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.

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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

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 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

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

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

- Some beaches are intermittently closed after rain storms, which may have introduced harmful bacteria and viruses to bathing areas.
- 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.
  - 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).
  - Shellfish harvesting for direct consumption is prohibited in the Harbor due to the potential presence of harmful bacteria and viruses.
- 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.
- 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.
- Floatables from decaying waterfront structures remain a persistent problem, impairing commercial uses, recreational navigation, and the enjoyment of beaches.

Ecosystem Health and Productivity Impairments

- 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.

- Low dissolved oxygen levels in some areas of the Bight have reduced the available habitat for fish and shellfish.
- Contaminants in water and sediments have resulted in the bioaccumulation of toxics in resident biota.
- 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.
- Levels of copper in Harbor waters approach, and levels of mercury exceed, water quality standards (see text box below).
- 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 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:

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.

- 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 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.

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, 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 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.

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 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 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

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:

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

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	
New Jersey Statewide		**General Population**	**High Risk Individuals[1]**
Note: local advisories may be more specific for the same species. See below.	American eel bluefish (over 6 lbs) striped bass*	do not eat more than once a week do not eat more than once a week consumption advisories vary by area; see below	do not eat do not eat consumption advisories vary by area; see below
Newark Bay Complex			
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* American eel* blue crab* bluefish (over 6 lbs), white perch and white catfish	do not eat do not eat more than once a week do not eat or harvest[2] do not eat more than once a week	do not eat do not eat do not eat or harvest[2] do not eat
Passaic River downstream of Dundee Dam and streams that feed into this section of the river.	all fish and shellfish* blue crab*	do not eat do not eat or harvest[2]	do not eat do not eat or harvest[2]
Hudson River			
Hudson River includes the river downstream of NY-NJ border (about 4 miles above Alpine, NJ) and Upper New York Bay.	American eel* striped bass* bluefish (over 6 lbs), white perch and white catfish blue crab	do not eat more than once a week do not eat more than once a week do not eat more than once a week do not eat green gland (hepatopancreas)[3]	do not eat do not eat do not eat do not eat green gland (hepatopancreas)[3]
Raritan Bay Complex			
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* bluefish (over 6 lbs.), white perch and white catfish blue crab	do not eat more than once a week do not eat more than once a week do not eat green gland (hepatopancreas)[3]	do not eat do not eat do not eat green gland (hepatopancreas)[3]
Northern Coastal Waters			
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.
1 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.
2 No harvest means no taking or attempting to take any blue crabs from these waters.
3 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 contain contaminants harmful to your health. Fish in other waters are much cleaner. The Bight Restoration Plan works to make the waters cleaner.

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:

- **$** Women of childbearing age and children er 15 years of age should EAT NO fish from se waters.
- **$** Other people should EAT NO fish except erican shad. Eat no more than one meal per k 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 er 15 years of age should EAT NO fish from se 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:

- **$** If you catch fish to eat, **choose smaller (of legal size)**. Smaller fish are younger and erally have lower contaminant levels than er, older fish.
- **$ Choose kinds of fish not mentioned in** [illegible] fish [illegible] er els of contaminants.

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

- Restore and maintain an ecosystem which supports an optimum diversity of living resources on a sustained basis.
- Preserve and restore ecologically important habitat and open space.
- Attain water quality that fully supports bathing and other recreational uses of the Estuary.
- Ensure that fish and shellfish in the Estuary are safe for unrestricted human consumption.
- Restore and enhance the aesthetic quality of the Estuary.
- Actively address emerging issues that impact the Estuary.
- 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.
- Manage pollutants within the Estuary so that they do not contribute to use impairments outside the Estuary.

A FOCUS ON HABITAT AND LIVING RESOURCES

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

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 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 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.

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 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

CAUSE / IMPAIRMENT	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

CAUSE / SOURCE	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:
   - To reduce loadings of pollutants contributing to the impairments;
   - To remediate problems due to past discharges;
   - To minimize risk to human health and the environment; and
   - 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 AImplementing the Plan@ below) which includes:

- 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;
- Encouraging existing non-profit organizations to fund appropriate CCMP recommended actions; and
- 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 AImplementing the Plan@ below).

MANAGEMENT OF HABITAT AND LIVING RESOURCES

IMPAIRMENTS	***FACTORS CONTRIBUTING TO IMPAIRMENTS***
Habitat loss, fragmentation, and degradation	*Pollutant Loadings*
Impaired commercial and recreational fisheries	*Coastal development*
Impaired coastal and terrestrial living resources and communities	*Shoreline and aquatic habitat modification*
Lack of public access	*Alteration of freshwater inputs*
	Human disturbance of natural habitats
	Overharvesting
	Insufficient/inadequate sites for public access

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

GOALS *To restore and maintain an ecosystem which supports an optimum diversity of living resources on a sustained basis.*

To preserve and restore ecologically important habitat and open space.

To encourage watershed planning to protect habitat.

To foster public awareness and appreciation of the natural environment.

To minimize erosion; to decrease soil and water loadings of sediment and pollutants to the Harbor/Bight.

To increase public access, consistent with maintaining the Harbor/Bight ecosystem.

OBJECTIVES ***Comprehensive Regional Strategy***

H-1 Develop a comprehensive regional strategy to protect the Harbor/Bight watershed and to mitigate continuing adverse human-induced effects.

Focused Application of Existing Programs

H-2 Control point and non-point loadings of pollutants.

H-3 Manage coastal development.

H-4 Manage shoreline and aquatic habitat modifications.

H-5 Maintain healthy estuarine conditions by managing freshwater inputs.

H-6 Minimize human disturbance of natural habitats.

H-7 Preserve and improve fish, wildlife, and plant populations and biodiversity.

H-8 Increase public access consistent with other ecosystem objectives.

H-9 Increase public education, stewardship, and involvement on issues related to management of habitat and living resources.

H-10 Complete ongoing research and initiate special studies on habitat issues.

Geographically-targeted Special Efforts

H-11 Identify significant coastal habitats warranting enhanced protection and restoration.

H-12 Develop and implement plans to protect and restore significant coastal habitats and impacted resources.

INTRODUCTION

The complex geology and geography of the Harbor/Bight sustains a remarkable diversity of habitat types and species within a relatively small area. Several major river systems drain into the Estuary, merging into a network of tidal channels and bays, ultimately flowing into the Atlantic Ocean. This confluence concentrates marine, estuarine, and diadromous fish in the Harbor core area and New York Bight Apex. Within the Harbor core area alone, over 100 species of fish have been recorded.

The Harbor/Bight area lies on the Atlantic Flyway, a major pathway for migratory birds, providing both coastal migratory corridors and the north-south oriented migratory corridors of the Hudson Highlands region. Thus, coastal as well as overland migrating species are channeled through the region. The various habitats in the Harbor/ Bight area provide food and rest for these migratory birds. The Estuary also supports large and flourishing populations of aquatic birds. Today, heron populations in the New York-New Jersey Harbor represent up to 25 percent of all nesting wading birds along the coast from Cape May, New Jersey to the Rhode Island line, clearly a wildlife assemblage of regional importance.

Finally, the Harbor/Bight is blessed with an exceptionally diverse plant life on a landscape that varies from glacial outwash plains to unglaciated shores and uplands. On Staten Island alone, 178 historical sites of state and/or globally rare plant species have been recorded, 28 of which have recently been relocated and confirmed.

Recent water quality improvements (e.g., increased dissolved oxygen and decreased turbidity, biological oxygen demand, and bacterial indicators) have led to a waterfront renaissance -- a reawakening of the recreational and scenic potential of the Harbor/Bight shorelines. Shore recreation is a dominant component of the tourist economies of both New Jersey and New York. Public access to Estuary resources and to the large well-utilized public beaches on the ocean shores enhances public awareness of these rich natural resources and fosters increased appreciation and stewardship of fish and wildlife habitat. Opportunities to engage in shoreline activities and environmental improvements can contribute significantly to the quality of life of urban area residents and have great potential for economic benefits as well, by making the area surrounding the Harbor more desirable as a place in which to live and work.

The Hudson River, including the Harbor Estuary, is one of the few East Coast estuaries that retains viable populations of all of its historical indigenous aquatic species. The significant level of native biodiversity remaining in one of the world's most densely populated regions offers hope that people and natural resources can thrive in close proximity to each other. The presence of critical habitat for rare and endangered plant and wildlife is a source of great pride to many local citizens and provides outstanding opportunities for educational and stewardship projects. The task of monitoring, protecting, maintaining, and, where appropriate, restoring these precious resources is a unique opportunity to promote and utilize government/civic partnerships.

In order to reflect the priorities of the residents of New York and New Jersey, this CCMP focuses on identifying important natural habitats still remaining in the Harbor/Bight watershed and uniting public and private interests to develop a Comprehensive Regional Plan. Consistent with HEP=s vision, the objective of the Plan is to balance competing interests to sustain the overall health and welfare of the ecosystem and the general public, as well as to sustain local economies. These competing interests, such as public access, industry, and Port activities, as well as habitat protection, are considered in the development of actions throughout the CCMP.

IMPAIRMENTS

Habitat Loss, Fragmentation, and Degradation

As previously noted, the New York-New Jersey Harbor Estuary and Bight together provide diverse habitats, including tidal rivers, salt and fresh tidal marshes, woodlands, shallow bays, barrier beaches,

and dune systems. Much of this natural habitat has been lost because of human activities, including: the filling of wetlands and water areas; alterations of shorelines including the construction of piers and platforms; dredging; smothering of marshland due to washups of floatable debris; and coastal development. Loss of natural habitats results in diminished local and regional biodiversity and negatively impacts the ecological integrity of the Harbor/Bight.

Coastal wetlands in the Harbor/Bight region, including salt and fresh tidal marshes, now cover about 180,000 acres in New Jersey and about 25,000 acres in New York. Most of this acreage is located in the back bays and tributary watersheds of the Bight, where productive fin and shellfisheries exist. In and around the Harbor, however, wetlands loss has been great. At least 75 percent of the historic tidal wetlands in each of New York City's five boroughs has been lost. For example, one-quarter of the land area of Manhattan Island was created by filling wetlands and shallow water areas. Similar losses have occurred in New Jersey counties of the Harbor core area. In addition, as much as 99 percent of New York City's historic freshwater wetlands may no longer exist. Dams on coastal rivers have blocked the reach of tidal waters and reduced estuarine habitats as well as spawning areas for certain fish. Although all of these examples of habitat loss and degradation are past events, development pressure remains a problem and continues to threaten remaining natural areas.

Most of the remaining wetlands have been modified or degraded through diking, impound-ment, channelization, or toxic contamination. For example, Jamaica Bay, which was once a classic coastal back bay, has been dredged and modified by channel deepening, landfilling, wetland fill activities, airport construction, and other similar activities. Because of these modifications, residence time for water in the bay has increased from 11 to 35 days, magnifying the impact of pollutants entering the bay.

Much of the historic large-scale filling of wetlands and shallow water areas within the Harbor Estuary has decreased with the implementation of regulatory programs to control such activities. In recent years, however, there have been proposals to extend development beyond inner Harbor shorelines on top of piers and platform structures. The environmental impacts of this type of development are uncertain, but the potential cumulative impact of many such projects presents a new threat to the environmental integrity of the ecosystem.

Marine and upland habitats in the region have also suffered significant losses, due to development and pollution associated with population increases. In the Harbor core area, particularly New York City, natural habitats are found almost exclusively in designated parklands, preserves, and other large land holdings of governments and institutions. Nearshore upland landscapes are significant to the estuarine ecosystem. These areas function as buffers against storm surges, sea level rise, and non-point source pollution, and serve as useful wildlife habitat.

Numerous functions and values are lost with shoreline modifications that involve the filling in or removal of wetlands. Wetlands provide essential habitat and food for fish and wildlife species. Many species of waterfowl and fish require wetland habitat for breeding, nesting, or rearing of their young, as well as for resting, migration, or overwintering areas. Wetlands also exhibit very high rates of plant productivity, supporting the food web in the surrounding estuarine environment. In addition, wetlands act as filters for the aquatic ecosystem, providing water quality protection through the processes of sediment trapping, chemical detoxification, and nutrient removal. Other functions provided by wetlands include storm water control, which can be important where surrounding areas are paved, and shoreline stabilization.

Recent water quality improvements in the Harbor/Bight have alleviated some of the chronic impairments to aquatic habitats. Contaminants in some bottom sediments, however, are still a major concern. In addition, chemical and oil spills remain a continuing threat to regional habitat and water quality.

Impaired Commercial and Recreational Fisheries

The Harbor/Bight system continues to support viable recreational and commercial fish populations and provides a major outlet to hundreds of thousands of the sportsfishing public. Today there remains a very large and active recreational fishery and party-charter boat fishery in Raritan Bay, Jamaica Bay, Sandy Hook Bay, the Navesink River, and Shrewsbury River for such species as striped bass, bluefish, fluke, and winter flounder. However, available information on commercial fishery landings shows a distinct decline in the abundance of fish and shellfish in the past 100 years. In colonial times, tens of thousands of bushels of oysters were collected per year, providing a staple food item for regional residents. Today, no commercial quantities exist. Atlantic sturgeon was once so abundant that it earned the title "Albany beef". Today there is only a modest commercial fishery in the Hudson River for American shad, and there is an even smaller commercial fishery for Atlantic sturgeon. In the Lower Bay area, commercial fisheries exist for species such as blue crab, winter flounder, menhaden, bluefish, weakfish, and baitfish.

Fisheries management in the Harbor/Bight region is under the authority of the Atlantic States Marine Fisheries Commission (in state waters) and the Mid-Atlantic Fishery Management Council (in federal ocean waters). Commercial fishery landings in the region decreased from 317,000 metric tons in 1957 to 72,600 metric tons in 1987. The human impacts (fishing mortality and environmental perturbation) are often difficult to identify and sort out from natural factors, but both, in combination or separately, have been responsible for declines in various fish stocks. Since many of the commercially and recreationally important species are migratory in nature and spend part of their time outside of the Estuary, overfishing and habitat loss in the New York Bight and Long Island Sound also affect population levels. Scientists from the National Marine Fisheries Service predict that the inshore fishery will crash in ten years without a concerted effort to preserve and restore coastal habitats. Despite these losses, the Hudson River remains one of the few East Coast rivers that retains viable populations of all its historic native species.

In addition to declining numbers, commercial fisheries within the Harbor core area are restricted due to toxic and/or pathogenic contamination. New York has closed its commercial fishery for striped bass in the Harbor, the Hudson River, and parts of the Bight due to concerns about PCB contamination. Commercial fishing for American eel and blue crabs is also prohibited due to toxic contamination in some areas of the Harbor. Recreational fishing is similarly restricted in the Harbor core area. Consumption advisories throughout the region provide warnings about locally caught fish. The most stringent advisories in New Jersey recommend no consumption of 1) crabs in the Newark Bay complex, 2) striped bass from all New Jersey tributaries to the Harbor (including those shared with New York), and 3) any fish from the Passaic River. New York recommends no, or limited, consumption of striped bass, American eel, white perch, white catfish, carp, and goldfish, and the hepatopancreas of lobsters and crabs from the entire tidal portion of the Hudson River, including the Harbor core area.

Pathogenic contamination primarily affects shellfish harvesting. Harvesting of shellfish in the Harbor for direct consumption is prohibited, but harvesting, for depuration or relay, is permitted in portions of the Lower Bay complex and in the Shrewsbury and Navesink Rivers. Direct harvesting is permitted in ocean waters.

Impaired Coastal and Terrestrial Living Resources

Coastal bird and mammal populations have also seriously declined in the Harbor/Bight region. A number of beach-nesting birds are now classified as endangered or threatened species; yet the region remains vital to the eventual recovery of their populations. Some recovery trends are noticeable -- the osprey, a fish-eating hawk, now nests in portions of the Harbor core area where it had been absent for decades. Ten percent of the nesting population of the federally endangered peregrine falcon, on the East Coast, is located in the New York-New Jersey metropolitan area. The Harbor Herons Complex, first documented in the industrial Arthur Kill waterway in the 1970s, has become a regionally significant heron and egret nesting rookery.

On the other hand, much of the native flora and fauna of the region has been lost or drastically reduced due to the loss of coastal upland habitats. The diversity and populations of both resident and migratory species are directly related to the area and quality of available habitat.

