

New York-New Jersey  
Harbor Estuary Program  
Including the Bight Restoration Plan



Final  
Comprehensive Conservation  
and Management Plan

March 1996

## Note

---

Since the Comprehensive Conservation and Management Plan was finalized in March 1996, there have been a number of significant developments at the federal and state levels related to dredged material management. In particular, the Clinton Administration has announced its plan to close the Mud Dump Site, and to designate the Historic Area Remediation Site in and around the site, where historic dumping has occurred; and the Governors of New York and New Jersey have announced the Joint Dredging Plan for the Port of New York and New Jersey. The Management Conference will, therefore, expeditiously update the Plan to reflect these developments.

## TABLE OF CONTENTS

|  | PAGE |
|--|------|
| STATE OF THE HARBOR AND BIGHT.....                   | 1    |
| <b>THE PLAN</b>                                      |      |
| Overview of the Plan .....                           | 15   |
| Management of Habitat and Living Resources .....     | 21   |
| Management of Toxic Contamination.....               | 71   |
| Management of Dredged Material .....                 | 131  |
| Management of Pathogenic Contamination.....          | 161  |
| Management of Floatable Debris.....                  | 181  |
| Management of Nutrients and Organic Enrichment.....  | 197  |
| Rainfall-Induced Discharges .....                    | 223  |
| Public Involvement and Education .....               | 241  |
| <b>IMPLEMENTING THE PLAN</b>                         |      |
| Post-CCMP Management Structure.....                  | 257  |
| Monitoring, Modeling, and Research Strategy.....     | 263  |
| Reporting on Progress in Implementing the Plan ..... | 271  |
| Costs and Financing .....                            | 273  |

LIST OF TABLES

|         |  |     |
|---------|--|-----|
| 1(o).   | Causes of Human Use and Ecosystem Health Impairments   |     |
| 2(o).   | Sources Contributing to Causes of Impairments  | 17  |
| 3(hc).  | Enhanced Program Costs for Habitat and Living Resources  | 49  |
| 4(hc).  | Project Implementation Costs for Habitat and Living Resources  | 50  |
| 5(hs).  | SummaryC Management of Habitat and Living Resources  | 52  |
| 6(t).   | Chemicals of Concern in the NY-NJ Harbor Estuary and Bight   | 74  |
| 7(t).   | Waterbodies Needing TMDLs  | 76  |
| 8(t).   | POTWs in NY-NJ Harbor Subject to USEPA CWA Section 308 Reporting Requirements for Metals, PCBs, and Dioxin | 84  |
| 9(t).   | Status of Actions at Diamond Alkali Superfund Site   | 92  |
| 10(t).  | Sites Contaminated with PCBs in the Upper Hudson River Basin   | 93  |
| 11(tc). | Enhanced Program Costs for Management of Toxic Contamination   | 104 |
| 12(tc). | Project Implementation Costs for Management of Toxic Contamination   | 107 |
| 13(ts). | SummaryC Management of Toxic Contamination   | 109 |
| 14(dc). | Enhanced Program Costs for Management of Dredged Material  | 147 |
| 15(dc). | Project Implementation Costs for Management of Dredged Material  | 148 |
| 16(ds). | SummaryC Management of Dredged Material  | 150 |
| 17(p).  | Use Impairments by Bacterial Pathogenic Indicator Sources in the Harbor/Bight                              | 165 |
| 18(pc). | Enhanced Program Costs for Management of Pathogenic Contamination  | 173 |
| 19(pc). | Project Implementation Costs for Management of Pathogenic Contamination                                    | 174 |
| 20(ps). | SummaryC Management of Pathogenic Contamination  | 176 |
| 21(f).  | Debris Collected   | 183 |
| 22(fc). | Enhanced Program Costs for Management of Floatable Debris  | 189 |
| 23(fc). | Project Implementation Costs for Management of Floatable Debris  | 190 |

LIST OF TABLES *(Continued)*

|  |     |
|--|-----|
| 24(fs). SummaryC Management of Floatable Debris.....   | 192 |
| 25(nc). Enhanced Program Costs for Management of Nutrients and Organic Enrichment.....       | 213 |
| 26(nc). Project Implementation Costs for Management of Nutrients and Organic Enrichment..... | 214 |
| 27(ns). SummaryC Management of Nutrients and Organic Enrichment.....                         | 216 |
| 28(rc). Enhanced Program Costs for Rainfall-Induced Discharges .....                         | 231 |
| 29(rc). Project Implementation Costs for Rainfall-Induced Discharges .....                   | 232 |
| 30(rs). SummaryC Rainfall-Induced Discharges .....   | 234 |
| 31(ec). Enhanced Program Costs for Public Involvement and Education .....                    | 249 |
| 32(es). SummaryC Public Involvement and Education .....                                      | 251 |
| 33(ic). Enhanced Program Costs for Post-CCMP Management Structure.....                       | 260 |
| 34(is). SummaryC Post-CCMP Management Structure.....   | 261 |
| 35(ic). Enhanced Program Costs for Monitoring, Modeling, and Research Strategy.....          | 266 |
| 36(is). SummaryC Monitoring, Modeling, and Research Strategy.....                            | 267 |
| 37(is). SummaryC Reporting on Progress in Implementing the Plan .....                        | 272 |
| 38(is). SummaryC Costs and Financing .....   | 276 |
| 39(ic). Summary of Enhanced Program Costs.....   | 279 |
| 40(ic). Summary of Project Implementation Costs.....   | 280 |

