

••Federally endangered

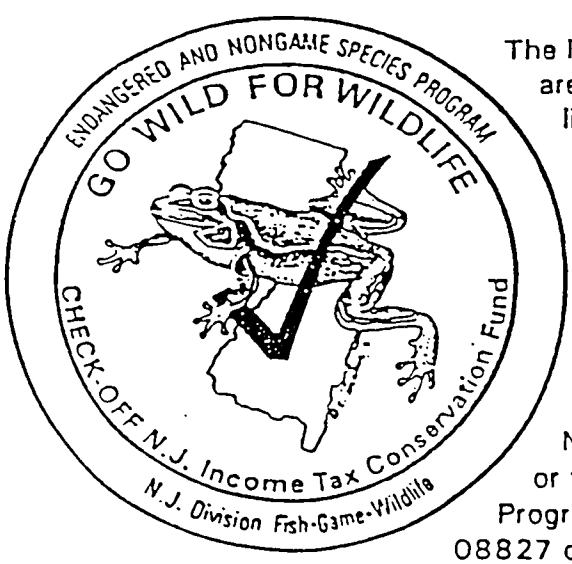
FISH

Endangered

Shortnose Sturgeon, *Acipenser brevirostrum*••

List revisions:
March 29, 1979
January 17, 1984
May 6, 1985
July 20, 1987
June 3, 1991





The lists of New Jersey's endangered and nongame wildlife species are maintained by the DEP&E's Division of Fish, Game and Wildlife's, Endangered and Nongame Species Program. These lists are used to determine protection and management actions necessary to insure the survival of the State's endangered and nongame wildlife. This work is made possible only through voluntary contributions received through the Wildlife Check-off on the New Jersey State Tax Form. The Wildlife Check-off is the only major funding source for the protection and management of the State's endangered and nongame wildlife resource. For more information about the Endangered and Nongame Species Program or to report a sighting of endangered or threatened wildlife contact: Endangered and Nongame Species Program, Northern District Office, Box 383 R.D. 1, Hampton, N.J. 08827 or call (908) 735-8975.

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FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES IN NEW YORK

Common Name	Scientific Name	Status	Distribution
FISHES			
Sturgeon, shortnose*	*Acipenser brevirostrum*	E	Hudson River & other Atlantic coastal rivers
REPTILES			
Turtle, bog	*Clemmys muhlenbergii*	T	Albany, Columbia, Dutchess, Genesee, Orange, Oswego, Putnam, Seneca, Ulster, Wayne, and Westchester Counties
Turtle, green*	*Chelonia mydas*	T	Oceanic summer visitor coastal waters
Turtle, hawksbill*	*Eretmochelys imbricata*	E	Oceanic summer visitor coastal waters
Turtle, leatherback*	*Dermochelys coriacea*	E	Oceanic summer resident coastal waters
Turtle, loggerhead*	*Caretta caretta*	T	Oceanic summer resident coastal waters
Turtle, Atlantic ridley*	*Lepidochelys kempii*	E	Oceanic summer resident coastal waters
BIRDS			
Eagle, bald	*Haliaeetus leucocephalus*	T	Entire state
Falcon, peregrine	*Falco peregrinus*	E	Entire state - re-establishment to former breeding range in progress
Plover, piping	*Charadrius melodus*	E T	Great Lakes Watershed Remainder of coastal New York
Tern, roseate	*Sterna dougallii dougallii*	E	Southeastern coastal portions of state
MAMMALS			
Bat, Indiana	*Myotis sodalis*	E	Entire state
Cougar, eastern	*Felis concolor couguar*	E	Entire state - probably extinct
Whale, blue*	*Balaenoptera musculus*	E	Oceanic
Whale, finback*	*Balaenoptera physalus*	E	Oceanic
Whale, humpback*	*Megaptera novaeangliae*	E	Oceanic
Whale, right*	*Eubalaena glacialis*	E	Oceanic
Whale, sei*	*Balaenoptera borealis*	E	Oceanic
Whale, sperm*	*Physeter catodon*	E	Oceanic
MOLLUSKS			
Snail, Chittenango ovate amber	*Succinea chittenangoensis*	T	Madison County
Mussel, dwarf wedge	*Alasmidonta heterodon*	E	Orange County - lower Neversink River

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

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES IN NEW YORK (Cont'd)

nmon Name	Scientific Name	Status	Distribution
BUTTERFLIES			
Butterfly, Karner blue	*Lycaeides melissa samuelis*	E	Albany, Saratoga, Warren, and Schenectady Counties
PLANTS			
Monkshood, northern wild	*Aconitum noveboracense*	T	Ulster, Sullivan, and Delaware Counties
Pogonia, small whorled	*Isotria medeoloides*	T	Entire state
Swamp pink	*Helonias bullata*	T	Staten Island - presumed extirpated
Gerardia, sandplain	*Agalinis acuta*	E	Nassau and Suffolk Counties
Fern, American hart's-tongue	*Asplenium scolopendrium* var. *americana*	T	Onondaga and Madison Counties
Orchid, eastern prairie fringed	*Platanthera leucophea*	T	Not relocated in New York
Bulrush, northeastern	*Scirpus ancistrochaetus*	E	Not relocated in New York
Roseroot, Leedy's	*Sedum integrifolium* ssp. *Leedyi*	T	West shore of Seneca Lake
Amaranth, seabeach	*Amaranthus pumilus*	T	Atlantic coastal plain beaches
Goldenrod, Houghton's	*Solidago houghtonii*.	T	Genesee County

E=endangered T=threatened P=proposed

DIVISION OF FISH, WILDLIFE AND MARINE RESOURCES

New York State Department of Environmental Conservation February 1997

Endangered, Threatened and Special Concern Fish and Wildlife Species of New York State

Endangered

●	Chittenango Ovate Amber Snail	*Succinea chittenangoensis*
◆	Dwarf Wedge Mussel	*Alasmidonta heterodon*
◆	Karner Blue Butterfly	*Lycaeides melissa samuelis*
● ◆	American Burying Beetle	*Nicrophorus americanus*
◆	Shortnose Sturgeon	*Acipenser brevirostrum*
	Round Whitefish	*Prosopium cylindraceum*
	Pugnose Shiner	*Notropis anogenus*
	Eastern Sand Darter	*Ammocrypta pellucida*
	Bluebreast Darter	*Etheostoma camurum*
	Gilt Darter	*Percina evides*
●	Spoonhead Sculpin	*Cottus ricei*
●	Deepwater Sculpin	*Myoxocephalus thompsoni*
	Tiger Salamander	*Ambystoma tigrinum*
	Bog Turtle	*Clemmys muhlenbergii*
◆	Leatherback Sea Turtle	*Dermochelys coriacea*
◆	Hawksbill Sea Turtle	*Eretmochelys imbricata*
◆	Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
	Massasauga	*Sistrurus catenatus*
●	Golden Eagle	*Aquila chrysaetos*
●	Bald Eagle	*Haliaeetus leucocephalus*
◆	Peregrine Falcon	*Falco peregrinus*
● ◆	Eskimo Curlew	*Numenius borealis*
● ◆	Piping Plover[1]	*Charadrius melodus*
	Least Tern	*Sterna antillarum*
◆	Roseate Tern	*Sterna dougallii*
	Loggerhead Shrike	*Lanius ludovicianus*
◆	Indiana Bat	*Myotis sodalis*
◆	Sperm Whale	*Physeter catodon*
◆	Sei Whale	*Balaenoptera borealis*
◆	Blue Whale	*Balaenoptera musculus*
◆	Finback Whale	*Balaenoptera physalus*
◆	Humpback Whale	*Megaptera novaeangliae*
◆	Right Whale	*Eubalaena glacialis*
● ◆	Gray Wolf	*Canis lupus*
● ◆	Cougar	*Felis concolor*
●	Allegheny Woodrat	*Neotoma magister*

Threatened

● ●	Northeastern Beach Tiger Beetle	*Cicindela dorsalis dorsalis*
	Lake Sturgeon	*Acipenser fulvescens*
	Mooneye	*Hiodon tergisus*

◆ Currently listed as "endangered" by the U.S. Department of the Interior.
● Currently listed as "threatened" by the U.S. Department of the Interior.
● Species is extirpated from New York State.
Endangered - Any native species in imminent danger of extirpation or extinction in New York.
Threatened - Any native species likely to become an endangered species within the foreseeable future in New York.
Special Concern - Any native species for which a welfare concern or risk of endangerment has been documented.
1. Piping Plover is listed as federally endangered in Great Lakes Region, and in the Atlantic Coastal Region as federally threatened.

Threatened (Cont.)

	Lake Chubsucker	*Erimyzon sucetta*
	Mud Sunfish	*Acantharchus pomotis*
	Longear Sunfish	*Lepomis megalotis*
	Northern Cricket Frog	*Acris crepitans*
	Eastern Mud Turtle	*Kinosternon subrubrum*
	Blanding's Turtle	*Emydoidea blandingii*
●	Loggerhead Sea Turtle	*Caretta caretta*
●	Green Sea Turtle	*Chelonia mydas*
	Timber Rattlesnake	*Crotalus horridus*
	Osprey	*Pandion haliaetus*
	Red-shouldered Hawk	*Buteo lineatus*
	Northern Harrier	*Circus cyaneus*
	Spruce Grouse	*Dendragapus canadensis*
	Common Tern	*Sterna hirundo*

Special Concern

Barrens Buckmoth	*Hemileuca maia*
Silver Chub	*Macrhybopsis storeriana*
Gravel Chub	*Erimystax x-punctata*
Blackchin Shiner	*Notropis heterodon*
Black Redhorse	*Moxostoma duquesnei*
Banded Sunfish	*Enneacanthus obesus*
Longhead Darter	*Percina macrocephala*
Southern Leopard Frog	*Rana utricularia*
Hellbender	*Cryptobranchus alleganiensis*
Jefferson Salamander	*Ambystoma jeffersonianum*
Blue-spotted Salamander	*Ambystoma laterale*
Spotted Salamander	*Ambystoma maculatum*
Spotted Turtle	*Clemmys guttata*
Wood Turtle	*Clemmys insculpta*
Diamondback Terrapin	*Malaclemys terrapin*
Worm Snake	*Carphophis amoenus*
Eastern Hognose Snake	*Heterodon platirhinos*
Common Loon	*Gavia immer*
Least Bittern	*Ixobrychus exilis*
Cooper's Hawk	*Accipiter cooperii*
Black Rail	*Laterallus jamaicensis*
Upland Sandpiper	*Bartramia longicauda*
Black Tern	*Chlidonias niger*
Common Barn Owl	*Tyto alba*
Short-eared Owl	*Asio flammeus*
Common Nighthawk	*Chordeiles minor*
Common Raven	*Corvus corax*
Sedge Wren	*Cistothorus platensis*
Eastern Bluebird	*Sialia sialis*
Henslow's Sparrow	*Ammodramus henslowii*
Grasshopper Sparrow	*Ammodramus savannarum*
Vesper Sparrow	*Pooecetes gramineus*
Eastern Small-footed Bat	*Myotis leibii*
New England Cottontail	*Sylvilagus transitionalis*
Harbor Porpoise	*Phocoena phocoena*

Effective date promulgated in state regulation August 3, 1987.

GEORGE E. PATAKI, GOVERNOR

JOHN P. CAHILL, ACTING COMMISSIONER

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Appendix C

Written Correspondence with the New York District
Army Corps of Engineers

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
927 North Main Street (Bldg. D1)
Pleasantville, New Jersey 08232

Tel: 609-646-9310
FAX: 609-646-0352

IN REPLY REFER TO:

FP-97/61
FP-98/07

February 3, 1998

Mr. John Sassi, Chief
Planning Division
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-0090

Dear Mr. Sassi:

This responds to your November 24, 1997 and January 12, 1998 letters to the U.S. Fish and Wildlife Service (Service) requesting Service input toward the preparation of an environmental assessment (EA) for two potential disposal sites associated with the deepening of the Kill Van Kull and Newark Bay (KVK/NB) federal navigation channels and the Port Jersey Channel. The two potential sites include Koppers Coke, Kearny, New Jersey and the OENJ Bayonne Landfill / Golf Course (Bayonne Landfill), Bayonne, New Jersey.

AUTHORITY

The following comments and recommendations are provided pursuant to the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to ensure the protection of endangered and threatened species and are intended to assist the Corps in complying with Sections 7 and 9 of the Act. However, these comments and recommendations do not constitute the report by the Secretary of Interior on the use of the Koppers Coke site or Bayonne Landfill as disposal sites within the meaning of Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401; 16 U.S.C. 661 *et seq.*).

BACKGROUND

The Service has provided the Department of the Army, Corps of Engineers, New York District (Corps) with a number of letters, planning aid reports, and FWCA reports regarding dredging projects in the New York / New Jersey Harbor (Harbor) including: Newark Bay, Arthur Kill, Kill Van Kull, and Port Jersey Channel. In addition, the Service recently provided the Corps with a Biological Opinion pursuant to the ESA entitled, "*Biological Opinion on the Effects of Channel Deepening Activities Within the Arthur Kill, Kill Van Kull, and Newark Bay Channels, New York and New Jersey, on the Peregrine Falcon*," dated December 22, 1997. The Biological Opinion did not address impacts to the peregrine falcon (*Falco peregrinus*) caused by the disposal of project-generated dredged material.

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In addition to FWCA reports for the subject Harbor federal navigation projects, the Service has reviewed public notices (PN) for Department of the Army permits under Section 404 of the Clean Water Act (33 U.S.C. 1344 *et seq.*) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403 *et seq.*). Specifically, we provided the Corps (Regulatory Branch) with comments and recommendations regarding the use of Koppers Coke and Bayonne Landfill via letters dated October 22, December 1, and December 10, 1997.

DISPOSAL SITES

1. Koppers Coke

The Koppers Coke site is located near Kearny, Hudson County, New Jersey along the Hackensack River. Based on information in the PN, project plans include: transporting Category II and III dredged material from New York / New Jersey Harbor dredging projects to the site; blending the dredged material with cement-based additives; and, either storing the blended material on site or shipping the material to construction projects that require structural fill. The PN did not identify the amount of wetland or upland acres that are on the site or that would be adversely impacted by the project. However, the Service is aware that the Koppers Coke site contains both upland and wetland habitats.

2. Bayonne Landfill

The Bayonne Landfill site is located near Bayonne, Hudson County, New Jersey, along the Upper New York Bay. Based on information in the PN and the application for State land use permits, this site consists of two major parcels. The first parcel is the Bayonne Landfill site, which contains approximately 38 acres of upland and wetland habitats that were formed after the closure of the municipal landfill in the 1980s. The second parcel consists of a 98-acre landfill owned by Public Service Electric and Gas Company (PSE&G), which also contains upland and wetland habitats. Project plans for the Bayonne Landfill include: site remediation; construction of a dredged material handling facility to blend and stabilize Category II and III dredged material from other Harbor projects with cement-based additives; disposal of 4 to 4.5 millon cubic yards of treated dredged material; capping the site; and, constructing a municipal golf course on top of the cap.

FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

The peregrine falcon, federally listed as endangered, is known to occur in the vicinity of the two proposed disposal sites. Two pairs of peregrine falcons nests less than 5 miles from the Koppers Coke site. One pair nests on an abandoned building adjacent to the General Pulaski Skyway, which is approximately 1.3 miles from the Koppers Coke site and the second pair nests

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near the I-280 bridge over the Passaic River and is located approximately 4.5 miles from the potential disposal site. The New Jersey Audubon Society (Kane, pers. comm., 1997) has identified that peregrines (adults and young) from a nest near the General Pulaski Skyway have been observed taking shorebird, waterfowl, and passerines within the area. The Bayonne Landfill site is located approximately 2.5 miles from the Bayonne Bridge, which harbors a nesting pair of peregrine falcons.

As mentioned above, both the Koppers Coke and Bayonne Landfill sites contain upland and wetland habitats that are used by various terrestrial and aquatic avian species that form the prey base for peregrines. In addition, disposal areas have the potential to attract and concentrate prey species (e.g., gulls) that may be exposed to potentially high levels of contaminants associated with dredged material deposited at the disposal site. In turn, concentrations of prey species attract predators such as the peregrine falcon. Due to its high position in the food chain, the peregrine falcon is at risk of dietary exposure to bioaccumulating environmental contaminants, such as dioxins, polychlorinated biphenyls (PCBs), and organochlorine pesticides. Dredged material may have higher levels of contaminants than currently exist at the site. Processing and disposal of such sediments at either site will increase the risk of exposure to contaminants, resulting in adverse impacts to peregrine falcons. In accordance with Section 7(a)(2) of the ESA, an assessment of potential direct, indirect, and cumulative impacts is required for all federal actions that may affect listed species.

The majority of the New York / New Jersey Harbor watershed is used by 12 pairs of peregrine falcons as forage habitat; therefore, this species could be adversely affected if forage areas were used for the disposal of dredged material containing elevated levels of environmental contaminants. Based on the above-mentioned information regarding impacts to peregrine falcons from environmental contaminants, the Service cannot concur with the Corps determination that use of either disposal site (Koppers Coke and Bayonne Landfill) will not adversely affect the peregrine falcon. Thus, the Corps should conduct a Biological Assessment, pursuant to the ESA, for the peregrine falcon regarding the two disposal sites.

The lead federal agency for a project has the responsibility under Section 7(c) of the ESA to prepare a Biological Assessment, if the proposal is a major construction project that requires an Environmental Impact Statement (EIS). The assessment should contain information concerning federally listed species and any species proposed for listing that may be present in the action area and an analysis of any potential effects of the proposed action on such species. The following may be considered for inclusion in a Biological Assessment of the proposed project, although actual contents are at the discretion of the federal agency:

(1) results of field surveys to determine if listed species are present or occur seasonally, including information on the use of the site as foraging habitat;

(2) results of field surveys to determine the extent of upland and wetland habitats on the site;

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(3) results of field surveys (e.g., National Audubon Society bird counts) to determine the composition of other fish and wildlife species that use the site;

(4) analysis of prey species taken by peregrines in the project area;

(5) results of chemical analyses, bioaccumulation studies, and toxicity tests on the dredged material that will be brought to the site;

(6) method(s) of containing dredged material on the site;

(7) method(s) for processing dredged material;

(8) method(s) for handling and treating excess water from the dredged material;

(9) method(s) of disposing of processed dredged material;

(10) analysis of environmental contaminants available at the site once the processed dredged material is disposed on the site;

(11) duration of time that processed dredge material will be exposed to weathering;

(12) analysis of weathering on processed dredged material;

(13) analysis of the processed dredged material for leaching of environmental contaminants;

(14) method(s) to avoid concentrating prey species at the site;

(15) views of recognized experts on the species;

(16) literature reviews;

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

(18) analysis of alternative actions.

Biological Assessments may be consolidated with documents produced under interagency cooperation procedures required by other statutes such as the FWCA or the National Environmental Policy Act of 1969 (83 Stat. 852, as amended; 42 U.S.C. 4321 *et seq.*). However, satisfying the requirements of these other statutes does not in itself absolve a federal agency of its obligation to comply with the Biological Assessment procedures of the ESA. If the Biological Assessment indicates that no listed or proposed species are present or will be affected, and the Service concurs in writing with the assessment, then no formal consultation pursuant to Section 7 will be required.

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To comply with requirements of the ESA, the Corps must prepare a Biological Assessment to address the above-mentioned potential impacts to the peregrine falcon for a disposal site. Specifically, the Biological Assessment must address any potential direct or indirect adverse impacts to peregrines caused by disposing of contaminated dredged material. Enclosed is an example outline for a Biological Assessment or Biological Evaluation.

COMMENTS

In addition to potential impacts at either potential disposal site to federally listed species, the use of Koppers Coke, Bayonne Landfill, or other area disposal sites would result in the loss of habitat for fish and wildlife, and potential contamination of adjacent aquatic habitats. The Corps has not addressed impacts to fish and wildlife resources or the means to avoid, minimize, and / or compensate for the loss of aquatic and terrestrial fish and wildlife habitat caused by the use of Koppers Coke, Bayonne Landfill, or other potential disposal sites. The Corps must identify project related impacts and means of avoiding, minimizing, and compensating for adverse impacts to fish and wildlife resources.

RECOMMENDATIONS

To minimize the adverse impacts of the Port Jersey Channel project on fish and wildlife resources caused by the use of Koppers Coke or Bayonne Landfill, the Service is providing the following recommendations to the Corps.

1. Prepare a Biological Assessment to address potential impacts to the peregrine falcon caused by the disposal of project-generated dredged material and include site information.