Limited Public Access

There are two issues associated with restricted public access: physical blockage of the shoreline and private ownership of the shoreline. The need for public access to the shoreline was rarely a consideration in the early development of New York City and the metropolitan areas of New Jersey; consequently, the Harbor shoreline is dominated by industrial and commercial uses, from shipping terminals and commercial ports to oil terminals and heavy industrial sites. In the less developed regions of the Harbor/Bight, public access is restricted by private ownership of the shoreline. Nevertheless, according to Public Trust doctrine, the states hold all underwater lands up to the tideline for the benefit of all citizens.[1]

In the urban Harbor area, water access is frequently constrained by the placement of fill and privately owned shoreline structures, such as bulkheads, piers, revetments, and pile-supported platforms over the water. In addition, the shoreline has often been the site for placing railroad tracks and highways.

As population expanded and maritime uses declined, the waterfront was viewed as the greatest open space opportunity in the region, and pressure for improved public access for fishing, boating, biking, hiking, and passive recreation increased.

Recent efforts have been taken to improve proximity and visual access, such as walkways, greenways, and expanded ferry service. Public parkland has been created in New York City at the World Financial Center and at Roberto Clemente and Riverbank State Parks. In New Jersey, efforts are underway to provide a public walkway, the Hudson Waterfront Walkway, along 18 miles of river and harborfront. Liberty State Park, an important urban recreational area, is a major component of the Walkway.

Direct contact with the shore and the ability to sunbathe, swim, boat, or engage in study and research, are limited by the lack of public lands. Even for shoreline areas that are technically "open to the public," the lack of necessary support facilities, such as transportation access and restrooms, effectively restricts public access. This problem is especially severe in the more densely populated portions of the Harbor core area and the larger Bight communities. Despite these constraints, both New York and New Jersey have a number of large public beach facilities, and, in fact, shore recreation is a dominant component of the tourist economies of both New Jersey and Long Island. It must also be recognized that many areas available for additional public access are also areas that offer opportunities to increase fish and wildlife populations and restore the regional ecosystem.

FACTORS CONTRIBUTING TO THE IMPAIRMENTS

Pollutant Loadings

Historic pollution, associated with human activities in the Harbor/Bight region, has profoundly affected the condition of the natural environment. Fishes, birds, and mammals that depend on rivers and estuaries are particularly vulnerable to the effects of these activities. For example, the destruction of once-abundant oyster beds in Raritan Bay can be linked to pollution and the smothering of seed beds. Pollution-induced low dissolved oxygen levels in the water can result in fish and shellfish mortalities. Likewise, studies have shown that the prevalence of fish and shellfish diseases is generally more widespread and severe in polluted

[1] In the Harbor/Bight system, one notable exception is Jamaica Bay which is held by the

federal government for the benefit of all citizens.

waters, particularly near inshore sewage outfalls. There are breeding colonies of birds which remain vulnerable to multiple toxic stressors. Trophic transfer studies which link concentrations of toxics in the birds with sources of toxics may clarify factors contributing to this problem.

Recent advances in pollution controls and the closure of ocean disposal sites have improved environmental conditions, including water quality, in the Harbor/Bight. Marine water quality improvements have been documented, some fisheries have rebounded from previously depressed populations, recovery trends have been observed for certain endangered bird populations, and fish and shellfish diseases declined significantly around 1973 (although the reasons for this last fact are unclear). The challenge ahead is to maintain these improvements and to enhance the environmental quality of the Harbor/Bight.

Of particular importance to habitat issues is the discharge of suspended solids and sedimentation. Poorly controlled runoff can carry significant quantities of sediment that impair living conditions for estuarine resources, from the shoaling of bays and channels and destruction of spawning areas to increases in turbidity. Sediments may also carry contaminants and add to dredging concerns. Implementation of storm water and non-point source controls is necessary to reduce the discharge of sediments.

Oil and chemical spills have been an historic problem, affecting the water and habitat quality in the Harbor core area. Following a 1990 rupture of its underwater pipeline in the Arthur Kill, which threatened a regionally significant heron rookery, and the resulting civil and criminal lawsuits, Exxon Corporation agreed to a $15 million settlement. The involved federal, state, and local agencies are working together, as the New York-New Jersey Harbor Spill Restoration Committee, to oversee distribution of these and other future settlement funds for actions that will remediate environmental damage caused by such spills.

Coastal Development

Development of the metropolitan region of New York and New Jersey has resulted in enormous reductions in the acreage and quality of natural habitats and a resulting decline in native wildlife populations in the region. This development has also blocked coastal access for the majority of the citizens of the region.

The post-industrial period of today provides both opportunities and continuing threats to the regional ecosystem. In some cases, such as the Jamaica Bay Wildlife Refuge in New York and Kearny Marsh in the Hackensack Meadowlands of New Jersey, habitat recovery in the urban environment is supporting the return of native wildlife, and these areas are vital components of a preservation and recovery strategy for the ecosystem. Liberty State Park, a former transport terminal and industrial/ commercial site, is another example of the potential for natural recovery of the inner Harbor landscape. However, as abandoned inner Harbor sites are turning wild, new sites are being developed at the outer reaches of the metropolitan area.

Land use decisions, both in the urban core and in outlying counties, remain a critical factor to the future well-being of the Harbor/Bight ecosystem. It is important that such decisions be made based on a thorough analysis of the true cost of waterfront development. Frequently, new coastal projects require massive public investment in area infrastructure: water supply and waste disposal; roads; and utilities; as well as shore erosion projects and damage repair after severe storms.

Shoreline and Aquatic Habitat Modification

New York-New Jersey Harbor has close to 1,000 miles of shoreline (576 miles in New York City alone), 75 percent of which consists of man-made structures, such as bulkheads, rip-rap, and piers.

Shoreline construction and modifications disrupt aquatic and terrestrial ecosystems. Obstructions on tidal rivers reduce available habitat for fresh and saltwater spawning fishes. Structures along the shoreline reduce public access to the coast and can reduce the migration of coastal habitats in the event of sea level rise. Construction-related impacts, such as loss of shallows and changes in salinity, as well as structures, such as riprap,

bulkheads, piers, and platforms, may degrade the value of estuarine habitat.

Another issue of great importance is coastal erosion. Natural shorelines are subject to cyclic erosion and accretion patterns depending on the prevailing currents, littoral drift, storms, and sea level changes. This changing shoreline is integral to the maintenance of coastal habitat diversity. Construction or aquatic habitat modification activities, within the zone of dynamic coastal processes, may directly reduce coastal habitat and may also disrupt the process by which coastal habitats are maintained, affecting coastal areas well beyond the immediate construction site. As buildings are threatened by waves or erosion, additional investments in shoreline structures may be needed, leading to greater degradation of natural habitats.

Alteration of Freshwater Inputs

The natural mixing of freshwater with saltwater is one of the defining features of an estuary, creating an extremely productive environment for living resources. The estuarine environment of the Harbor/Bight has been measurably affected by the human alteration and use of its freshwater resources. Water withdrawals from the Harbor/ Bight cause the salt wedge of tidal rivers to extend further upstream and the change in salinity between fresh and saltwater to be more abrupt. Dams also preclude the natural mixing of fresh and salt water that produces the salinities characteristic of riverine estuaries. Coastal groundwater withdrawals may cause saltwater intrusion, upsetting established coastal freshwater habitats and contaminating coastal groundwater aquifers.

Human Disturbance of Natural Habitats

Human disturbance of the habitats of native wildlife populations can have a significant negative effect, even if the habitat areas are adequate. In the Harbor/Bight region, coastal habitats, particularly beaches and dunes, are among those most impacted by human activity. A number of coastal birds, such as terns (common, roseate, and least), black skimmer, and piping plover, are on state or federal lists of endangered or threatened species. Common threats to all these species are disturbances by beachgoers, their pets, and introduced species.

Overharvesting

There are other impairments to living resources that are not strictly associated with habitat conditions. One of these is overharvesting of available fish or wildlife stocks. Much of the recent decline in East Coast fisheries can be attributed to overharvesting.

Insufficient/Inadequate Sites for Public Access

The region's shoreline is largely developed with privately owned residences or commercial facilities which block public access. There is also reserved natural habitat where human intrusion would be undesirable. Initial efforts to provide public parks or open space offer visual amenities, but few provide boat launches, fishing piers, or other facilities which enable direct contact with the water.

THE PLAN TO SOLVE THE PROBLEMS

Overview

The Habitat and Living Resources component of the CCMP is critical to the establishment and maintenance of a healthy and productive Harbor/Bight ecosystem with full beneficial uses. This component of the Plan has six goals:

- To restore and maintain an ecosystem which supports an optimum diversity of living resources on a sustained basis.
- To preserve and restore ecologically important habitat and open space.
- To encourage watershed planning to protect habitat.
- To foster public awareness and appreciation of the natural environment.
- To minimize erosion; to decrease soil and water loadings of sediment and pollutants to the Harbor/Bight.
- To increase public access, consistent with

maintaining the Harbor/Bight ecosystem.

It is important to note that habitat and living resources issues were not initial priorities of HEP or the Bight Restoration Plan. The decision to include these issues as a primary focus of the Plan was based on public comments received at meetings on the Bight Restoration Plan and, later, at a coastal conference on behalf of HEP at Manhattan College, New York.

Due to this refocusing of program priorities, the analysis of habitat and living resources has been somewhat delayed relative to the other pollution-related environmental problems, which were identified early in the planning process. As a result, this CCMP recommends an iterative strategy for building a comprehensive plan to protect and enhance the Harbor/Bight watershed:

- To develop a comprehensive regional strategy to protect the Harbor/Bight watershed for the long term and to mitigate continuing adverse impacts of human development.

HEP has conducted an analysis of existing habitat-related programs and recommends a more focused application of those programs:

- To control point and non-point loadings of pollutants;
- To manage coastal development;
- To manage shoreline and aquatic habitat modification;
- To maintain healthy estuarine conditions by managing freshwater inputs;
- To minimize human disturbance of natural habitats;
- To manage fish and wildlife stocks;
- To increase the number and quality of public access sites consistent with other ecosystem objectives;
- To increase public education and involvement; and,
- To complete ongoing research and initiate special studies.

HEP is currently in the process of identifying significant[1] coastal habitats warranting special protection and developing options to preserve and restore them. USEPA, on behalf of HEP, has entered into an Interagency Agreement with the U.S. Fish and Wildlife Service (USFWS) to use existing information to identify habitats, summarize their conservation status, and present recommendations for their preservation and restoration. In addition, HEP has undertaken studies to evaluate existing habitat quality, particularly in the most heavily developed portion of the Harbor core area (see Action H-10.3 below). Using the results of these and future studies, HEP recommends special geographically-targeted efforts:

- To identify significant coastal habitats warranting enhanced protection; and,
- To develop and implement plans to protect significant coastal habitats and improve water quality.

HEP anticipates that taking steps to improve existing programs and targeting geographic areas of the region for special protection will measurably benefit the regional ecosystem; however, these measures may not be sufficiently comprehensive to ensure long-term sustainability or to redress historic insults to the ecosystem.

Accordingly, HEP will assess the short-term actions identified in this section of the Plan to determine their sufficiency, and recommend additional steps.

[1] The use of the term "significant" to define coastal habitats is descriptive and different from the regulatory meaning accorded to it by New York State, except where noted.

COMMITMENTS AND RECOMMENDATIONS

Comprehensive Regional Strategy

OBJECTIVE H-1 Develop a comprehensive regional strategy to protect the Harbor/Bight watershed and to mitigate continuing adverse human-induced effects

ACTION H-1.1
Development of a Comprehensive Regional Strategy
HEP will develop a regional strategy to protect habitats in the Harbor/Bight watershed, including those identified in the USFWS report (see Action H-11.1 below).

To accomplish the following, HEP will encourage cooperative partnerships throughout the region to share resources on a coordinated basis.

Key components of the strategy are:

-- HEP will identify regional and local habitats requiring special protection (see Objective H-11 below).

-- The responsible resource management agencies, counties, and municipal governments will identify the most effective means of using their authorities, programs, and expertise to protect habitats and living resources.

-- The strategy will recommend modifications to authorities and programs, as appropriate.

-- HEP will build on existing programs to develop the comprehensive regional strategy. For example, the New Jersey Landscape Project has three phases to protect rare species populations: 1) mapping; 2) coordination of land management agencies; and 3) coordination of land use regulation and planning (see Action H-11.2 below).

-- HEP will coordinate with the New York-New Jersey Harbor Spill Restoration Committee Natural Resources Restoration Plan for Oil and Chemical Releases in the New York-New Jersey Harbor Estuary, and other natural resources damages accounts as appropriate.

-- HEP will identify the need for additional geographically-targeted sub-planning (see Action H-12.2 below).

-- In developing the regional strategy, HEP will work closely with local governments and grassroots organizations in the region through the watershed planning coordinating subcommittee of the Habitat Work Group (see Action H-1.2 below).

ACTION H-1.2
Outreach and Technology Transfer for Watershed Planning and Habitat Conservation
HEP and NJDEP will actively foster, through various specific activities, the transfer of information and tools which will enhance and encourage watershed planning and habitat conservation throughout the region. HEP will work through county and local governments and grassroots organizations in these efforts. HEP will establish a watershed planning coordinating subcommittee of the Habitat Work Group to coordinate actions at the local government and grassroots levels. HEP's activities will serve the dual purposes of:

-- Fostering the exchange of information on successful local planning and conservation tools to other areas, and incorporating these tools into the Comprehensive Regional Strategy (Action H-1.1).

-- Fostering a regional watershed perspective in local planning to protect Harbor/Bight habitats from unplanned and fiscally or environmentally unwise development.

Specific activities may include, but are not limited to:

Conduct regional and watershed workshops and meetings for information exchange. For example, in connection with the "Habitat Options Guide" (see Action H-9.1 below), results of HEP studies will be shared, such as the USFWS significant coastal habitats report (see Action H-11.1 below) and the piers and platforms study (see Action H-10.3 below), as well as NJDEP's Landscape Project (see Action H-11.2 below).

-- Enlist services of city and/or county governments to bring regional planning to the local level through grants and other incentives (see Action H-2.5 below).
-- Encourage and develop pilot projects for integrated watershed planning (see Actions H-2.1 and H-2.2 below).
-- Develop a long term data management strategy (see Objective M-4 below) by considering establishment of one or more coordinated regional information management and data resource centers for habitat and other environmental information.

ACTION H-1.3
Implementation Agreements
Upon completion of the Comprehensive Regional Strategy and its endorsement by the Management Conference, HEP will seek establishment of memoranda of understanding, or other formal mechanisms, among federal natural resource agencies, states, and county and municipal governments, to implement the recommendations, to the extent legally permissible and appropriate.

Focused Application of Existing Programs

OBJECTIVE H-2 Control point and non-point loadings of pollutants

The sections of the Plan on the management of toxic contamination, dredged material, pathogen contamination, floatable debris, nutrients and organic enrichment, and rainfall-induced discharges present numerous commitments to control pollutant inputs to the Harbor/Bight system. These actions to control pollutant inputs will improve conditions by enhancing water quality and fostering the overall health of the regional coastal ecosystem. This objective expands the pollution reduction actions by addressing human-induced increases in turbidity and sedimentation in the Harbor and Bight. This objective also includes an emphasis on utilizing natural drainage features and functions, rather than more expensive sewer infrastructure, to ensure that surface water runoff associated with development is minimized.

ACTION H-2.1
New Jersey Sediment Control Pilot Project -- Whippany River
As part of a joint strategic plan, USEPA and NJDEP have agreed to implement programs for the control of non-point source runoff in several Harbor/Bight watersheds impacted by non-point source pollution (see Actions NPS-1.1 and 1.2 below). One such watershed in the Harbor drainage area is the Whippany River, a tributary of the upper Passaic River located in Morris County, NJ. NJDEP will supplement this program to address sediment export. HEP supports this effort as a potential model for additional projects elsewhere in the Harbor/Bight region.

-- NJDEP will develop a pilot project to minimize the export of sediment from the Whippany River Basin to the Harbor Estuary.

ACTION H-2.2
New York Sediment Control Pilot Project
New York State is also in the process of developing a pilot project for non-point source pollution control within the Harbor/Bight watershed.