LIST OF FIGURES

|     |   |     |
|-----|---|-----|
| 1.  | New York/New Jersey Harbor Estuary.....   | 3   |
| 2.  | New York Bight .....  | 4   |
| 3.  | Fish and Crab Advisories for New Jersey Waters based on PCB, Dioxin and Chlordane Contamination.....                                  | 11  |
| 4.  | Fish Advisories and Health Advice for New York Waters of the Harbor/Bight Area .....  | 12  |
| 5.  | Sources of Several Metals to the Harbor under Conditions of High and Low Riverine Flow.....   | 78  |
| 6.  | Estimated Sources of PCBs to the Harbor.....  | 79  |
| 7.  | Overview of HEP's Plan for Management of Toxic Contamination .....  | 81  |
| 8.  | Loadings of Fecal Coliform to the Estuary.....  | 164 |
| 9.  | Communications Network for Reporting and Responding to Floatable Debris Slicks .....  | 184 |
| 10. | Areas of Long Island Sound with Minimum Bottom Water Dissolved Oxygen Levels below 5mg/l in the Summers of 1987, 1989, and 1991 ..... | 199 |
| 11. | Minimum Bottom Water Dissolved Oxygen Concentrations in Jamaica Bay, 1993 .....   | 201 |
| 12. | Eutrophication-related Effects in Raritan Bay, 1988-1989 .....  | 202 |
| 13. | Minimum Bottom Water Dissolved Oxygen Concentrations (mg/l) in the Bight, July-September, 1977-1985 .....                             | 203 |
| 14. | Distribution of the Nitrogen Load to Long Island Sound among Several Source Categories .....  | 205 |
| 15. | Nitrogen Loadings to New York-New Jersey Harbor.....  | 206 |
| 16. | Nitrogen Loadings to Bight Apex .....   | 206 |
| 17. | Long-term HEP Management Structure .....  | 258 |

**APPENDICES** (available separately)

- 1 List of HEP/New York Bight sponsored reports**
- 2 Management Conference structure and membership**
- 3 How HEP has met several requirements of the Clean Water Act, Section 320**
  - A Characterization of problems**
  - B Base program analysis**
  - C Action plan**
  - D Public participation summary**
- 4 Finance Plan and Implementation Strategy**
- 5 Environmental Monitoring Plan**
- 6 Federal Consistency Report**
- 7 Summary of Responses to the Public Comments received on the Proposed CCMP**





## THE STATE OF THE HARBOR AND BIGHT

### A RESOURCE WORTHY OF PROTECTION

New York-New Jersey Harbor and the New York Bight (referred to throughout this document as the Harbor/Bight) are extraordinary in many ways -- their abundant resources, their beauty, and their many competing uses. The Harbor/Bight abounds with diverse natural resources, yet it is the heart of the most densely populated region of the nation. It provides recreational opportunities including fishing, boating, and swimming to over 20 million residents, and yet it supports a world class port for both passengers and cargo. It yields extensive commercial and recreational fisheries. It is also a repository for municipal and industrial effluents, for storm runoff from the vast metropolitan area, and for the disposal of dredged material.

It provides a livelihood for the local fishing community and citizens who work in the tourism industry. For others, the Harbor/Bight represents a great opportunity to enjoy open space, offering leisure time activities which are generally rare in an urban metropolis.

For all these reasons and more, those who work and play here should consider it a resource worthy of protection. The New York-New Jersey Harbor Estuary Program is a testimony to the fact that people care about the Harbor/Bight. Elected officials have authorized the expenditure of millions of taxpayer dollars to better understand the problems of the ecosystem. Hundreds of people have participated in the Management Conference for the past five years to develop a plan for its future. These citizens represent federal, state, and local government agencies, scientists, members of the commercial and recreational fishing community, public interest groups, environmental groups, and business and industry.

And why do people care about the Harbor/Bight? The answer is simple. Despite a legacy of environmental insults, the ecosystem is alive, and, in some areas, even teeming with marine life and valuable natural resources.

Although we can never restore this extraordinary resource to a pristine condition, we can make a difference--each of us can. The goal confirmed by participants in the Harbor/Bight Estuary Program is ***to establish and maintain a healthy and productive ecosystem with full beneficial uses***. To achieve this goal, each individual has an opportunity and an obligation to contribute to the solutions.

### ENVIRONMENTAL PROBLEMS OF THE HARBOR/BIGHT

Despite recent improvements in environmental conditions in the Harbor/Bight, significant problems remain. These problems include human use impairments such as fish consumption advisories and intermittent closures of bathing beaches, and ecosystem health and productivity impairments such as declines in fish and shellfish populations. These problems are caused, in significant part, by habitat loss and degradation, toxics, pathogens, floatables, and nutrients and organic enrichment.

### ENVIRONMENTAL SETTING FOR THE HARBOR/BIGHT ESTUARY PROGRAM

#### ***What is an Estuary?***

An estuary is a semi-enclosed coastal body of water which connects with the open sea. It is a transition zone where salt water from the ocean mixes with fresh water from rivers and land. The amount of fresh water flowing into the estuary varies from season to season and from year to year.

This variation, coupled with the daily rise and fall of the tides and the consequent movement of salt water up- and down-river, creates a unique environment. Estuaries are among the most productive of the Earth's systems; more than 80 percent of all fish and shellfish use estuaries as a primary habitat or as spawning or nursery grounds. Estuaries also provide feeding, nesting, breeding, and nursery areas for other diverse animal life.

### ***What is the Harbor Estuary Program?***

Congress recognized the significance of preserving and enhancing coastal environments with the establishment of the National Estuary Program in the 1987 amendments to the Clean Water Act. The purpose of the National Estuary Program is to promote the development of comprehensive management plans for estuaries of national significance threatened by pollution, development, or overuse. At the request of the Governors of New York and New Jersey, the Harbor was accepted into the program in 1988. In 1987, Congress also required USEPA to prepare a restoration plan for the Bight. Because the Harbor and Bight are linked in so many ways, USEPA and the Management Conference agreed to make the Bight Restoration Plan a product of the Harbor Estuary Program (HEP).

### ***What is the Geographic Scope of the Program?***

The New York-New Jersey Harbor Estuary encompasses the waters of New York Harbor and the tidally influenced portions of all rivers and streams which empty into the Harbor. There is a core area (defined by the shading on Figure 1) which includes the tidal waters of the Hudson-Raritan Estuary from Piermont Marsh in New York State to an imaginary line at the mouth of the Harbor which connects Sandy Hook, New Jersey and Rockaway Point, New York. This imaginary line is known as the Harbor Transect.

The core area includes the bi-state waters of the Hudson River, Upper and Lower Bay, Arthur Kill, Kill Van Kull, and Raritan Bay. In New York, it includes the East and Harlem Rivers and Jamaica

Bay, and, in New Jersey, it includes the Hackensack, Passaic, Raritan, Shrewsbury, Navesink, and Rahway Rivers, and Newark and Sandy Hook Bays.