2. Provide the following information for evaluation:

   (a) inventory of fish and wildlife that use the candidate disposal sites;

   (b) habitat delineations to determine the extent of upland and wetland areas that would be adversely impacted via disposal of project-generated dredged material;

   (c) method(s) of dredged material disposal;

   (d) analyses of the concentrations of environmental contaminants in the dredged material;

   (e) method(s) to avoid dispersal of contaminated sediments at the disposal site;

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(f) analysis of environmental contaminants available at the site once the processed dredged material is disposed on the site.

(g) method(s) to monitor contaminant levels both on site and in the surrounding aquatic environment;

(h) quantitative evaluation of project impacts to fish and wildlife resources (e.g., Habitat Evaluation Procedures); and,

(i) measures that will be taken to avoid, minimize, and compensate for impacts to fish and wildlife resources.

4. Provide a cumulative impact analysis that adequately evaluates the effects of Harbor dredging on fish and wildlife resources and develop effective measures to sustain and safeguard these resources.

5. Coordinate with the Service, the New Jersey Division of Fish, Game and Wildlife (NJDFG&W), and the National Marine Fisheries Service (NMFS) for the evaluation of impacts to fish and wildlife resources once a suitable disposal area is selected.

6. Coordinate with the Service, NJDFG&W, and NMFS to develop a mitigation plan to compensate for unavoidable adverse impacts to fish and wildlife habitats caused by disposal of project-generated dredged material.

The Service recommends that the Corps include the aforementioned information into its EAs for the various Harbor projects. Without complete information regarding the disposal areas and the impacts on fish and wildlife from the disposal of dredged material, the Service cannot support the use of either the Koppers Coke site or the Bayonne Landfill as disposal areas for Harbor federal navigation projects.

Should you have any questions regarding these comments and recommendations, please contact John Staples, Peter Benjamin, or John Cochnar of my staff.

Sincerely,

Clifford G. Day
Supervisor

Enclosure

PERSONAL COMMUNICATION

Kane, R. 1997. Director of Conservation. New Jersey Audubon Society. Franklin Lakes, New Jersey.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
927 North Main Street (Bldg. D1)
Pleasantville, New Jersey 08232

Tel: 609-646-9310
FAX: 609-646-0352

IN REPLY REFER TO:

ES-98/51

June 2, 1998

Colonel Gary Thomas, District Engineer
U.S. Army Corps of Engineers, New York District
26 Federal Plaza
New York, New York 10278-0090

Dear Colonel Thomas:

This letter responds to your March 30, 1998 request to the U.S. Fish and Wildlife Service (Service) to review the "*Peregrine Falcon Biological Assessment*" (Biological Assessment) prepared by Lawler, Matusky, and Skelly Engineers, LLP, Pearl River, New York regarding the use of the Port Authority of New York and New Jersey's Seaboard (Koppers) Site (Koppers Coke), Kearny, Hudson County, New Jersey as a dredged material disposal site. Specifically, the U.S. Army Corps of Engineers, New York District (Corps) is preparing a public notice (PN) regarding an application by the ECDC East, Incorporated, for a Department of the Army (DA) permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403 *et seq.*) and Section 404 of the Clean Water Act (33 U.S.C. 1344 *et seq.*) to dispose of dredged material at the Koppers Coke site from both public and private dredging projects in the New York / New Jersey Harbor area. The proposed project entails the remediation of a 155-acre coke and by-products manufacturing facility via construction of barriers to prevent migration of contaminated groundwater, relocation of heavily contaminated soil, sediment and debris to upland portions of the site, and capping the site with approximately 4.5 million cubic yards of processed dredge material (PDM) (i.e., sediments mixed with Portland cement). In addition, approximately 18 acres of wetlands will be filled with PDM.

The Service recommended in a December 1, 1997 letter to the Corps that a Biological Assessment was needed because of the potential adverse impacts to the federally listed (endangered) peregrine falcon (*Falco peregrinus*) from use of Koppers Coke as a disposal area for contaminated dredged material.

AUTHORITY

The following comments and recommendations are provided pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to ensure the protection of endangered and threatened species and are intended to assist the Corps in complying with Sections 7 and 9 of the Act.

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FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

The peregrine falcon is known to nest and forage in the vicinity of the proposed disposal site. Two pairs of peregrine falcons nest less than five miles from the Koppers Coke site. One pair nests on an abandoned building adjacent to the General Pulaski Skyway, approximately 1.3 miles from the Koppers Coke site, and the second pair nests near the I-280 bridge over the Passaic River located approximately 4.5 miles from the potential disposal site. The New Jersey Audubon Society (Kane, pers. comm., 1997) identified that peregrines (adults and young) from a nest near the General Pulaski Skyway have been observed taking shorebird, waterfowl, and passerines within the area.

As previously mentioned, the Koppers Coke site contains upland and wetland habitats that are used by various terrestrial and aquatic avian species that form the prey base for peregrines. In addition, disposal areas have the potential to attract and concentrate prey species (e.g., gulls) that may be exposed to potentially high levels of contaminants associated with dredged material deposited at the disposal site. In turn, concentrations of prey species attract predators such as the peregrine falcon. Due to its high position in the food chain, the peregrine falcon is at risk of dietary exposure to bioaccumulating environmental contaminants, such as dioxins, polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins (PCDDs or dioxins), polychlorinated dibenzofurans (PCDFs or furans) (the most toxic is 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)), and organochlorine pesticides. Dredged material may have higher levels of contaminants than currently exist at the site. Processing and disposal of such sediments at the Koppers Coke site will increase the risk of exposure to contaminants, resulting in adverse impacts to peregrine falcons.

BACKGROUND

The following is a chronology of the subject consultation.

1. The Corps issued an amendment to PN #96/97-NWK dated September 23, 1997, identifying that Koppers Coke was selected as the disposal site for Port Newark / Port Elizabeth project. However, no information regarding contaminants was identified in the amendment to the PN.

2. The Service provided the Corps with a letter dated October 22, 1997, in response to the amendment to PN #96/97-NWK, requesting that the Corps withhold designating the Koppers Coke site as a disposal area until the Corps could provide the Service with additional information about the proposed disposal site and environmental contaminants. In addition, based on information from the PN and Service files, the Service concurred with the Corps that the proposed project may affect, but was not likely to adversely affect the peregrine falcon. This determination was premised on a presumed lack of foraging habitat available to the falcon. No information was provided by the Corps.

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3. In a letter dated December 1, 1997, the Service notified the Corps that use of Koppers Coke as a disposal site for the Port Newark / Port Elizabeth project may adversely affect the peregrine falcon because Koppers Coke may contain suitable foraging habitat for peregrine falcons. Falcons feeding on contaminated prey at the site could ingest contaminants. The Service's determination was based on new information provided by the New Jersey Audubon Society (Kane, pers. comm., 1997) identifying that peregrines (adults and young) from two nearby nests were observed feeding near the Koppers Coke site. In the December 1 letter, the Service recommended that the Corps prepare a Biological Assessment regarding project impacts to the peregrine falcon.

4. On December 4, 1997, the Service attended an interagency meeting at the Hackensack Meadowlands Development Commission's office to discuss the proposed project. During the meeting, a Service biologist identified that the peregrine falcon may be adversely impacted and that a Biological Assessment would be needed.

5. On December 10, 1997, the Service received a telephone call from the Corps regarding the Service's December 1, 1997 correspondence. We discussed the Service's non-concurrence for the use of Koppers Coke as the disposal site for the Port Newark / Port Elizabeth project due to potential impacts to the peregrine falcon. Discussions between representatives of both the Service and Corps revealed that the PDM would be placed in a non-vegetated, 6.9-acre upland portion of the site. In addition, the Corps agreed to provide the Service with contaminant-related information on the dredged material.

6. On December 10; 1997, the Service received data (via facsimile from the Corps) on contaminant levels in dredged sediments before and after processing for disposal. Additional information on methods used to process dredged material, project size, and contaminants at the Koppers Coke site were received December 15, 1997 from Ron Korbini of IRM/ITEX (project contractors), Addison, Texas. The latter included an October 1997 report entitled, "*Remedial Action Work Plan For The Former Koppers Seaboard Site, Kearny, New Jersey*" (Work Plan) prepared for the project contractors by Key Environmental, Incorporated, Carnegie, Pennsylvania.

7. In a letter dated February 2, 1998, the Service concurred with the Corps that disposal of PDM from the Port Newark / Port Elizabeth project at the Koppers Coke site will not adversely affect the peregrine falcon. However, the February 2 concurrence only included the 6.9-acre upland portion of the site and not the entire 155 acres. The Service recommended that further consultation be initiated if the larger project were to be proposed.

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COMMENTS

The Koppers Coke site is the subject of a large contaminated site remediation. As indicated in the Work Plan, groundwater, surface water, soils, and sediments on the 155-acre property are heavily contaminated with metals (arsenic, chromium, copper, lead, manganese, nickel, and zinc), cyanide, polynuclear aromatic hydrocarbons (PAHs), and fuel oils. In addition, site-related contaminants have migrated with shallow groundwater into the neighboring Hackensack River.

Remedial actions for the property will include construction of barriers to prevent migration of contaminated groundwater, relocation of heavily contaminated soil, sediment, and debris to upland portions of the site, and capping with approximately 4.5 million cubic yards of PDM. The PDM will consist of contaminated dredged sediment from New York / New Jersey Harbor that has been chemically stabilized by the addition of portland cement (8 to 12 percent by sediment wet weight). It is understood that the processing operation is an enclosed system, minimizing the potential for spillage or for attracting potential peregrine prey species to the contaminated material. The PDM will have a soil-like consistency. Once in place, the PDM is to be compacted, acting as structural fill, and ultimately supporting commercial / industrial development.

The majority of the New York / New Jersey Harbor watershed is used by 12 pairs of peregrine falcons as forage habitat; therefore, this species may experience dietary exposure to unsafe levels of certain contaminants from the proposed project site in its current condition and as a disposal site for potentially contaminated PDM. Based on the information provided in the Biological Assessment the Service concluded the following.

1. Metals, PAHs, and fuel oils are the current site-related contaminants of concern (COCs). The COCs are generally compounds that do not biomagnify (i.e., food chain transfer is not significant). Therefore, only species that are directly exposed to the contaminated media are likely to accumulate toxic levels of COCs in their tissues. Biota at risk of significant exposure to COCs are benthic / soil invertebrates and fish. Terrestrial species may also be adversely affected by direct contact with concentrated leachate or ingestion of heavily contaminated substrate or benthic biota. The impact of site COCs on peregrine falcons is expected to be limited to loss of food supply because potential prey species may not be attracted to the area if benthic invertebrates and finfish are absent.

2. The proposed site remediation will limit, through containment, further releases of COCs into neighboring wetland and aquatic habitats of the Hackensack River. Once covered, the potential for direct contact with the most contaminated material will be eliminated. Because of the contaminant levels involved, remedial actions are warranted and would benefit the natural resources of the area. Benefits should be realized as long as remedial structures such as the cap and slurry wall are functioning properly. We recommend post-remediation monitoring to ensure that the remedy is effectively preventing migration of contaminants from the site.

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3. The proposed project has the potential of importing substantial quantities of PDM with contaminant concentrations greater than those already present in the area. Of particular concern for peregrine falcons are the organochlorine compounds, including pesticides, PCBs, dioxins, furans, and TCDD, identified in the sediments of the Port Newark / Port Elizabeth project. Such compounds may enter the food web through incidental ingestion of soil-like PDM by soil invertebrates and small mammals. Once in the food web, they may, through bioaccumulation and food chain transfer, reach levels in tissues of peregrine prey species that are harmful to peregrine falcons that ingest them.

The Service expressed concerns regarding the potential for one portion of the proposed project area (i.e., Port Newark / Port Elizabeth project's "Interim Storage Area" (ISA) to affect peregrine falcons in a February 2, 1998 letter to the Corps. At that time, the Service determined that sediments in the PDM had concentrations of dioxin that may be higher than levels present in the project area and sufficient to pose a risk of adverse effects to upper trophic level organisms. However, the potential for exposure, therefore adverse effects, was considered to be limited by the small size of the project (approximately seven acres). This cannot be said of the project currently under consideration, which will cover 155 acres.

Concerns about contaminants in the PDM for the 155-acre site are alleviated if access by soil-dwelling terrestrial biota is prevented. This may be the case during remedial activities when material will be repeatedly deposited in the area and compacted. However, it is assumed that once remediation is completed, unmanaged surficial PDM may be colonized by terrestrial biota. Presumably, the potentially contaminated PDM will be covered by buildings or covered with clean fill.

4. Mitigation for tidal wetlands along the river side of the site will be on-site, with enhancement commencing after remedial actions are completed. Implementation of the remedy, including removal of coal tar and debris from the tidal wetlands, will be an improvement over existing conditions. However, successful establishment of the fish and invertebrate community in the enhanced wetland will depend in part on residual levels of contaminants in the sediment. As a proposed brownfields project, it is assumed that remedial actions at the site will be considered adequate if contaminant levels do not exceed New Jersey guidelines for protection of human health under industrial exposure conditions. Such contaminant levels are not necessarily protective of ecological receptors. Sampling in the tidal wetland should be considered to evaluate the effectiveness of the remedy as well as to determine if residual contamination may affect chances for the proposed mitigation to succeed.

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SERVICE POSITION

Overall, the Service has concluded that contaminants in soils, sediments, and water on the Koppers Coke site are sufficiently elevated to be toxic to directly exposed biota, thereby contaminating the supply of food for peregrine falcons in the area. Consequently, remedial action is considered to be warranted and would benefit local natural resources.

For peregrine falcons, the greatest threat of exposure to toxic substances from the proposed project is considered to be from sediments used in the PDM, particularly if this material is to remain uncovered and undisturbed for an extended period of time. The sediments from dredging projects in the New York / New Jersey Harbor estuary are expected to be contaminated with toxic, bioaccumulating compounds (i.e., chlorinated pesticides, PCBs, dioxins, and furans). Dioxin concentrations in soils from the Koppers Coke site and the PDM may be sufficient to adversely affect peregrine falcons. Soil dioxin concentrations as low as 10 ppt may lead to unsafe levels of exposure in avian top predators (Meyn *et al.*, 1997). If pre-project concentrations in soils from the Koppers Coke site are near those observed by the National Oceanic and Atmospheric Administration (1995) in sediments nearby, peregrine falcons feeding in the project area are already at risk of adverse effects from exposure to dioxins.

The Corps has not provided information regarding contaminant levels in the PDM that will be disposed of at the Koppers Coke site. Contaminants are to be addressed in the future as dredging projects are identified. Until chemical analyses of bulk sediments are performed, the Service will assume that concentrations of chlorinated pesticides, PCBs, dioxins and furans in dredged sediments will be greater than those already occurring at Koppers Coke and that placement of PDM at the site may adversely affect peregrine falcons. The potential for adverse effects would be considered negligible if it is demonstrated that contaminant levels in the PDM are not greater than those already present in the area (i.e., contaminant analyses of dredged sediments) or if the PDM is covered.

RECOMMENDATIONS

As noted, the Service's main concern for the peregrine falcon at the project site is the disposal of contaminated PDM. Bioaccumulating environmental contaminant concentrations in sediments used for the ISP are sufficiently elevated to be of concern for peregrine falcons. The potential for contaminant-related adverse effects on peregrine falcons should be considered if contaminated sediments are to be used for PDM in the larger, 155-acre project. However, the following project modifications can be made that would avoid the likelihood of adverse impacts to peregrines.

1. Monitor the project site for the life of the project for use by peregrine falcons. Immediately report any findings to the Service's New Jersey Field Office (NJFO).

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2. Request annual updates from the Service regarding the presence of federally listed species and candidate species in the area of the proposed project if the proposed project is not completed within one year.

3. Since the levels of environmental contaminants in the PDM that are to be disposed at the Koppers Coke site have not been determined, one of the following methods for disposal should be followed:

   a. Analyze the concentrations of environmental contaminants in the dredged material (i.e., PDM) for bioaccumulating environmental contaminants and determine whether these contaminants exceed the levels that currently exist at the site. If levels exceed the current levels, PDM can either be: (1) disposed of at Koppers Coke and capped with clean, nontoxic fill (12 inches minimum) if left exposed and undisturbed (i.e., no construction activity taking place) for longer than one month, or (2) not placed at Koppers Coke.

   b. Assume that all PDM have bioaccumulating environmental contaminant levels that exceed the current levels at Koppers Coke and cap with clean, nontoxic fill (12 inches minimum), if left exposed and undisturbed (i.e., no construction activity taking place) for longer than one month.

   No PDM with elevated levels of bioaccumulating environmental contaminants should be exposed for more than one month if left undisturbed, including when the project is completed.

4. Monitor the project site for encroachment of vegetation. Vegetated areas harbor prey species of peregrines and could possibly attract the falcon and expose it to bioaccumulating environmental contaminants in the PDM. If areas of Koppers Coke containing PDM become vegetated, remove the vegetation by mechanical methods or cover with clean, nontoxic fill material.

5. Monitor the project site during the construction and PDM placement phases for use by prey species of the peregrine falcon. Notify the Service's NJFO if prey species are found to use Koppers Coke.

6. Implement measures that prevent PDM from entering the adjacent waterways during transport and off-loading onto the project site.

7. Use environmentally sensitive methods for dredging projects that generate PDM for Koppers Coke, such as closed clamshell dredge and no barge overflow or other best management practices, in reaches with potentially contaminated (i.e., fine grained) materials.

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8. Develop and implement a monitoring plan to track the effectiveness of the site remediation. Chemical analyses should be conducted on sediments from the wetland mitigation site to ensure that restoration will not be hindered by residual contamination.

9. Provide the Service's NJFO with annual project progress reports, including photographs, peregrine falcon sightings, vegetation growth, and animal species observed on the site.

If the proposed project is modified as described above, through changes in the project plans or incorporated into the DA permit, the project would not likely adversely impact the peregrine falcon and further consultation under Section 7 of the ESA is not necessary. However, if the above-mentioned project modifications cannot be incorporated into the proposed project plans or DA permit, further consultation with the Service will be necessary. Should you have any questions regarding these comments please contact John Staples or John Cochnar of my staff.

Sincerely,

Clifford G. Day
Supervisor

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REFERENCES

Meyn, O., M. Zeeman, M.J. Wise, and S.E. Keane. 1997. Terrestrial wildlife risk assessment for TCDD in land-applied pulp and paper mill sludge. Env. Toxicol. Chem. 16(9):1789-1801.

National Oceanic and Atmospheric Administration. 1995. Magnitude and extent of sediment toxicity in the Hudson-Raritan Estuary. NOAA Technical Memorandum NOS ORCA 88. National Oceanic and Atmospheric Administration. Silver Spring, Maryland. 230 pp.

PERSONAL COMMUNICATIONS

Kane, R. 1997. Director of Conservation. New Jersey Audubon Society. Franklin Lakes, New Jersey.

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United States Department of the Interior

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IN REPLY REFER TO:
PL-NY-98/206

July 22, 1998

Colonel William H. Pearce, District Engineer
U.S. Army Corps of Engineers, New York District
26 Federal Plaza
New York, New York 10278-0090

Dear Colonel Pearce:

This letter responds to your June 18, 1998 request to the U.S. Fish and Wildlife Service (Service) to review the *"U.S. Army Corps of Engineers, New York District, Section 7 Consultation-Biological Assessment"* (Biological Assessment). The Biological Assessment was prepared by the U.S. Army Corps of Engineers, New York District (Corps) as part of its review of a permit application pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403 *et seq.*) and Section 404 of the Clean Water Act (33 U.S.C. 1344 *et seq.*) regarding potential impacts to the federally listed (endangered) peregrine falcon (*Falco peregrinus*) caused by the proposed project by OENJ, Bayonne L.L.C. in the Upper New York Bay (Bay), New York / New Jersey Harbor (Harbor), City of Bayonne, Hudson County, New Jersey. The proposed project would involve the following activities: closure of the former 38-acre Bayonne Sanitary Landfill using contaminated dredged material mixed with lime, Portland cement, and fly ash as a stabilized fill material (i.e., processed dredged material (PDM)); remediation of the 97-acre Public Service Electric and Gas Company (PSE&G) contaminant site by removing wastes (drums and soil) from contaminated areas and capping with PDM; dredging of an access channel in the Bay by removing 148,000 cubic yards of sediments to a depth of 16.5 feet below the plane of mean low water (to provide watercraft access for barges and scows loaded with contaminated dredged material from other Harbor projects); construction of a pier and a dredged material processing facility; discharge of 4 to 4.5 million cubic yards of PDM on both Bayonne Landfill and PSE&G's sites; and, construction of an 18-hole golf course.