-- NYSDEC will select, develop, and implement a pilot project to minimize sediment export from a sub-watershed of the Hudson River or in the watersheds in the Bronx draining to the Harbor.

ACTION H-2.3
Basin-Wide Program
HEP, building upon the state pilot projects and programs, will develop a targeted basin-wide program to minimize sediment export to the Harbor Estuary.

ACTION H-2.4
Staten Island Watershed Actions
Southern Staten Island, the least developed area of New York City, is also the largest area of the City that is unsewered. New York City is implementing a strategy that will utilize and preserve existing drainage features to reduce the need for expensive sewer infrastructure. HEP supports this low technology, moderate cost approach to watershed protection and runoff control.

-- NYCDEP will invest in stream corridor and wetland acquisitions and other watershed protection actions in the Staten Island Bluebelt, in conjunction with limited storm sewer infrastructure. This action supports the incorporation of natural systems into traditional infrastructure programs.

ACTION H-2.5
Local Watershed Planning to Limit Surface Water Runoff associated with Development

-- HEP will seek funding to encourage city and county governments across the region to bring regional watershed planning to the local level through grants and other incentives.
-- Regional Environmental Planning Councils in Monmouth County, New Jersey, which have been established on a watershed basis, are coordinating with individual local governments to ensure that surface water runoff associated with new development is minimized. (NJDEP has provided $100,000 in base program funding to Monmouth County for its watershed management planning.)

ACTION H-2.6
Non-structural, Low Technology, and Low Maintenance Means to Reduce Runoff and Pollutant Inputs
HEP encourages the use of non-structural, low technology, and low maintenance means to reduce runoff and pollutant inputs associated with environmentally responsible development, pollution abatement (e.g., CSO and storm water abatement), and remediation (e.g., landfill closure). Such projects should emphasize the use of natural features and systems. HEP, acting through the Habitat Work Group, will encourage, develop, and seek funding for appropriate projects. For example:

-- NYSDOS, in cooperation with local governments, will develop regional coastal management plans for New York City and for Long Island's south shore.
-- HEP will encourage projects through ongoing technology transfer and outreach activities (see Action H-1.2).
-- HEP will develop and seek funding for a program of pilot studies for nitrogen reduction through innovative means (see Action N-3.6 below).
-- HEP will encourage projects recommended under geographic plans which currently exist or are under development (see Objective H-12 below).

OBJECTIVE H-3 Manage coastal development

-- HEP will encourage efforts in connection with the Harlem River Restoration.

The current regulatory mechanism to control development in coastal regions is the federal Coastal Zone Management Program, which in New York and New Jersey is administered by the states. A complementary program is the Coastal Non-point Pollution Program. New York State has established a two-tiered boundary for the coastal non-point program: the coast boundary is the first tier; the second tier is the watershed area, where coterminous. New Jersey administers its Coastal Zone Management Program through separate regulatory vehicles that cover the highly developed metropolitan area coastline and the less developed bay and ocean shores. These programs are the basis for better coastal zone management, ecosystem protection, and the achievement of development/ redevelopment needs.

ACTION H-3.1
Regional Coastal Development Plans and Programs
The states will develop and utilize regional coastal management plans and programs to manage coastal development.

-- NJDEP will continue administering its coastal zone program through a number of regulatory authorities:
- **$** Coastal Area Facilities Review Act (CAFRA) in the outer coast and bay shores from Monmouth through Cape May Counties
- **$** Waterfront Development Law
- **$** Wetlands Act of 1970
- **$** Hackensack Meadowlands Development Commission's Special Area Management Plan (SAMP)

-- NYSDOS and NJDEP will coordinate with other ongoing planning efforts, such as the New Jersey State Development and Redevelopment Plan and the New York City Comprehensive Waterfront Plan, to steer development and redevelopment toward areas with existing adequate infrastructure, and to promote conservation of the region's natural resources.

-- Under the authority of Section 309 of the Clean Air Act, which establishes the Clean Waters Program, USEPA will take into account HEP issues as part of its responsibility to comment on the environmental impacts of any federal action within the Harbor/Bight area.

ACTION H-3.2
Special Protection of Habitats through Consistency Reviews
NYSDOS, NYSDEC, and NJDEP will ensure that coastal habitats are afforded protection through the consistency review process of the Coastal Zone Management Program.

-- NYSDOS has established regulatory designations of Significant Coastal Fish and Wildlife Habitats and will update them in coordination with the applicable local waterfront revitalization program (see Action H-11.5 below).

-- NJDEP has identified areas which are afforded special protection and is developing a proposal to use the designations in the New Jersey State Development and Redevelopment Plan in the consistency review process; NJDEP will update site designations as appropriate (see Action H-11.5 below).

ACTION H-3.3
Comprehensive Planning
The state Coastal Zone Management Programs will encourage and support local comprehensive plans for habitat protection, along with zoning codes to enforce them.

-- With support from NYSDOS, New York City is redrafting its Waterfront Revitalization Program to make its policies reflect the priorities of the New York City Comprehensive Waterfront Plan (1992). This will be a regional coastal management program that will recognize local characteristics and habitat concentrations of the New York City region.

ACTION H-3.4
Regional Cooperation
HEP, through the watershed planning coordinating subcommittee, will identify projects and issues requiring regional cooperation and will facilitate that cooperation (see Action H-1.2).

OBJECTIVE H-4 Manage shoreline and aquatic habitat modifications

Human activities are directly responsible for shoreline and aquatic habitat modifications and degradation of important upland habitats. Such activities are regulated by both federal and state legislation, as well as by local zoning and codes. One of the most important federal programs that protects shoreline and aquatic habitats is Section 404 of the Clean Water Act, which regulates disposal of dredged and fill material in "waters of the U.S."

A significant emerging issue, with continued development pressure on the shoreline of the Harbor, concerns the use of pile-supported structures. Developers are proposing to erect buildings on existing or newly created pilefields, because of the resistance by regulators to permit

further landfilling of underwater lands. HEP has partially funded a research study to evaluate habitat conditions of piers, pile fields, and pile-supported platform structures in the urbanized Hudson River waterfront. HEP recommends that federal, state, and local government regulatory agencies use the results of this study to improve habitat management (see Action H-10.3 below).

ACTION H-4.1
Memoranda of Agreement on the Tidal and Freshwater Wetlands Programs
The responsible state and federal agencies will, as legally permissible and appropriate, develop Memoranda of Agreement to coordinate surveillance, inspection, permitting, and enforcement activities for regulated wetlands and upland areas.

ACTION H-4.2
Freshwater Wetlands
The states should ensure that proposed actions involving less than one acre of fill receive individual agency review.

-- HEP recommends that NYSDEC evaluate the need for, the environmental significance of, and workload associated with water quality certification for freshwater wetland fill projects affecting less than one acre and identify actions necessary to protect them.
-- NYSDEC, in order to permit regulatory protection of wetlands through the water quality certification process, will consider development of water quality standards for wetlands.
-- Through its Hudson River Estuary Management Program, NYSDEC will analyze wetland regulatory programs to improve protection of Hudson River wetlands and shallow water habitat, and to identify gaps in statutory protection. Part of the analysis will examine more comprehensive protection to Hudson River wetlands by extending the reach of the state's tidal wetlands program to the entire tidal portion of the Hudson River (to the Troy Lock and Dam).
-- Through its delegated freshwater permits program, NJDEP will individually review general permit applications for projects that affect less than one acre of non-tidal wetlands.
-- HEP recommends that New York State amend its Freshwater Wetlands Law to require permits for wetlands less than 12.4 acres. Presently, only locally significant freshwater wetlands less than 12.4 acres, in addition to all wetlands greater than 12.4 acres, are protected under this law.

ACTION H-4.3
Designation of Regulatory Buffer Zones
Wetlands and other aquatic habitats can be adversely affected by human activities even when those activities take place above the upland border of the wetland. Accordingly, the following commitments recognize the need to regulate activities within the upland zone immediately adjacent to wetland edges.

-- When NYSDEC next proposes changes to tidal wetlands land use regulations, the issue of the definition of "adjacent area" (i.e., regulatory boundary, setback requirement) will be considered. Current regulations prohibit structures within 30 feet of the shoreline within a regulatory boundary of 150 feet within New York City, and a setback of 75 feet for structures within a 300-foot regulatory boundary in the rest of the marine district.
-- NYSDEC will consider expanding the scope of the state's regulatory authority to issue water quality certificates to include all projects adjacent to wetlands or those that exceed a minimum size. Currently activities beyond state jurisdiction, such as in previously built-up shoreline areas, are exempted from water quality certification.

New Jersey will use its existing authority to regulate development adjacent to wetlands within the Harbor Estuary. The buffer will vary depending on the classification of the wetlands and the proximity to tidal waters. NJDEP will explore changes in statutory authority to regulate buffers adjacent to watercourses. The intent would be to

prohibit development in the buffer zone of a wetland unless it can be demonstrated that the proposed development will not have a significant adverse impact, and that it will cause minimum feasible adverse impact on the wetland.

ACTION H-4.4
Net Increase in Aquatic Habitat
HEP, acting through participating agencies, will seek to ensure that relevant actions, in the aggregate, result in a net increase in both quality and quantity of aquatic habitat within the Harbor/Bight, including upland buffer areas.

Special emphasis will be placed on key habitat types, such as submerged aquatic vegetation. This policy will be implemented through actions identified under Objective H-12 below.

-- New York State will increase the quantity and quality of tidal wetland resources and, when feasible and desirable, its freshwater wetland resources. New York State will also explore a policy for enhanced protection of all other marine and estuarine habitats.
-- New Jersey will work to ensure that actions impacting habitat in the Harbor core area, in the aggregate, result in a net increase in the acreage and quality of aquatic habitat where feasible and appropriate.
-- HEP and the participating agencies will examine opportunities to increase habitat and habitat value. One means to implement this action is through Section 1135 of the Water Resources Development Act of 1986 (see discussion on page 45), in which the USACE can study and implement habitat restoration measures in areas previously impacted by water resources projects. Another means is through the beneficial use of clean dredged material.

OBJECTIVE H-5 Maintain healthy estuarine conditions by managing freshwater inputs

Preservation of estuarine habitat requires maintenance of adequate freshwater flows to coastal waters.

ACTION H-5.1
Freshwater Withdrawal Controls
To protect estuaries, HEP recommends that the states recognize the impacts that upstream freshwater withdrawals, and other hydrologic changes, may have on salinity levels and consider these impacts in the states' water supply and wastewater planning processes.

ACTION H-5.2
Water Conservation Strategies
State and local authorities will develop and implement water conservation strategies as components of their water supply programs, to maintain the adequacy of their water supplies, to keep wastewater flows within the capacity of operating treatment plants, and to reduce or delay the need for additional projects that may impact estuaries.
-- New York City initiated a water conservation program in 1986, which, to date, has reduced citywide demand by 110 million gallons per day.
-- Since 1981, NJDEP has implemented a water conservation program.

OBJECTIVE H-6 Minimize human disturbance of natural habitats

Habitat impairment caused by overuse and abuse of fragile coastal dunes and wetlands is generally not noticed by an uneducated public. Environmental education opportunities, however, are limited by a lack of public access to the water's edge. Coastal shorebird populations are particularly vulnerable to disturbance by beachgoers, beach vehicles, and recreational boaters. Unfortunately, the human population density of the region and the demand for open space and recreational pursuits create conflicts in satisfying requirements for new access opportunities (see Objective H-8 below) and protection of natural habitat areas. HEP supports

efforts to retain sufficient habitat areas free of human disturbance to perpetuate viable populations of coastal species, emphasizing protection for those recognized as threatened, endangered, or of special concern. HEP will promote a balance of competing interests for the overall good of the general public and the natural ecosystem.

ACTION H-6.1
Workshops on Protection of Habitat Values
HEP will sponsor workshops on the protection of habitat values for federal, state, and local land management agencies, other appropriate agencies, and other large land owners, that administer parks, beaches, and other open space lands. The workshops will develop mechanisms to assist these managers in protecting habitat values.

ACTION H-6.2
Protection for Beach-nesting and Coastal Species
Responsible federal, state, and local authorities are engaged in efforts to minimize human disturbance to beach-nesting and coastal species which appear on federal and state endangered and threatened species lists. The majority of these efforts concentrate on birds, and HEP recommends that these efforts extend to other species, including turtles and plants, wherever possible. These programs are especially important when the habitat areas are close to active recreation or planned public access improvements. HEP recommends continued and expanded funding for these efforts and closer coordination between agencies providing public access and those seeking to protect habitat and natural resources.

-- The U.S. Fish and Wildlife Service and the U.S. National Park Service of the Department of the Interior, and the National Marine Fisheries Service of the Department of Commerce, directly and in cooperation with local and state agencies, will continue to monitor and protect sensitive coastal wildlife populations.
-- USACE, in performing shoreline protection, beach renourishment, or inlet dredging projects, will cooperate with other agencies and local conservation groups to incorporate coastal habitat enhancements wherever possible.
-- NJDEP, in cooperation with The Nature Conservancy and the U.S. Fish and Wildlife Service, is expanding piping plover protection with funds from a natural resources damages account, and will: continue to support beach-nesting bird colonies along the ocean shore from Sandy Hook to Cape May, New Jersey; monitor and manage osprey and peregrine falcon nests; and conduct a five year inventory of colonial waterbird (e.g., herons, egrets, gulls, and terns) breeding locations.
-- NYSDEC will continue to monitor coastal endangered species populations in the metropolitan area to ensure their continued viability. An inventory of colonial waterbird breeding locations has been completed.
-- Within New York City, the City Department of Parks and Recreation and the U.S. National Park Service maintain programs to protect beach-nesting piping plovers. The Park Service also monitors and manages osprey nests. NYCDEP, in cooperation with NYSDEC, monitors and manages peregrine falcon nests.

ACTION H-6.3
Educational Efforts to Reduce Human Disturbance to Coastal Species
HEP encourages appropriate state, local, and private sponsors to implement programs to educate the general public with regard to reducing human disturbance to sensitive coastal species.

-- NYSDEC, in partnership with the Aquarium for Wildlife Conservation (Coney Island Aquarium), will conduct its "Tidal Wetlands Education Course", a course to educate violators of the New York State Tidal Wetlands Law on how to minimize adverse impacts to coastal resources, and explore expansion of the course to include shorefront owners, local municipalities, students, and other interested groups.
-- NYSDEC and the YMCA will fund the Aquarium to conduct this course for children.
The Aquarium will seek additional funding to expand the course.
-- HEP will encourage additional efforts by state, local, and private sponsors to promote public education with regard to reducing human disturbance to sensitive coastal species.

OBJECTIVE H-7 Preserve and improve fish, wildlife, and plant populations and biodiversity

A number of federal and state agencies have a basic authority to manage species populations and habitats. In addition, efforts have been undertaken to coordinate species management on a regional and national scale.

ACTION H-7.1
Biodiversity Initiatives
New York State has established the Biodiversity Research Institute, jointly run by the Departments of Environmental Conservation and Education and the Office of Parks, Recreation, and Historical Preservation. Funded through the State's Environmental Protection Fund, the Institute's primary activity is the development of a statewide database for fish and wildlife populations (coordinated by the Natural Heritage Program), including establishment of an entomological clearinghouse, protection of state-owned under(fresh)water lands, and identification of species and groups of organisms which may act as indicators of environmental quality. The Institute will also prepare a computer-based inventory of 1) scientists knowledgeable about New York's biological resources and 2) collections of biological specimens located around the state.

ACTION H-7.2
Fisheries Management Plans
Appropriate agencies will comply with and adopt fisheries management plans.

-- The States of New York and New Jersey will maintain full compliance with fisheries management plans approved by the Atlantic States Marine Fisheries Commission.
-- The States of New York and New Jersey will implement fishery management measures which are compatible with applicable provisions of federal Fishery Management Plans prepared by regional Fishery Management Councils and approved by the U.S. Department of Commerce.