The Bight (Figure 2) is the ocean area extending approximately 100 miles offshore from the Harbor Transect to the outer limits of the Continental Shelf. Almost 240 miles of sandy shoreline, stretching from Cape May, New Jersey to Montauk Point, Long Island form its landward border. There are several back bays which are located behind the barrier beaches outside the core area of the Harbor. Some of the larger back bays adjacent to the Bight are the Great South Bay, Shinnecock Bay, and Moriches Bay in New York, and Barnegat Bay, Great Bay, Great Egg Harbor, and Little Egg Harbor in New Jersey.

### ***What is the Value of the Harbor/Bight?***

The Harbor/Bight is clearly an economic as well as an ecological asset. Billions of dollars are generated annually in the regional economy from boating, commercial and sport fishing, swimming, and beachgoing. The Port of New York and New Jersey is the largest port on the east coast of the United States and one of the largest ports in the world. Data from the Port Authority of New York and New Jersey indicate that 38 million long tons of bulk and general cargo, valued at approximately \$54.7 billion, were shipped through the Port of New York and New Jersey in 1992. The regional economy also benefits from other uses of the Harbor/Bight, including ferry transportation, which is expanding, and sightseeing.

While it is fairly easy to quantify the economic value of the Harbor/Bight, there are numerous other values related to ecology and aesthetics which are much more difficult to price. What is the worth of a salt or freshwater wetland or a barrier beach as a habitat for a variety of plants and mammals, birds and reptiles -- some of which are threatened or endangered? What is the value of the personal sense of well-being that comes from an afternoon of boating or fishing?

Figure 1. New York/New Jersey Harbor Estuary

Figure 2. New York Bight

Although some of this decline may be attributed to overharvesting or natural fluctuations, pollution and



The ecological and economic integrity of the Harbor/Bight system are clearly interdependent. For example, New York, New Jersey, and the federal government have closed some commercial fisheries in portions of the Harbor and Bight. The Port has experienced substantial economic losses due to problems associated with the controversial disposal of dredged sediments contaminated with dioxin and other toxic chemicals from the Port Newark complex.

The uncertainty of future dredging operations has also impacted the volume of shipping in the Harbor. Over the past 100 years, there has been a decline in the abundance of commercially important fish and shellfish. By the early 1900s, nuisance and health conditions related to untreated sewage brought about an increasing demand for effective wastewater management. Treatment plants were constructed in the Harbor/Bight area throughout the century, leading to improvements in environmental conditions. Nevertheless, at the time the Clean Water Act was passed in 1972, water quality

destruction of habitat are clearly contributing factors. For example, there have been historic declines in once-abundant oyster beds in Raritan Bay. In addition, thriving habitats

and good water quality contribute to higher shore-line residential property values and tourism revenues, and the well-being of every living creature.

### ***What Environmental Problems have been Faced in the Past?***

in the Harbor/Bight was still poor. There were low levels of dissolved oxygen and high concentrations of coliforms, toxic metals, and organics. The region's sewage treatment plants (STPs) were discharging nearly half a billion gallons per day of raw sewage to the Harbor; in addition half of the sewage treatment plants were discharging effluent with only primary

treatment, which provides minimal treatment of sanitary waste and minimal or no treatment of industrial wastes discharged to municipal sewage systems. A high percentage of combined sewers in the region were not operating properly, allowing additional outpourings of raw sewage to the Harbor/Bight during dry weather.

In the two decades since the passage of the Clean Water Act, investments in water pollution control programs have resulted in significantly improved water quality in the region. These improvements have occurred despite an ever-increasing number of people and activities in the Harbor/Bight. Obvious sources of pollution are now regulated through permit programs and tidal wetlands are protected. New and expanded treatment plants are providing better treatment; only one sewage treatment plant still operates below secondary treatment levels. Industrial Pretreatment Programs have helped reduce discharges of industrial wastes to municipal sewage systems, resulting in substantial reductions in loadings of several toxic chemicals including metals. More recently, agencies have begun to focus on the ecosystem as a whole and on previously inadequately controlled sources, such as combined sewer overflows (CSOs), storm water, and non-point source runoff.

## **HUMAN USE & ECOSYSTEM HEALTH IMPAIRMENTS**

Despite these improvements, many problems remain. The water quality of the Harbor/Bight is far from what it could be, and many uses or values are still impaired from current or old abuses. There are a substantial reservoir of toxics in the sediments of the Harbor/Bight and problems with toxic contamination of biota. The major continuing impairments are as follows:

### ***Human Use Impairments***

- Ë Some beaches are intermittently closed after rain storms, which may have introduced harmful bacteria and viruses to bathing areas.
- Ë Both New York and New Jersey have advised people to limit or avoid consumption of several species of fish and shellfish caught in the waters of

the Harbor/Bight.

- 6 Health advisories in New York and New Jersey warn people to limit or avoid consumption of striped bass, eel, blue claw crabs, bluefish, and other species caught in Harbor waters due to toxic contamination. A complete list of New York and New Jersey fishing advisories for the New York-New Jersey Harbor Estuary due to toxics is provided at the end of this section (see Figures 3 and 4 below).
- 6 Shellfish harvesting for direct consumption is prohibited in the Harbor due to the potential presence of harmful bacteria and viruses.
- Ë New York has closed its commercial fishery for striped bass in the Harbor and in parts of the Bight due to concerns about PCB contamination.
- Ë Trash and litter, flushed to the water from beaches and streets, through CSOs and storm water runoff, pose a hazard to navigation and living resources.
- Ë Floatables from decaying waterfront structures remain a persistent problem, impairing commercial uses, recreational navigation, and the enjoyment of beaches.

### ***Ecosystem Health and Productivity Impairments***

- Ë Habitat destruction, pollution, and overfishing have contributed to serious declines in commercial and recreational fish and shellfish stocks. For example, in the Bight there has been a substantial alteration in the species composition of groundfish stocks. These declines are expected to persist for years

even with aggressive management actions.

- È Low dissolved oxygen levels in some areas of the Bight have reduced the available habitat for fish and shellfish.
- È Contaminants in water and sediments have resulted in the bioaccumulation of toxics in resident biota.
- È Wetlands, intertidal areas, and other habitats have been greatly reduced by development and pollution. For example, of the 100 square miles of wetlands that existed in pre-colonial times in New York City, only 14 square miles remain today.
- È Levels of copper in Harbor waters approach, and levels of mercury exceed, water quality standards (see text box below).
- È Toxic contamination has historically reduced the reproductive ability of some species of coastal birds.