In addition, Appendix E of the Biological Assessment contained a proposed mitigation plan that, if approved and implemented, would compensate for the loss of 7.53 acres of palustrine emergent wetlands and 2.02 acres of estuarine intertidal flats / beach caused by the proposed project. The proposed project site was visited by Service biologists on January 14, 1998 and discussions regarding the mitigation plan occurred with consultants for OENJ, Bayonne L.L.C.

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AUTHORITY

The following comments on the proposed activity have been prepared under the authority of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401; 16 U.S.C. 661 *et seq.*) and the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), and are consistent with the intent of the Service's Mitigation Policy (Federal Register, Vol. 46, No. 15, Jan. 23, 1981). These comments are intended for the protection of fish and wildlife in your public interest review (33 CFR Part 320.4) and for your use in determining compliance with the Section 404(b)(1) Guidelines (40 CFR Part 230). The Service's Mitigation Policy and the Section 404(b)(1) Guidelines emphasize that avoidance and minimization precede compensation, which is to be considered solely for unavoidable adverse impacts on fish and wildlife resources and supporting ecosystems.

FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

The peregrine falcon is known to nest on the Bayonne Bridge, which spans the Kill Van Kull and is located approximately 2.5 miles from the Bayonne Landfill / PSE&G project site. The peregrine falcon feeds primarily on shorebirds, waterfowl, and passerine birds, and may travel 10 to 18 miles in search of prey, seeking feeding opportunities in marshes and riparian areas where prey concentrate. EnviroScope, Incorporated (1997) stated that the site was possibly used by peregrine falcons based on the proximity of recorded nesting sites in the region, such as the Goethals Bridge and Bayonne Bridge. In addition, in 1987, the New Jersey Audubon Society (1987) identified a peregrine falcon pursuing prey at the Global Terminal and Container Services facility, which is located just north of the project area.

The Bayonne Landfill / PSE&G site contains upland and wetland habitats that are used by various terrestrial and aquatic avian species that form the prey base for peregrines. In addition, disposal areas have the potential to attract and concentrate prey species (e.g., gulls) that may be exposed to potentially high levels of contaminants associated with dredged material deposited at the disposal site. In turn, concentrations of prey species attract predators such as the peregrine falcon. Due to its high position in the food chain, the peregrine falcon is at risk of dietary exposure to bioaccumulating environmental contaminants (i.e., contaminants of concern (COC), such as polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins (PCDDs or dioxins), polychlorinated dibenzofurans (PCDFs or furans) (the most toxic is 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)), and organochlorine pesticides. Dredged material may have higher levels of contaminants than currently exist at the site. Processing and disposal of such sediments at the Bayonne Landfill / PSE&G site will increase the risk of exposure to contaminants, resulting in adverse impacts to peregrine falcons.

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BACKGROUND

The following is a chronology of the subject consultation.

1. The Corps issued Public Notice (PN) 97-09590-J1, dated October 24, 1997, identifying that OENJ, Bayonne L.L.C. was applying for a Department of the Army permit to complete the above-mentioned activities at the Bayonne Landfill / PSE&G site.

2. The Service provided the Corps with a letter dated December 10, 1997, recommending that a Biological Assessment was needed because of the potential adverse impacts to the peregrine falcon from the use of Bayonne Landfill / PSE&G site as a disposal area for contaminated dredged material.

3. On January 14, 1998, Service biologists accompanied OENJ, Bayonne L.L.C. representatives on an inspection of the Bayonne Landfill / PSE&G site. During the site inspections, meeting participants discussed the project, methods to avoid impacts to wetlands, and potential mitigation areas to compensate for unavoidable wetland losses.

4. On January 26, 1998, the Service received information from Coastal Environmental Services, Incorporated (CESI) (consultant for OENJ, Bayonne L.L.C.) regarding comments and concerns the Service identified in our December 10, 1997 letter. Included in the January 26 information package was information that would be incorporated into the Biological Assessment.

5. The Service received a report dated May 8, 1998, from Post, Buckley, Schuh, and Jernigan, Incorporated (formerly CESI) entitled, "*Conceptual Wetland Mitigation Plan, OENJ Bayonne, Bayonne, New Jersey.*" This report described the proposed mitigation plan that OENJ, Bayonne L.L.C would implement to compensate for project impacted wetland loses.

6. On June 5, 1998, the Service received a copy of the draft Biological Assessment for Bayonne Landfill / PSE&G site (via facsimile from the Corps).

COMMENTS

A. Federally Listed Species

The Bayonne Landfill / PSE&G site is the subject of a large contaminated site remediation. Service concerns about the proposed project were originally expressed in a December 10, 1997 letter to the Corps. The information provided to the Service by CESI and in the Biological Assessment were reviewed. Descriptions of relevant aspects of the project and results of tests that were performed on sediments from the access channel were provided for

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review. Results of chemical analyses of access channel sediment were also provided for review. The latter included analyses of bulk sediments before and after stabilization, and of leachate from amended material.

Remedial actions for the property will include construction of barriers to prevent migration of contaminated groundwater, relocation of heavily contaminated soil, sediment, and debris, and capping with approximately 4.5 million cubic yards of PDM. The PDM will consist of contaminated dredged sediment from the Harbor that has been chemically stabilized by the addition of portland cement (8 to 12 percent by sediment wet weight). It is understood that the processing operation is an enclosed system, minimizing the potential for spillage or for attracting potential peregrine prey species to the contaminated material. The PDM will have a soil-like consistency. Once in place, the PDM is to be compacted, acting as structural fill, and ultimately supporting a municipal golf course.

The majority of the New York / New Jersey Harbor watershed is used by 18 breeding pairs of peregrine falcons as forage habitat; therefore, this species may experience dietary exposure to unsafe levels of certain contaminants from the proposed project site in its current condition and if it is used as a disposal site for potentially contaminated PDM. Based on the information provided in the Biological Assessment the Service concluded the following.

1. Contaminant levels measured in unprocessed sediment were compared with concentrations observed in studies by the National Oceanic and Atmospheric Administration (1995) and a review by the Service (1993). Observed concentrations of most contaminants in unprocessed dredged material from the access channel were unremarkable. However, mercury, copper, TCDDs, and furans from sample areas 3, 4, and 5 appear to be elevated. At these locations, mercury concentrations were between 1.9 and 3.1 parts per million (ppm), and concentrations of copper were between 82 and 145 ppm. Concentrations of 2, 3,7.8-TCDD were between 12 and 97 parts per trillion (ppt), and those of 2,3,7,8-TCDF were between 1,390 and 2,940 ppt. Concentrations of the aforementioned substances are at the upper end of ranges reported for locations in the Upper Bay (U.S. Fish and Wildlife Service, 1993) and approach concentrations observed by NOAA (1995) in sediments from Newark Bay. Therefore, while dredging reaches that involve sample locations 3, 4, and 5, it is recommended that measures be taken to limit drift of resuspended sediments into potentially less contaminated areas.

2. Contaminant levels in PDM from the access channel were not greatly different than those in unprocessed sediments, with two exceptions. The dioxin and furan concentrations observed in the PDM from sample areas 4 and 5 may be sufficient to pose risks to wildlife in a terrestrial food web (Meyn *et al.*, 1997). However, it has been noted that PDM from other Harbor projects will be compacted and covered with new PDM about every one to four months. Such activities, combined with the high pH of PDM, should prevent establishment of terrestrial vegetation and prevent the exposure of terrestrial species to contaminants of concern.

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3. Material for the final cap has not been clearly defined. In an undated letter by CESI to the Service, CESI stated that the Bayonne Landfill / PSE&G site will be capped with two feet of PDM. Yet, in the same document under Item "i," CESI states that PDM is to be covered with a clean soil cap. Exposure to sediment-borne contaminants is not expected to occur if the cap is of clean material and its integrity is maintained. However, it may be necessary to further investigate risks posed to terrestrial wildlife by sediment-borne contaminants, lime and / or cement if processed dredged material is considered for use as the final cap.

4. The proposed project has the potential of importing substantial quantities of PDM with contaminant concentrations greater than those already present in the area. Of particular concern for peregrine falcons are the organochlorine compounds, including pesticides, PCBs, dioxins, furans, and TCDD, identified in other Harbor projects. Such compounds may enter the food web through incidental ingestion of soil-like PDM by soil invertebrates and small mammals. Once in the food web, they may, through bioaccumulation and food chain transfer, reach levels in tissues of peregrine prey species that are harmful to peregrine falcons that ingest them.

5. Results of analyses on leachate from PDM indicate that contaminants will not migrate with shallow groundwater from the site. Any off-site migration of contaminants currently in the groundwater will be hindered by construction of sheet pile barriers around the site. Leachate test results and plans to construct barriers do not eliminate concerns about off-site migration of fine particulate material due to weathering. In addition to transporting contaminants, fine-grained PDM may alter the pH and chemical equilibria in receiving waters of neighboring wetland habitat. The Service recommends that measures to prevent migration via erosion of fine particulate material be aggressively employed for all stages of the project.

B. Project Mitigation

The Public Notice (PN) 97-09590-J1, dated October 24, 1997, identified that the proposed project would fill 18 acres of palustrine emergent and estuarine emergent wetlands and 10 acres of estuarine intertidal flat. No compensatory mitigation was given as part of the proposed project. The Service objected to the permit (letter dated December 10, 1997) because the applicant did not demonstrate that steps had been taken to avoid or minimize impacts to waters of the United States, including wetlands. However, subsequent information provided to the Service has convinced us that the project impacts to waters of the United States and wetlands have been avoided and minimized to the least amount of impact. Project impacts have been reduced to 7.53 acres of palustrine emergent wetlands and 2.02 acres of estuarine intertidal flat /beach. In addition, the applicant proposes to create 2.2 acres of estuarine intertidal flat and 8.1 acres of estuarine emergent wetlands along the northern portion of the site, and 2.5 acres of estuarine intertidal flat and 1.1 acres of maritime grassland / shrubland along the eastern portion of the project site, totalling 13.9 acres.

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SERVICE POSITION

Overall, the Service has concluded that contaminants in soils, sediments, and water on the Bayonne Landfill / PSE&G site are sufficiently elevated to be toxic to directly exposed biota, thereby contaminating the supply of food for peregrine falcons in the area. Consequently, remedial action is considered to be warranted and would benefit local natural resources.

For peregrine falcons, the greatest threat of exposure to toxic substances from the proposed project is considered to be from sediments used in the PDM, particularly if this material is to remain uncovered and undisturbed for an extended period of time. The sediments from dredging projects in the Harbor estuary are expected to be contaminated with toxic, bioaccumulating compounds (i.e., chlorinated pesticides, PCBs, dioxins, and furans). Dioxin concentrations in soils from the Bayonne Landfill / PSE&G site and the PDM may be sufficient to adversely affect peregrine falcons. Soil dioxin concentrations as low as 10 ppt may lead to unsafe levels of exposure in avian top predators (Meyn *et al.*, 1997). If pre-project concentrations in soils from the Bayonne Landfill / PSE&G site are near those observed by the National Oceanic and Atmospheric Administration (1995) in sediments nearby, peregrine falcons feeding in the project area are already at risk of adverse effects from exposure to dioxins.

Except for contaminant levels in the sediments from dredging the access channel, the Corps has not provided information regarding contaminant levels in the PDM that will be disposed of at the Bayonne Landfill / PSE&G site. Contaminants are to be addressed in the future as dredging projects are identified. Until chemical analyses of bulk sediments are performed, the Service will assume that concentrations of chlorinated pesticides, PCBs, dioxins, and furans in dredged sediments will be greater than those already occurring at Bayonne Landfill / PSE&G and that placement of PDM at the site may adversely affect peregrine falcons. However, in the Biological Assessment, the Corps has stated that the applicant would be required to cover PDM with 12 inches of clean fill material (if left exposed for more than one month) if a Department of the Army permit is issued. Also, the applicant will be responsible for monitoring the site during the life of the project for peregrine falcon use and report any findings to the Service. Thus, the Service concurs with the Corps that the proposed project is not likely to adversely impact the peregrine falcon and further consultation under Section 7 of the ESA is not necessary. If project plans change or the above-mentioned condition is not incorporated into a DA permit or enforced, further consultation with the Service will be necessary.

In addition, the Service has no objection to the subject mitigation plan as proposed. However, the Service recommends permanent protection of the mitigation area from future development once the permitted work has been successfully completed. The Service also requests copies of the mitigation monitoring reports.

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Should you have any questions regarding these comments please contact John Staples or John Cochnar of my staff.

Sincerely,

Clifford G. Day

Clifford G. Day
Supervisor

REFERENCES

EnviroScope, Incorporated. 1997. OENJ Bayonne Project: Permit Application, Waterfront Development, General Freshwater Wetlands Numbers 4 and 6, and Tidal Wetlands. EnviroScope Project Number 96-100. Boulder, Colorado.

Meyn, O., M. Zeeman, M.J. Wise, and S.E. Keane. 1997. Terrestrial wildlife risk assessment for TCDD in land-applied pulp and paper mill sludge. Env. Toxicol. Chem. 16(9):1789-1801.

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U.S. Fish and Wildlife Service. 1993. Planning Aid Report. New York Harbor Dredging Reconnaissance: Fish and Wildlife Resources and Contaminants Study for Red Hook Anchorage and New York Mud Dump Ocean Disposal Site. U. S. Department of the Interior, Fish and Wildlife Service, Pleasantville, New Jersey.

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APPENDIX B

Coastal Zone Management Report for the dPEIS for the Dredged Material Management Plan for the Port of New York/New Jersey

Appendix B.1 NEW YORK COASTAL MANAGEMENT PROGRAM

1. **Project:** Dredged Material Management Plan (DMMP) for the Port of New York and New Jersey

2. **Applicant:** U.S. Army Corps of Engineers, New York District

3. **Applicable Policies:** Based on a review of the latest (August, 1982) Coastal Management Program policies for New York (including New York City), each option of the DMMP has been reviewed to identify all potentially applicable policies. Section 4 summarizes each of the 17 policies which apply to the DMMP. Section 5 consists of a table of policies applicable to each DMMP option under consideration.

4. **Policies which apply to the DMMP:**

a. Applicable New York State Policies:

(1) **Policy 3**

Further develop the State's major ports of Albany, Buffalo, New York, Ogdensburg, and Oswego as centers of commerce and industry, and encourage the siting, in these port areas, including those under the jurisdiction of State public authorities, of land use and development which is essential to, or in support of, the waterborne transportation of cargo and people.

(2) **Policy 7**

Significant coastal fish and wildlife habitats will be protected, preserved, and, where practical, restored so as to maintain their viability as habitats.

(3) **Policy 8**

Protect fish and wildlife resources in the coastal area from the introduction of hazardous wastes and other pollutants which bioaccumulate in the food chain or which cause significant sublethal or lethal effect on those resources.

(4) **Policy 12**

Activities or development in the coastal area will be undertaken so as to minimize damage to natural resources and property from flooding and erosion by protecting natural protective features including beaches, dunes, barrier islands and bluffs.

(5) **Policy 15**

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Mining, excavation or dredging in coastal waters shall not significantly interfere with the natural coastal processes which supply beach materials to land adjacent to such waters and shall be undertaken in a manner which will not cause an increase in erosion of such land.

(6) Policy 16

Municipal, industrial, and commercial discharge of pollutants, including but not limited to, toxic and hazardous substances, into coastal waters will conform to State and National water quality standards.

(7) Policy 18

To safeguard the vital economic, social and environmental interests of the State and of its citizens, proposed major actions in the coastal area must give full consideration to those interests, and to the safeguards which the State has established to protect valuable coastal resource areas.

(8) Policy 21

Water dependent and water enhanced recreation will be encouraged and facilitated, and will be given priority over non-water related uses along the coast.

(9) Policy 23

Protect, enhance and restore structures, districts, areas or sites that are of significance in the history, architecture, archeology or culture of the State, its communities, or the Nation.

(9) Policy 25

Protect, restore or enhance natural and man-made resources which are not identified as being of statewide significance, but which contribute to the overall scenic quality of the coastal area.

(10) Policy 35

Dredging and dredge spoil disposal in coastal waters will be undertaken in a manner that meets existing State dredging permit requirements, and protects significant fish and wildlife habitats, scenic resources, natural protective features, important agricultural lands, and wetlands.

(11) Policy 37

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Best management practices will be utilized to minimize the non-point discharge of excess nutrients, organics and eroded soils into coastal waters.

(12) **Policy 38**

The quality and quantity of surface water and groundwater supplies, will be conserved and protected, particularly where such waters constitute the primary or sole source of water supply.

(13) **Policy 41**

Land use or development in the coastal area will not cause National or State air quality standards to be violated.

(14) **Policy 44**

Preserve and protect tidal and freshwater wetlands and preserve the benefits derived from these areas.

b. New York City Management Plan

(1) **Policy B**

Improve channels as necessary to maintain and stimulate economic growth.

(2) **Policy G**

Maintain and protect New York City beaches to the fullest extent possible.

5. Summary table of New York policies and applicability to DMMP options

The table below identifies all New York state policies discussed in Section 4 and the DMMP options under consideration. The DMMP options include the "no action" option, contaminant reduction, sediment reduction methods, beneficial uses such as the Historic Area Remediation Site (HARS), habitat creation, and land remediation, decontamination/ treatment technologies, contained aquatic disposal pits, and confined disposal facilities (CDFs) such as upland CDFs, nearshore, CDFs, and island CDFs. An 'X' indicates that the New York policy listed is potentially applicable to the DMMP option under consideration and will be investigated in further detail if the need arises.

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NY STATE POLICIES	No Action	Contam Redux	Sed Redux	HARS	Habitat Creation	Land Remediatn	Decon	CAD Pits	Upland CDFs	Nearshore CDFs	Island CDFs
Policy 3							X		X		
Policy 7			X	X	X			X		X	X
Policy 8			X	X	X	X	X	X	X	X	X
Policy 12			X		X	X	X		X	X	
Policy 15			X	X	X			X		X	X
Policy 16						X	X		X		
Policy 18			X	X	X	X	X	X	X	X	X
Policy 21			X	X	X			X		X	X
Policy 23			X	X	X	X	X	X	X	X	X
Policy 25			X	X	X	X	X	X	X	X	X
Policy 35			X	X	X	X	X	X	X	X	X
Policy 37		X	X	X	X			X	X	X	X
Policy 38					X	X	X		X	X	
Policy 41					X	X	X		X		
Policy 44					X	X	X		X		
Policy B			X		X			X		X	X
Policy G			X		X					X	

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Appendix B.2 NEW JERSEY COASTAL RESOURCE AND MANAGEMENT POLICIES

1. **Project:** Dredged Material Management Plan (DMMP) for the Port of New York and New Jersey

2. **Applicant:** U.S. Army Corps of Engineers, New York District

3. **Applicable Policies:** Based on a review of the latest (December 7, 1998) amended Coastal Resource and Management Policies for New Jersey, each option of the DMMP has been reviewed to identify all potentially applicable policies. Section 4 summarizes each of the 31 policies, which apply to the DMMP. Section 5 consists of a table of policies applicable to each DMMP option under consideration.