ACTION H-7.3
Restoration of Anadromous Fishery Habitat
HEP has provided partial funding to the New York-New Jersey Harbor Baykeeper (American Littoral Society) in support of a project to restore and improve habitat in the Harbor core area for anadromous herring species. In cooperation with community groups and volunteers, the Baykeeper conducted debris removal from banks and channels, in areas including several small tidal tributaries to the Arthur Kill. This effort helped reduce obstructions to anadromous fish and to foster bank stabilization and revegetation for improved riparian habitat. No heavy equipment was used during the operation. Involvement by local residents helped to educate them about the environmental resources in their communities, the threats to those resources, and the public health issues related to contaminants in the environment. The Baykeeper will continue project activities as funding sources are found. The habitat improvement measures will be monitored, and follow up activities will include dam bypasses and fish stocking, or "herring heaves", to carry migrating fish past physical obstructions.

-- HEP will continue to support efforts to restore the anadromous fishery (including habitats and abundance) to Harbor/Bight tributary rivers and streams. In so doing, HEP will ensure that public health risks associated with exposure to contaminants are minimized.

ACTION H-7.4
Implementation of the North American Waterfowl Management Plan

HEP supports the continuing implementation of the North American Waterfowl Management Plan to enhance and protect high quality wetland habitat in North America that supports a variety of wetland-dependent and recreational uses. The plan is a broad policy framework that identifies problems facing waterfowl populations, sets general guidelines for addressing problems, and establishes population and habitat goals for waterfowl in North America. The plan is a partnership effort based on the joint venture concept including private, local, state, and federal interests.

-- New York State has made it a top priority to implement the Long Island South Shore Focus Area Plan, a component of the North American Waterfowl Management Plan.
-- NJDEP will use state waterfowl stamp program funds to continue habitat acquisition efforts; this will both support the expansion of the Forsythe National Wildlife Refuge and help meet the goals of the North American Waterfowl Management Plan. A combined total of over 10,000 acres is expected to be acquired within the next 10 years and various waterfowl habitat improvement projects will be undertaken.

ACTION H-7.5
Natural Resources Inventory Funding

-- States will maintain funding levels for their Natural Heritage Programs to document occurrences of sensitive species in the region, as well as habitats that are vital to their continued survival.
-- HEP will investigate opportunities to enhance other ongoing programs and will encourage Natural Heritage Programs to include greater coverage of marine systems and species.

ACTION H-7.6
Agency Regulatory Reviews

-- Federal agencies and New York State will consider species and habitats recognized as significant by HEP (e.g., in the USFWS report, Species of Special Emphasis in the New York Bight Region), in agency regulatory reviews (see Action H-11.1 below).

-- NJDEP will consider species and habitats recognized as significant by HEP (e.g., in the USFWS report, Species of Special Emphasis in the New York Bight Region), in agency regulatory reviews, to the extent legally permissible and appropriate.

ACTION H-7.7
Implementation of Artificial Reef Programs
Construction of artificial reefs along the generally sandy bottom of the Atlantic Ocean off Long Island and New Jersey can enhance regional marine habitat. Reefs can be created by strategic placement of sunken ships and barges, large rock rubble, concrete blocks, or other types of clean construction material on the ocean bottom. Reefs can provide shelter for many marine fish and mobile invertebrates, and the hard surfaces of the sunken structures provide attachment points for a variety of sessile organisms. Reefs also increase opportunities for fishing, a regionally important recreational activity, and provide sites for scuba diving. Both states currently have active artificial reef programs. HEP does not recognize artificial reefs as a means of waste management.

-- New Jersey, during the last 11 years, has established a network of 14 reef sites, evenly spaced along the coast, over 23.7 square miles of sea floor. This program is supported by two non-profit organizations, the Artificial Reef Association and the Sportfish Fund. Three new reef sites were planned for 1994, at Barnegat Light Reef, Great Egg Reef, and Wildwood Reef.
-- Since 1993, USACE, at the request of NJDEP, has diverted blasted rock, created during the construction of deeper navigation channels in the Kill Van Kull and Newark Bay, to an artificial reef site off Sea Bright, New Jersey. This action not only has produced valuable habitat at no added cost, but it also has provided for beneficial use of dredged material that would otherwise have been programmed for ocean disposal.

-- New York State, in its Plan for the Development and Management of Artificial Reefs in New York's Marine and Coastal District, will seek funding to develop new artificial reefs in appropriate areas of New York waters to increase fishing opportunities. Plans have been developed to construct reefs in the Atlantic Ocean off Cholera Bank, Shinnecock Inlet, Jones Inlet, and Great South Bay to supplement existing reefs in seven areas.

Note that, in addition to the above programs, NJDEP is implementing a plan for the protection of rare species in New Jersey, known as the Landscape Project (see Action H-11.2 below).

OBJECTIVE H-8 Increase public access consistent with other ecosystem objectives

There is a public demand for open space opportunities along the coastline. Providing public access can meet this need while building a constituency for enhanced protection of natural habitat and species populations. But these benefits will not be forthcoming unless access to the shore is coupled with the right kind of space to accommodate different uses: places to fish, places to swim, places close to wildlife habitat for observation, safe places for boating including support facilities, and places to walk along the water. HEP recognizes that access must not be an afterthought. People must be able to enjoy and appreciate a cleaned up estuary for there to be continuing support for further investments to improve water quality and coastal habitats. HEP supports maintaining a balance between the needs and opportunities for public access and the requirements for sustaining living resources.

Special planning efforts are necessary to require all new development to provide public access and to ensure implementation of permit requirements, public guides, and improved opportunities on existing sites. Both states' coastal programs make public access a priority and encourage localities to incorporate public access into building and zoning codes.

ACTION H-8.1
Public Access Improvements
HEP recommends that federal, state, county, and municipal governments ensure improved public access to Harbor/Bight waters by:

-- Fully implementing existing projects, including:

- **$** Hudson River Greenway
- **$** Hudson Waterfront Walkway
- **$** NYC Greenway Plan
- **$** NYSDEC Hudson River Access Plan
- **$** NYSDEC Marine Recreational Fishing Access Plan
- **$** Greenways to the Arthur Kill
- **$** Hackensack Meadowlands public walkway;

-- Employing the Intermodal Surface Transportation Efficiency Act (ISTEA) program to fund public access improvements (see Action SW-1.5 below);

-- Identifying additional projects, including the Bight, as necessary;

-- Enhancing enforcement of existing regulatory programs; and

-- Encouraging grass roots work projects (e.g., through the Youth Corps).

ACTION H-8.2
Public Access Guides
HEP recommends that the states develop user-friendly public access guides for the major components of the Harbor/Bight system.

-- NJDEP, with partial funding from USEPA, has developed a public access guide for the Hudson Waterfront Walkway, a proposed 18-mile public accessway along New Jersey's Hudson River waterfront from Fort Lee to Bayonne.

-- HEP recommends that the States of New York and New Jersey develop additional guides as necessary.

ACTION H-8.3
Public Access Infrastructure
HEP recommends that state, regional, and local authorities develop and maintain the support facilities necessary to promote public access in targeted areas. New York City's Greenway Plan proposes to increase public use of the waterfront through development of a series of inter-connecting bicycle and pedestrian paths in all five City boroughs.

ACTION H-8.4
Waterfront Zoning Regulations
New York City will implement waterfront zoning regulations mandating public access via waterfront paths and upland connections in new residential and commercial development, in addition to view corridors for visual access to the waterfront.

OBJECTIVE H-9 Increase public education, stewardship, and involvement on issues related to management of habitat and living resources

Public education is important to habitat protection because it provides an understanding of the human link to the regional ecosystem and the responsibilities that people have for maintaining that ecosystem. In many cases, the public has actively promoted wise stewardship of living resources and is seeking constructive opportunities for personal involvement. HEP supports efforts to fulfill these needs.

ACTION H-9.1
Habitat Options Guide

-- HEP will develop and distribute a "Habitat Options Guide," prepared by the Habitat Work Group, which is designed to facilitate the consideration of habitat values within the framework of local government and private land use decisions. This non-regulatory approach will complement regulatory programs to protect, maintain, and enhance environmental values across the region. (Note: HEP will seek additional funds to assist production and distribution of the Guide).

-- HEP will hold workshops to ensure widespread exposure to the principles in the Habitat Options Guide, in conjunction with habitat value workshops.

ACTION H-9.2
Support for Habitat Laws and Programs
HEP recommends that appropriate agencies educate potential users and the general public on the impacts of lifestyle on habitat and living resources, as well as the availability of habitat information. HEP will encourage agencies to:

-- Enlist advocacy and local user groups, and educational institutions, to develop new habitat protection education programs. Topics should include wetlands values and functions, as well as shoreline values and shoreline dynamics.

-- Initiate and support ongoing pilot programs, such as those conducted by the Youth Conservation Corps, to conduct habitat enhancement or restoration activities and to focus efforts on watershed-scale approaches to conserve biodiversity.

-- Support the enforcement potential of citizen habitat "watchdog" groups.

ACTION H-9.3
Education Programs
HEP recommends that state and local authorities, with federal support through environmental education grants, encourage the integration of educational materials and opportunities into school programs at all levels.

ACTION H-9.4
New York City Environmental Fund
In 1994, through a negotiated settlement of environmental violations with the Consolidated Edison Utility Company, NYSDEC established a New York City Environmental Fund in cooperation with the Hudson River Foundation (HRF).

-- NYSDEC, in cooperation with HRF, will use the fund to provide grants to a wide range of community, educational, and volunteer organizations, to support environmental restoration, cleanup, education, interpretation, and related projects in New York City and Westchester County.

ACTION H-9.5
Availability of Habitat Report
Given sufficient funds for production, HEP will provide copies of the USFWS report on regionally significant coastal habitats (see Action H-11.1 below) to libraries, local planners, and other interest groups in the Harbor/Bight region.

OBJECTIVE H-10 Complete ongoing research and initiate special studies on habitat issues

The CCMP contains recommendations and commitments to maintain, preserve, and restore habitat and living resources based on our current understanding and knowledge of the regional ecosystem. At the same time, HEP recognizes that this understanding is incomplete and must be supplemented by additional studies. Continued inventory and monitoring efforts will serve as a critical link to allow for an adaptive management approach to habitat improvement.

ACTION H-10.1
Identification of Significant Coastal Habitats
Given additional funding, HEP, acting through federal natural resources agencies and the states, and in partnership with local stewardship groups, will conduct field studies and produce documentation to develop a more comprehensive record of significant coastal habitats throughout the Harbor/Bight region. For example, in New Jersey this effort may enhance the Landscape Project (see Action H-11.2 below).

ACTION H-10.2
Continuation of Studies on Aquatic and Coastal Habitat Values
Federal and state agencies should fully evaluate data gaps on the value of the existing aquatic and coastal habitats in the Harbor/Bight system and conduct additional studies accordingly. The studies would be used to:

-- Identify habitat types warranting special protection and restoration.
-- Refine and augment the HEP-funded report on significant coastal habitats (see Action H-11.1 below).
-- Identify priority sites for restoration and acquisition.
-- Evaluate enhancement and restoration technologies.
-- Estimate the cumulative impacts of individual projects on the quantity and quality of existing habitats.

ACTION H-10.3
Piers and Platforms Study
After years of sporadic studies, scientists still do not fully understand the effects of pile-supported structures on the value of the habitat in the Harbor. HEP and NYSDEC collaborated with HRF, NMFS, and Rutgers University to fund a research study to determine the effects of pile-supported structures on the growth and survival of recently settled (i.e., juvenile) fishes, along the developed Hudson River shoreline. A two year study was conducted that included both fish trapping and holding fish in caged enclosures to analyze growth. Results from the trapping study helped provide a synoptic picture of habitat use at the selected sites; growth studies reflected variability in habitat quality. Though analysis is continuing, preliminary findings indicate that underpier areas provide poor habitat for juvenile winter flounder and tautog, specifically, and probably for most benthic fish, in general.

-- HEP will convene a work group, consisting (at a minimum) of federal, state, county, and municipal agencies that have the authority to control shoreline development, to develop recommendations to identify appropriate regulatory tools to manage habitat.

-- USACE plans to extend this study to examine fish and wildlife use of abandoned and deteriorated structures, including pile fields and ship/barge "graveyards". The study will examine the use and mitigation needs of areas in the Arthur Kill and Kill Van Kull slated for potential drift removal or stabilization under the Harbor Drift Removal Program.
-- HEP recommends appropriate follow up research to assess more fully the effects of piers, platforms, and pile fields on habitat quality.

ACTION H-10.4
Assessment of Past Restoration Efforts
HEP will review the success of past habitat restoration efforts in the Harbor/Bight system in order to develop appropriate criteria and protocols for the selection of new projects -- with a maximum likelihood of success.

ACTION H-10.5
Investigation on Restoring Flood Plains and Erosion Areas
Federal and state authorities should examine opportunities to restore natural flood plains, coastal erosion hazard areas, and other natural features and functions that have been degraded by previous development. Federal actions will be guided, in part, by Executive Order 11988, Floodplain Management (May 24, 1977), which charges federal agencies to: 1) avoid floodplain development where practicable; 2) reduce flood hazards; 3) minimize flood impacts on human welfare; and 4) restore and preserve natural values of floodplains.

-- Consistent with the New York State Governor's Task Force Report, NYS will, given adequate funding, identify feasible opportunities and evaluate the cost effectiveness of buying out homeowners in disaster prone areas.
-- New Jersey will update its existing shore protection master plan that addresses the restoration of flood plains and coastal erosion hazard areas.
-- NYSDOS and USACE will implement a physical coastal erosion monitoring program for the south shore of Long Island (from Montauk Point to Coney Island) primarily, and, secondarily, along Long Island Sound and the south shore of Staten Island.
-- USACE, in cooperation with local sponsors, will continue to execute its responsibility regarding beach erosion projects, including an assessment of the habitat impacts of such projects, with appropriate remedial measures.

ACTION H-10.6
GIS Inventory of Habitats
Building on existing efforts, HEP recommends that federal and state agencies develop a Geographic Information System (GIS)-based inventory of Harbor/Bight habitats to aid in management planning. The USFWS coastal habitat inventory funded by HEP (see Action H-11.1 below) will be the basis for the development of a GIS-based system.

ACTION H-10.7
Turbidity and Total Suspended Solids Studies
HEP recommends studies of the effects of total suspended solids on water quality (e.g. clarity, transparency) and on changes in physical characteristics of aquatic sites due to sediment deposition. These studies could be used to develop strategies to improve habitat for rooted aquatic plants that require good water clarity, to enhance habitat value for benthic organisms by providing more stable bottom sediments, and to produce a side benefit of reducing the sedimentation rate in areas requiring dredging. Improved water quality may also lead to greater algal growth; this relationship must be better understood.

Geographically-targeted Special Efforts

OBJECTIVE H-11 Identify significant coastal habitats warranting enhanced protection and restoration

ACTION H-11.1
Significant Coastal Habitat Study

HEP has funded the U.S. Fish and Wildlife Service to produce a report, based on available information, which identifies significant coastal habitats warranting special protection, summarizes their conservation status, and presents recommendations for their preservation and restoration. The geographic extent of the report includes the entire coastal watershed of New Jersey and Long Island and the lower Hudson River watershed below the Troy Lock and Dam. Interim products that have been completed include:

- $ Species of Special Emphasis in the New York Bight Region, a comprehensive list of species of special emphasis, including federal trust species, state species of concern, and an array of commercially, recreationally, or ecologically important fish, wildlife, and plant species in the project area; and
- $ a draft report on regionally significant coastal habitats.

-- USFWS, with HEP review, will complete the report on significant coastal habitats warranting special protection.

-- HEP will supplement the USFWS report, as appropriate, through additional studies identified in Objective H-10, and through the New Jersey Landscape Project (see Action H-11.2 below), to improve our understanding of habitats and the coastal ecosystem and to focus actions for their protection.

ACTION H-11.2

New Jersey Landscape Project

NJDEP is implementing a plan for the protection of rare species in New Jersey, known as the Landscape Project. This effort focuses on the relationships between organisms and their environment, emphasizing the larger region, or landscape, in which these communities occur. Although New Jersey has large parcels of public land and strong regulatory protection, it recognizes that there are current weaknesses in the long term preservation of rare species that the landscape project must address. These include: 1) incomplete information on rare species occurrences and habitat requirements; 2) fragmentation of habitats; 3) lack of coordinated land management among governmental agencies; and 4) lack of a mechanism to incorporate rare species habitat protection into local land use planning.