## CAUSES OF THE PROBLEMS

Residential, commercial, and recreational development have increased pollution, altered land surfaces, reduced open spaces, and restricted access to the shoreline. During the twentieth century, the use of the Bight as a disposal site for human and other wastes increased, and the expanded "paving" of land increased runoff into coastal waters. Habitat destruction and alteration throughout the watershed impacted native wildlife populations and reduced the breeding grounds and nursery areas for a variety of species.

HEP has decided to focus on five primary causes of human use and ecosystem impairments. These are **habitat loss and degradation, toxic contamination, pathogen contamination, floatable debris, and nutrient and organic enrichment**. Although these are the primary causes, other factors such as overfishing also contribute to the problems.

### *Habitat Loss and Degradation*

As the New York metropolitan area became the most

Numeric criteria and standards, including water quality criteria and standards, fish tissue action levels and advisory levels, sediment quality criteria, and other criteria are designed as surrogates for direct measurement of adverse pollution effects.

Criteria and standards designed to protect marine life indicate the maximum concentration of a substance considered safe to protect sensitive marine organisms from adverse toxic effects. For example, at concentrations of a substance exceeding criteria or standards, sensitive organisms may not be able to reproduce successfully, or may be killed by exposure to the water or sediments.

Concentrations of a substance exceeding criteria or standards designed to protect wildlife or human health indicate unacceptable health risks to wildlife or humans consuming fish, shellfish, or crustacea caught in the waterbody. These criteria and standards are usually designed to be compared with concentrations measured in the tissues of edible species, but may be extrapolated to water or sediments. For example, some USEPA water quality criteria are based on protection of humans from a  $10^{-6}$  (one in a million) lifetime risk of cancer due to consumption of seafood.

densely populated area in the nation and New York-New Jersey Harbor evolved into a world class port, the waterfront changed. At least 75 percent of historical wetlands have disappeared, and one-quarter of the land mass of the island of Manhattan is actually an artificially-filled shallow water habitat.

This loss and degradation of natural habitat is attributable to a variety of human activities including the filling of wetlands and shallow water habitats, alteration of shorelines, dredging, and coastal development. Potential future threats to coastal habitat, including sea level rise, could be exacerbated by human activities. Habitat loss and degradation contribute to the following human use and ecosystem impairments:

- reduction in commercial and recreational fisheries;
- destruction of shellfish seed beds;
- reduction in diversity and abundance of coastal wildlife;
- reduction in open space for recreation and habitat; and
- loss of tourism revenues.

The plan to address habitat loss and degradation includes the focused application of existing programs, as well as the geographic targeting of areas requiring special protection.

### ***Toxic Contamination***

Toxic substances produced by human activities are now found in the waters, sediments, and biota of the Harbor/Bight where they persist at elevated levels and pose risks to both human and ecosystem health. Historically, much of this contamination came from industrial sources. Continuing sources of toxics today include wastewater treatment facilities and CSOs, as well as accidental spills, vehicle exhaust emissions, household chemicals, pesticides, atmospheric. While our knowledge about toxic contaminants and our capabilities to detect trace amounts of toxic chemicals are increasing each year, we still have much to learn. Further data collection and analysis will help us understand 1) the nature and fate of many of the complex toxic chemicals in the marine environment, 2) how to distinguish the negative impacts of toxics from other sources, and 3) the synergistic effects between various classes of toxics and other pollutants. Additional planning and research efforts are needed to support new remedial actions in the future.

The plan to address toxics includes specific actions to reduce continuing loadings, especially loadings of chemicals of concern, and specific actions for in-place contaminated sediments.

### ***Pathogen Contamination***

Pathogens are disease causing microscopic bacteria,

deposition, leachate from landfills, urban runoff, and other non-point sources. In addition, because sediments accumulate contaminants, they continue to act as a source of toxics even after past discharges cease.

Compliance with pollution control requirements has resulted in a decrease in the loading of toxics to the Harbor/Bight; however, sources remain, and toxic contamination is still a major problem. Toxics contribute to the following human use and ecosystem impairments:

- unsafe seafood;
- reduction in commercial and recreational fisheries;
- reproductive impairments in coastal species; and
- adverse impacts on port operations associated with concerns about dredging and disposal of contaminated sediment.

HEP characterization studies have identified at least 15 chemicals or classes of chemicals of concern. These include metals, chlorinated pesticides, dioxins, PCBs, and polycyclic aromatic hydrocarbons.

protozoans, and viruses. They are present in untreated or inadequately treated human sewage and domestic and wild animal wastes. Primary sources of pathogens include CSOs, sewage treatment plant malfunctions, illegal connections to storm sewers, vessel sewage discharges, urban runoff, and other non-point sources of pollution. Bacterial indicators are currently used to evaluate the potential for pathogen contamination. Pathogens contribute to the following human use and ecosystem impairments:

- beach closures; and
- prohibitions and/or restrictions on shellfish harvesting.

Bacterial water quality for recreational bathing is generally acceptable on both the New Jersey and Long Island coasts. However, occasionally certain beaches are closed because of elevated coliform concentrations.

These elevated levels result, usually, from storm water discharges and CSOs, and, less frequently, from malfunctions in wastewater collection and treatment systems.

The entire Harbor core area is closed to direct shellfish harvesting. In areas where water quality meets federal and state "special restricted" standards, harvesting through relay and depuration programs is allowed; harvesting for relay is currently permitted in western Long Island Sound and portions of Raritan Bay, Sandy Hook Bay, and the Shrewsbury and Navesink Rivers.

There is no approved shellfishing in Jamaica Bay because of water quality concerns and because of the U.S. National Park Service's Jamaica Bay Wildlife Refuge management mandate, which has the primary aim of conserving the natural resources, fish, and wildlife.

Present regulations require year round chlorination of sewage effluent to reduce microbial bacteria concentrations. Modern wastewater treatment facilities and conventional disinfection practices have greatly reduced prevalent disease causing bacteriological organisms; as a result, viruses are now the most common human Most of the floatable debris originates around the periphery of the Hudson-Raritan Estuary and is flushed out to the Bight by a combination of freshwater high flows and spring and storm tides. The intensity of the freshwater flows and tides dictates the size of the floatable load; winds determine the distribution of the floatable load during the beach season. This debris is accumulated in ocean slicks, which are washed ashore by wind, creating the widespread public perception that the ocean is polluted. Floatable debris contributes to the following human use and ecosystem impairments:

- beach closures;
- reduction in aesthetic value of beaches, shores, and waters;
- hazards to marine organisms; and
- hazards to commercial and recreational navigation.