4. **Policies which apply to the DMMP:**

7:7E-3.2 SHELLFISH HABITAT 3

7:7E-3.3 SURF CLAM AREAS 3

7:7E-3.4 PRIME FISHING AREAS 3

7:7E-3.5 FINFISH MIGRATORY PATHWAYS 4

7:7E-3.6 SUBMERGED VEGETATION HABITAT 4

7:7E-3.7 NAVIGATION CHANNELS 6

7:7E-3.11 PORTS 6

7:7E-3.12 SUBMERGED INFRASTRUCTURE ROUTES 6

7:7E-3.13 SHIPWRECKS AND ARTIFICIAL REEFS 6

7:7E-3.15 INTERTIDAL AND SUBTIDAL SHALLOWS 7

7:7E-3.16 DUNES 7

7:7E-3.17 OVERWASH AREAS 8

7:7E-3.19 EROSION HAZARD AREAS 9

7:7E-3.22 BEACHES 9

7:7E-3.23 FILLED WATER'S EDGE 10

7:7E-3.27 WETLANDS 11

7:7E-3.28 WETLANDS BUFFERS 16

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7:7E-3.36 HISTORIC AND ARCHAEOLOGICAL RESOURCES 16

7:7E-3.38 ENDANGERED OR THREATENED WILDLIFE OR VEGETATION SPECIES HABITATS 18

7:7E-3.40 PUBLIC OPEN SPACE 18

7:7E-3.41 SPECIAL HAZARD AREAS 19

7:7E-3.43 SPECIAL URBAN AREAS 19

7:7E-3.45 HACKENSACK MEADOWLANDS DISTRICT 19

7:7E-4.2 (F) STANDARDS RELEVANT TO MAINTENANCE DREDGING ARE AS FOLLOWS: 20

7:7E-4.2 (G) STANDARDS RELEVANT TO NEW DREDGING ARE AS FOLLOWS: 22

7:7E-4.2 (H) STANDARDS RELEVANT TO DREDGED MATERIAL DISPOSAL ARE AS FOLLOWS: 23

7:7E-4.2 (I) STANDARDS RELEVANT TO DUMPING (SOLID WASTE OR SLUDGE) ARE AS FOLLOWS: 24

7:7E-4.2 (L) STANDARDS RELEVANT TO SAND AND GRAVEL EXTRACTION ARE AS FOLLOWS: 25

7:7E-7.11 COASTAL ENGINEERING 26

7:7E-7.11 (D) STANDARDS RELEVANT TO BEACH NOURISHMENT ARE AS FOLLOWS: 26

7:7E-7.11 (E) STANDARDS RELEVANT TO STRUCTURAL SHORE PROTECTION ARE AS FOLLOWS: 26

7:7E-7.12 DREDGE SPOIL DISPOSAL ON LAND 28

7:7E-8.2 MARINE FISH AND FISHERIES 28

7:7E-8.4 WATER QUALITY 29

7:7E-8.5 SURFACE WATER USE 29

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7:7E-3.2 Shellfish habitat

Policy:

1. Development which would result in the destruction, condemnation (downgrading of the shellfish growing water classification) or contamination of shellfish habitat is prohibited.

   a. The term "destruction" includes actions of filling to create fast land, overboard dumping or disposal of solids or spoils which would smother shellfish populations, or create unsuitable conditions for shellfish colonization or the creation of bottom depressions with anoxic conditions.

2. Maintenance dredging (defined at N.J.A.C. 7:7E-4.11(f)) within shellfish habitat is conditionally acceptable, provided the disturbance to shellfish habitat is minimized to the greatest extent possible.

3. New dredging adjacent to shellfish habitat is discouraged in general, but may be conditionally acceptable if it can be demonstrated that the proposed dredging activities will not adversely affect shellfish habitat, population or harvest. If the Department determines dredging to be acceptable, dredging shall be managed pursuant to N.J.A.C. 7:7E-4.11(g) so as not to cause significant mortality of the shellfish due to increased turbidity and sedimentation, resuspension of toxic chemicals, or any other occurrence which will interfere with the natural functioning of the shellfish habitat.

4. Development required for national security for which there exists no other prudent and feasible alternative site is acceptable under this rule, provided that the shellfish resource is salvaged and mitigated pursuant to a plan approved in writing by the Department. The applicant is responsible for all the expenses of resource salvaging and mitigation. All such programs shall be coordinated with the appropriate shellfish management agency.

7:7E-3.3 Surf clam areas

Policy:

1. Development which would result in the destruction, condemnation, or contamination of surf clam areas is prohibited.

2. Development within surf clam areas is conditionally acceptable only if the development is of national interest and no prudent or feasible alternative sites exist.

7:7E-3.4 Prime Fishing Areas

Policy:

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1. Permissible uses of prime fishing areas include recreational and commercial finfishing and shellfishing, as presently regulated by NJDEP Division of Fish, Game, and Wildlife, scuba diving and other water related recreational activities.

2. Prohibited uses include sand or gravel submarine mining which would alter existing bathymetry to a significant degree so as to reduce the high fishery productivity of these areas. Disposal of domestic or industrial waste must meet applicable State and Federal effluent limitations and water quality standards.

7:7E-3.5 Finfish migratory pathways

Policy:

1. Development, such as dams, dikes, spillways, channelization, tide gates and intake pipes, which creates a physical barrier to the movement of fish along finfish migratory pathways is prohibited, unless acceptable mitigating measures such as fish ladders, erosion control, or oxygenation are used.

2. Development which lowers water quality to such an extent as to interfere with the movement of fish along finfish migratory pathways or to violate State and Delaware River Basin Commission water quality standards is prohibited.

   a. Mitigating measures are required for any development which would result in: lowering dissolved oxygen levels, releasing toxic chemicals, raising ambient water temperature, impinging or suffocating fish, entrainment of fish eggs, larvae or juveniles, causing siltation, or raising turbidity levels during migration periods.

3. Water's edge development which incorporates migration access structures, such as functioning fish ladders, will be conditionally acceptable, provided that the NJDEP, Division of Fish, Game and Wildlife approves the design of the access structure. As of January, 1994, the NJDEP Division of Fish, Game and Wildlife is currently evaluating anadromous fish spawning areas for potential enhancement work. This may include building of fish ladders, removal of obstructions, stocking, and other means. A development proposal shall be consistent with these Department efforts.

7:7E-3.6 Submerged vegetation habitat

Policy:

1. Regulated activities in submerged vegetation habitat are prohibited except for the following:

   a. Trenching for utility pipelines and submarine cables in the public interest, provided there is no practicable or feasible alternative alignment, the impact area is minimized and that, following pipeline or cable installation, the disturbed area is restored to its preconstruction contours and conditions. This may include subsequent monitoring and replanting of the disturbed area if these species have not recolonized the disturbed area within three years. The

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use of directional drilling techniques for utility installations is strongly encouraged, rather than the use of trenching;

b. New dredging of State and Federal navigation channels provided that there is no practicable or feasible alternative to avoid the vegetation; and that impacts to the habitat area (for example dredging width, length and depth) are minimized to the maximum extent practicable. Mitigation will be required for destruction of one acre or more which possess submerged aquatic vegetation;

c. Maintenance dredging as defined at N.J.A.C. 7:7E-4.2(f) of previously authorized, existing State and Federal navigation channels and associated disposal areas provided that there is no practicable or feasible alternative to avoid the vegetation and that impacts to the habitat area are minimized to the maximum extent practicable;

d. New and maintenance dredging as defined at N.J.A.C. 7:7E-4.2(f), of previously authorized operating marinas and any necessary access channels to the expanded portion of such marinas (this exception does not include the boat basin of the expanded portion of the marina) and existing launching facilities with 25 or more dockage, storage or trailer parking units and their associated access channels, provided the proposed areas to be dredged (such as channel length, depths and widths) are minimized to the maximum extent practicable;

e. Maintenance dredging as defined at N.J.A.C. 7:7E-4.2(f) to regain access to existing private docks, piers, boat ramps and mooring piles not associated with marinas that were previously dredged to an authorized channel and/or mooring depth, width and length, provided there is no practicable or feasible alternative on site that would avoid dredging in submerged vegetation habitat;

2. Regulated activities in upland or water areas adjacent to submerged vegetation habitat or in submerged vegetation habitat which result in erosion or turbidity increases in the waters supporting submerged vegetation are prohibited unless mitigating measures are provided.

3. Compensation for unavoidable, permanent significant impacts to submerged vegetation habitats, when required, shall consist of the establishment of self-sustaining habitat for the appropriate species in accordance with scientifically-documented transplanting methods. Monitoring and replanting shall be carried out biannually to demonstrate persistence of the compensatory habitat for a minimum of three years. The following must be documented for any area proposed for seagrass habitat restoration: that the area previously supported seagrass but no longer does; the specific cause(s) of seagrass elimination; and that the specific condition(s) or action(s) responsible for elimination of seagrass has since ceased. Priority will be given to in-kind restoration of seagrass habitat in as close proximity as possible to the impacted site. No compensation credit will be given for attempts to plant seagrass within unvegetated interpatch areas of

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existing seagrass habitat or for attempts to increase bottom coverage within existing seagrass beds (defined as an area where seagrass rhizomes overlap, or where seagrass shoots intermingle within less than one square meter).

7:7E-3.7 Navigation channels

Policy:

1. New or maintenance dredging of existing navigation channels is conditionally acceptable providing that the condition under the new or maintenance dredging rule is met (see N.J.A.C. 7:7E-4.2(f) and (g)).

2. Development which would cause terrestrial soil and shoreline erosion and siltation in navigation channels shall utilize appropriate mitigation measures.

3. Development which would result in loss of navigability is prohibited.

4. Any construction which would extend into a navigation channel is prohibited.

5. The placement of structures within 50 feet of any authorized navigation channel is discouraged, unless it can be demonstrated that the proposed structure will not hinder navigation.

7:7E-3.11 Ports

Policy:

1. Any use which would preempt or interfere with port uses of this water area is prohibited.
2. Aquaculture and dumping of solid waste or semi-solid waste is prohibited.
3. Docks and piers for cargo movements are encouraged.

7:7E-3.12 Submerged infrastructure routes

Policy:

1. Any activity which would increase the likelihood of infrastructure damage or breakage, or interfere with maintenance operations is prohibited.

7:7E-3.13 Shipwrecks and artificial reefs

Policy:

1. Acceptable uses of these submerged habitats include recreational and commercial finfishing and shellfishing, and scuba diving. In addition, construction of new or expanded artificial reefs by the deposition of weighed non-toxic material is conditionally acceptable provided that:

    a. It can be demonstrated that the material will not wash ashore and interfere with either navigation as regulated by U.S. Coast Guard or commercial fishing operations; and
    b. Placement of the material and ultimate management of the habitat is coordinated with the DEP Division of Fish, Game and Wildlife.

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2. Any use, except archeological research, which would significantly adversely affect the usefulness of this special area as a fisheries resource is prohibited. Persons conducting archeological research which significantly affects the usefulness of a shipwreck for fisheries purpose shall compensate for this loss by creation of an artificial reef or equal habitat value.

7:7E-3.15 Intertidal and Subtidal Shallows

Policy:

1. Development, filling, new dredging or other disturbance is discouraged but may be permitted in accordance with the acceptability conditions found at N.J.A.C. 7:7E-4.2. Dredging is acceptable only if the following criteria are satisfied in addition to the acceptability conditions found at N.J.A.C. 7:7E-4.2:

   a. The dredging of intertidal and subtidal shallows may be acceptable to maintain adequate water depths for any existing or new marinas with 25 or more slips or public launching facilities and existing ports.

2. Submerged infrastructure is conditionally acceptable, provided that:

   a. There is no feasible alternative route that would not disturb intertidal and subtidal shallows;

   b. The infrastructure is buried deeply enough to avoid exposure or hazard;

   c. Directional drilling for the purpose of installation of submerged infrastructure is preferred to trenching where feasible; and

   d. All trenches are backfilled to the preconstruction depth with naturally occurring sediment.

3. The filling of intertidal and subtidal shallows for beach nourishment is conditionally acceptable provided it meets the requirements found under the Filling rule (N.J.A.C. 7:7E-4.2(j)) and the Coastal Engineering rule (N.J.A.C. 7:7E-7.11(d)).

4. If the destruction of intertidal and subtidal shallows takes place, mitigation shall be carried out at a ratio of one acre created to one acre lost. Mitigation sites shall be located within the same estuary whenever feasible. Specific filling activities acceptable under N.J.A.C. 7:7E-4.2(j)2iii(1) and 7.11(d) are exempt from this mitigation requirement.

7:7E-3.16 Dunes

Policy:

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1. Development is prohibited on dunes, except for development that has no practicable or feasible alternative in an area other than a dune, and that will not cause significant adverse long-term impacts on the natural functioning of the beach and dune system, either individually or in combination with other existing or proposed structures, land disturbances or activities. In addition, the removal of vegetation from any dune, and the excavation, bulldozing or alteration of dunes is prohibited, unless these activities are a component of a Department approved beach and dune management plan. Examples of acceptable activities are:

2. Limited stairs, walkways, pathways and boardwalks to permit access across dunes to beaches, in accordance with N.J.A.C. 7:7E-3A , provided they cause minimum feasible interference with the beach and dune system;

3. The planting of native vegetation to stabilize dunes in accordance with N.J.A.C. 7:7E-3A;

4. Sand fencing, either a brush type barricade or picket type, to accumulate sand and aid in dune formation in accordance with N.J.A.C. 7:7E-3A;

5. Shore protection structures which meet the use conditions of N.J.A.C. 7:7E-7.11(e); and,

6. Linear development which meets the Rule on Location of Linear Development (N.J.A.C. 7:7E-6.1).

7. The creation of dunes for the purpose of shore protection is strongly encouraged. According to the National Flood Insurance Program (NFIP) Regulations established by the Federal Emergency Management Agency (FEMA), primary frontal dunes will not be considered as effective barriers to base flood storm surges and associated wave action where the cross-sectional area of the primary frontal dune, as measured perpendicular to the shoreline and above the 100-year stillwater flood elevation and seaward of the dune crest, is equal to or less than 540 square feet. This standard represents the minimal dune volume to be considered effective in providing protection from the 100-year storm surge and associated wave action, and should represent a "design dune" goal.

7:7E-3.17 Overwash Areas

Policy:

1. Development is prohibited on overwash areas, except for development that has no prudent or feasible alternative in an area other than an overwash area, and that will not cause significant adverse long-term impacts on the natural functioning of the beach and dune system, either individually or in combination with other existing or proposed structures, land disturbances or activities. Examples of acceptable activities are:

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a. Creation of dunes or expansion of existing dunes in accordance with N.J.A.C. 7:7E-3A;

b. Demolition and removal of paving and structures;

c. Limited, designated access ways for pedestrians and authorized motor vehicles between public streets and the beach that provide for the minimum feasible interference with the beach and dune system and are so oriented as to provide the minimum feasible threat of breaching or over-topping as a result of storm surge or wave runup;

d. Shore protection structures which meet the use conditions of N.J.A.C. 7:7E-7.11(e);

e. Linear development which meets the Rule on Location of Linear Development (N.J.A.C. 7:7E-6.1);

f. Removal of newly deposited overwash fans from public roads and or developed lots; and

7:7E-3.19 Erosion Hazard Areas

Policy:

1. Development is prohibited in erosion hazard areas, except for:

   a. Linear development which meets the Rule on Location of Linear Development (N.J.A.C. 7:7E-6.1);

   b. Shore protection activities which meet the appropriate Coastal Engineering Use Rule (N.J.A.C. 7:7E-7.11);

7:7E-3.22 Beaches

Policy:

1. Development is prohibited on beaches, except for development that has no prudent or feasible alternative in an area other than a beach, and that will not cause significant adverse long-term impacts to the natural functioning of the beach and dune system, either individually or in combination with other existing or proposed structures, land disturbances or activities. Examples of acceptable activities are:

   a. Dune creation and related sand fencing and planting of vegetation for dune stabilization, in accordance with N.J.A.C. 7:7E-3A;

   b. The reconstruction of existing amusement and fishing piers and boardwalks;

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c. Shore protection structures which meet the use conditions of N.J.A.C. 7:7E-7.11(e);

d. Linear development which meets the Rule on Location of Linear Development (N.J.A.C. 7:7E-6.1);

2. Beach maintenance activities which do not adversely affect the natural functioning of the beach and dune system, and which do not preclude the development of a stable dune along the back beach area. These activities include routine cleaning, debris removal, mechanical sifting, maintenance of access ways and Department approved dune creation and maintenance activities; and Post-storm beach restoration activities involving the placement of clean fill material on beaches, and the mechanical redistribution of sand along the beach profile from the lower beach to the upper beach. These post-storm activities, which are different than routine beach maintenance activities, must be carried out in accordance with the standards found at N.J.A.C. 7:7E-3A.

3. Public access and barrier free access to beaches and the water's edge is encouraged. Coastal development that unreasonably restricts public access is prohibited.

7:7E-3.23 Filled Water's Edge

Policy:

1. The waterfront portion of the site shall be developed with a water dependent use (see N.J.A.C. 7:7E-1.5(c) for definitions) or left undeveloped for future water dependent uses;

2. On the remaining non-waterfront portion of the site, provision of additional area devoted to water dependent or water-oriented uses may be required as a special case at locations which offer a particularly appropriate combination of natural features and opportunity for waterborne commerce and recreational boating; and

3. On large filled water's edge sites, of about 10 acres or more upland acres, where water-dependent and water-oriented uses can co-exist with other types of development, a greater mix of land uses may be acceptable or even desirable. In these cases, a reduced waterfront portion, that is, less than that provided by a 100 foot setback, may be acceptable provided that non-water related uses do not adversely affect either access to or use of the waterfront portion of the site.

4. On filled water's edge sites without direct access to navigable water, the area to be devoted to water related uses will be determined on a case-by-case basis.

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5. On filled water's edge sites with an existing or pre-existing water dependent use, that is, one existing at any time since July of 1977, development must comply with the following additional conditions:

6. Along the Hudson River and in other portions of the Northern Waterfront and Delaware River Region, where water dependent uses are deemed infeasible, some part of the waterfront portion of the site may be acceptable for non-water dependent development under the following conditions:

   a. The development proposal addresses, as a minimum, past use of the site as well as potential for future water dependent, commercial, transportation, recreation, and compatible maritime support services uses;

   b. The developed land uses closest to the water's edge are water oriented;

   c. Currently active maritime port and industrial land uses are preserved;

   d. Adverse impacts on local residents and neighborhoods are mitigated to the maximum extent practicable; and

   e. All other coastal rules are met.

7:7E-3.27 Wetlands

Policy:

1. Development in wetlands defined under the Freshwater Wetlands Protection Act of 1987 is prohibited unless the development is found to be acceptable under the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A).

2. Development of all kinds in all other wetlands not defined in (1) above is prohibited unless the Department can find that the proposed development meets the following four conditions:

   a. Requires water access or is water oriented as a central purpose of the basic function of the activity (this rule applies only to development proposed on or adjacent to waterways). This means that the use must be water dependent as defined in N.J.A.C. 7:7E-1.5;

   b. Has no prudent or feasible alternative on a non-wetland site;

   c. Will result in minimum feasible alteration or impairment of natural tidal circulation (or natural circulation in the case of non-tidal wetlands); and

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d. Will result in minimum feasible alteration or impairment of natural contour or the natural vegetation of the wetlands.

3. In particular, dumping solid or liquid wastes and applying or storing certain pesticides on wetlands are prohibited.

4. No action by the Commissioner shall prohibit, restrict or impair the exercise or performance of the powers and duties conferred or imposed by law on the Department of Environmental Protection, the Natural Resource Council and the State Mosquito Control Commission in said Department, the Department of Health, or any mosquito control or other project or activity operating under or authorized by the provisions of chapter 9 of Title 26 of Revised Statutes. This rule does not supersede the authority of the State Mosquito Commission to undertake mosquito control projects authorized by chapter 9 of Title 26 of the Revised Statutes.

5. Development that adversely affects white cedar stands such as water table drawdown, surface and groundwater quality changes and the introduction of non-native plant species is prohibited.

6. For projects which require a Waterfront Development permit, the reuse of former dredged material disposal sites for continued dredged material disposal is conditionally acceptable provided the following criteria are met:

a. The site has been used for dredged material disposal within the past 10 years;

b. The site has existing dikes or berms in sound condition, and/or has sufficient area of previously disposed material within the previously disturbed disposal area to allow the construction of structurally sound dikes and berms;

c. There are no anticipated adverse effects on threatened or endangered species;

d. There are no colonial nesting birds present on site which would be adversely affected (seasonal restrictions may be required);

e. No wetlands regulated pursuant to the Wetlands Act of 1970 would be adversely affected

f. The former dredged material disposal area is not subject to daily tidal innundation, and the vegetation community is limited primarily to scrub/shrub or phragmites;

g. and the required Waterfront Development permit and Water Quality Certification are obtained

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7. If an application to disturb or destroy wetlands meets the standards for permit approval, the Department will require the applicant to mitigate for the loss or degradation of the wetlands in accordance with the following:

   a. Mitigation for the loss of wetlands subject to the Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et seq., shall meet the standards of N.J.A.C. 7:7A.

   b. When a permit allows the disturbance or loss of wetlands by filling or other means, this disturbance or loss shall be compensated for as specified under (h)9 below unless the applicant can prove through the use of productivity models or other similar studies, that by restoring or creating a lesser area, there will be replacement of wetlands of equal ecological value. In order to demonstrate equal ecological value, the applicant shall survey and provide written documentation regarding, at a minimum, existing soil, vegetation, water quality functions, flood storage capacity, soil erosion and sediment control functions, and wildlife habitat conditions and detail how the proposed mitigation plan will replace the ecological values of the wetland to be lost or disturbed.

   c. Mitigation shall be performed prior to or concurrent with activities that will permanently disturb wetlands and immediately after activities that will temporarily disturb these habitats. Applicants shall be required to obtain a secured bond, or other surety acceptable to the Department including an irrevocable letter of credit or money in escrow, that shall be sufficient to hire an independent contractor to complete and maintain the proposed mitigation should the applicant default. The performance bond for the construction of the proposed mitigation shall be posted in an amount equal to 115 percent of the estimated cost of construction of the mitigation activity. In addition, a maintenance bond to assure the success of the mitigation shall be posted in the amount equal to 30 percent of the estimated cost of construction. The performance and maintenance bonds will be reviewed annually and shall be adjusted to reflect current economic factors.

   d. The performance bond or other surety will be released upon an inspection by the Department confirming completion of construction and planting of the mitigation site. The maintenance bond will be released upon the Department's confirmation that the three-year, post-planting monitoring period has been successfully completed and that no additional maintenance is required in order to meet the specifications of the approved mitigation plan.

   e. Where the Department permits a mitigation surface area of less than 2:1, monitoring by the permittee at a frequency determined by the Department to be appropriate on a case-by-case basis shall be required. In such cases,

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additional mitigation or further remedial action shall be required at a level and within the forms determined to be appropriate on a case-by-case basis by the Department when the Department determines that a net loss of equal ecological value occurs. Under no circumstances shall the mitigation area be smaller than the disturbed area. Creation of wetlands from existing natural resources protected under the applicable Special Area Rules (N.J.A.C. 7:7E-3) is not an acceptable form of mitigation, nor is transfer of title of existing wetlands or intertidal or subtidal shallows to a government agency or conservation organization.