-- NJDEP will conduct the Landscape Project in two delineated areas, Cape May County and a small portion of the Passaic River watershed in the northern Highlands region (e.g., Passaic, Morris, Somerset, Hunterdon, and Sussex Counties). NJDEP has committed $800,000 for these efforts.

-- With additional funding, NJDEP will conduct mapping and rare species surveys, coordinate land management practices, and coordinate land use regulation and planning in the Harbor Estuary and coastal Bight area in New Jersey.

ACTION H-11.3

Inventory of Potential Habitat Restoration Projects within Significant Regional Habitats

HEP will, given sufficient funding, identify and inventory sites within the designated boundaries of significant coastal habitats, as defined in the USFWS report, which have physical and institutional characteristics which indicate the potential for restoration of habitat values. Such sites may include former landfills, industrial sites, and transport terminals. In developing the inventory, HEP will build on existing programs including state priority lists. Note: HEP and others will also identify and implement restoration projects in other areas of the Harbor/Bight (see Action H-12.4 below).

ACTION H-11.4

Protection of Locally Significant Habitats

Although HEP's focus has been on habitats of regional significance, HEP recognizes the importance of conserving habitats of local significance. There are a number of areas in the Harbor core area that are fragments of formerly contiguous habitat areas, or that are recovering from previous intensive use. These sites may be vital to the overall Harbor ecosystem, either for their existing or potential future values, in particular, collectively.

-- HEP will identify and inventory sites using readily available information. The USFWS report and an effort being conducted by NJDEP's Division of Fish, Game, and Wildlife (see below) are among the information sources expected to be useful in

this effort. In addition, a number of such sites were brought to HEP's attention at recent public meetings.

-- The NJDEP Division of Fish, Game, and Wildlife is conducting a Wildlife Assessment and Restoration Project (NJ WARP), which is a wildlife inventory of terrestrial and aquatic species in the bi-state tributaries of the Harbor core area. Data will be gathered from a variety of sources to be entered into NJDEP's computerized Geographic Information System and made available through NJDEP's Bureau of Geographic Information Analysis. The information will be used in natural resources damages assessments and may also be useful for identifying potential restoration projects in Harbor tributaries, such as the Rahway and Woodbridge Rivers and other Arthur Kill tributaries.

-- HEP will seek opportunities to protect, enhance, and acquire such sites, using existing programs, authorities, and funding sources. This will be done in coordination with affected state and local governments and local stewardship groups.

ACTION H-11.5
Adjustment to Significant Habitat Designations within State Coastal Zone Boundaries
Based on the USFWS report, and other studies of regionally and locally significant habitat, including those noted above:

-- NYSDOS will adjust its designation of significant coastal fish and wildlife habitats in the coastal zone, as necessary.

-- NJDEP will consider species and habitats recognized as significant by HEP (e.g., in the Significant Coastal Habitat Study) in agency regulatory reviews and special area designations in the coastal zone, to the extent legally permissible and appropriate.

OBJECTIVE H-12 Develop and implement plans to protect and restore significant coastal habitats and impacted resources

There are a number of geographically-targeted efforts underway within the Harbor/Bight region that aim to promote coordinated and comprehensive planning, including the protection, acquisition, and restoration of natural habitats. Many of the environmental protection goals of these planning efforts support the HEP CCMP, and offer a ready-made opportunity to implement CCMP goals and objectives at the local and sub-regional levels. Following are descriptions of a number of these ongoing planning efforts. Note that not all aspects of these plans have been reviewed by HEP nor have they necessarily been endorsed by all HEP participants. HEP does, however, hope to build on these efforts and foster the implementation of aspects of the efforts which support HEP goals. Further review of these efforts, and initiation of new ones, will be part of HEP's continuing planning process.

Jamaica Bay

Jamaica Bay is the westernmost bay on the south shore of Long Island, lying primarily within the two New York City boroughs of Brooklyn and Queens. Hosting a population of 2 million people within a 5-mile radius, Jamaica Bay's wetlands and open water habitat has been reduced from 25,000 to 13,000 acres, including a 75 percent loss of wetlands. With these changes and population impacts, Jamaica Bay suffers from chronically degraded water quality. NYCDEP (with a Jamaica Bay Steering Committee) has prepared a draft watershed management plan aimed both to protect

the remaining natural habitats of the bay and to reduce structural costs for water pollution abatement by 50 percent ($1.1 billion vs. $2.2 billion for the structural alternative). Other plans for this area which are more specifically targeted to habitat acquisition and restoration, and which are complementary to the watershed management plan, are the Buffer the Bay initiative and the New York State Jamaica Bay Restoration Plan. New York State has made Jamaica Bay a priority area for environmental restoration. The U.S. National Park Service has significant ownership and management responsibility for the lands and waters of Jamaica Bay pursuant to the establishment of the Gateway National Recreation Area in 1972.

Hackensack Meadowlands

The Hackensack Meadowlands District is a 32 square mile area covering portions of 14 municipalities in Bergen and Hudson Counties, New Jersey. The resident population of the District is slightly over 15,000, with close to 2 million people living in the immediately surrounding areas. The Meadowlands, once an almost unbroken expanse of coastal wetlands, has suffered at least a 50 percent loss of those wetlands and severe alteration and degradation of most of the remaining wetlands. However, of the remaining undeveloped areas within the District, approximately 8,000 acres are wetlands; these remaining wetlands are under substantial development pressure.

The Special Area Management Plan (SAMP) is an interagency environmental initiative among USACE, USEPA, NOAA, HMDC, and NJDEP, which targets pollution remediation, natural resource protection, and reasonable economic growth in the District.

Harbor Herons/Greenways to the Arthur Kill

The Harbor Herons Project and the Greenways to the Arthur Kill are two independent, but compatible, habitat management strategies for opposite sides of the Arthur Kill, a bi-state Harbor waterway separating New Jersey from Staten Island, New York.

The Harbor Herons Project, an effort of the Trust for Public Lands and the New York City Audubon Society, is named for a complex of heron nesting colonies on three islands in the Arthur Kill. The colonies are supported, in part, by foraging areas in the northwestern quadrant of Staten Island, an area covering about 10 square miles. This habitat preservation plan identifies existing habitats important to the nesting herons and other urban wildlife, as well as the conservation status of those habitats. Of particular importance are more than 1,000 acres of tidal and freshwater wetlands within the study area. Recommendations are being implemented by the New York-New Jersey Harbor Spill Restoration Committee. To date, 26 acres in the vicinity of Goethals Bridge Pond, a critical wetland area, have been acquired and salt marshes along the Arthur Kill have been restored.

The Greenways to the Arthur Kill project, coordinated by the New Jersey Conservation Foundation, encompasses the entire New Jersey watershed of the Arthur Kill, an area of about 130 square miles, including six tributary rivers and creeks. The watershed has 690,000 residents which, at a density of 5,300 per square mile, is nearly five times the density for New Jersey as a whole, the nation's most densely populated state. Although heavily developed, the watershed retains a large amount of varied and valuable wildlife habitat, including wetlands, floodplain and swamp forests, and upland forests. Some of these habitats are protected in county and municipal parks, but many are fragmented pieces of an urban and suburban landscape.

The focus of the Greenways Plan is to protect the stream corridors for their values related to water quality, flood prevention, natural habitat, public recreation, and aesthetics, all of which provide economic benefits to the watershed communities. Portions of this plan are also being implemented through the New York-New Jersey Harbor Spill Restoration Committee.

Barnegat Bay

Barnegat Bay, a 75 square mile back bay ecosystem, is an environmentally sensitive estuary, replete with aquatic vegetation, shellfish beds,

finfish habitats, waterfowl nesting grounds, and scenic vistas. Yet the Bay is relatively shallow throughout, with slow mixing and flushing. The Bay drains a coastal watershed of approximately 450 square miles, parts of which contain densely developed residential areas. The watershed is home for nearly 450,000 residents, and this population doubles during the summer season.

Recent (post-1950) and continuing land use changes are causing significant degradation of Barnegat Bay water quality, which stimulated the New Jersey State Legislature to initiate the Barnegat Bay Study. The study resulted in the Barnegat Bay Watershed Management Plan in 1992, which provides a series of actions to preserve the values and resources of Barnegat Bay. Most recently, Barnegat Bay has been accepted into the National Estuary Program, and a separate CCMP will be developed for the Bay over the next three years.

Hudson River Estuary

In 1987, the New York State Legislature passed the Hudson River Estuary Management Act, which directed NYSDEC to develop a management program for the estuary and its shoreline. The purpose of the program is better coordination of management activities both within the Department as well as with other government agencies responsible for the estuary's resources. NYSDEC is issuing the final Hudson River Estuary Management Plan and an Action Plan which highlights priority actions. The Action Plan contains commitments and recommendations for water quality improvement, management of water resources, protection of biodiversity and habitat, open space management, monitoring, and other concerns.

Long Island South Shore Reserve

One of the more recent regional planning efforts in the Harbor/Bight area is the Long Island South Shore Estuarine Reserve. Similar to Barnegat Bay, Long Island's South Shore Bays have had tremendous population growth over the last 40 years; in fact, the majority of Long Island's 2.6 million residents are located in close proximity to the South Shore. Water quality impairments are severe in some areas, and most of the coastal habitat, including at least 30 percent of historic tidal wetlands, has been lost. This effort, to be patterned after the National Estuary Program, is in the first phase of a two-phase planning effort.

Actions to protect, preserve, and restore habitat areas and values have a number of potential funding sources, including the following:

Section 1135 of the Water Resources Development Act (WRDA) of 1986

Section 1135 of WRDA (1986), Section 204 of WRDA (1993), and various project-specific authorizations allow the USACE to study and implement habitat restoration measures in areas previously impacted by water resources projects. Federal funds are cost-shared with state and local sponsors to plan, design, and construct habitat restoration projects employing the broad principles of ecosystem-based planning. Many areas throughout the Harbor and Bight have been adversely impacted by federal water resources projects and could be eligible for funding through this program. Currently, the USACE is negotiating with NYSDEC, NYSDOS, and NYCDEP to initiate detailed studies for restoration projects within the lower Hudson River and in Jamaica Bay.

Natural Resources Damages Assessment Accounts

Several enforcement actions in the Harbor region have resulted in natural resources damages assessment accounts that can be used for natural resources protection and restoration. One account, resulting from a 1990 oil spill at the Exxon Bayway refinery in the Arthur Kill, is administered by a committee of two federal agencies, the U.S. Department of the Interior and the National Oceanic and Atmospheric Administration; two states, New York and New Jersey; and New York City (New York-New Jersey Harbor Spill Restoration Committee), which is developing a plan known as the Natural Resources Restoration Plan for Oil and

Chemical Releases in the New York-New Jersey Harbor Estuary. Another account will help remediate environmental damage in Jamaica Bay and areas of Staten Island and the Bronx affected by illegal dumping at sanitary landfills. A third fund, the New York City Environmental Fund, will support public education and outreach efforts, natural resource restoration, and grass roots environmental improvement projects (see Action H-9.4).

ACTION H-12.1
Incorporation of Recommendations into CCMP Implementation Schedule
HEP will independently review the recommendations of ongoing geographically- targeted efforts, which seek the preservation and restoration of habitat and living resources, and recommend their implementation by appropriate members of HEP.

-- HEP will complete an expedited review of NYC=s Comprehensive Watershed Management Plan and other Jamaica Bay initiatives (e.g., see Action H-12.3 below).

ACTION H-12.2
Additional Geographically-targeted Plans
HEP will ensure the development and implementation of additional geographically- targeted plans.

-- Upon completion of the HEP-sponsored USFWS report on significant coastal habitats, HEP will identify priority areas warranting protection beyond the focused application of existing programs.
-- HEP will coordinate with the New York-New Jersey Harbor Spill Restoration Committee Natural Resources Restoration Plan for Chemical Releases in the New York-New Jersey Harbor Estuary.
-- HEP will seek state and local sponsors for the development and implementation of geographically-targeted plans for priority habitat areas.
-- HEP will evaluate the extent to which additional measures are necessary to protect significant upland habitats.

ACTION H-12.3
Special Efforts to Restore Habitat and Improve Water Quality in Jamaica Bay

-- New York City Audubon Society, with a demonstration project grant from HEP, has undertaken a coastal habitat restoration project at Dubos Point Wetlands Sanctuary and Bayswater State Park, along the southern shoreline of Jamaica Bay. The project accomplished the following tasks: trash and debris removal; removal of concrete and rubble; security fencing to protect nesting terrapins and birds; vegetation control to favor native species; community education activities; monitoring surveys of birds, marine invertebrates, plankton, butterflies, dragonflies, flora, and water quality; and photo documentation.
-- NYSDEC will develop a habitat restoration plan to use approximately $8 million available from a successful natural resources damages claim to support special efforts to restore habitat in Jamaica Bay. Pelham Bay in the Bronx and Staten Island are also sites eligible for restoration funding.
-- New York City will finalize an agreement with USACE for a cost-shared feasibility study to investigate alternatives and develop detailed plans to implement a habitat restoration project for Jamaica Bay, including measures to address water quality problems related to poor flushing and other hydrological alterations. NYSDEC is cooperating in the feasibility study and will cost-share (with the $8 million in settlement funds) in the construction of recommended habitat restoration plans, making it a comprehensive and integrated federal, state, and local effort.

- NYSDEC will seek an agreement with USACE, NYCDEP, and the U.S. National Park Service Gateway National Recreation Area to develop a comprehensive Jamaica Bay Plan to integrate all activities associated with water quality improvement; habitat protection, restoration, and acquisition; public access; and educational opportunities. (Note: HEP will complete an expedited review of Jamaica Bay initiatives as stated in Action H-12.1).

ACTION H-12.4
Hudson River Restoration Efforts
USACE, in cooperation with NYSDEC and NYSDOS, has prepared a reconnaissance report

recommending priority habitat restoration sites and goals for the Hudson River Estuary.

-- USACE, with the cooperation of NYSDEC and NYSDOS, will finalize a plan of study that will lead to a cost-shared feasibility study to investigate restoration alternatives and develop detailed plans to implement recommended habitat restoration measures throughout the lower river, from Troy to New York City.
-- Following the feasibility study, the three agencies will enter into a cost-share agreement to fund construction of recommended measures.

ACTION H-12.5
Habitat Acquisition and Restoration Projects
Appropriate federal and state agencies will identify and facilitate the implementation of habitat acquisition and restoration projects, with priority given to projects that:

- $ Provide maximum ecosystem benefits, based on research results.
- $ Can be accomplished largely through the restoration of natural coastal processes (e.g., restoring tidal flow, shoaling of dredged areas, allowing natural plant succession).
- $ Can be implemented as part of urban/suburban redevelopment efforts.

-- HEP will identify potential habitat restoration projects and techniques, encourage entities with regulatory authority to implement the projects, and facilitate implementation.
-- HEP will encourage use of funds available through the Intermodal Surface Transportation Efficiency Act (ISTEA) program to implement appropriate habitat restoration (see Action SW-1.5).
-- USACE will continue to seek funding under Section 1135 (WRDA, 1986) and Section 204 (WRDA, 1992), as well as individual project authorizations, to implement habitat restoration measures in areas adversely impacted by past water resources projects. In addition to the studies targeting Jamaica Bay and the Hudson River, consideration is being given to the Hackensack and Raritan Rivers, the Arthur Kill, Raritan Bay, and Moriches and Great South Bays on Long Island.
-- USACE, in cooperation with NYSDEC, NYSDOS, NJDEP, and other federal, state, and local resource and planning/regulatory agencies, will continue to evaluate habitat restoration as part of ongoing studies under Section 216 of the River and Harbor and Flood Control Act, as well as Sections 306 and 307 of WRDA, 1990. Restoration opportunities will be identified, cost estimates will be developed, and local non-federal cost-sharing partners will be sought to implement these measures as part of, or independently of, the ongoing study.
-- HEP will coordinate with the New York-New Jersey Harbor Spill Restoration Committee Natural Resources Restoration Plan for Oil and Chemical Releases in the New York-New Jersey Harbor Estuary for qualifying habitat acquisition and restoration projects.

ACTION H-12.6
Public Private Partnerships
HEP recommends the establishment of a mechanism for public/private partnerships to preserve and restore habitat. An ecosystem-based Harbor Habitat Conservancy could be incorporated within appropriate local conservancies, such as the Hackensack River Land Conservancy, to negotiate appropriate techniques to preserve the significant habitats identified by USFWS. The Conservancy would work cooperatively with existing agencies and organizations to develop funding and support to implement local conservancies.