Floatable debris resulted in significant reductions in recreational values and major economic losses to

disease agents in the Harbor. There is a growing national interest in finding a reliable human-specific viral microbial indicator as a supplement to existing bacterial indicators to support management actions for contaminated waters. HEP has funded studies to identify such an indicator.

The plan to address pathogens includes specific actions to reduce the continuing loading of harmful bacteria and viruses to Harbor/Bight waters, and to restore beneficial uses.

### ***Floatable Debris***

There are two primary components of floatable debris.

The first results from the careless disposal of trash, which then enters the ecosystem through runoff, storm water discharges, CSOs, beach and boat litter, and poor solid waste handling operations. The second category, called Harbor Drift, provides the majority of floatable debris. It is composed primarily of material from derelict shoreline structures such as piers, bulkheads, and pilings.

tourism during the summers of 1987 and 1988. A report developed as part of the Bight Restoration Plan estimated that New York lost between \$900 million and \$2 billion, and New Jersey lost between \$900 million and \$4 billion during this time period. Some of this lost revenue resulted from beach closures; the remainder was lost when beaches were open but the public stayed away from fear of contamination.

In response to this significant problem, HEP developed, and the participating agencies have implemented, a highly successful short-term floatables action plan which includes shoreline cleanup activities such as "Operation Clean Shores" and the removal of floatable slicks. The implementation of this plan has helped to reduce floatable-related beach closings.

The plan to address floatables includes the continued implementation of the short-term floatables action plan, and the refinement of a long-term plan focused on preventing floatables from entering Harbor/Bight waters.



### ***Nutrients and Organic Enrichment***

There is strong evidence that eutrophication, induced by excessive discharges of the nutrient nitrogen, from both point and non-point sources, is a significant problem in the coastal waters of the Harbor/Bight. Recent studies indicate a direct correlation between excessive enrichment from nitrogen and depressed dissolved oxygen levels in coastal waters. Long-term trend analyses indicate that low dissolved oxygen continues to be a problem in the Harbor/Bight, with some areas showing an improvement and others experiencing a decline in water quality. The general trend for the past 20 years is an improvement in the highly polluted waterways and inner Harbor areas. Over the past 10 years, however, a decline in water quality is evident in some of the outlying areas, such as Long Island Sound and parts of Jamaica Bay.

Each day sewage treatment plants discharge large amounts of treated effluent containing nitrogen into the Harbor/Bight. Recent requirements for sludge dewatering prior to land disposal have resulted in HEP has concluded that a system-wide eutrophication model (SWEM) and a complementary program of basic research are needed in order to better understand the nature and causes of this problem and the impact of a reduction in nutrients on dissolved oxygen concentrations. HEP would use this model and studies to identify actions necessary to eliminate the adverse impacts of hypoxia and other eutrophic effects in the Harbor, Bight, and Long Island Sound.

On an interim basis, HEP is considering the implementation of low cost nitrogen control measures to minimize the discharge of nitrogen to Harbor/Bight waters.

### **FUTURE WITHOUT A COMPREHENSIVE CONSERVATION AND MANAGEMENT PLAN**

The collective problems of the Harbor/Bight cut across many jurisdictional boundaries and affect us all. Until HEP began, however, there was little opportunity for a public dialogue about the future of this ecosystem. Restoration and attainment of full beneficial uses of Harbor/Bight resources were left to fragmented

increased nitrogen loadings to the Harbor/Bight. Other nitrogen sources include runoff from overfertilized lawns, atmospheric deposition, and CSOs.

Excessive nutrients and organic materials also contribute to noxious water quality conditions in tributaries and inner Harbor areas where there are many CSOs and poor circulation. The primary cause of these problems is decomposition of organic materials. Flushing Bay and Gowanus Canal in New York often experience noxious water quality conditions. There have also been dense red tides in the Lower Bay Complex, including Raritan and Sandy Hook Bays.

Depressed oxygen levels caused by nutrient and/or organic enrichment contribute to the following human use and ecosystem impairments:

- È reduction in fish and shellfish reproduction;
- È reduction in habitat for fish/shellfish; and
- È noxious odors.

planning, unilateral regulatory decisions, and court decisions.

This program provides the opportunity to make enlightened and educated system-wide decisions based upon good scientific data, to foresee research and monitoring needs prior to the onset of crises, and to develop sound actions to manage the ecosystem.

With the actions in this Comprehensive Conservation and Management Plan, the water quality improvements made in recent years can continue. If these actions, which further reduce and control the discharge of pollutants and preserve and enhance coastal habitats, are not taken, people will turn away from the Harbor/Bight as a source of livelihood and recreation.

The regional economy will shrink as people find other places to boat, fish, swim, and live.

### **MESSAGE TO THE PUBLIC**

Our challenge today is to develop and maintain public support for future conservation and management of the Harbor/Bight resources. This means more than simple

information transfer. Information is only one step in a continuum involving awareness, understanding, stewardship, behavioral changes, empowerment, and action. In listening to the public over the past five years, we have learned that, in order to maintain support, HEP's Management Conference must establish commitments and take actions. We must appreciate that the public was instrumental in getting HEP underway and sustaining it over the last five years. We must all work together to develop a regional consensus for further action and commit the necessary resources to see that actions are implemented.

It is imperative that the public and private sectors participate in HEP because we are all part of the problem and we are all part of the solution. From the onset of this process, the Management Conference has realized the importance of convincing individuals that there is a problem, that there is a compelling need to take action, and that individual life style choices are equally as important as regulatory actions to reduce pollution. While our knowledge about many of the pollutants impacting the ecosystem is increasing each year, we have not always done a good job of communicating this information to the public. There is a lack of public appreciation for the ecosystem and a lack of knowledge of the interdependence of human activities and ecosystem health.