8. The Department will not consider a mitigation proposal in determining whether a project should be awarded a permit, but will require mitigation as a condition of any permit found to be acceptable under the criteria listed in N.J.A.C. 7:7A-3 and/or N.J.A.C. 7:7E-3.15 and 3.27.

9. As a condition of every creation or enhancement plan authorized under this subsection, an applicant shall sign a Department approved conservation easement and register this restriction on the deed for the subject parcel. This restriction will provide that no regulated activities will occur in the created or enhanced wetland area. This restriction shall be memorialized in a deed restriction meeting the Department's requirements and shall run with the land and be binding upon the applicant and the applicant's successors in interest in the premises or any part thereof. The permit will not become effective until the deed restriction is registered with the county clerk or Registrar of Deeds and Mortgages, if applicable. Any regulated activities undertaken on the site before a copy of the registered restriction is submitted to the Department will be considered in violation of these rules.

10. No future development will be permitted on the mitigation site unless the Department finds that the regulated activity has no practicable alternative which would:

    a. Not involve a wetland site;

    b. Involve a wetland but would have a less adverse impact on the aquatic ecosystem;

    c. Not have other significant adverse environmental consequences, that is it shall not merely substitute other significant environmental consequences, for those attendant on the original proposal; and

    d. There is a compelling public need for the activity greater than the need to protect the mitigation site.

11. The Department distinguishes between four types of mitigation: restoration, creation, enhancement, and contribution. Depending on the circumstances under which

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wetlands are lost or disturbed, different types of mitigation may be required by the Department. The types of mitigation are explained below, in decreasing order of their desirability:

12. Restoration refers to actions performed on the site of a regulated activity, within six months of the commencement of the regulated activity, in order to reverse or remedy the effects of the activity on the wetland and to restore the site to preactivity condition.

13. Restoration shall be required at a ratio of one acre created to one acre lost or disturbed. If restoration actions are performed more than six months after the commencement of the regulated activity which disturbed the wetland, these actions will no longer be considered restoration, but will be considered creation, and will be governed by the provisions of (h)9ii(3) below.

14. If restoration actions are performed on degraded wetlands offsite, these actions will be considered enhancement and will be governed by the provisions of (h)9iii below.

15. Creation refers to actions performed to establish wetland characteristics, habitat and functions on:

    a. A non-wetlands site; or

    b. A former wetlands site which has been filled or otherwise disturbed such that it no longer retains wetland characteristics. If the site retains wetland characteristics such that it meets the definition of a degraded wetland pursuant to N.J.A.C. 7:7A-1.4, it is not eligible for use in creation. Rather, it is only eligible for enhancement activities pursuant to (h)9iii below. If the disturbance to a formerly wetlands site is the result of a violation of the Freshwater Wetlands Protection Act and/or the Wetlands Act of 1970, the Department may, at its discretion, condition an approval of a mitigation proposal, or a permit, or both, on the resolution of the violation.

16. Creation will be required at a ratio of two acres created to one acre lost or disturbed. Under no circumstances shall the mitigation area be smaller than the disturbed area.

17. Creation shall not be permitted on a site that retains wetlands characteristics.

18. Enhancement refers to actions performed to improve the characteristics, habitat and functions of an existing, degraded wetland such that the enhanced wetland will have resource values and functions similar to an undisturbed wetland. The enhancement requirement will be determined on a case-by-case basis.

19. Contribution refers to the donation of money or land. The Department will permit the donation of land only after determining that all alternatives to the donation are not practicable or feasible, or that the permanent protection of the land will provide

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ecological benefits equal to or greater than those resulting from the creation of wetlands. This determination will be made in consultation with the United States Environmental Protection Agency (USEPA) for freshwater wetlands. Monies donated shall be used for the purchase of land to provide areas for wetland losses, to provide areas for restoration of degraded wetlands, and to provide areas to preserve wetlands and transition areas determined to be of critical importance, and the transfer of funds for research to enhance the practice of mitigation. If money is donated, the Department will require an amount equivalent to the lesser of the following costs:

a. **Purchasing and enhancing existing degraded wetlands, resulting in preservation of wetlands of equal ecological value to those which are being lost; or**
b. Purchase of property and the cost of creation of wetlands of equal ecological value to those which are being lost.

20. If the Department determines that land may be donated as part or all of a contribution to mitigate for the destruction of freshwater wetlands, the Wetlands Mitigation Council must first determine that the donated land has the potential to be a valuable component of the wetlands ecosystem.

21. All mitigation projects shall be carried out on-site to the maximum extent practicable. Mitigation of wetlands, on- site or off-site, from other existing climax habitats is not practicable and is discouraged.

    a. If on-site mitigation is found to be impracticable, off-site mitigation shall be considered and implemented within the same watershed or estuary if feasible.

22. All mitigation proposals submitted to the Department shall be prepared in accordance with N.J.A.C. 7:7E-3B.

7:7E-3.28 Wetlands Buffers

Policy:

1. Development is prohibited in a wetlands buffer around all other wetlands, unless it can be demonstrated that the proposed development will not have a significant adverse impact and will cause minimum feasible adverse impact, through the use of mitigation where appropriate on the wetlands, and on the natural ecotone between the wetlands and surrounding upland. The precise geographic extent of the actual wetlands buffer required on a specific site shall be determined on a case-by-case basis using these standards.

7:7E-3.36 Historic and Archaeological Resources

Policy:

1. Development that detracts from, encroaches upon, damages, or destroys the value of historic and archaeological resources is discouraged.

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2. Development that incorporates historic and archaeological resources in sensitive adaptive reuse is encouraged.

3. Scientific recording and/or removal of the historic and archaeological resources or other mitigation measures must take place if the proposed development would irreversibly and/or adversely affect historic and archaeological resources. Surveys and reports to identify and evaluate historic and archaeological resources potentially eligible for the New Jersey or National Registers shall be performed by professionals who meet the National Park Service's Professional Qualifications Standards in the applicable discipline. Professional procedures and reports shall meet the applicable Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation and the New Jersey Historic Preservation Office's professional reporting and surveying guidelines, once these guidelines are promulgated as rules, in accordance with the Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq. A description of the qualifications and performance standards is available at the Historic Preservation Office.

4. New development in undeveloped areas near historic and archaeological resources is conditionally acceptable, provided that the design of the proposed development is compatible with the appearance of the historic and archaeological resource. For archaeological resources within the area of the undertaking, avoidance and protection is appropriate. When this is not feasible and prudent, and these resources are of value solely for the information which they contain, archaeological data recovery to mitigate the project impact will be required.

5. Recovery of shipwrecks consistent with the protection of historic values and environmental integrity of shipwrecks and their sites may be permitted subject to the following conditions:

   a. The proposed project is in the public interest;

   b. The archaeological knowledge gained will outweigh the loss to future archaeological research and to the public of the preserved shipwreck;

   c. The applicant has expertise in underwater archaeology as outlined by the Federal Requirements 36 CFR 66, pursuant to the Archaeological and Historic Preservation Act of 1974 (P.L. 93-291), and through the National Environmental Policy Act, the National Historic Preservation Act of 1966, (as amended), the Abandoned Shipwreck Act of 1987, and their respective implementing regulations and guidelines;

   d. Artifacts will be recovered in an archaeologically appropriate manner;

   e. Recovered artifacts will be analyzed and inventoried, and as appropriate, preserved, restored, and/or made accessible to future researchers;

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f. Two copies of a professional archaeological report will be prepared for the Department giving the following information about the shipwreck and its excavation: Historic background, description of environment, salvage methodology, artifact analysis, description of techniques used in preservation of artifacts, base map, narrative and grid map on artifacts recovered, bibliography, photographs, National Register documentation and conclusions; and

g. The entire exploration and salvage effort will be in accordance with the Secretary of the Interior's 1983 Standards and Guidelines for Archaeology and Historic Preservation, and the Department of the Interior's 1990 Abandoned Shipwreck Act Final Guidelines which are available from the Historic Preservation Office.

h. The Department may require the submission of a cultural resource survey report if it is determined that there is a known historic or prehistoric resource in the project area, or a reasonable potential for the presence of such a resource, which may be affected by a proposed development. However, in general, such surveys will not be required for the developments and/or sites listed below:

6. The ultimate decision on the requirement for a cultural resource survey will be made by the Department's Land Use Regulation Program, based on information received in response to public comments or information provided by the New Jersey Historic Preservation Office regarding the presence of known historic and prehistoric resources or the potential for their presence.

7:7E-3.38 Endangered or Threatened Wildlife or Vegetation Species Habitats

Policy:

1. Development of this special area is prohibited unless it can be demonstrated that endangered or threatened wildlife or vegetation species habitat would not directly or through secondary impacts on the relevant site or in the surrounding area be adversely affected.

7:7E-3.40 Public Open Space

Policy:

1. New or expanded public or private open space development is encouraged at locations compatible or supportive of adjacent and surrounding land uses.

2. Development that adversely affects existing public open space is discouraged.

3. Development within existing public open space is conditionally acceptable, provided that the development complies with the Rules on Coastal Zone Management and is consistent with the character and purpose of public open space, as described by the park master plan when such a plan exists.

4. Provision of barrier free access to public open space is encouraged.

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5. All new development adjacent to public open space will be required to provide an adequate buffer area and to comply with the Buffers and Compatibility of Uses rule (N.J.A.C. 7:7E-8.13). The buffer required will be dependent upon adjacent land uses and potential conflicts between users of public open space and the proposed adjacent land use.

7:7E-3.41 Special Hazard Areas

Policy:

1. Coastal development, especially residential and labor-intensive economic development, within special hazard areas is discouraged. All development within special hazard areas must include appropriate mitigating measures to protect the public health and safety.

7:7E-3.43 Special Urban Areas

Policy:

1. Development that will help to restore the economic and social viability of special urban areas is encouraged. Development that would adversely affect the economic well being of these areas is discouraged, when an alternative which is more beneficial to the special urban areas is feasible. Development that would be of economic and social benefit and that serves the needs of local residents and neighborhoods is encouraged.

2. Where piers have been removed as part of the harbor clean up program, the equivalent pier area may be replaced in either the same or other nearby location;

3. Where structurally sound existing pilings have been reconfigured, provided that the total area of water coverage is not increased and that fisheries resources are not adversely impacted; or

4. Where expansion of the existing total area water coverage has occurred, provided that it can be shown that extensions are functionally necessary for water dependent uses. For example, additional piers and pilings would be conditionally acceptable for a marina which is a water dependent use.

7:7E-3.45 Hackensack Meadowlands District

Policy:

1. The HMDC will act as the lead coastal planning and management agency within this Special Area. The HMDC Master Plan Zoning Rules (N.J.S.A. 19:4) are adopted as part of the Coastal Management Program (see Appendix I) and the Hackensack Meadowlands District is designated a Geographic Area of Particular Concern (see section on GAPS in Chapter 4). The Division will periodically review Commission actions and will consider incorporating any proposed changes in HMDC plans or policies into the Coastal Management Program with particular attention to continued protection of wetlands and other environmental resources.

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2. Coastal activities under the jurisdiction of the HMDC shall not require a Freshwater Wetlands permit, or be subject to transition area requirements of the Freshwater Wetlands Protection Act, except that discharge of dredged or fill materials may require a permit issued under the provisions of Section 404 of the Federal Water Pollution Control Act of 1972 as amended by the Federal Clean Water Act of 1977, or under an individual or general permit program administered by the State under the provisions of the Federal Act and applicable State laws.

7:7E-4.2 (f) Standards relevant to maintenance dredging are as follows:

Policy:

1. Maintenance dredging is conditionally acceptable to the authorized depth, length and width within all General Water Areas to ensure that adequate water depth is available for safe navigation, provided that:

   a. An acceptable dredged material disposal site with sufficient capacity exists (see (g) below and N.J.A.C. 7:7E-7.12 for rules on dredged material disposal).

   b. Pre-dredging chemical and physical analysis of the dredged material and/or its elutriate may be required where the Department suspects contamination of sediments. Additional testing, such as bioaccumulation testing, and bioassay of sediments, may also be required. The results of these tests will be used to determine if contaminants may be resuspended at the dredging site and what methods may be needed to control their escape. The results will also be used to determine acceptability of the proposed disposal method.

   c. Turbidity concentrations (that is, suspended sediments) and other water quality parameters at, downstream, and upstream of the dredging site, and slurry water overflows shall meet applicable State Surface Water Quality Standards in N.J.A.C. 7:9-4. NJDEP may require the permittee to conduct biological, physical and chemical water quality monitoring before, during and after dredging and disposal operations to ensure that water quality standards will not be exceeded.

   d. If predicted water quality parameters are likely to exceed State Surface Water Quality Standards, or if pre- dredging chemical analysis of dredged material or elutriate reveals significant contamination, then the Department will work cooperatively with the applicant to fashion acceptable control measures and will impose seasonal restrictions under the specific circumstances identified below.

   e. For maintenance dredging using mechanical dredges such as clamshell bucket, dragline, grab, orange peel, or ladders, deploying silt curtains at the dredging site may be required, if feasible based on site conditions. In sites at which the use of silt curtains is infeasible, dredging using closed watertight buckets or lateral digging buckets will be examined. NJDEP may decide not to allow mechanical dredging of highly contaminated sites even if turbidity control measures were planned.

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f. In the waterways characterized below, if the applicant for mechanical maintenance dredging cannot meet the acceptability conditions in (f)i through v above, then the Department will authorize dredging on a seasonally restricted basis only, in waterways characterized by the following:

(1) Known spawning or nursery areas of Endangered shortnose sturgeon (N.J.A.C. 7:7E-3.38);

(2) Known spawning sites of anadromous fishes such as: Atlantic sturgeon; alewife; blueback herring; and striped bass;

(3) Waterbodies downstream of known anadromous fish spawning sites, as in N.J.A.C. 7:7E-3.9, where the predicated turbidity plume will encompass the entire cross-sectional area of the water body, thus forming a potential blockage to upstream migration;

(4) Areas of contaminated sediments with high levels of fecal coliform and/or streptococcus bacteria, and/or hazardous substances adjacent to (upstream or downstream) State approved shellfishing waters and public or private bathing beaches;

(5) Areas within 1,000 meters or less of oyster beds as defined in N.J.A.C. 7:7E-3.2; or

(6) Known female blue crab winter hibernation areas. These typically are located in higher salinity water near bay mouths.

g. For hydraulic dredges, if the applicant cannot meet the above acceptability conditions in (f)i through v above, specific operational procedures, such as removal of cutter head, flushing of pipeline sections prior to disconnection, limitations on depth of successive cuts, etc. shall be examined. Seasonal dredging restrictions may be imposed in the following areas to prevent entrainment and mortality of aquatic organisms:

(1) Known female blue crab winter hibernation areas;

(2) Known spawning, nursery, or wintering areas of the endangered shortnose sturgeon as in N.J.A.C. 7:7E-3.38 and/or winter flounder; or

(3) Known wintering areas of adult Atlantic or shortnose sturgeon, striped bass and/or white perch.

h. To mitigate adverse impacts upon Shellfish Habitat (N.J.A.C. 7:7E-3.2) or Endangered and Threatened Wildlife or Vegetation Species Habitat (N.J.A.C. 7:7E-3.38), Finfish Migratory Pathways (N.J.A.C. 7:7E-3.5), Marine Fish and

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Fisheries (N.J.A.C. 7:7E-8.2) and wintering area for finfish or blue crabs, and to prevent reduction of ambient dissolved oxygen below critical levels, or the increase of turbidity or the resuspension of toxic substances above critical levels, seasonal limitations may be imposed on maintenance dredging as specifically described in this subsection.

7:7E-4.2 (g) Standards relevant to new dredging are as follows:

Policy:

1. New dredging is conditionally acceptable in all General Water Areas for boat moorings, navigation channels or anchorages (docks) provided that:

   a. There is a demonstrated need that cannot be satisfied by existing facilities;

   b. The facilities served by the new dredging satisfy the location requirements for Special Water's Edge Areas;

   c. The adjacent water areas are currently used for recreational boating, commercial fishing or marine commerce;

   d. The dredge area causes no significant disturbance to Special Water or Water's Edge Areas;

   e. The adverse environmental impacts are minimized to the maximum extent feasible;

   f. Dredging will be accomplished consistent with all conditions described under the maintenance dredging provisions, (f)2(i) through vii above, as appropriate to the dredging method;

   g. An acceptable dredge spoil disposal site exists;

   h. The dredge area is reduced to the minimum practical;

2. The maximum depth of the newly dredged area shall not exceed that of the connecting access or navigation channel necessary for vessel passage to bay or ocean; and

   a. Dredging will have no adverse impacts on groundwater resources.

3. To mitigate adverse impacts upon Shellfish Habitat (N.J.A.C. 7:7E-3.2), Endangered or Threatened Wildlife or Vegetation Species Habitat (N.J.A.C. 7:7E-3.38), Finfish Migratory Pathways (N.J.A.C. 7:7E-3.5), Marine Fish and Fisheries (N.J.A.C. 7:7E-8.2), spawning or wintering areas for finfish, or female blue crab wintering areas, and to prevent reduction of ambient dissolved oxygen below critical levels, or the increase of turbidity or the resuspension of toxic substances above critical levels, seasonal and/or dimensional limitations may be imposed on new dredging.

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4. New dredging or excavation to create new lagoons for residential development is prohibited in Wetlands, Wetlands Buffer, Endangered or Threatened Wildlife or Vegetation Species Habitats as defined in N.J.A.C. 7:7E-3.25, 3.26 and 3.40 and discouraged elsewhere.

5. New dredging is conditionally acceptable to control siltation in lakes, ponds and reservoirs, provided that an acceptable sedimentation control plan is developed to address re-sedimentation of these water bodies.

7:7E-4.2 (h) Standards relevant to dredged material disposal are as follows:

Policy:

1. Dredged material disposal is prohibited in tidal guts, man-made harbors, and medium rivers, creeks and streams.

2. Dredged material disposal is discouraged in open bays, semi-enclosed and backbays where the water depth is less than six feet.

3. Disposal of dredged materials in the ocean and bays deeper than six feet is conditionally acceptable provided that it is in conformance with the USEPA and US Army Corps of Engineers Guidelines parts 220-228 and 33 CFR, Parts 320-330 and 335-338) established under Section 404(b) of the Clean Water Act.

4. EPA Guidelines require that consideration be given to the need for the proposed activity, the availability of alternate sites and methods of disposal that are less damaging to the environment, and applicable water quality standards. They also require that the choice of the site minimize harm to municipal water supply intakes, shellfish, fisheries, wildlife, recreation, threatened and endangered species, benthic life, wetlands and submerged vegetation, and that it be confined to the smallest practicable area.

5. Overboard disposal (also known as aquatic, open water, side casting, subaqueous or wet) of uncontaminated sediments into unconfined disposal sites is conditionally acceptable in existing anoxic dredge holes, provided that data on water quality, benthic productivity and seasonal finfish use evidence limited biological value and submerged elbow or underwater diffuser is used. The hole shall not be filled higher than the depth of the surrounding waters.

6. Overboard disposal of sediments less than 90 percent sand shall be acceptable in unconfined disposal sites when shallow waters preclude removal to an upland or confined site provided that: Shellfish Habitats (as defined in N.J.A.C. 7:7E-3.2) are not within 1,000 meters; disposal will not smother or cause condemnation or contamination of harvestable shellfish resources (as in N.J.A.C. 7:7E-3.2); and sediment characteristics of the dredged material and disposal site are similar. If unconfined aquatic disposal can not meet these conditions, then NJDEP shall impose a seasonal restriction appropriate to the resource of concern.