ACTION H-12.7
Amendment to New York Open Space Plan for Habitat Acquisition
NYSDEC, in consultation with its Region II Open Space Acquisition Committee, will amend, as appropriate, the acquisition recommendations of the New York State Open Space Plan to include newly identified, significant habitats.

ACTION H-12.8
Acquisition of Habitats in New Jersey
NJDEP will seek opportunities for acquisition of significant upland habitats (e.g., areas within the

Rahway River watershed).

ACTION H-12.9
Restoring and/or Increasing Land and Water Conservation Funds
HEP advocates the funding of federal and New York State land and water conservation funds, which could be used for implementation of protection and restoration projects or elements of the regional strategy (see Objective H-1).

COSTS OF IMPLEMENTING THIS PLAN

Many of the commitments and recommendations in the Habitat and Living Resources component of the CCMP can be accomplished through the effective use of base program resources. In fact, full implementation of the CCMP relies, in large part, on continued operation, and funding at current levels, of existing programs to meet habitat and living resources needs. The Habitat and Living Resources component of the CCMP describes 41 new HEP-driven commitments to be accomplished using base program resources.

These actions represent a major commitment to CCMP implementation.

The Habitat and Living Resources component of the CCMP also includes 23 significant commitments and recommendations that entail enhanced program funding. As shown in Table 3(hc) below:

- The Plan includes 7 actions for which a total of $6,995,500 has been committed by the responsible entities.
- The Plan includes 13 actions for which increased funding of $1,073,900 plus $550,000 per year is recommended.
- The Plan also includes three additional recommendations for action for which cost estimates will be developed during the continuing planning process.

This CCMP component includes 16 additional actions that require implementation costs for special projects. As shown in Table 4(hc) below:

- The Plan includes 5 actions for which a total of $15,596,000 has been committed by the responsible entities.
- The Plan includes 2 additional actions for which a total of $500,000 plus $1 million per year are recommended.
- The Plan includes 9 additional commitments and recommendations for action for which cost estimates will be developed during the continuing planning process.

Table 3(hc). Enhanced Program Costs for Management of Habitat and Living Resources

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION H-2.1 Enhance pilot project for Whippany River sediment control.	$100,000			
ACTION H-2.5 Encourage watershed planning at the local level.				$50,000
ACTION H-6.3 Conduct/expand educational efforts to reduce human disturbance to habitats.	$15,000		$10,000	
ACTION H-7.5: Enhance natural resources inventories.			*	
ACTION H-8.1: Enforce public access programs.				$150,000
ACTION H-8.2: Produce Hudson River Public Access Guide.	$32,500			
ACTION H-8.2: Produce additional public access guides.			$50,000	
ACTION H-9.1: Distribute Habitat Options Guide.			$18,900	
ACTION H-9.2: Initiate pilot programs for habitat restoration.				$100,000
ACTION H-9.4: Provide environmental education and stewardship grants through the NYC Environmental Fund.	$5,000,000			
ACTION H-9.5: Distribute USFWS report on coastal habitats.			$25,000	
ACTION H-10.1: Continue habitat inventory field studies.				$150,000
ACTION H-10.2: Continue studies of coastal habitat values.				$100,000
ACTION H-10.3: Complete study of piers/platforms habitat value.	$208,000			
ACTION H-10.3: Continue research on piers/platforms habitat value.			*	
ACTION H-10.5: Investigate flood plain and coastal erosion area restoration.			$50,000	
ACTION H-10.5: Implement coastal erosion monitoring program for Long Island.	$1,400,000			
ACTION H-10.6: Develop GIS inventory of habitats.			$200,000	
ACTION H-10.7: Study effects of total suspended solids.			*	
ACTION H-11.1: Identify habitats warranting special protection.	$240,000			
ACTION H-11.2: Conduct NJ Landscape Project.			$670,000	
ACTION H-11.3: Identify and inventory potential habitat restoration projects.			$50,000	
TOTAL	$6,995,500		$1,073,900 + * [1]	$550,000/yr

[1] * Actions to be developed as part of the continuing planning process.

Table 4(h): Project Implementation Costs for Management of Habitat and Living Resources

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION H-2.1: Implement full-scale project for Whippany River sediment control.			$500,000	
ACTION H-2.2: Implement full-scale project for Hudson sub-basin or Bronx sediment control.			*	
ACTION H-2.4: Implement watershed protection in Staten Island (NYC).	$6 million			
ACTION H-2.6: Implement projects using non-structural means to reduce runoff.			*	
ACTION H-7.3: Support Baykeeper to restore spawning habitat.**	$170,000			
ACTION H-7.3: Implement additional fishery habitat restoration.			*	
ACTION H-8.1: Implement existing public access programs.			*	
ACTION H-8.3: Provide public access infrastructure.			*	
ACTION H-12.3: Implement restoration in Jamaica Bay.				
-- HEP grant to NYC Audubon.	$26,000			
-- NYSDEC natural resources damages account. -- NYC cost-share to federal, state, local projects.	$8 million *			
ACTION H-12.4: Implement restoration in Hudson River.	*			
ACTION H-12.5: Use available federal funding for restoration (e.g., Section 1135 of WRDA, ISTEA). -- Coordinate with natural resources damages accounts for qualifying projects.	* *			
ACTION H-12.8: Implement upland habitat protection/acquisition.	$1,400,000			
ACTION H-12.9: Revive land and water conservation funds.				$1 million
TOTAL	$15,596,000 + *[1]		$500,000 + *[1]	$1,000,000/yr

* Project implementation costs to be developed as part of the continuing planning process.
** Project is incrementally funded; commitments for full project funding have not yet been acquired.
[1] Notation (+ *) indicates cost plus additional costs to be determined.

BENEFITS OF IMPLEMENTING THIS PLAN

Full implementation of the commitments and recommendations in the Habitat and Living Resources component of the Plan, including the development and implementation of a comprehensive regional strategy, would result in

- the preservation and restoration of the region's ecosystem;
- effective management of living resources;
- regulation and minimization of erosion and sedimentation; and
- enhanced opportunities for public access and coastal recreation.

As noted in the opening part of this section, however, we are a long way from reaching these endpoints. Nevertheless, through the focused application of existing programs and the geographic targeting of habitat areas for special protection, the Program will achieve:

- incremental progress toward ecosystem goals on a system-wide basis; and
- restoration and protection of selected ecosystem components and habitat types.

This effort will foster the consideration of ecosystem needs at every level of government and among the public so that the economic progress of the region no longer comes at the expense of the natural ecosystem. Quantifiable benefits of the measures identified in this Plan must be identified on a case-by-case basis and in consideration of past, present, and future impacts of human activity in the region. It is important to recognize that many of the benefits of ecosystem protection are non-quantifiable and range from aesthetic considerations to the maintenance of a healthful environment for the human population.

Table 5(hs). SummaryC Management of Habitat and Living Resources

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE H-1: Develop a comprehensive regional strategy to protect the Harbor/Bight watershed and to mitigate continuing adverse human-induced impacts.				
ACTION H-1.1: Develop a comprehensive regional strategy. (Note: In developing the strategy, HEP will need to involve other agencies and local/county governments, in addition to those listed. HEP will work to gain the commitment of these entities.)	HEP, USACE, USEPA, NOAA, USFWS, NYSDEC, NYSDOS, NJDEP, NYC	Draft: Dec 1996 Final: June 1997	Base program	C/N
ACTION H-1.2: Foster information transfer and tools to enhance and encourage watershed planning.	HEP & NJDEP	Ongoing	Base program	C/N
-- Establish a watershed planning coordinating subcommittee of the Habitat Work Group.	HEP, including NJDEP	Feb 1996	Base program	C/N
-- Conduct workshops and meetings with local governments and grassroots organizations.	HEP, acting through the watershed planning coordinating subcommittee & NJDEP	Beginning Feb 1996	Base program	C/N
-- Develop pilot projects for integrated watershed planning.	HEP, acting through the watershed planning coordinating subcommittee & NJDEP	Dec 1996	Base program	C/N
ACTION H-1.3: Seek establishment of memoranda of understanding, or other formal mechanisms, among agencies to implement recommendations, to	HEP	By Dec 31, 1997	Base program	C/N

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[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
the extent legally permissible and appropriate.				
OBJECTIVE H-2: Control point and non-point loadings of pollutants.				
ACTION H-2.1: Minimize sediment export from the Whippany River Basin through NJ pilot project.				
-- Develop pilot project.	NJDEP	Jun 30,1996	Base program	C/N
-- Enhance pilot project.	NJDEP	Jun 30, 1996	Enhanced program cost - $100,000	C/N
-- Implement full scale project.	NJDEP	By Dec 31, 1998	Project implementation cost - $500,000	R
ACTION H-2.2: Minimize sediment export from a sub-watershed of the Hudson River or in the Bronx through NY pilot project.				
-- Select pilot project.	NYSDEC	Jun 1996	Base program	C/N
-- Develop and conduct pilot project.	NYSDEC	Jun 1997	Base program	C/N
-- Implement full scale project.	NYSDEC	By Dec 31, 1997	Project implementation cost to be estimated by NYSDEC in 1996	R
ACTION H-2.3: Building upon the state pilot projects and programs, develop a targeted basin-wide program to minimize sediment transport to the Harbor Estuary.	HEP	Post-CCMP	Base program	C/N
ACTION H-2.4: Invest in watershed protection to minimize impacts from development in Staten Island.	NYCDEP	By Dec 31, 1996	Project implementation cost - $6 million over 3 yrs	C/O

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION H-2.5: Minimize runoff associated with development through local watershed planning.				
-- Coordinate watershed planning with local governments.	Monmouth County, Regional planning councils	Ongoing	Base program (NJDEP has provided $100,000 in base program funding to Monmouth County for its watershed management planning.)	C/O
-- Seek funding to encourage watershed planning regionwide at the local level.	HEP	Post-CCMP	Enhanced program cost - $50,000/yr	R
ACTION H-2.6: Encourage the use of non-structural, low-tech, and low maintenance means to reduce runoff and pollution associated with environmentally responsible projects.				
-- Develop projects.	HEP	Ongoing through Dec 1996	Base program	C/N
-- Implement projects.	HEP & other sponsors	Beginning by Dec 31, 1996	Project implementation cost estimate to be developed	R
OBJECTIVE H-3: Manage coastal development.				
ACTION H-3.1: Develop and utilize regional coastal management plans and programs.				
-- Develop regional plan for New York City.	NYSDOS & local	By Dec 31, 1996	Base program	C/N

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ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
	governments			
-- Develop regional plan for the Long Island South Shore.	NYSDOS	By Dec 31, 1997	Base program	C/O
-- Utilize elements of coastal program to manage growth.	NJDEP	Ongoing	Base program	C/O
-- Coordinate ongoing planning efforts, promote conservation of natural resources, and encourage redevelopment in areas where infrastructure is in place.	NYSDOS & NYSDEC	Ongoing	Base program	C/O
-- Coordinate ongoing planning efforts, steer development and redevelopment toward areas with existing infrastructure, and promote conservation of the region=s natural resources.	NJDEP	Ongoing	Base program	C/O
-- Consider HEP issues in commenting on the environmental impacts of federal actions in the Harbor/Bight area.	USEPA	Ongoing	Base program	C/O
ACTION H-3.2: Ensure that Significant coastal habitats are afforded protection through the consistency review process of the Coastal Zone Management Program.	NYSDEC, NYSDOS, NJDEP	Ongoing	Base program	C/O
ACTION H-3.3: Encourage and support local comprehensive plans for habitat protection.	NYSDOS & NJDEP	Ongoing	Base program	C/O
ACTION H-3.4: Identify projects and issues requiring regional cooperation; facilitate cooperation.	HEP	Ongoing	Base program	C/N
OBJECTIVE H-4: Manage shoreline and aquatic habitat modifications.				
ACTION H-4.1: Develop memoranda of agreement,	USEPA, USACE,	By Dec 31, 1996	Base program	C/N

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
as legally permissible and appropriate, to coordinate surveillance, inspection, permitting, and enforcement activities in tidal wetlands.	NYSDOS, NYSDEC, NJDEP			
ACTION H-4.2: Ensure regulation of proposed actions involving less than one acre of fill in freshwater wetlands.				
-- Consider issuing individual water quality certificates for projects that affect < 1 acre of freshwater wetlands.	NYSDEC	Ongoing	Base program	R
-- Consider development of water quality standards for projects affecting wetlands.	NYSDEC	Ongoing	Base program	C/N
-- Take steps to improve protection of Hudson River freshwater wetlands.	NYSDEC, through Hudson River Estuary Mgmt. Program	Ongoing	Base program	C/O
-- Require individual reviews of general permits for projects that affect < 1 acre of non-tidal wetlands.	NJDEP	Ongoing	Base program	C/O
-- Amend the NYS freshwater wetlands law to cover wetlands less than 12.4 acres.	NY government	By Dec 31, 1996	Base program	R
ACTION H-4.3: Use existing authorities to regulate activities in upland buffer areas that impact adjacent wetlands.	NYSDEC & NJDEP	Ongoing	Base program	C/N
ACTION H-4.4: Ensure that actions impacting habitat in the Harbor core area, in the aggregate, result in a net increase in the acreage and quality of aquatic habitat, where feasible and appropriate. Emphasize key habitat types such as submerged	HEP, NYSDEC, NYSDOS, NJDEP	Ongoing	Base program	C/N

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ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
aquatic vegetation.				
OBJECTIVE H-5: Maintain healthy estuarine conditions by managing freshwater inputs.				
ACTION H-5.1: Consider impacts of freshwater withdrawals and other hydrologic changes on estuarine salinity.	NYSDEC & NJDEP	Post-CCMP	Base program	R
ACTION H-5.2: Continue to implement water conservation programs.	NYSDEC, NYCDEP, NJDEP, local NJ authorities	Ongoing	Base program	C/O
OBJECTIVE H-6: Minimize human disturbance of natural habitats.				
ACTION H-6.1: Sponsor workshops to encourage federal, state, and local land management agencies, other appropriate agencies, and other large land owners to protect habitat values.	HEP	By Dec 31, 1996	Base program	C/N
ACTION H-6.2: Protect vulnerable beach-nesting and coastal species.				
-- Monitor and protect federally-listed beach-nesting and coastal species populations.	USFWS, USDOI/NPS, NMFS	Ongoing	Base program	C/O
-- Incorporate enhancement into coastal civil works projects.	USACE, with local sponsors	Ongoing	Base program, plus project-specific enhancements by local sponsors	C/O
-- Protect coastal species from Sandy Hook to Cape May, NJ.	NJDEP	Ongoing	Base program	C/O
-- Protect coastal species along Long Island shore.	NYSDEC	Ongoing	Base program	C/O
-- Protect coastal species in NYC.	NYCDPR, USDOI/NPS, NYCDEP, NYSDEC	Ongoing	Base program	C/O

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION H-6.3: Conduct and expand educational efforts to reduce human disturbance to coastal species.				
-- Conduct planned course on environmental sensitivity.	NYSDEC & Coney Island Aquarium	Ongoing	Base program	C/O
-- Extend course to children.	NYSDEC, Coney Island Aquarium, YMCA	Mar 1996	Enhanced program cost - $15,000	C/N
-- Seek additional funding to expand the course to a wider audience.	NYSDEC, Coney Island Aquarium	Beginning by Dec 31, 1996	Enhanced program cost - $10,000	R
-- Encourage additional efforts to promote environmental sensitivity to coastal species.	HEP	Beginning by Dec 31, 1996	Base program	C/N
OBJECTIVE H-7: Preserve and improve fish, wildlife, and plant populations and biodiversity.				
ACTION H-7.1: Develop statewide database of fish and wildlife populations through the Biodiversity Research Institute.	NYSDEC	Ongoing	Base program	C/O
ACTION H-7.2: Comply with and implement fisheries management plans.				
-- Maintain full compliance with plans approved by ASMFC.	NYSDEC & NJDEP	Ongoing	Base program	C/O
-- Implement measures compatible with federal plans approved by USDOC.	NOAA, NYSDEC, NJDEP	Ongoing	Base program	C/O
ACTION H-7.3: Support efforts to restore anadromous spawning fishery habitat.				
-- Support Harbor Baykeeper efforts in NJ	HEP & Harbor Baykeeper	Ongoing	Project	C/N