Our message to the public is simple: learn what you can do to establish and maintain a healthy and productive Harbor/Bight with full beneficial uses. **You can make a difference!!**

**Figure 3. Fish and Crab Advisories for New Jersey Waters based on PCB, Dioxin and Chlordane Contamination (excerpted from *A Guide to Health Advisories for Eating Fish and Crabs Caught in New Jersey Waters, March 1995*)**

| LOCATION   | SPECIES   | ADVISORY/PROHIBITION                                 |  |
|--|---|--|--|
|  |   | General Population                                   | High Risk Individuals <sup>1</sup>                   |
| <b>New Jersey Statewide</b>  |   |  |  |
| Note: local advisories may be more specific for the same species. See below.   | American eel  | do not eat more than once a week                     | do not eat   |
|  | bluefish (over 6 lbs)                                 | do not eat more than once a week                     | do not eat   |
|  | striped bass*   | consumption advisories vary by area; see below       | consumption advisories vary by area; see below       |
| <b>Newark Bay Complex</b>  |   |  |  |
| This complex includes Newark Bay, Hackensack River downstream of Oradell Dam, Arthur Kill, Kill Van Kull, tidal portions of all rivers and streams that feed into these water bodies and   | striped bass*   | do not eat   | do not eat   |
|  | American eel*   | do not eat more than once a week                     | do not eat   |
|  | blue crab*  | do not eat or harvest <sup>2</sup>                   | do not eat or harvest <sup>2</sup>                   |
|  | bluefish (over 6 lbs), white perch and white catfish  | do not eat more than once a week                     | do not eat   |
| Passaic River downstream of Dundee Dam and streams that feed into this section of the river.   | all fish and shellfish*                               | do not eat   | do not eat   |
|  | blue crab*  | do not eat or harvest <sup>2</sup>                   | do not eat or harvest <sup>2</sup>                   |
| <b>Hudson River</b>  |   |  |  |
| Hudson River includes the river downstream of NY-NJ border (about 4 miles above Alpine, NJ) and Upper New York Bay.  | American eel*   | do not eat more than once a week                     | do not eat   |
|  | striped bass*   | do not eat more than once a week                     | do not eat   |
|  | bluefish (over 6 lbs), white perch and white catfish  | do not eat green gland (hepatopancreas) <sup>3</sup> | do not eat   |
|  | blue crab   |  | do not eat green gland (hepatopancreas) <sup>3</sup> |
| <b>Raritan Bay Complex</b>   |   |  |  |
| This complex includes the New Jersey portions of Sandy Hook and Raritan bays, the tidal portions of the Raritan River (downstream of the Rte. 1 bridge in New Brunswick) and the tidal portions of all rivers and streams that feed into these water bodies. | striped bass*   | do not eat more than once a week                     | do not eat   |
|  | bluefish (over 6 lbs.), white perch and white catfish | do not eat more than once a week                     | do not eat   |
|  | blue crab   | do not eat green gland (hepatopancreas) <sup>3</sup> | do not eat green gland (hepatopancreas) <sup>3</sup> |
| <b>Northern Coastal Waters</b>   |   |  |  |
| This area includes all coastal waters from Raritan Bay south to the Barnegat Inlet.  | striped bass*   | do not eat more than once a week                     | do not eat   |

**For More Information**

For information on New Jersey health advisories, contact:  
 NJ Department of Environmental Protection  
 Division of Science & Research (609) 984-6070  
 Division of Fish, Game & Wildlife (609) 748-2020  
 NJ Department of Health Consumer Health Services (609) 588-3123  
 For background information on the advisories local libraries can refer you to NJ Administrative Code 7:25-14, 18A

\* Selling any of these species from designated water bodies is prohibited in New Jersey.  
<sup>1</sup> High risk individuals include infants, children under the age of 15, pregnant women, nursing mothers, and women of childbearing age. They are advised not to eat any such fish or crabs taken from the designated regions since these contaminants have a greater impact on the developing young.  
<sup>2</sup> No harvest means no taking or attempting to take any blue crabs from these waters.  
<sup>3</sup> Interim recommendations based on research showing elevated levels of chemical contaminants in the blue crab hepatopancreas, also called the

**Figure 3. Fish and Crab Advisories for New Jersey Waters based on PCB, Dioxin and Chlordane Contamination** *(excerpted from A Guide to Health Advisories for Eating Fish and Crabs Caught in New Jersey Waters, March 1995)*

| LOCATION | SPECIES | ADVISORY/PROHIBITION |
|----------|---------|----------------------|
|----------|---------|----------------------|

green gland.

delicious fish species. Many eat the fish they catch. However, some fish in certain waters are contaminated with chemicals that can harm your health. Eating fish from these waters can make you sick. The fish in these waters are not safe to eat. The fish in these waters are not safe to eat. The fish in these waters are not safe to eat.

**NEW YORK, NEW JERSEY HARBOR ESTUARY PROGRAM**

**Final CCMP**

MONTH of American eel, Atlantic needlefish, bluefish, carp, goldfish, largemouth and smallmouth bass.

What should you consider in deciding whether or not to eat the fish you catch? The New York State Department of Health issues health advisories for people who eat fish from waters where chemical contaminants may be a problem. You can make an informed decision about the potential risks from eating contaminated sportfish by using this brochure.

Health advice is also available through news releases, other brochures and the Department of Environmental Conservation Fishing Regulations Guide which is available where fishing licenses are sold; or call the Department of Health at 1-800-458-1158 ext. 409.

**WHY IS THIS ADVICE IMPORTANT TO ME?**

Chemicals are found in some fish at levels that may be harmful to your health. Some chemicals build up in your body over time or affect organs such as your kidneys or liver.

**Women of childbearing age** may be at special risk from eating contaminated fish. Chemicals (such as PCBs, dioxins and mercury) found in some fish build up in your body over time. During pregnancy, and when breast-feeding, these chemicals may be passed on to your baby. This can harm the baby's growth and development.

**Children under the age of 15** should not eat contaminated fish as they are still growing and developing, and are at special risk from contaminants.

The following guidelines are a shortened version of the complete health advisory for the Lower Hudson River, New York Harbor and marine waters of New York.

For more detailed advice about eating fish, please consult the guide *Health Advisories: Chemicals in Sportfish and Game*. For a copy, call the Health Department at 1-800-458-1158 ext. 409.

**HOW MUCH FISH SHOULD I EAT?**

The following advice is for:

**Hudson River between Troy Dam and bridge at Catskill:**

\$ Women of childbearing age and children under 15 years of age should EAT NO fish from these waters.

\$ Other people should EAT NO fish except American shad. Eat no more than one meal per week of American shad.