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7. Uncontaminated dredged sediments with 75 percent sand or greater are generally encouraged for beach nourishment.

8. Dredged material disposal in lakes, ponds and reservoirs is prohibited.

9.. 9.. Conditions for dredged material disposal on land are indicated in N.J.A.C. 7:7E-7.12.

7:7E-4.2 (i) Standards relevant to dumping (solid waste or sludge) are as follows: Policy:

1. Filling is prohibited in lakes, ponds, reservoirs, and open bay areas at depths greater than 18 feet, unless the filling is consistent with the Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 et seq.) and Regulations, N.J.A.C. 7:7A.

2. In all other natural water areas, filling is discouraged, but limited filling may be considered for acceptability provided that:

   a. The use that requires the fill is water dependent;

   b. There is a demonstrated need that cannot be satisfied by existing facilities;

   c. There is no feasible or practical alternative site on an existing Water's Edge;

   d. The minimum practical area is filled;

   e. The adverse environmental impacts are minimized, e.g. by compensating for the loss of aquatic habitat by creation of an area of equivalent or greater environmental value elsewhere in the same estuary;

   f. Minimal feasible interference is caused to Special Areas; and

   g. Pilings and columnar support or floating structures are unsuitable for engineering or environmental reasons.

3. Filling in a man-made lagoon is discouraged unless it complies with the conditions found under (j)2ii above or the following two conditions:

   a. In those areas where two existing lawful bulkheads are not more than 75 feet apart and no limit of fill line has been promulgated, the connecting bulkhead may not extend seaward of a straight line connecting the ends of the existing bulkheads. Compliance with the mitigation rule shall not be required in such cases.

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b. Elsewhere, the proposed retaining structure shall not extend seaward of the spring high water line.

c. In no event may regulated wetlands be filled except under the conditions of the Wetlands Special Area Rule (N.J.A.C. 7:7E-3.27).

4. Filling using clean sediment of suitable particle size and composition is acceptable for beach nourishment projects (see the Coastal Engineering Use Rules N.J.A.C. 7:7E-7.11).

5. Standards relevant to the removal of unauthorized fill are as follows:

a. For filling which took place prior to September 26, 1980 (the effective date of the Rules on Coastal Zone Management, N.J.A.C. 7:7E), or prior to September 28, 1978 for areas within the coastal area defined at N.J.S.A. 13:19-4 (CAFRA), removal shall be required only if the fill has resulted in ongoing significant adverse environmental impacts, such as the blocking of an otherwise viable tidal wetland or waterbody, and its removal will alleviate the adverse impacts.

b. For filling which took place subsequent to September 26, 1980 (or subsequent to September 28, 1978 for areas within the coastal area defined at N.J.S.A. 13:19-4), removal shall be required if it violates the acceptability conditions for filling in water areas set forth in this subsection.

7:7E-4.2 (l) Standards relevant to sand and gravel extraction are as follows:

Policy:

1. Sand and gravel extraction is prohibited in lakes, ponds and reservoirs, man-made harbors and tidal guts unless the waterbody was created by the extraction process, in which case the use is conditionally acceptable. This activity is discouraged in all other General Water Areas. In these General Water Area types, priority will be given to sand extraction for beach nourishment, and extraction is conditionally acceptable provided that:

a. Special areas are not directly or indirectly degraded;

b. Turbidity and resuspension of toxic materials is controlled throughout the extraction operation consistent with the Department's Surface Water Quality Standards (N.J.A.C. 7:9-4);

c. There is an acceptable disposal site for the waste from washing operations;

d. In rivers, creeks and streams, the depth of water at the mining site is at least six feet MLW;

e. The mining will not increase shoreline erosion; and

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f. The mining will not create anoxic water conditions.

7:7E-7.11 Coastal Engineering

Policy:

1. Non-structural solutions to shoreline erosion problems are preferred over structural solutions. Vegetative shore protection measures have been proven effective, and are preferred at shoreline sites in which they are feasible. Feasibility is dependent on the following factors: shoreline geometry; shoreline slope; sediment type; boat traffic; and wind and extent of exposed land/water surface (fetch). The infeasibility and impracticability of a non-structural solution must be demonstrated before structural solutions may be deemed acceptable.

7:7E-7.11 (d) Standards relevant to beach nourishment are as follows:

Policy:

1. Beach nourishment projects, such as non-structural shore protection measures, are encouraged, provided that:

a. The particle size and type of the fill material is compatible with the existing beach material to ensure that the new material will not be removed to a greater extent than the existing material would be by normal tidal fluctuations;

b. The elevation, width, slope, and form of proposed beach nourishment projects are compatible with the characteristics of the existing beach;

c. The sediment deposition will not cause unacceptable shoaling in downdrift inlets and navigation channels; and

d. Public access to the nourished beach is provided in cases where public funds are used to complete the project.

7:7E-7.11 (e) Standards relevant to structural shore protection are as follows:

Policy:

1. The construction of new shore protection structures or expansion or fortification of existing shore protection structures, including, but not limited to, jetties, groins, seawalls, bulkheads, and other retaining structures to retard longshore transport and/or to prevent tidal waters from reaching erodible material is acceptable only if it meets all of the following five conditions:

a. The structure is essential to protect water dependent uses or heavily used public recreation beach areas in danger from tidal waters or erosion, or the structure is essential to protect existing structures and infrastructure in developed shorefront areas in danger from erosion, or the structure is essential to mitigate, through, for example, the construction of a retained earthen berm, the projected erosion in an erosion hazard area along a headland and provide erosion protection for a

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APPENDIX C

CULTURAL RESOURCES CORRESPONDANCE DREDGED MATERIAL MANAGEMENT PLAN FOR THE PORT OF NEW YORK AND NEW JERSEY

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189
518-237-8643

June 1, 1999

Frank Santomauro, P.E.
Chief, Planning Division
U.S. Army Corps of Engineers
NY District
Jacob K. Javits Federal Bldg.
New York, New York 10278-0090

Dear Mr. Santamauro:

Re: CORPS
Dredged Material Management Plan/Port of New York & New Jersey
Multiple Cities, Multiple Counties
96PR2916

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the Dredged Material Management Plan (DMMP) project in accordance with Section 106 of the National Historic Preservation Act of 1966 and the relevant implementing regulations.

Based upon this review, the SHPO approves the Final Draft report, A Geomorphological and Archaeological Analysis of Potential Dredged Material Management Alternative Sites in the New York Harbor-Apex Region.

We concur with the recommendations of your May 17, 1999, letter and look forward to continued consultation in accordance with Section 106.

When responding please be sure to refer to the SHPO project review (PR) number noted above. If you have any questions, please feel free to call me at (518) 237-8643 ext. 255.

Sincerely,

Robert D. Kuhn
Assistant Director

RDK:bsd

An Equal Opportunity/Affirmative Action Agency
printed on recycled paper

THE CITY OF NEW YORK LANDMARKS PRESERVATION COMMISSION
100 Old Slip, New York, NY 10005 (212) 487-6800

ENVIRONMENTAL REVIEW

USACE/106-Y
PROJECT NUMBER

05/24/99
DATE RECEIVED

The Following Properties Possess Architectural or Archaeological Significance:

0 DMMP

COMMENTS: The Dredged Material Management Plan report of 2-25-99 appears to adequately identify potential for impacts to, and treatment plans for prehistoric cultural resources within the area of potential effect.

SIGNATURE

06/04/99
DATE

cc: SHPO

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278–0090

REPLY TO
ATTENTION OF

May 17, 1999

Environmental Assessment Section
Environmental Analysis Branch

Ms. Dorothy P. Guzzo
Deputy Chief Historic Preservation Officer
Historic Preservation Office
New Jersey Department of Environmental Protection
CN 404
Trenton, New Jersey 08625

Dear Ms. Guzzo:

The U.S. Army Corps of Engineers, New York District (Corps), is pleased to furnish you with a copy of a final draft report entitled "A Geomorphological and Archaeological Analysis of Potential Dredged Material Management Alternative Sites in the New York Harbor-Apex Region, Affecting the Coastal Areas of New York, Queens, Kings and Richmond Counties in New York and Bergen, Hudson, Middlesex and Monmoth Counties in New Jersey." The study was undertaken for the Corps by Philip C. La Porta, Linda E. Sohl and Margaret C. Brewer in association with Woods Hole Oceanographic Institute and Texas A&M Palynology Laboratory. The draft report was submitted to you office for Section 106 comments on July 20, 1998 (Enclosures 1 and 2; NJHPO# 98-1640; HPO-J98-110). As per comments received from your office, as well as Corps review comments, sections of the draft report were expanded and technical issues were more clearly explained in the final draft document.

Based on results of study by LaPorta, et al., it is the opinion of the Corps that work associated with the Dredged Material Management Plan (DMMP) proposed in areas of low archaeological sensitivity will require no further cultural resource studies. The DMMP project locations in New Jersey waters with low sensitivity are the center channel of the Hudson River and the previously dredged navigation channels at Constable Hook/Port Jersey and Newark Bay. Areas considered to posses moderate sensitivity will be subject to additional studies in the form of remote sensing surveys and additional corings. Areas within Newark Bay that have not been previously dredged have been determined to be moderately sensitive. Moderate sensitivity has also been applied to an area in southeast corner of Zone 1 and to all of Zones 2 and 3 (note, though, that the locations of these draft zones are subject to change based on comments we may receive and incorporation of new data and if they change additional cultural resource evaluations will be undertaken). Highly sensitive areas, such as those at Ward's Point, at the border with New York and New Jersey, and a swath of Zone 1 in Raritan Bay,

will be studied further through remote sensing, vibracores, and sediment testing. The locations under consideration for the DMMP continue to be evaluated and revised and therefore not all locations examined by LaPorta et al. will be pursued as part of the DMMP. Section 106 coordination will continue as the project becomes more defined.

Additional information has been collected in a number of these areas during the course of cultural resource work associated with the New York and New Jersey Harbor Navigation Project. The draft report documenting the study will be submitted to the Corps in July and will be forwarded to your office for review. The results of this on-going work may provide additional information which will allow the areas of sensitivity to be more clearly defined. Ultimately, the Corps is hoping to develop a model of prehistoric and paeloenvironmental sensitivity for the New York and New Jersey Harbor. This model will greatly facilitate project planning and will provide a useful research tool for the archaeological community.

Please review the enclosed revised document and provide Section 106 comments, pursuant to 36 CFR 800.5. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-0229.

Sincerely,

Frank Santomauro, P.E.
Chief, Planning Division

Enclosures

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

REPLY TO
ATTENTION OF

May 17, 1999

Environmental Assessment Section
Environmental Analysis Branch

Ms. Ruth L. Pierpont
New York State Office of Parks,
Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Dear Ms. Pierpont:

The U.S. Army Corps of Engineers, New York District (Corps), is pleased to furnish you with a copy of a final draft report entitled "A Geomorphological and Archaeological Analysis of Potential Dredged Material Management Alternative Sites in the New York Harbor-Apex Region, Affecting the Coastal Areas of New York, Queens, Kings and Richmond Counties in New York and Bergen, Hudson, Middlesex and Monmoth Counties in New Jersey." The study was undertaken for the Corps by Philip C. La Porta, Linda E. Sohl and Margaret C. Brewer in association with Woods Hole Oceanographic Institute and Texas A&M Palynology Laboratory. The draft report was submitted to you office for Section 106 comments on July 20, 1998 (Enclosures 1 and 2; NYSOPRHP# 96PR2916). As per comments received from your office, as well as Corps review comments, sections of the draft report were expanded and technical issues were more clearly explained in the final draft document.

Based on results of study by LaPorta, et al., it is the opinion of the Corps that work associated with the Dredged Material Management Plan (DMMP) proposed in areas of low archaeological sensitivity will require no further cultural resource studies. The DMMP project location in New York State with low sensitivity is the center channel of the Hudson River. Areas considered to posses moderate sensitivity will be subject to additional studies in the form of remote sensing surveys and additional corings. Bowery Bay has been determined to be moderately sensitive. Moderate sensitivity has also been applied to an area in the southeast corner of Zone 1 and to all of Zones 2 and 3 (note, though, that the locations of these draft zones are subject to change based on comments we may receive and incorporation of new data and if they change additional cultural resource evaluations will be undertaken). Additional vibracores are recommended for Red Hook/Bay Ridge which was evaluated to have a moderate to low sensitivity. Highly sensitive areas, such as those at Ward's Point and a swath of Zone 1 in Raritan Bay, will be studied further through remote sensing, vibracores, and

sediment testing. The locations under consideration for the DMMP continue to be evaluated and revised and therefore not all locations examined by LaPorta et al. will be pursued as part of the DMMP. Section 106 coordination will continue as the project becomes more defined.

Additional information has been collected in a number of these areas during the course of cultural resource work associated with the New York and New Jersey Harbor Navigation Project. The draft report documenting the study will be submitted to the Corps in July and will be forwarded to your office for review. The results of this on-going work may provide additional information which will allow the areas of sensitivity to be more clearly defined. Ultimately, the Corps is hoping to develop a model of prehistoric and paeloenvironmental sensitivity for the New York and New Jersey Harbor. This model will greatly facilitate project planning and will provide a useful research tool for the archaeological community.

Please review the enclosed revised document and provide Section 106 comments, pursuant to 36 CFR 800.5. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-0229.

Sincerely,

Frank Santomauro, P.E.
Chief, Planning Division

Enclosures

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

REPLY TO
ATTENTION OF

May 17, 1999

Environmental Assessment Section
Environmental Analysis Branch

Dr. Arthur Bankoff
New York City Landmarks Preservation Commission
100 Old Slip
New York, New York 10005

Dear Dr. Bankoff:

The U.S. Army Corps of Engineers, New York District (Corps), is pleased to furnish you with a copy of a final draft report entitled "A Geomorphological and Archaeological Analysis of Potential Dredged Material Management Alternative Sites in the New York Harbor-Apex Region, Affecting the Coastal Areas of New York, Queens, Kings and Richmond Counties in New York and Bergen, Hudson, Middlesex and Monmoth Counties in New Jersey." The study was undertaken for the Corps by Philip C. La Porta, Linda E. Sohl and Margaret C. Brewer in association with Woods Hole Oceanographic Institute and Texas A&M Palynology Laboratory. The draft report was submitted to you office for Section 106 comments on July 20, 1998 (Enclosures 1 and 2). As per comments received from your office and the New York and New Jersey State Historic Preservation Offices, as well as Corps review comments, sections of the draft report were expanded and technical issues were more clearly explained in the final draft document.

Based on results of study by LaPorta, et al., it is the opinion of the Corps that work associated with the Dredged Material Management Plan (DMMP) proposed in areas of low archaeological sensitivity will require no further cultural resource studies. The DMMP project location in New York State with low sensitivity is the center channel of the Hudson River. Areas considered to posses moderate sensitivity will be subject to additional studies in the form of remote sensing surveys and additional corings. Bowery Bay has been determined to be moderately sensitive. Moderate sensitivity has also been applied to an area in the southeast corner of Zone 1 and to all of Zones 2 and 3 (note, though, that the locations of these draft zones are subject to change based on comments we may receive and incorporation of new data and if they change additional cultural resource evaluations will be undertaken). Additional vibracores are recommended for Red Hook/Bay Ridge which was evaluated to have a moderate to low sensitivity. Highly sensitive areas, such as those at Ward's Point and a swath of Zone 1 in Raritan Bay, will be studied further through remote sensing, vibracores, and

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Please review the enclosed revised document and provide comments. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-0229.

Sincerely,

Frank Santomauro, P.E.
Chief, Planning Division

Enclosures

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

REPLY TO ATTENTION OF

January 4, 1999

Environmental Assessment Section
Environmental Analysis Branch

Ms. Dorothy P. Guzzo
Deputy Chief Historic Preservation Officer
Historic Preservation Office
New Jersey Department of Environmental Protection
CN 404
Trenton, New Jersey 08625

Dear Ms. Guzzo,

The U.S. Army Corps of Engineers, New York District (Corps), is pleased to furnish you with a copy of the final Archeological Remote Sensing Survey Report for the Dredged Material Management Plan (DMMP), Raritan Bay and Lower Bay, New York Harbor, Monmouth County, New Jersey and Richmond County, New York. The study was undertaken for the Corps by Dolan Research, Inc. in association with Dames & Moore and Battelle Ocean Sciences. The draft report was submitted to you office for Section 106 comments on 20 July 1998. The comments provided by your office upon review of the draft report were incorporated into the final document.

Thank you for your assistance in the Section 106 process. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-0229.

Sincerely,

Frank Santomauro

Frank Santomauro, P.E.
Chief, Planning Division

Enclosure

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

REPLY TO
ATTENTION OF

January 4, 1999

Environmental Assessment Section
Environmental Analysis Branch

Ms. Ruth L. Pierpont
New York State Office of Parks,
Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Dear Ms. Pierpont,

The U.S. Army Corps of Engineers, New York District (Corps), is pleased to furnish you with a copy of the final Archeological Remote Sensing Survey Report for the Dredged Material Management Plan (DMMP), Raritan Bay and Lower Bay, New York Harbor, Monmouth County, New Jersey and Richmond County, New York. The study was undertaken for the Corps by Dolan Research, Inc. in association with Dames & Moore and Battelle Ocean Sciences. The draft report was submitted to you office for Section 106 comments on 20 July 1998. The comments provided by your office upon review of the draft report were incorporated into the final document.

Thank you for your assistance in the Section 106 process. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-0229.

Sincerely,

Frank Santomauro

Frank Santomauro, P.E.
Chief, Planning Division

Enclosure

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

REPLY TO
ATTENTION OF

January 4, 1999

Environmental Assessment Section
Environmental Analysis Branch

Dr. Arthur Bankoff
New York City Landmarks Preservation Commission
100 Old Slip
New York, New York 10005

Dear Dr. Bankoff,

The U.S. Army Corps of Engineers, New York District (Corps), is pleased to furnish you with a copy of the final Archeological Remote Sensing Survey Report for the Dredged Material Management Plan (DMMP), Raritan Bay and Lower Bay, New York Harbor, Monmouth County, New Jersey and Richmond County, New York. The study was undertaken for the Corps by Dolan Research, Inc. in association with Dames & Moore and Battelle Ocean Sciences. The draft report was submitted to you office for Section 106 comments on 20 July 1998. The comments provided by your office upon review of the draft report were incorporated into the final document.

Thank you for your assistance in the Section 106 process. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-0229.

Sincerely,

Frank Santomauro, P.E.
Chief, Planning Division

Enclosure

THE TOWNSHIP OF MIDDLETOWN
Landmarks Commission
1 Kings Highway
Middletown, NJ 07748-2594

Organized December 14, 1667
"Pride In Middletown"

December 1, 1998

Ms. Lynn Rakos
U. S. Army Corps of Engineers
CENAN-PL-EA
26 Federal Plaza
New York, New York 10278

Dear Ms. Rakos:

Thank you for your letter of September 30th regarding the Corps' DMMP in the New York and New Jersey Harbor region.

We would be very interested in receiving all impact statements and cultural resource reports and request that you add our organization to your mailing list.

Thank you for alerting us to this important development program.

Sincerely,

Mary Ann Kiernan
Secretary

cc: Middletown Township Committee

CONFIDENTIAL MAXUS2023143

METROPOLITAN NEW YORK STATE ARCHAEOLOGICAL ASSOCIATION CHAPTER

Mr. Frank Santomauro, P.E.
Chief, Planning Division
U.S. Army Corps of Engineers
CENAN-PL-EA
26 Federal Plaza
New York, NY 10278

October 30, 1998

Dear Mr. Santomauro

On behalf of the New York State Archaeological Association, Metropolitan Chapter, I would appreciate being kept apprised of cultural resource activities related to the Army Corps' Dredged Material Management Plan for the Port of New York and New Jersey.

I look forward to the opportunity of commenting on the direction and results of the cultural resource work.

Sincerely,

Diane Dallal

Diane Dallal
President, Metropolitan Chapter
New York State Archaeological Association

SOUTH STREET SEAPORT MUSEUM

Mr. Frank Santomauro, P.E.
Chief, Planning Division
U.S. Army Corps of Engineers
CENAN-PL-EA
26 Federal Plaza
New York, NY 10278

October 30, 1998

Dear Mr. Santomauro

The South Street Seaport Museum would appreciate being kept informed about the cultural resource activities related to the Army Corps' Dredged Material Management Plan for the Port of New York and New Jersey.