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ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
tributaries and Staten Island, NY.			implementation cost - $170,000 over 2 yrs (includes $26,000 commitment of HEP funds)	
-- Identify additional projects.	HEP	Completed	Base program	C/N
-- Implement additional projects.	To be determined	Post-CCMP	Project implementation costs to be estimated by Dec 1996	R
ACTION H-7.4: Implement the North American Waterfowl Management Plan.	Private, local, state, federal interests	Ongoing	Base program	C/O
ACTION H-7.5: Support natural resources inventories.				
-- Maintain funding levels for natural heritage programs.	NY & NJ	Ongoing	Base program	C/O
-- Investigate opportunities to enhance other natural resources inventory programs, and encourage natural heritage programs to include greater coverage of marine systems and species.	HEP	Ongoing	Base program	C/N
ACTION H-7.6: Conduct agency regulatory reviews.				
-- Consider significant HEP species and habitats in regulatory reviews.	USEPA, USACE, NYSDEC, NYSDOS, NYC Dept. of City Planning	Post-CCMP	Base program	C/N
-- Consider significant HEP species and habitats in regulatory reviews, to the extent legally	NJDEP	Post-CCMP	Base program	C/N

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
permissible and appropriate.				
ACTION H-7.7: Implement artificial reef programs.	NY & NJ	Ongoing	Base program	C/O
OBJECTIVE H-8: Increase appropriate public access.				
ACTION H-8.1: Federal, state, and local governments should implement existing programs to ensure improved public access.				
-- Fully implement existing projects.	Federal, state, & local governments; regulated community	Ongoing	Project implementation costs to be developed	R
-- Identify additional projects, as necessary.	HEP	Beginning Feb 1996	Base program	C/N
-- Enhance enforcement of existing regulatory programs.	State & local governments	Post-CCMP	Enhanced program costs - $150,000/yr	R
ACTION H-8.2: Develop public access guides.				
-- Develop guide for Hudson Waterfront Walkway.	NJDEP	Completed	Enhanced program cost - $32,500	C/N
-- Develop guides for Harbor/Bight system.	NYSDEC & NJDEP	By Dec 31, 1996	Enhanced program cost - $50,000	R
ACTION H-8.3: Develop infrastructure necessary to support public access.	NY, NJ, local governments	By Dec 31, 1997	Project implementation costs to be developed	R
ACTION H-8.4: Implement waterfront zoning regulations mandating public access via waterfront paths, upland connections, and view corridors.	NYC Dept. of City Planning	Completed	Base program	C/O

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R - Recommendation

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE H-9: Increase public education, stewardship, and involvement on issues related to management of habitat and living resources.				
ACTION H-9.1: Develop and distribute a "Habitat Options Guide".				
-- Develop guide.	HEP	By Dec 31, 1996	Base program	C/N
-- Distribute guide.	HEP	By Dec 31, 1996	Enhanced program cost - $18,900	R
-- Sponsor workshops to ensure exposure to guide.	HEP	By Dec 31, 1996	Base program	C/N
ACTION H-9.2: Educate the public on the impacts of lifestyle on habitat and living resources.				
-- Encourage local user groups and educational institutions to develop education programs.	NYSDEC, NYSDOS, NJDEP, local governments	Post-CCMP	Base program	R
-- Initiate pilot programs to conduct habitat enhancement or restoration activities.	NYSDEC, NYSDOS, NJDEP	Post-CCMP	Enhanced program cost - $100,000/yr	R
-- Support citizens habitat "watchdog" groups.	HEP, USEPA, USACE, NOAA, NYSDEC, NYSDOS, NJDEP	Post-CCMP	Base program	R
ACTION H-9.3: Encourage the integration of habitat educational materials into local school curricula.	NY & NJ	Post-CCMP	Base program	R
ACTION H-9.4: Program New York City Environmental Fund for public education/outreach.				
-- Provide grants to support environmental education and stewardship.	NYSDEC & Hudson River Foundation	Apr 1996	Enhanced program cost - $5 million	C/N
ACTION H-9.5: Provide copies of the USFWS report on aquatic and coastal habitat values to libraries and other interested parties in the Harbor/Bight area.	HEP	Mar 1996	Enhanced program cost - $25,000	R

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE H-10: Complete ongoing research and initiate special studies on habitat issues.				
ACTION H-10.1: Continue field studies to develop a comprehensive record of coastal habitats throughout the Harbor/Bight region.	HEP, USFWS, NYSDEC, NJDEP, NOAA/NMFS	Post-CCMP	Enhanced program cost - $150,000/yr	R
ACTION H-10.2: Continue studies on coastal and aquatic habitat values.	USEPA, USACE, NOAA, NYSDEC, NYSDOS, NJDEP	Post-CCMP	Enhanced program cost - $100,000/yr	R
ACTION H-10.3: Continue assessment of the habitat values of piers and platforms.				
-- Complete 2-yr study of effects of piers and platforms.	NYSDEC & HEP	Completed	Enhanced program cost - $208,000	C/N
-- Continue research effort, as appropriate.	HEP	Post-CCMP	Enhanced program cost to be determined	R
-- Convene a work group consisting (at a minimum) of federal, state, and local authorities that have authority to control shoreline development.	HEP	By Dec 31, 1996	Base program	C/N
-- Develop recommendations.	HEP	Jul 1996	Base program	C/N
-- Examine fish and wildlife use of abandoned shoreline structures within reviews for harbor drift removal projects.	USACE	Ongoing	Base program	C/N
ACTION H-10.4: Assess the success of past habitat restoration efforts.	HEP	By Dec 31, 1996	Base program	C/N
ACTION H-10.5: Investigate feasibility of restoring				

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ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
flood plains and coastal erosion hazard areas.				
-- Identify feasible opportunities and evaluate the cost effectiveness of buying out homeowners in disaster prone areas.	NYS	By Dec 31, 1996	Enhanced program cost - $50,000	R
-- Develop a shore protection master plan that will address the restoration of flood plains and coastal erosion hazard areas.	NJDEP	Sep 30, 1996	Base program	C/O
-- Implement a physical coastal erosion monitoring program for the south shore of Long Island.	NYSDOS & USACE	Ongoing through 2001	Enhanced program cost - $1.4 million	C/O
ACTION H-10.6: Building on existing efforts, develop GIS-based inventory of Harbor/Bight habitats.	HEP & appropriate federal and state agencies	By Dec 31, 1996	Enhanced program cost - $200,000	R
ACTION H-10.7: Study effects of turbidity and total suspended solids.	HEP	Jun 1996	Enhanced program costs to be estimated by Jun 1996	R
OBJECTIVE H-11: Identify significant coastal habitats warranting enhanced protection and restoration.				
ACTION H-11.1: Prepare a report of regionally significant coastal habitats warranting special protection.	USFWS	Draft report: Completed Final report: Apr 1996	Enhanced program cost - $240,000	C/N
ACTION H-11.2: Implement New Jersey Landscape Project.				
-- Conduct project in Cape May County and Highlands region.	NJDEP	Cape May - Dec 1997; Highlands - Jun 2000	Base program	C/O

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Conduct project in NJ Harbor/Bight area excluding Cape May and Highlands.	NJDEP	Jun 1997	Enhanced program cost - $270,000	R
-- Coordinate land management practices in Harbor/Bight.	NJDEP	Beginning by Dec 31, 1996	Enhanced program cost - $200,000	R
-- Coordinate land use regulation and planning in Harbor/Bight in NJ.	NJDEP	Beginning by Dec 31, 1996	Enhanced program cost - $200,000	R
ACTION H-11.3: Identify and inventory potential habitat restoration projects within the boundaries of significant coastal habitats as defined in the USFWS report.	HEP	Jun 1997	Enhanced program cost - $50,000	R
ACTION H-11.4: Identify and protect locally significant habitats in the Harbor area.				
-- Identify sites using readily available information.	HEP	Dec 1995 and continuing	Base program	C/N
-- Conduct Wildlife Assessment and Restoration Project (NJ WARP).	NJDEP	Ongoing	Base program	C/O
-- Seek opportunities to protect, enhance, and acquire sites.	HEP	Beginning by Mar 1996	Base program	C/N
ACTION H-11.5: Based upon report, adjust designation of significant coastal habitats, as appropriate.	NYSDOS & NYSDEC	By Dec 31, 1996	Base program	C/N
	NJDEP	By Dec 31, 1999	Base program	C/N
OBJECTIVE H-12: Develop and implement plans to protect and restore significant coastal habitats and impacted resources.				
ACTION H-12.1: Review ongoing geographically targeted initiatives and incorporate them in the CCMP, as appropriate.	HEP	Ongoing; Complete Jun 1997	Base program	C/N

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ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Complete expedited review of NYC=s Comprehensive Watershed Management Plan and other Jamaica Bay Initiatives	HEP	Dec 1996	Base program	C/N
ACTION H-12.2: Ensure the development and implementation of geographically targeted plans.				
-- Identify priority areas warranting protection beyond focused application of existing programs.	HEP	Mar 1996	Base program	C/N
-- Seek sponsors to develop and implement plans for priority habitat areas.	HEP	Post-CCMP	Base program	C/N
-- Evaluate the extent to which additional measures are necessary to protect significant upland habitats.	HEP	Post-CCMP	Base program	C/N
ACTION H-12.3: Implement special efforts to restore habitat and improve water quality in Jamaica Bay.				
-- Support NYC Audubon Restoration Project.	HEP	Completed	Enhanced program cost - $26,000	C/N
-- Develop and implement habitat restoration plan.	NYSDEC	Initiated 1994	Project implementation cost - $8 million	C/O
-- Develop and implement cooperative comprehensive restoration plan.	USACE, NYSDEC, NYCDEP	Initiated Dec 1995	Project implementation cost to be determined	C/N
-- Seek agreement to develop a comprehensive Jamaica Bay Plan to integrate all activities associated with water quality improvement; habitat protection,	NYSDEC working with USACE, NYCDEP & USDOI/NPS, Gateway NRA	Ongoing	Base program	C/N

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
restoration, and acquisition; public access; and educational opportunities.				
ACTION H-12.4: Implement Hudson River restoration efforts.	USACE, NYSDEC, NYSDOS	By Dec 31, 1996	Base program	C/O
-- Finalize plan of study to investigate restoration alternatives.	USACE, NYSDEC, NYSDOS	Completed	Base program	C/O
-- Enter cost-share agreement to fund recommended actions.	USACE, NYSDEC, NYSDOS	By Dec 31, 1997	Project implementation cost to be determined	C/O
ACTION H-12.5: Identify and facilitate implementation of habitat acquisition and restoration projects.				
-- Identify potential habitat restoration projects, and encourage and facilitate implementation.	HEP	Ongoing	Base program	C/N
-- Utilize funds available under WRDA and ISTEA to implement habitat enhancement and restoration projects.	USACE, NYSDEC, NJDEP, NYSDOS	Ongoing	Project implementation cost to be provided by USACE	C/O
-- Evaluate habitat restoration and improvement factors as part of all federal navigation maintenance and beach restoration projects.	USACE, NYSDEC, NJDEP, NYSDOS	Ongoing	Base program	C/O
ACTION H-12.6: Establish a mechanism for public/private partnerships to preserve habitat.	HEP	Post-CCMP	Base program	R
ACTION H-12.7: Amend and implement open space plan to include significant habitats.	NYSDEC	Post-CCMP	Base program	C/O

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ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION H-12.8: Seek opportunities for upland habitat acquisition.	NJDEP	Post-CCMP	Project implementation cost - $1.4 million	C/O
ACTION H-12.9: Restore land and water conservation funds.	Federal & NYS governments	By Dec 31, 1996	Project implementation cost - $1 million/yr	R

MANAGEMENT OF TOXIC CONTAMINATION

PROBLEMS

Unsafe seafood
Adverse impacts on port operations
Damage to commercial and recreational fisheries
Damage to other coastal species

SOURCES

Municipal discharges
Direct/indirect industrial discharges
Combined sewer overflows
Storm water
Contaminated sediments
Atmospheric deposition
Chemical/oil spills
Tributary inputs
Solid/hazardous waste sites
Other non-point sources

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

GOALS

To restore and maintain a healthy and productive Harbor/Bight ecosystem, with no adverse ecological effects due to toxic contamination.
To ensure fish, crustacea, and shellfish caught in the Harbor/Bight are safe for unrestricted human consumption.
To ensure that dredged sediments in the Harbor are safe for unrestricted ocean disposal.

OBJECTIVES

To reduce continuing inputs of toxic chemicals to the Harbor/Bight system:

T-1 Reduce municipal discharges of chemicals of concern.
T-2 Reduce industrial discharges of chemicals of concern.
T-3 Minimize the discharge of toxic chemicals from CSOs, storm water, and non-point sources (see section on Rainfall-Induced Discharges).
T-4 Reduce air emissions of chemicals of concern.
T-5 Remediate identified solid and hazardous waste sites.
T-6 Track-down and clean-up other sources of chemicals of concern.
T-7 Improve chemical/oil spill response and prevention.
T-8 Focus pollution prevention activities on chemicals of concern.

To remediate selected contaminated sediments:

T-9 Identify and remediate selected contaminated sediments.

To minimize human health risks due to the consumption of fish, crustacea, and shellfish caught in the Harbor/Bight:

T-10 Establish consistent methodology to assess risks and improve communication of fish advisories.

To better understand the toxic contamination problem and take additional management actions as more is learned:

T-11 Review and develop criteria for copper and other priority chemicals.
T-12 Assess ambient levels, loadings, and effects of chemicals.
T-13 Develop mass balances for metals and organic chemicals.

THE PROBLEMS

Overview

Toxic contaminants include both man-made and naturally occurring substances that can cause adverse ecosystem or human health effects when exceeding certain concentrations.

Prior to the passage of the Clean Water Act (CWA) in 1972, pollution of the Harbor/Bight was worse than today, based in part on the largely uncontrolled release of toxic substances to the environment. Since then, significant progress has been made in abating toxic and other forms of contamination. For example, as a result of major investments in wastewater treatment infrastructure, discharges of raw sewage during dry weather periods have been virtually eliminated, and most municipal and industrial wastewater treatment plants are in compliance with technology-based effluent limits. Also, under laws other than the CWA, certain toxic substances have been banned or reduced.

Despite these improvements, there is still a toxic contamination problem in the Harbor/Bight. HEP has characterized this problem in two ways:

First, there is direct evidence, from field and laboratory studies, of the adverse effects of toxic contamination on the Harbor/Bight ecosystem, as explained below. This is an **ecosystem** or **effects-based** approach to characterizing toxic contamination.

Second, levels of a number of chemicals in the water, sediments, and tissues of edible fish, crustacea, and shellfish in the Harbor/Bight exceed the criteria and standards developed by government agencies to protect marine life, wildlife, and human health. This **chemical-specific** approach, as detailed in the following text box, is the principal basis for regulating chemical contamination.

Toxic contamination also interferes with dredging and dredged material disposal in the Harbor/Bight because the sediments have accumulated contaminants from discharges of toxic chemicals.

THE SIGNIFICANCE OF CRITERIA AND STANDARDS

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.

In general, toxic contamination is worse in the Harbor than in the Bight. Within the Harbor, Newark Bay, its tributaries, and the Kills have the most contamination. Contamination is worse in inner Harbor areas and tributaries Harbor-wide, than in the open-water areas.

Ecosystem Approach

Although specific indicators of the adverse ecological effects of toxic chemicals exhibit the variability typical of all environmental indicators, there is significant evidence of current and past problems in the Harbor/Bight:

- Sediments in much of the Harbor and some areas of the Bight are toxic to a variety of organisms in laboratory tests.
- Ambient waters of the Harbor are sometimes toxic to sensitive organisms in laboratory tests.
- In the Harbor/Bight region, reproductive impairment in fish-eating birds has historically been caused by DDT, a pesticide. Other effects, which have not been conclusively shown to be caused by toxic contamination, but are believed to be consistent with toxic contamination, occur in the Harbor and/or Bight. For example, some bird species nesting in the Kills have had decreased reproductive success in recent years; and some fish in the Harbor/Bight have exhibited fin rot (observed in winter flounder), certain types of tumors (many tomcod develop liver cancer), developmental abnormalities, behavioral impairments, and altered life histories (observed in mummichogs).
- Preliminary observations suggest that the community of bottom-dwelling organisms (benthos) is degraded in areas of the Harbor. This may be due to toxic contamination and/or other stressors such as hypoxia.