**Hudson River south of Catskill, Arthur Kill, Kill Van Kull and Upper Bay of New York Harbor (north of Verrazano Narrows Bridge):**

\$ Women of childbearing age and children under 15 years of age should EAT NO fish from these waters.

**WHAT FISH ARE SAFER TO EAT, AND WHERE ARE THE CLEANER PLACES TO FISH?**

You can limit your exposure to chemical contaminants in these other ways:

\$ If you catch fish to eat, **choose smaller (of legal size)**. Smaller fish are younger and generally have lower contaminant levels than larger, older fish.

\$ **Choose kinds of fish not mentioned in this advisory**. Fish not mentioned in this advisory are safer to eat because they have lower levels of contaminants.

rainbow smelt, striped bass, walleye, white catfish and white perch and EAT NO MORE THAN ONE MEAL PER WEEK of other fish species.

\$ EAT NO MORE THAN 6 blue crabs per week and don't consume the hepatopancreas (mustard, tomalley, liver) or cooking liquid.

**Harlem River and East River (to the Throgs Neck Bridge):**

\$ Women of childbearing age and children under 15 years of age should EAT NO fish from these waters.

\$ Other people should EAT NO MORE THAN ONE MEAL PER MONTH of Atlantic needlefish, bluefish, striped bass and white perch and EAT NO MORE THAN ONE MEAL PER WEEK of other fish species.

\$ EAT NO American eel.

**Lower Bay of New York Harbor, Jamaica Bay, Long Island Sound, Peconic/Gardiners Bays, Block Island Sound and Long Island South Shore Waters:**

\$ Women of childbearing age and children under 15 years of age should EAT NO striped bass from Long Island Sound west of Wading River, New York Harbor and Jamaica Bay and

Other people should EAT NO MORE THAN ONE MEAL PER MONTH of striped bass from these waters.

\$ Everyone should EAT NO MORE THAN ONE MEAL PER WEEK of striped bass from Long Island Sound east of Wading River, Peconic/Gardiners Bays, Block Island Sound and Long Island South Shore waters.

\$ Everyone should EAT NO MORE THAN ONE MEAL PER WEEK of American eel and bluefish.

## THE PLAN



## OVERVIEW OF THE PLAN

*To establish and maintain a healthy and productive Harbor/Bight ecosystem with full beneficial uses.*

In order to achieve this vision, the Harbor Estuary Program established the following goals:

- Ë Restore and maintain an ecosystem which supports an optimum diversity of living resources on a sustained basis.
- Ë Preserve and restore ecologically important habitat and open space.
- Ë Attain water quality that fully supports bathing and other recreational uses of the Estuary.
- Ë Ensure that fish and shellfish in the Estuary are safe for unrestricted human consumption.
- Ë Restore and enhance the aesthetic quality of the Estuary.
- Ë Actively address emerging issues that impact the Estuary.
- Ë Manage and balance the competing uses of the Estuary to improve environmental quality.
  - In particular, ensure the continued economic viability of the Port to support safe and efficient waterborne commerce without adversely impacting the ecosystem; and
  - Increase public access.
- Ë Manage pollutants within the Estuary so that they do not contribute to use impairments outside the Estuary.

### A FOCUS ON HABITAT AND LIVING RESOURCES

Completion of the comprehensive strategy is critical to achieving HEP's goals. The strategy will be developed in an ecosystem context, working with local governments and through public/private

Achieving the Harbor Estuary Program vision requires a focus on habitat and living resources. Ultimately, our success in implementing the CCMP will be measured by the condition of the plants and animals inhabiting the Estuary and Bight. Due, in part, to public comments in the early planning phase of the Harbor Estuary Program, the focus and priorities of the Program were shifted from purely water quality concerns to include habitat and living resources. In recent meetings on the draft CCMP, the importance of protecting, restoring, and enhancing habitat and living resources was reinforced by the public.

HEP is therefore developing a comprehensive regional strategy (see Objective H-1 below) which will serve to further develop and refine the actions in this plan with a focus on protecting, restoring, and enhancing habitat and living resources in the Harbor/Bight watershed.

Actions in other sections of the CCMP also contribute to the protection, restoration, and enhancement of habitat and living resources in several ways:

- pollution prevention
- reduction of pollution at the source
- remediation of existing contamination in the Estuary and Bight
- favoring non-structural solutions and the use of natural systems
- addressing pollution from all media affecting the Estuary and Bight

partnerships, and considering the Long Island Sound CCMP and local geographic plans in the region.



## **HOW THE PLAN IS ORGANIZED**

The human use and ecosystem health impairments discussed in the State of the Harbor and Bight section are an indication of the challenge we face in achieving our goals. Table 1(o) groups these impairments into five broad categories and identifies their primary causes:

- Habitat Loss and Degradation
- Toxics
- Pathogens
- Floatables
- Nutrients and Organic Enrichment

Each of the primary causes is a component of the CCMP and is presented as a section of the Plan: habitat loss, toxics contamination, pathogens, floatables, and nutrient and organic enrichment. A separate section has been added on dredged material management because of its importance to the Harbor/Bight. In addition, because combined sewer overflows, storm water, and non-point source runoff contribute to all of the primary causes of impairments, a separate section on rainfall-induced discharges addresses these sources. Appropriate cross referencing is provided in each section. The Plan also includes sections on HEP's public involvement and education strategy, and other activities associated with plan implementation.

Each section of the Plan has specific goals that are consistent with HEP's vision and the overall goals stated above.

A comprehensive set of commitments and recommendations is provided for each section of the Harbor/Bight watershed is, however, a very large area with numerous pollution problems and diverse local interests. In a plan of such broad geographic scope, it is difficult to include a specific focus on all locally significant issues. HEP believes its most important role is to maintain a regional perspective, which integrates a local perspective and builds upon local programs. The CCMP reflects this. For example, the CCMP integrates geographically targeted initiatives to protect habitat. Also, the CCMP

Plan. These commitments and recommendations cover permitting, enforcement, monitoring, standard setting, and resource management activities, as well as public involvement and activities associated with plan implementation. The tables at the end of each section indicate, for each action, whether the action is an ongoing commitment, a new commitment as a direct result of the HEP CCMP, or is still at the recommendation stage. The tables also identify the costs associated with each of the commitments and recommendations. Information on funding is in the section on Costs and Financing.

HEP has prepared a Public Summary of the CCMP which presents an overview of the problems and management approaches, as well as action highlights.