We look forward to the opportunity of reviewing and commenting upon the direction and results of any cultural resource work.

Sincerely,

Diane Dallal
Director of Archaeology
South Street Seaport Museum

Copy to Lyn

207 FRONT STREET • NEW YORK, NY 10038 • TEL 212-748-8600 • FAX 212-748-8610 • WWW.SOUTHSTSEAPORT.ORG

Lynn,

Pls include us in your findings evaluations & any subjective comments.

Address material to:

David Simkins
Waterfront Museum
290 Conover St
Brooklyn NY 11231

718 624 4719
fax 718 522 7162
e-mail waterfrontmuseum@bigplanet.com
website www.bigbrett.net/waterfront

Thanks,

SIIAS
STATEN ISLAND INSTITUTE OF ARTS & SCIENCES

October 29, 1998

Ms. Lynn Rakos
Project Archaeologist
U.S. Army Corps of Engineers
CENAN-PL-EA
26 Federal Plaza
New York, NY 10278

Dear Mrs. Rakos:

We are interested in participating in the Secion 106 process as outlined in your letter of September 30, 1998.

Please include our Curator of History as follows on your mailing list:

Vincent Sweeney
Curator of History
Staten Island Institute of Arts and Sciences
75 Stuyvesant Place
Staten Island, NY 10310-1998

Thank you.

Sincerely,

Mary S. De Silva

(Mrs.) Mary S. De Silva
Librarian/Asst. Archivist

Any information, advice or opinion "opinion" concerning the identification, provenance or other attributes of an object or item is given on the understanding that the addressee is the owner or authorized agent of the owner of the item in question and is not seeking and will not use such opinion in connection with any past or contemplated commercial transaction. It is further given on the understanding that the addressee will not assert any claim with respect to such opinion and will indemnify the Staten Island Institute of Arts & Sciences, its trustees, officers, employees and agents against any and all liability and expenses arising out of the provision of such opinion.

75 STUYVESANT PLACE STATEN ISLAND, NY 10301-1998 VOICE 718 727 1135 FAX 718 273 5683

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HISTORICAL
SOCIETY

October 22, 1998

Ms. Lynn Rakos
U.S. Army Corps of Engineers
CENAN-PL-EA
26 Federal Plaza
New York, NY 10278

Dear Ms. Rakos:

We recently received two slightly different letters from the Department of the Army, one of which concerned a Dredged Material Management Plan for the Port of New York and New Jersey, and the other regarding a New York and New Jersey Harbor Navigation Study. Please place the New Jersey Historical Society on the cultural resource component mailing list for both of these projects. Correspondence should be sent to the attention of Sally Yerkovich, Executive Director.

Thank you.

Sincerely,

Tom Bolze

Tom Bolze
Assistant to the Director

52 Park Place
Newark, NJ 07102-4302
Telephone: (973) 596-8500
Telefax: (973) 596-6957

State of New Jersey

...ne Todd Whitman
...overnor

Department of Environmental Protection
Natural & Historic Resources
PO Box 404
Trenton, N.J. 08625-0404
TEL: (609)292-3541
FAX: (609)984-0836

Robert C. Shinn, Jr.
Commissioner

98-1640
HPO-J98-110
October 21, 1998

Mr. Frank Santomauro
Chief, Planning Division
Department of the Army, New York District
Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

Attn: Lynn Rakos

RE: Bergen, Hudson, Middlesex and Monmouth Counties
Dredged Material Management Plan (DMMP) for
the Port of New York and New Jersey
Comments on July draft cultural resource documents

Dear Santomauro:

Thank you for having provided the opportunity to comment on the draft July 1, 1998 *Remote Sensing Survey* prepared by Dames & Moore and the draft July 7, 1998 *Cultural Resource Assessment of Proposed Dredged Material Management Alternative Sites in the New York Harbor-Apex Region* prepared by LaPorta & Associates, Inc. Generally, the reports are well prepared and are good steps in addressing Section 106 responsibilities associated with this project. However, I do have some comments on the reports and recommendations.

Because of recent damage or destruction to wrecks in avoidance areas, more stringent methodologies need to be developed and implemented for their protection. Targets identified which could be shipwrecks within Zones 1 and 2, should, at minimum, be

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subjected to diving to determine what if anything is visible on the surface. Further, for targets which are identified as shipwrecks or cannot be discounted as being shipwrecks (if not visible), and therefore are potentially National Register eligible, a detailed plan for avoidance will need to be developed in conjunction with the Historic Preservation Office. This will need to include large avoidance areas (recent ones developed by or in conjunction with the Philadelphia District have been 1000 feet on all sides of targets), identification of locations and significance in project plans and specifications, accurate methods for demarcating and avoiding avoidance zones, etc. Deborah Fimbel of my staff has provided Lynn Rakos with some of the recent comments and methodologies used for avoidance of wrecks to serve as potential examples. Also, the remote sensing survey report needs to incorporate USGS maps illustrating the areas surveyed.

Related to the draft LaPorta and Associates, Inc. report, at minimum, summary and recommendations sections should be expanded or rewritten to be more lay level explanations; they should explain in lay terms why testing was located where it was and why the recommendations rendered have been made (i.e. how the testing and analysis which has been done has led to the recommendations which have been put forth).

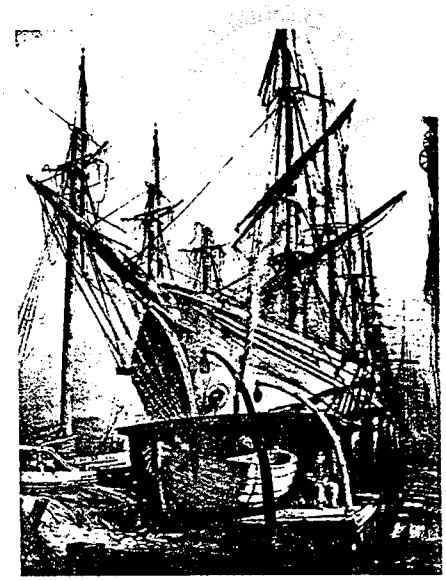
Thank you again for providing this opportunity for review and Consultation. I look forward to receiving the revised reports and upcoming reports on the following phases of work. If you have any questions, please do not hesitate to contact Deborah Fimbel at (609) 984-6019.

Sincerely,

James F. Hall
Deputy State Historic
Preservation Officer

JFH:DRF

The John A. Noble Collection



October 19, 1998

Ms. Lynn Rakos
Project Archaeologist
U.S. Army Corps of Engineers
CENAN-PL-EA
26 Federal Plaza
New York, NY 10278

Dear Ms. Rakos,

We received notice from Mr. Frank Santomauro about your Dredged Material Management study for New York Harbor, and would like to be included on your cultural resource mailing list.

The John A. Noble Collection
1000 Richmond Terrace
Building D
Staten Island, NY 10301

Thank you.

Sincerely,

Barbara E. Stanwick
Assistant to the Executive Director

Board of Trustees

Steven P. Kalil
Chairperson

Nancy L. Pouch
Vice Chairperson

Erin M. Urban
Secretary
Executive Director

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DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278–0090

REPLY TO
ATTENTION OF

September 30, 1998

Environmental Assessment Section
Environmental Analysis Branch

Dear Sir or Madam,

The U.S. Army Corps of Engineers, New York District is currently conducting a major study to develop a Dredged Material Management Plan (DMMP) for the Port of New York and New Jersey. The DMMP will address dredged material management options for the Harbor. Numerous techniques and potential locations for implementation are undergoing analyses. Studies are on-going to identify short- and long-term disposal options as well as to determine the potential for sites to be selected for detailed investigation and design. The potential disposal options may be implemented in a variety of locations, off-shore, near-shore and upland in the New York-New Jersey Harbor region.

As part of our responsibilities under Section 106 of the National Historic Preservation Act of 1966, as amended, the Corps has begun to conduct cultural resource investigations in connection with the DMMP. A draft Programmatic Environmental Impact Statement is also currently being prepared.

We are seeking to identify interested parties to participate in the Section 106 process. We would be please to include you, or the organization you represent, on the mailing list for the cultural resource component of this Harbor-wide project. You will be kept informed of cultural resource activities and will have the opportunity to provide input and comments on the direction and results of the cultural resource work. If you would like to be included on the mailing list please write to the Project Archaeologist at the address below:

Ms. Lynn Rakos
U.S. Army Corps of Engineers
CENAN-PL-EA
26 Federal Plaza
New York, NY 10278

Thank you for your interest in this important study. If you require additional information or have any questions, please contact Ms. Rakos, at (212)264-0229.

Sincerely,

Frank Santomauro

Frank Santomauro, P.E.
Chief, Planning Division

DMMP INTERESTED PARTIES - MAILING LIST

Ms. Susan P. Coen, Director
Union County Office of Cultural and Heritage
ffairs
-52 Rahway Avenue, 4th Floor
Elizabeth, N.J. 07202

Bonnie Nalwaski, Acting Director
Staten Island Institute for the Arts
75 Stuyvesant Avenue
Staten Island, N.Y 10301

Dr. Hermalyn
Bronx County Historical Society
3309 Bainbridge Avenue
Bronx, N.Y 10467

Rebecca Yamin, Ph.D, President
Professional Archaeologists of New York City
c/o John Milner Associates
1216 Arch Street, 5th Floor
Philadelphia, PA 19107

Lee Ellen Griffith, Executive Director
Monmouth County Historical Association
70 Court Street
eehold, New Jersey 07728

Director
Bayonne Historical Society
P.O. Box 3034
Bayonne, New Jersey 07002-0297

Ms. Bierce Riley, President
Roebling Chapter
Society for Industrial Archaeology
19 Budd Street
Morristown, New Jersey 07960

New York Historical Society
Stewart Desmond
Director of Public Affairs
2 West 77th Street
New York, N.Y. 10024

David Sharps, President
The Hudson Waterfront Museum
290 Conover Street
Pier 45
Brooklyn, New York 11231

ewark Landmarks and Historic Preservation
ommission
Harry Hines, City Planning Officer
55 Liberty Street
Newark, NJ 07102

Ms. Anna Aschkenes, Executive Director
Middlesex County Cultural and Heritage
Commission
841 Georges Road
North Brunswick, New Jersey 08902

Catherine Abrams, Curator
Queens Historical Society
143-35 37th Avenue
Flushing, N.Y 11354

Mr. Richard Heaps, Director
Brooklyn Historical Society
128 Pierrepont Street
Brooklyn, N.Y 11201

Norman Brouwer
Ships Historian and Librarian
South Street Seaport Museum
207 Front Street
New York, New York 10038

Gail Hunton
Principal Historic Preservation Specialist,
Monmouth County Parks System
805 Newman Springs Road
Lincroft, New Jersey 07738-1695

Mr. Charles Bello
President
Archaeological Society of New Jersey
19 Ledge Street
Pipersville, PA 18947

Diane Dallal
President, New York State Archaeological Association-
Metropolitan Chapter
c/o New York Unearthed
17 State Street
New York, N.Y. 10004

Diane Dallal
Director of Archaeology
New York Unearthed
17 State Street
New York, N.Y. 10004

Erin M. Urban, Director
John A. Noble Collection
Snug Harbor Cultural Center
1000 Richmond Terrace
Staten Island, New York 10301

Jersey City Historic Preservation Commission
Charles Balcer, Senior Planner
30 Montgomery Street
Jersey City, NJ 07302

Middlesex County Cultural & Heritage Commission
841 Georges Road
North Brunswick, New Jersey 08902

Union County Office of Cultural & Heritage Affairs
633 Pearl Street
Elizabeth, New Jersey 07202

Friends of Liberty State Park
c/o Sam Pesin, President
P.O. Box 3407
Jersey City, New Jersey 07303-3407

New Jersey Coastal Heritage Trail
c/o Janet Wolf, Project Director
P.O. Box 568
Newport, New Jersey 08345

New Jersey Marine Educator Association
c/o Warren Marcioni, President
85 Brookside Drive
Caldwell, New Jersey 07006

Twin Lights Historical Society
c/o Richard Scheuing
Lighthouse Road
Highlands, New Jersey 07732

Middletown Township Landmarks Commission
George Rudolph, Chair
1 King's Highway
Middletown, NJ 07748-2594

Director
Sayreville Historical Society
511 Main Street
P.O. Box 18
Sayreville, New Jersey 08872

Director
Union County Historical Society
P.O. Box 241
Elizabeth, New Jersey 07207

Paul Kuchynskas
445 State Street
Brooklyn, N.Y 11217

Director
New Jersey Historical Society
230 Broadway
Newark, New Jersey 07104

Director
Preservation New Jersey
The Proprietary House
149 Kearny Avenue, 2nd Floor
Perth Amboy, New Jersey 08861-4700

Union County Office - Cultural and Historic Affairs
c/o William Higginson
633 Pearl Street
Elizabeth, New Jersey 07202

Dr. Lorraine Williams
State Archaeologist
New Jersey State Museum
Bureau of Archaeology and Ethnology
205 Sate Street
Trenton, New Jersey 08625

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Nadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

September 3, 1998

Mr. Frank Santomauro, P.E.
Chief, Planning Division
Environmental Assessment Section
Environmental Analysis Branch
Department of the Army
New York District, Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

Dear Mr. Santomauro:

RE: CORPS
Dredged Material Management Plan
Port of New York/New Jersey
96PR2916

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the Dredged Material Management Plan (DMMP) project in accordance with Section 106 of the National Historic Preservation Act of 1966 and the relevant implementing regulations.

Based upon this review, the SHPO approves the two reports: Field Support of Dredged Material Management Alternatives for New York District, Remote Sensing Survey and Preliminary Draft, Cultural Resource Assessment of Proposed Dredged Material Management Alternative Sites in the New York Harbor-Apex Region.

We concur with the recommendations in your July 20, 1998 correspondence and look forward to continued consultation towards the goal of establishing a Programmatic Agreement for this undertaking.

When responding, please be sure to refer to the OPRHP project review (PR) number noted above. If you have any questions, please feel free to call me at (518) 237-8643 ext. 255.

Sincerely,

Robert D. Kuhn, Ph.D
Historic Preservation Coordinator
Field Services Bureau

RDK/rma

An Equal Opportunity/Affirmative Action Agency
printed on recycled paper

THE CITY OF NEW YORK LANDMARKS PRESERVATION COMMISSION
100 Old Slip, New York, NY 10005 (212) 487-6800

ENVIRONMENTAL REVIEW

USACE/106-Y — PROJECT NUMBER

07/28/98 — DATE RECEIVED

PROJECT

DMMP: DREDGED MATERIAL MANAGEMENT PLAN

[X] No architectural significance

[ ] No archaeological significance

[ ] Designated New York City Landmark or Within Designated Historic District

[ ] Listed on National Register of Historic Places

[ ] Appears to be eligible for National Register Listing and/or New York City Landmark Designation

[X] May be archaeologically significant; requesting additional materials

COMMENTS

The reports titled, "Preliminary Draft, Cultural Resource Assessment of Proposed Dredged Material Management Alternative Sites in the New York Harbor-Apex Region," and "Field Support of Dredged Material, Remote Sensing Survey," are acceptable. Notify the Commission in the event that a determination is made that historic properties will be affected by the proposed action.

Gina Santucci — SIGNATURE

08/10/98 — DATE

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

July 20, 1998

REPLY TO ATTENTION OF

Environmental Assessment Section
Environmental Analysis Branch

Ms. Dorothy P. Guzzo
Deputy Chief Historic Preservation Officer
Historic Preservation Office
New Jersey Department of Environmental Protection
CN 404
Trenton, New Jersey 08625

Dear Ms. Guzzo,

The U.S. Army Corps of Engineers, New York District (Corps), is currently conducting further studies in connection with the Dredged Material Management Plan (DMMP) for the Port of New York and New Jersey. A preliminary assessment and scoping document for cultural resources was previously coordinated with your office (Attachments 1 and 2). At that time, the DMMP study area was vast and it was not feasible to conduct cultural resource studies. Since then, reconnaissance level geomorphological and remote sensing investigations have been conducted for off-shore disposal options (pits and islands) where proposed project locations have been more succinctly defined through geophysical studies and other siting criteria.

Cultural resource studies have been undertaken in the currently identified zones of siting feasibility, Zones 1, 2 (Attachment 3) and 3 (Attachment 4) and the in-channel disposal areas (Ward's Point Bend, Newark Bay, Hudson River, Bowery Bay, Constable Hook/Port Jersey and Red Hook/Bay Ridge) (Attachment 5). Zone 1 was divided into three subzones, Zones 1A, 1B and 1C due to the presence of pipelines across the larger Zone 1. These smaller parcels were surveyed for cultural resources. To date, only the central portion of Zone 2 has been surveyed. Zones 1 and 2 are located in the Lower Bay Complex and are potential areas for the construction of new Contained Aquatic Disposal Pits. Zone 3 lies in the New York Bight Apex and has been identified, along with Zone 2, as a potential location for the construction of an Island Confined Disposal Facility. In-channel pit disposal is proposed within the existing navigation channels, listed above, in the Upper Bay Complex. Ward's Point Bend, an in-channel option, is located in the Lower Bay.

A geomorphological study was conducted to assess the potential for prehistoric resources. During the late Pleistocene and Holocene periods, the DMMP study area was on a relatively dry coastal plain that may have been inhabited by Native American populations. The geomorphological study concentrated on the analysis of pollen, foraminifera, and grain size coupled with limited radiocarbon dating of sediments obtained

from vibracores and borings. These data were used to reconstruct the paleoenvironment and ascertain areas that may have been favorable for site locations and that are more likely to be preserved, having withstood geological and human scouring processes.

The analysis suggests that most areas examined have some potential to preserve prehistoric sites although some are more sensitive than others. The areas rated to have a "high potential" are Ward's Point and all of Zones 1 and 2. The Newark Bay area and Zone 3 were designated as having a "moderate potential." Bowery Bay and Red Hook/Bay Ridge, both in New York State, were classified as "moderate to low." Constable Hook/Port Jersey was deemed to have a "low potential" primarily because modern construction has disturbed any remains of prehistoric occupation. The Hudson River channel was assessed as "low potential" for the middle channel where a river channel has been in place prior to any occupation of the area but the outer portions of the river channel have been assessed as "moderate to high." Radio-Carbon dating results were not available at the time the remote sensing report was submitted to the Corps. The results and interpretation of this additional data will be submitted as an addendum to the attached report and will be forwarded to your office as soon as it is received.

It is the Corps opinion that if proposed work is limited to the existing channels in Constable Hook/Port Jersey and the center portion of the Hudson River then no further cultural resource investigations will be required. Additional studies to evaluate and delimit the potential archeologically sensitive areas will be undertaken for the other proposed off-shore disposal locations, if they remain under consideration.

A remote sensing survey was conducted to assess the potential of the DMMP off-shore study areas for historic resources. The locations proposed for in-channel options were not surveyed as historic dredging in the channels and anchorages would have likely removed any historic shipwrecks or debris. A remote sensing survey has not been conducted, to date, in Zone 3 but a survey will be programmed if this zone remains under consideration as a potential disposal location.

The results of the remote sensing survey in Zones 1 and 2 indicate that four targets are potential cultural resources. The Corps proposes to avoid these targets and establish a buffer zone around them. However, no underwater inspection of these targets has occurred, to date, to confirm that these targets are in fact cultural resources and no assessment has been made of their eligibility for the National Register of Historic Places. If avoidance is not possible, further study in the form of research and a diving inspection by a qualified underwater archaeologist would be necessary to determine what these targets represent. If a target is found to be modern debris or a rock outcropping then it will not be necessary to avoid that location. If the target is shown to be eligible and cannot be avoided, mitigation plans will be developed. We will coordinate with your office regarding the definition of protocols for ensuring adequate safety margins are provided for these potential resources.

Cultural resource investigations to identify properties and evaluate their eligibility for the National Register of Historic Places (NRHP) will be programmed for all other options, as appropriate, as the DMMP study proceeds. A draft Programmatic Agreement is presently being written and will be coordinated with your office. This agreement document will address the direction and procedures for further cultural resources work as well as those options that will require no further study.

Please review the enclosed documents and provide Section 106 comments, pursuant to 36 CFR 800.5. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-0229

Sincerely,

for Frank Santomauro, P.E.
Chief, Planning Division

Attachments

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

July 20, 1998

REPLY TO
ATTENTION OF

Environmental Assessment Section
Environmental Analysis Branch

Ms. Ruth L. Pierpont
New York State Office of Parks,
Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Dear Ms. Pierpont,

The U.S. Army Corps of Engineers, New York District (Corps), is currently conducting further studies in connection with the Dredged Material Management Plan (DMMP) for the Port of New York and New Jersey. A preliminary assessment and scoping document for cultural resources was previously coordinated with your office (Attachments 1 and 2). At that time, the DMMP study area was vast and it was not feasible to conduct cultural resource studies. Since then, reconnaissance level geomorphological and remote sensing investigations have been conducted for off-shore disposal options (pits and islands) where proposed project locations have been more succinctly defined through geophysical studies and other siting criteria.

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A geomorphological study was conducted to assess the potential for prehistoric resources. During the late Pleistocene and Holocene periods, the DMMP study area was on a relatively dry coastal plain that may have been inhabited by Native American populations. The geomorphological study concentrated on the analysis of pollen, foraminifera, and grain size coupled with limited radiocarbon dating of sediments obtained

from vibracores and borings. These data were used to reconstruct the paleoenvironment and ascertain areas that may have been favorable for site locations and that are more likely to be preserved, having withstood geological and human scouring processes.

The analysis suggests that most areas examined have some potential to preserve prehistoric sites although some are more sensitive than others. The areas rated to have a "high potential" are Ward's Point and all of Zones 1 and 2. The Newark Bay area and Zone 3 were designated as having a "moderate potential." Bowery Bay and Red Hook/Bay Ridge, both in New York State, were classified as "moderate to low." Constable Hook/Port Jersey was deemed to have a "low potential" primarily because modern construction has disturbed any remains of prehistoric occupation. The Hudson River channel was assessed as "low potential" for the middle channel where a river channel has been in place prior to any occupation of the area but the outer portions of the river channel have been assessed as "moderate to high." Radio-Carbon dating results were not available at the time the remote sensing report was submitted to the Corps. The results and interpretation of this additional data will be submitted as an addendum to the attached report and will be forwarded to your office as soon as it is received.

It is the Corps opinion that if proposed work is limited to the existing channels in Constable Hook/Port Jersey and the center portion of the Hudson River then no further cultural resource investigations will be required. Additional studies to evaluate and delimit the potential archeologically sensitive areas will be undertaken for the other proposed off-shore disposal locations, if they remain under consideration.

A remote sensing survey was conducted to assess the potential of the DMMP off-shore study areas for historic resources. The locations proposed for in-channel options were not surveyed as historic dredging in the channels and anchorages would have likely removed any historic shipwrecks or debris. A remote sensing survey has not been conducted, to date, in Zone 3 but a survey will be programmed if this zone remains under consideration as a potential disposal location.

The results of the remote sensing survey in Zones 1 and 2 indicate that four targets are potential cultural resources. The Corps proposes to avoid these targets and establish a buffer zone around them. However, no underwater inspection of these targets has occurred, to date, to confirm that these targets are in fact cultural resources and no assessment has been made of their eligibility for the National Register of Historic Places. If avoidance is not possible, further study in the form of research and a diving inspection by a qualified underwater archaeologist would be necessary to determine what these targets represent. If a target is found to be modern debris or a rock outcropping then it will not be necessary to avoid that location. If the target is shown to be eligible and cannot be avoided, mitigation plans will be developed. We will coordinate with your office regarding the definition of protocols for ensuring adequate safety margins are provided for these potential resources.

Cultural resource investigations to identify properties and evaluate their eligibility for the National Register of Historic Places (NRHP) will be programmed for all other options, as appropriate, as the DMMP study proceeds. A draft Programmatic Agreement is presently being written and will be coordinated with your office. This agreement document will address the direction and procedures for further cultural resources work as well as those options that will require no further study.

Please review the enclosed documents and provide Section 106 comments, pursuant to 36 CFR 800.5. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-0229

Sincerely,

for Frank Santomauro, P.E.
Chief, Planning Division

Attachments

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

July 20, 1998

REPLY TO ATTENTION OF
Environmental Assessment Section
Environmental Analysis Branch

Dr. Arthur Bankoff
New York City Landmarks Preservation Commission
100 Old Slip
New York, New York 10005

Dear Dr. Bankoff,

The U.S. Army Corps of Engineers, New York District (Corps), is currently conducting further studies in connection with the Dredged Material Management Plan (DMMP) for the Port of New York and New Jersey. A preliminary assessment and scoping document for cultural resources was previously coordinated with your office (Attachments 1 and 2). At that time, the DMMP study area was vast and it was not feasible to conduct cultural resource studies. Since then, reconnaissance level geomorphological and remote sensing investigations have been conducted for off-shore disposal options (pits and islands) where proposed project locations have been more succinctly defined through geophysical studies and other siting criteria.

Cultural resource studies have been undertaken in the currently identified zones of siting feasibility, Zones 1, 2 (Attachment 3) and 3 (Attachment 4) and the in-channel disposal areas (Ward's Point Bend, Newark Bay, Hudson River, Bowery Bay, Constable Hook/Port Jersey and Red Hook/Bay Ridge) (Attachment 5). Zone 1 was divided into three subzones, Zones 1A, 1B and 1C due to the presence of pipelines across the larger Zone 1. These smaller parcels were surveyed for cultural resources. To date, only the central portion of Zone 2 has been surveyed. Zones 1 and 2 are located in the Lower Bay Complex and are potential areas for the construction of new Contained Aquatic Disposal Pits. Zone 3 lies in the New York Bight Apex and has been identified, along with Zone 2, as a potential location for the construction of an Island Confined Disposal Facility. In-channel pit disposal is proposed within the existing navigation channels, listed above, in the Upper Bay Complex. Ward's Point Bend, an in-channel option, is located in the Lower Bay.

A geomorphological study was conducted to assess the potential for prehistoric resources. During the late Pleistocene and Holocene periods, the DMMP study area was on a relatively dry coastal plain that may have been inhabited by Native American populations. The geomorphological study concentrated on the analysis of pollen, foraminifera, and grain size coupled with limited radiocarbon dating of sediments obtained from vibracores and borings. These data were used to reconstruct the paleoenvironment

and ascertain areas that may have been favorable for site locations and that are more likely to be preserved, having withstood geological and human scouring processes.

The analysis suggests that most areas examined have some potential to preserve prehistoric sites although some are more sensitive than others. The areas rated to have a "high potential" are Ward's Point and all of Zones 1 and 2. The Newark Bay area and Zone 3 were designated as having a "moderate potential." Bowery Bay and Red Hook/Bay Ridge, both in New York State, were classified as "moderate to low." Constable Hook/Port Jersey was deemed to have a "low potential" primarily because modern construction has disturbed any remains of prehistoric occupation. The Hudson River channel was assessed as "low potential" for the middle channel where a river channel has been in place prior to any occupation of the area but the outer portions of the river channel have been assessed as "moderate to high." Radio-Carbon dating results were not available at the time the remote sensing report was submitted to the Corps. The results and interpretation of this additional data will be submitted as an addendum to the attached report and will be forwarded to your office as soon as it is received.

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options, as appropriate, as the DMMP study proceeds. A draft Programmatic Agreement is presently being written and will be coordinated with your office. This agreement document will address the direction and procedures for further cultural resources work as well as those options that will require no further study.

Please review the enclosed documents and provide comments. If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-0229

Sincerely,

for Frank Santomauro, P.E.
Chief, Planning Division

Attachments

State of New Jersey
Department of Environmental Protection
Division of Parks and Forestry
Historic Preservation Office
CN-404
Trenton, N.J. 08625-0404
TEL: (609)292-2023
FAX: (609)984-0578

Christine Todd Whitman
Governor

Robert C. Shinn, Jr.
Commissioner

HPO-F97-123
June 19, 1997

Mr. Stuart Piken, P.E.
Chief, Planning Division
Department of the Army New York District
Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

ATTN: Ms. Lynn Rakos

Re: Multiple Counties, Multiple Municipalities
Port of New York/New Jersey Dredged Material
Management Plan (DMMP)

Dear Mr. Piken:

Thank you for providing the opportunity for Consultation under Section 106 on this project: specifically for the opportunity to review the August 1996 **Preliminary Assessment of Cultural Resource Sensitivity and Scoping Document for Additional Studies in Connection With the New York Harbor Apex Region Dredged Material Management Plan (DMMP), New York and New Jersey** prepared by Lynn Rakos. This assessment successfully takes into account the potential for significant resources and identifies means to identify, evaluate and treat resources associated with various types of activities under the different alternatives and aspects associated with the DMMP. The only substantive comment I have on the preliminary assessment is on statements in the last paragraph on page 26 and the third paragraph on page 29. As stated elsewhere in the document, identification of eligible prehistoric resources is not a goal associated with studies in these locations. Consequently, if later editions of this assessment are produced, this sentence should be omitted.

CONFIDENTIAL MAXUS2023166

In preparing a Programmatic Memorandum of Agreement for the project, I recommend keeping abreast of the emergent PMOA for the Green Brook Flood Control Project, and possibly involving the Advisory Council on Historic Preservation (ACHP) early in its review. The ACHP has significantly revised the structure of model PMOA's so that this early consultation might avoid the need for revisions of the PMOA later in time.

Thank you again for this opportunity for consultation under Section 106 of the National Historic Preservation Act. If you have any questions please do not hesitate to contact Deborah Fimbel, staff reviewer for this project.

Sincerely,

Dorothy P. Guzzo
Deputy State Historic
Preservation Officer

DPG:DRF
C:\PW\wd\106\971591
c. Bernard Moore, Administrator, Division of Engineering and Construction

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189
518-237-8643

June 03, 1997

Mr. Stuart Piken, P.E.
U.S. Department of the Army
New York District, Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

Re: CORPS
Dredged Material Management Plan
Port of New York/New Jersey
(Preliminary Assessment of Cultural Resources Sensitivity)
96PR2916

Dear Mr. Piken:

Thank you for providing this office with a copy of your preliminary report on cultural resources and providing us with an opportunity to comment early in the planning process. The State Historic Preservation Office (SHPO) concurs with the approach to the identification of historic and archaeological resources outlined in your report and the attached cover letter. My staff and I look forward to continuing consultation with your office as dredging alignments and disposal alternatives are specifically defined. Please feel free to contact me at 518-237-8643 ext. 255 if I you have any questions.

Sincerely,

Robert Kuhn, PhD.
Historic Preservation Program
Coordinator
Historic Preservation
Field Services Bureau

THE CITY OF NEW YORK LANDMARKS PRESERVATION COMMISSION
100 Old Slip, New York, NY 10005 (212) 487-6800

ENVIRONMENTAL REVIEW

USACE/106-R
PROJECT NUMBER

05/23/97
DATE RECEIVED

PROJECT

DMMP: DREDGED MATERIAL MANAGEMENT PLAN

[ ] No architectural significance

[ ] No archaeological significance

[ ] Designated New York City Landmark or Within Designated Historic District

[ ] Listed on National Register of Historic Places

[ ] Appears to be eligible for National Register Listing and/or New York City Landmark Designation

[ ] May be archaeologically significant; requesting additional materials

COMMENTS

"Preliminary Assessment of Cultural Resources Sensitivity and Scoping Document for Additional Studies in Connection with the New York Harbor Apex Region Dredged Material Management Plan (DMMP), New York and New Jersey, August, 1996" is accepted. Please provide a map of proposed on-shore locations, if any.

SIGNATURE

09/17/97
DATE

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

April 25, 1997

REPLY TO ATTENTION OF

Environmental Assessment Section
Environmental Analysis Branch

Ms. Dorothy P. Guzzo
Deputy Chief Historic Preservation Officer
Historic Preservation Office
New Jersey Department of Environmental Protection
CN 404
Trenton, New Jersey 08625

Dear Ms. Guzzo,

The U.S. Army Corps of Engineers, New York District (Corps) is responsible for maintaining navigation channels in the Port of New York/New Jersey. A Dredged Material Management Plan (DMMP) is currently being developed to successfully continue this work. Numerous locations are presently undergoing preliminary analyses to identify short- and mid-term disposal alternatives as well as to determine the potential for sites to be selected for detailed investigation and design. Attached is a preliminary assessment of cultural resources sensitivity and scoping document for additional studies that may be necessary depending on which alternatives are implemented as part of the final DMMP.

As indicated in a previous letter to your office (attached), the overall study area as presently defined is extensive and the potential for cultural resources is vast. Cultural resource issues will be addressed for each of the smaller geographic sub-sets once they are determined and will be used to evaluate the alternative disposal sites. It is in the opinion of the Corps that, based on the general level of survey conducted for this phase of the DMMP, there is a high potential to encounter significant resources for many of the proposed DMMP alternatives.

As the project proceeds, additional cultural resources studies will be programmed, as necessary, for all DMMP alternatives that are selected for detailed investigation. A Programmatic Memorandum of Agreement (PMOA) for the entire DMMP will be developed to specify the process associated with each alternative for identifying historic properties within areas of potential effect, evaluating effects, avoiding adverse effects and minimizing or mitigating for unavoidable impacts. The PMOA will also specify which actions will have no effect on historic properties. Please provide comments on the results of the preliminary cultural resource findings and directions for further studies. This will aid us in programming solutions for the dredged material disposal crisis.

If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-4663.

Sincerely,

Stuart Piken, P.E.
Chief, Planning Division

Attachments

JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

May 29, 1996

REPLY TO ATTENTION OF

Environmental Assessment Section
Environmental Analysis Branch

Ms. Dorothy P. Guzzo
Deputy Chief Historic Preservation Officer
Historic Preservation Office
New Jersey Department of Environmental Protection
CN 404
Trenton, New Jersey 08625

Dear Ms. Guzzo,

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The overall study area as presently defined is massive and the potential for cultural resources is vast. Cultural resource remote sensing surveys would not be effective at the current scale of the investigation and at this preliminary stage of analysis. Cultural resource issues will be

addressed for each of the smaller geographic sub-sets once they are determined and will be used to evaluate the alternative disposal sites.

A preliminary study is underway within the Corps which focuses on the types of cultural resources that might be encountered, a brief examination of existing studies and the direction that further research should take for each alternative under consideration. Many Federal, State and local agencies and organizations have been contacted for information on prehistoric and historic resources on the Continental Shelf including contact by telephone with Michael Gregg of your staff. A draft copy of this Corps report will be provided to you for comment.

We will keep you apprised of the direction of further studies and their results as the project proceeds. Any input you may have regarding this work will be appreciated. We will request Section 106 comments, pursuant to 36 CFR 800.5., as appropriate. Please feel free to provide us with any general comments you may have at the present time.

If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-4663.

Sincerely,

Stuart Piken

Stuart Piken, P.E.
Chief, Planning Division

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

April 25, 1997

REPLY TO ATTENTION OF

Environmental Assessment Section
Environmental Analysis Branch

Ms. Ruth L. Pierpont
New York State Office of Parks,
Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Dear Ms. Pierpont,

The U.S. Army Corps of Engineers, New York District (Corps) is responsible for maintaining navigation channels in the Port of New York/New Jersey. A Dredged Material Management Plan (DMMP) is currently being developed to successfully continue this work. Numerous locations are presently undergoing preliminary analyses to identify short- and mid-term disposal alternatives as well as to determine the potential for sites to be selected for detailed investigation and design. Attached is a preliminary assessment of cultural resources sensitivity and scoping document for additional studies that may be necessary depending on which alternatives are implemented as part of the final DMMP.

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If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-4663.

Sincerely,

Stuart Piken, P.E.
Chief, Planning Division

Attachments

NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

April 25, 1997

REPLY TO ATTENTION OF

Environmental Assessment Section
Environmental Analysis Branch

Dr. Daniel Pagano
New York City Landmarks Preservation Commission
100 Old Slip
New York, New York 10005

Dear Dr. Pagano,

The U.S. Army Corps of Engineers, New York District (Corps) is responsible for maintaining navigation channels in the Port of New York/New Jersey. A Dredged Material Management Plan (DMMP) is currently being developed to successfully continue this work. Numerous locations are presently undergoing preliminary analyses to identify short- and mid-term disposal alternatives as well as to determine the potential for sites to be selected for detailed investigation and design. Attached is a preliminary assessment of cultural resources sensitivity and scoping document for additional studies that may be necessary depending on which alternatives are implemented as part of the final DMMP.

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If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-0473.

Sincerely,

Stuart Piken, P.E.
Chief, Planning Division

Attachments

State of New Jersey

tine Todd Whitman
Governor

Department of Environmental Protection

Robert C. Shinn, Jr.
Commissioner

DIVISION OF PARKS AND FORESTRY
HISTORIC PRESERVATION OFFICE
CN-404
TRENTON, N.J. 08625-0404
TEL: (609) 292-2023
FAX: (609) 984-0578

HPO-A97-120
January 24, 1997

Mr. Stuart Piken
Chief, Planning Division
Department of the Army, New York District
Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

ATTN: Mr. Robert Kurtz
CEIS Coordinator

Re: Dredged Material Management Plan for
the Port of New York and New Jersey

Dear Mr. Piken:

Thank you for your submission of the September 1996 Interim Report for the Dredged Material Management Plan for the Port of New York and New Jersey and for your notification of intent to prepare a draft Comprehensive Environmental Impact Statement for the Plan.

I look forward to our continuing coordination under Section 106 of the National Historic Preservation Act relating to the sites and areas selected or which may be potentially selected for impact or use under the Plan. One thing I wish to note at this time is that the Office has had reports of one or more shipwrecks in the are near the Mud Dump Site. If this site is subject to remediation which could impact an area larger than the currently approved site, underwater archaeological survey to identify and potentially evaluate potential shipwreck resources would be appropriate.

Thank you again for your notification. If you have any questions, please contact Deborah Fimbel, Historic Preservation Office staff reviewer for this project.

Sincerely,

Dorothy P. Guzzo

Dorothy P. Guzzo
Deputy State Historic
Preservation Officer

C:\PW\wd\106\97430
c. Lynn Rakos, Archaeologist, ACOE

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CONFIDENTIAL MAXUS2023175

OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189
518-237-8643

January 3, 1997

Mr. Stuart Piken, P.E.
U.S. Department of the Army
New York District, Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

Dear Mr. Piken:

Re: CORPS
Dredged Material Mgmnt Plan:
Port of New York/New Jersey
(Interim Report, 1996)
96PR2916

Thank you for requesting the comments of the New York State Office of Parks, Recreation and Historic Preservation on the above referenced project. As the state agency responsible for the coordination of the State and Federal historic preservation programs, we would like to offer the following comments.

As discussed in the report, the upland disposal of dredge spoils has the potential to negatively impact historic, cultural and/or archeological resources. As a result, a more comprehensive evaluation of these potential impacts will be needed in the CEIS. Once the potential disposal method(s) and site(s) has been selected a comprehensive analysis of the historic resources associated with the site(s) and its surroundings (truck routes and viewsheds) will be required.

The OPRHP also has concerns regarding the potential impacts of the project on underwater archeological sites. The port area is a site highly sensitive to the presence the wrecks and hulks of historic vessels. Therefore, it is our recommendation that an archeological survey of these features is fully warranted as part of the CEIS.

OPRHP welcomes the opportunity to provide early comments in this project as a means of insuring that historic properties are adequately addressed in environmental review process. If you should have any questions, do not hesitate to contact, Robert Kuhn, Program Coordinator at (518) 237-8643, ext. 255.

Sincerely,

Ruth L. Pierpont

Ruth L. Pierpont
Director, Historic Preservation
Field Service Bureau

RLP:cm

An Equal Opportunity/Affirmative Action Agency
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NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

May 29, 1996

REPLY TO ATTENTION OF

Environmental Assessment Section
Environmental Analysis Branch

Mr. J. Winthrop Aldrich
New York State Office of Parks,
Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Dear Mr. Aldrich,

The U.S. Army Corps of Engineers, New York District (Corps) is responsible for maintaining navigation channels in the Port of New York/New Jersey. A Dredged Material Management Plan (DMMP) is presently being developed to successfully continue this work.

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We will keep you apprised of the direction of further studies and their results as the project proceeds. Any input you may have regarding this work will be appreciated. We will request Section 106 comments, pursuant to 36 CFR 800.5., as appropriate. Please feel free to provide us with any general comments you may have at the present time.

If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-4663.

Sincerely,

Stuart Piken

Stuart Piken, P.E.
Chief, Planning Division

JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

May 29, 1996

REPLY TO ATTENTION OF

Environmental Assessment Section
Environmental Analysis Branch

Ms. Dorothy P. Guzzo
Deputy Chief Historic Preservation Officer
Historic Preservation Office
New Jersey Department of Environmental Protection
CN 404
Trenton, New Jersey 08625

Dear Ms. Guzzo,

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If you or your staff require additional information or have any questions, please contact Lynn Rakos, Project Archaeologist, at (212)264-4663.

Sincerely,

Stuart Piken

Stuart Piken, P.E.
Chief, Planning Division