## **SCOPE OF THE CCMP AND MANAGEMENT APPROACH**

The CCMP is a comprehensive plan for the Harbor/Bight watershed on a regional scale. For example, HEP is identifying regionally significant habitat areas and helping to ensure they are protected. HEP is also identifying the most significant pollution sources impacting the Harbor and Bight and focusing on actions to appropriately control them. The Harbor core area is subject to large pollution loadings which can impact not only the Estuary, but also the Bight and Long Island Sound. In focusing on the Harbor core area, HEP is considering the impacts of pollution from the Harbor on the entire Estuary and adjacent waterbodies. Also, if HEP determines that pollution from upstream in the Harbor/Bight watershed is significantly impacting the Estuary or adjacent waterbodies, HEP will recommend the steps necessary to appropriately control this pollution.

includes actions to help foster a regional perspective in local planning and transfer successful local planning tools to other localities, but does not intend to develop, critique, or oversee local land use plans.



**Table 1(o). Causes of Human Use and Ecosystem Health Impairments**

| IMPAIRMENT  | CAUSE | HABITAT LOSS | TOXICS | PATHOGENS | FLOATABLES | NUTRIENTS |
|---|-------|--------------|--------|-----------|------------|-----------|
| Beach Closures  |       |              |        | S         | S          |           |
| Unsafe Seafood  |       |              | S      | S         |            | -         |
| Damage to Commercial and Recreational Fisheries                 | S     |              | S?     | O?        | O          | S?        |
| Damage to Other Coastal Species                                 | S     |              | S?     | O?        | O          |           |
| Adverse Impacts on Commercial Shipping and Recreational Boating |       |              | S      |           | S          | O         |

S = Significant cause of the impairment  
 O = Other contributing cause of the impairment  
 ? = Uncertainty associated with the determination

Table 2(o) presents the most significant sources of pollutants associated with the five primary causes of impairments in the Harbor/Bight.

**Table 2(o). Sources Contributing to Causes of Impairments**

| SOURCE  | CAUSE | HABITAT LOSS | TOXICS | PATHOGENS | FLOATABLES | NUTRIENTS |
|---|-------|--------------|--------|-----------|------------|-----------|
| Municipal Discharges (including Indirect Industrial Discharges) |       |              | S      | S*        |            | S         |
| Direct Industrial Discharges                                    |       |              | S?     |           |            |           |
| Combined Sewer Overflows  | S     |              | S?     | S         | S          | O         |
| Storm water   | S     |              | S?     | S         | S          | O         |
| In-place Sediments  | S     |              | S      |           |            | S         |
| Atmospheric Deposition  |       |              | S?     |           |            | S         |
| Vessel Discharges   |       |              |        | S?        | O          |           |
| Solid/Hazardous Waste Sites                                     | O     |              | S?     |           | O          | O         |
| Chemical/Oil Spills   | S     |              | S?     |           |            |           |
| Other Non-Point Sources(1)                                      | S     |              | O?     | S?        | S?         | O         |
| Decaying Shoreline Structures                                   |       |              |        |           | S          |           |
| Fill  | S     |              |        |           |            |           |
| Shoreline Modification  | S     |              |        |           |            |           |
| Tributary Inputs  | S     |              | S      | O         | O          | S         |

(1) Other non-point sources is a broad category that includes sources that are not discharged through a pipe, other than those non-point source categories specifically mentioned. It includes such diverse sources as street runoff, beach littering, and marine transfer operations.  
 S = Significant source  
 ? = Uncertainty associated with the determination

O = Other contributing source

\* = Associated with malfunctions; based on existing indicators

The following approach has been used by the Management Conference in developing this Plan:

- 1) Use available existing information to characterize the primary causes of human use and ecosystem health impairments.
- 2) Use available existing information to characterize the most significant sources contributing to the impairments.
- 3) Act now, based on this information, and building upon existing programs:
  - È To reduce loadings of pollutants contributing to the impairments;
  - È To remediate problems due to past discharges;
  - È To minimize risk to human health and the environment; and
  - È To protect and restore ecosystem resources.
- 4) Conduct research, monitoring, and modeling studies to better understand the functioning of the ecosystem.
- 5) Take additional actions, as necessary over time, based on this research, monitoring, and modeling.

This approach attempts to maintain a balance between early action and further study. Where we have sufficient information characterizing an environmental problem and understanding its cause, the CCMP includes specific actions to address the problem. However, because we do not always have sufficient information, the CCMP includes actions for further study upon which to base additional management measures.

The CCMP builds on existing base programs of state, local, and federal governments, and others, because these programs are integral to helping to achieve HEP's goals. In many cases the CCMP identifies where these programs must be enhanced to more fully address HEP's goals.

## **IMPLEMENTING THE PLAN'S ACTIONS**

One of the strengths of the Harbor Estuary Program CCMP is that it includes many commitments for action from federal, state, interstate, and local agencies participating in the Management Conference.

Approximately 75 percent of the actions in the CCMP are commitments. These commitments are good faith pledges by the responsible agencies that they intend to carry out the actions and are based on current projections of resource availability. The commitments entail a substantial effort -- billions of dollars -- which, when fully implemented, will result in substantial progress toward HEP's goals. The remaining actions in the Plan, although critical to the ultimate achievement of HEP's goals, in total would clearly require resources beyond those currently available or foreseeable in the near future.

HEP has worked hard, in this time of limited resources at all levels of government, to obtain commitments for action. HEP will continue to work hard to turn recommended actions into commitments.

The CCMP describes this funding strategy (see *Implementing the Plan* below) which includes:

- È Using enforcement settlement funds (e.g., federal and New York State Supplemental Environmental Project funds) or other appropriate funding sources in New Jersey to implement appropriate CCMP recommended actions;
- È Encouraging existing non-profit organizations to fund appropriate CCMP recommended actions; and
- È Continuing to encourage government agencies to step forward to implement recommended actions as funding becomes available.

## **PLAN UPDATES**

In the future, as new information becomes available (e.g., regarding the health of the environment, funding, legislation, policy), it will be important to update and re-evaluate the CCMP. To do this, HEP is developing a process by which HEP and other responsible implementing entities, in partnership, will systematically track progress and schedule the additional actions necessary to achieve the goals.

This continuing planning process includes continuing the Management Conference to oversee CCMP implementation and annual reporting of progress (see *Implementing the Plan* below).