However, effects of toxic contamination on the Harbor/Bight ecosystem are not well understood.

One difficulty with using the ecosystem approach to control chemical contamination is that a linkage must be established between the observed effect and the level of contamination. Where this has been established, HEP's Plan includes actions to address the contamination. Other HEP actions call for ongoing studies to better characterize toxic effects and the chemicals responsible for such effects. Even in the absence of firm linkages between observed effects and levels of contamination, the ecosystem approach is an indispensable check on the effectiveness of the chemical-specific approach, which lacks some numeric criteria and does not consider mixtures of chemicals. Restoring and maintaining a healthy ecosystem, with no adverse effects due to toxic substances, is the ultimate measure of success.

Chemical-Specific Approach

Perhaps the most tangible result of toxic contami-nation in the Harbor/Bight is that some fish, crustacea, and shellfish caught in these waters are considered unsafe for human consumption:

- New York and New Jersey have advised people to limit or avoid the consumption of several species of fish and crustacea caught in waters of the Harbor/Bight and, in some cases, have prohibited the sale, consumption, and/or harvesting of fish, crustacea, and shellfish due to toxic contamination, especially PCBs and dioxin. A complete list of New York and New Jersey fishing advisories for the Estuary is provided in "The State of the Harbor and Bight", Figures 3 and 4.
- 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.

HEP has worked to define specific chemicals of concern in water, biota tissue, and/or sediments of the Harbor/Bight. An initial list of chemicals of concern, developed using historical data, included approximately 50 chemicals. HEP has revised this list by reviewing available new data, considering data quality, the scope and magnitude of criteria exceedances, and whether data are representative of current conditions. The revised list of chemicals of concern is shown in Table 6(t); HEP believes these chemicals are problems for the following reasons:

Metals

Mercury

- Exceeds the water quality standard virtually Harbor-wide.
- Expected to exceed state advisory levels in fish tissue.
- Levels in sediments exceed the NOAA Effects Range - Median Value (i.e., the level expected to cause adverse effects in biota) at sampling sites throughout the Harbor; and exceed this level by ten times or more at sampling sites in the Hackensack River, Arthur Kill, and Newark Bay.

Table 6(t). Chemicals of Concern in the NY-NJ Harbor Estuary and Bight[1]

CHEMICAL NAME	MEDIUM:		
	WATER	BIOTA	SEDIMENTS
Metals:			
Arsenic		"	
Cadmium		"	
Copper	#		
Mercury	!		"
PCBs	!	!	"
Dioxin		!	"
PAHs	!	"	"
Pesticides:			
DDT & metabolites		"	
chlordane		!	
dieldrin		"	
heptachlor		"	
heptachlor epoxide		"	
hexachlorobenzene		"	
gamma-BHC		"	
Volatile organic compounds:			
tetrachloroethylene	!		

" = Exceedances of unenforceable criteria (i.e., published USEPA criteria or other criteria or screening values such as USEPA fish tissue concentrations and NOAA Effects Range Values).

! = Exceedances of enforceable standards (i.e., state water quality standards, New York State water quality guidance values, USEPA Toxics Rule criteria, and U.S. FDA action levels and state advisory levels for fish tissue).

= Predicted by mathematical modeling to sometimes exceed enforceable standards.

[1] It is important to note that inclusion of a chemical in this table, while indicating that management attention is necessary, does not reflect the scope and magnitude of criteria exceedances; data may not be complete for all media. Also the technical validity of some criteria are questionable. See text for further details.

Copper
- Predicted to sometimes exceed the chronic water quality standard in portions of the Harbor (see Table 7(t)).

Cadmium
- Levels have caused New York State to advise limited consumption of 1) blue claw crabs caught in the Hudson River from Troy Dam, south to the Lower Bay, and 2) hepatopancreas ("tomalley") of lobsters caught throughout the Harbor.

Arsenic
- Levels in mussel tissue exceed the tissue concentration on which USEPA water quality criteria for human health protection are based, by roughly 1,000-10,000 times, at several sampling sites throughout the Harbor. (Note: USEPA is reviewing the validity of this water quality criterion.)

PCBs
- Advisories exist on the consumption of roughly 16 edible species in the Harbor and/or Bight, and commercial fishing ban is in place on striped bass.
- Levels in sediments exceed the NOAA Effects Range - Median Value at sampling sites throughout the Harbor; exceed this level by five times or more at sampling sites in the Newark Bay, Passaic River, Arthur Kill, and Raritan Bay; and exceed New York State sediment quality guidance values.
- Levels in water in tributaries to the Harbor have been found to exceed the water quality standard for protection of human health by roughly 1,000 times.

Dioxin
- New Jersey advises against consuming any fish, crustacea, or shellfish caught in the tidal Passaic River; also prohibits sale or consumption of several species throughout Newark Bay Complex due to dioxin contamination.
- Levels in tissues of at least eight edible species sometimes exceed the New York State advisory level in other areas of the Harbor.
- Levels in sediments in portions of the Newark Bay Complex limit options for disposal of contaminated dredged materials.
- Levels in sediments exceed New York State sediment quality guidance values at sampling sites throughout the Harbor.

PAHs
- Levels of total PAH and several individual PAHs at sediment sampling sites in many inner Harbor areas and tributaries exceed the NOAA Effects Range - Median Value, often by five to ten times or more; attributed to discharges of petroleum and related materials.
- Recent NOAA studies found a moderate positive correlation among levels of PAHs in Harbor/Bight sediments and toxic responses in a variety of laboratory test organisms.
- Levels of several PAHs in mussel tissue at several sampling sites throughout the Harbor sometimes exceed tissue concentrations on which USEPA water quality criteria for human health protection are based.
- Levels of four PAHs -- benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and benzo(k)fluoranthene -- sometimes exceed water quality standards in Jamaica Bay.

Pesticides
- In various edible species, tissue levels of all the pesticides shown in Table 6(t) greatly exceed tissue concentrations on which USEPA water quality criteria for human health protection are based.

chlordane
- Levels in striped bass and American eel sometimes exceed FDA advisory levels at locations throughout the Harbor.

VOCs

tetrachloroethylene (Perc)
- Levels sometimes exceed the New York State water quality guidance value for protection of human health at many locations in the Harbor.

HEP expects that management actions will be required to control loadings of these chemicals to the system, remediate selected contaminated sediments, and/or protect the public from unacceptable health risks due to consumption of contaminated seafood. Results of additional studies, including some HEP studies, will be

available soon, and HEP will use this information to further revise and update the list of chemicals of concern. Other limitations on our ability to draw conclusions regarding chemicals of concern are the lack of criteria and doubts about the technical validity of criteria. In particular, regulatory criteria for sediment quality have not been established nationally, or for the Harbor or Bight. However, USEPA has recently proposed national sediment quality criteria for five substances.

HEP has focused significant effort on a better understanding of water quality problems due to metals. Section 304 (l) of the Clean Water Act of 1987 requires the development of Individual Control Strategies (i.e., water quality-based permit limits) for substances which exceed water quality standards due to point source discharges. For the Harbor, 304 (l) investigations were conducted under the auspices of HEP. Based on indications, from the historical data base, that levels of metals were exceeding water quality criteria due to point sources, HEP supported studies to characterize the levels of the following metals in waters of the Harbor/Bight: copper, mercury, lead, nickel, zinc, cadmium, silver, and arsenic. Water samples were analyzed using “clean” trace metal techniques. Results of these studies indicated significantly lower metal concentrations compared to the historical data. Differences were attributed, in large part, to sample contamination within the earlier data base and the differing laboratory procedures used to collect the two sets of data. Exceedances of water quality criteria were found only for mercury. Subsequent water quality modeling analyses predicted exceedances of chronic water quality criteria for three additional metals: copper, nickel, and lead. For nickel and lead, the predicted exceedances were based on numeric criteria expressed in terms of total recoverable metal, established under the National Toxics Rule. After the modeling analyses were completed, however, USEPA amended the National Toxics Rule. The result of this action was the promulgation of water quality criteria in New Jersey based on dissolved metal. Thus, exceedances of nickel and lead criteria need to be reassessed. This is being done under a second phase (Phase II) of monitoring and modeling studies.

The data and modeled predictions enabled HEP to assess criteria exceedances on a waterbody-specific scale (Table 7(t)). USEPA and the States of New York and New Jersey, under the auspices of HEP, are using this information to develop total maximum daily loads (TMDLs)[1], and waste load allocations (WLAs) and load allocations (LAs), for the water quality limiting metals, as discussed below.

Table 7(t). Waterbodies Needing TMDLs

Waterbody	Copper	Mercury
Hudson River (MP 50 to 0)		X
Inner Harbor (Battery to Narrows)		X
Outer Harbor (Narrows to Ocean)		X
Arthur Kill/Kill Van Kull	X	X
East R./Harlem R.		X
Jamaica Bay		X
Raritan River/Bay	X	X
Hackensack River	X	X
Passaic River	X	X
Newark Bay	X	X

[1] A TMDL is the maximum allowable loading of a pollutant to a waterbody that will meet water quality standards. WLAs and LAs represent the portions of the TMDL allocated to the point and non-point source loads, respectively.

For copper, the analyses shown in Tables 6(t) and 7(t) are based on a proposed site-specific chronic criterion of 5.6 µg/l dissolved copper, developed under the auspices of HEP.

In New York and New Jersey, discharge requirements for municipal and direct industrial discharges include both chemical-specific and Whole Effluent Toxicity (WET) limitations. Chemical-specific limitations are imposed to provide compliance with corresponding chemical numeric criteria. WET limitations are imposed to preclude significant acute toxicity in the discharges after allowable mixing with receiving waters. The WET limitations address the effects of mixtures of chemicals in discharges.

SOURCES CONTRIBUTING TO THE PROBLEMS

Metals

The studies mentioned above have improved our understanding of the loads of metals to the Harbor/Bight and their sources. In order to develop TMDLs/WLAs/LAs for those metals which exceed water quality criteria, the data collected were used to generate mass balances, derived from a steady-state toxics model. The mass balances relate loadings of metals from all sources to the levels of these metals in water and sediment. Loadings for all the metals, except mercury, are fairly well established (Figure 5). Loadings of the metals in the Harbor complex are shown for conditions of high and low riverine flow. Because of the large amount of dilution attributed to fresh water inflows from the Hudson River and other tributaries, low flow conditions in these rivers become the critical condition for establishment of TMDLs for metals. Harbor-wide, important sources of metals, other than mercury, are: municipal and industrial point sources, atmospheric deposition, tributaries, storm water, and CSOs. In the New Jersey tributaries to the Harbor, however, the Phase I TMDL model indicates that CSOs and storm water contribute a greater load of most of the metals than municipal and industrial point sources. This must be confirmed through a Phase II TMDL monitoring and modeling effort (see Action T-1.1 below). Phase II efforts will also reassess criteria exceedances for nickel and lead based on criteria for dissolved metal, and develop TMDLs as necessary.

Loads for mercury require further analysis. In developing the mass balances for mercury, it was determined that most of the load is from a source not identified during the HEP monitoring effort (Figure 5). USEPA believes much of this source is attributable to atmospheric deposition. A longer term effort, including further monitoring to assess mercury partitioning and fate, reassess loads, and develop appropriate models, will be required to fully understand mercury loadings.

NYCDEP has documented decreasing trends in loadings of several metals from its sewage treatment plants from 1985 to 1993. Over this period, decreases in effluent loadings of metals including cadmium (88%) and nickel (84%) are likely attributable primarily to implementation of the industrial pretreatment program (IPP). Decreases over this period in effluent loadings of other metals, including copper (79%), lead (81%), and zinc (68%), are likely attributable both to implementation of IPP and corrosion control in the City's water supply system. Similar decreases have been documented Harbor-wide and are likely attributable, in part, to implementation of IPP and other actions in New York and New Jersey. The observed decreases may also be attributable, in part, to implementation of "clean" trace metal techniques (i.e., sampling and analytical procedures in which extreme care is used to minimize sample contamination), which began in 1991. In particular, mercury and arsenic had the most significant decreases in loading and variability when comparing data from the post-1991 period with earlier periods.

It is noteworthy that, in response to HEP concerns, the eleven municipal sewerage authorities in New Jersey which discharge to the Harbor joined to form the New Jersey Harbor Dischargers Group (NJHDG). NJHDG is conducting the studies necessary to support development of Phase II TMDLs. NJHDG is working cooperatively to support implementation of several actions in this Plan, including "Track-down and Clean-up" (see Action T-1.2 below), and development of a

Figure 5. Sources of Several Metals to the Harbor under Conditions of High and Low Riverine Flow

system-wide eutrophication model (see Action N-4.1 below).

Organic Chemicals

HEP has sponsored studies to estimate pollutant loads, including loads of toxic organic chemicals, to the Harbor/Bight using existing data. These studies concluded that, except for PCBs, existing data are insufficient to assess the relative importance of various source categories, even on a basin-wide scale. As shown in Figure 6, the relative significance of current sources of total PCBs to the Harbor was estimated as tributary inputs (50%), municipal point sources (22%), storm water (15%), CSOs (10%), atmospheric deposition (3%), and landfill

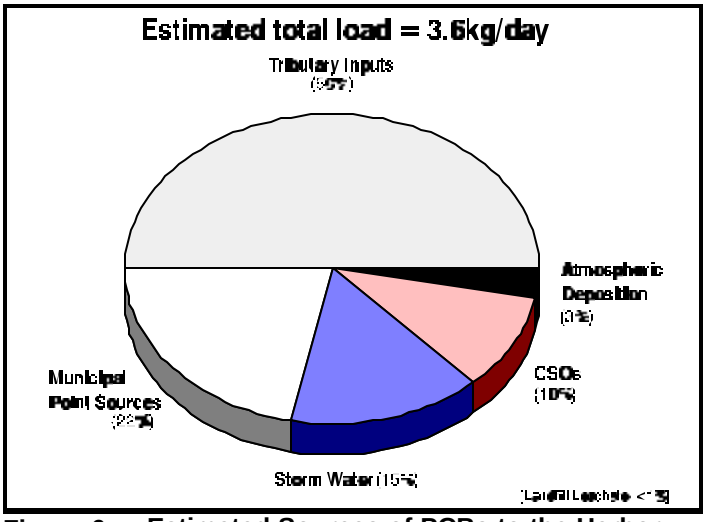

Figure 6. Estimated Sources of PCBs to the Harbor

leachate (< 1%). The data were considered inadequate to assess loads on smaller scales.

A preliminary mass balance and food chain model for PCBs indicated that continuing discharges of PCBs to the lower estuary are significant in causing PCB levels in striped bass to exceed the FDA standard. However, the estimates of continuing PCB loadings used in the model were based on limited data. Therefore, USEPA recently conducted a screening-level analysis of PCB levels in STP discharges to the Harbor. Twenty-four-hour composite effluent samples were collected during dry weather at five STPs discharging to the Harbor, representing about half the average STP discharge volume to the Harbor. Composite wet weather influent samples were also collected during single storm events at four of these STPs. Water samples were taken at four major tributaries to the Harbor. Total PCB concentrations in the STP effluent ranged from roughly 10 to 100 parts per trillion; total PCB concentrations in STP wet weather influent ranged from roughly 55 to 400 parts per trillion; and total PCB concentrations in the tributaries ranged from roughly 12 to 25 parts per trillion.

The study confirmed that STPs currently discharge PCBs at levels consistent with the earlier estimates. This information supports the need to address continuing discharges of PCBs and to improve the mass balance. As the next step in addressing continuing discharges of PCBs, USEPA, using Clean Water Act Section 308 letters, required municipal dischargers in the Harbor area to identify the levels of PCBs being discharged (see Action T-1.2 below). HEP has begun a modeling effort to improve the mass balance (see Action T-13.3 below).

Sources of other chemicals to the Harbor/Bight are understood only qualitatively. The most significant source of dioxin in causing exceedances of criteria may be sediment flux. In particular, there is a "hot spot" in the lower Passaic River due to past discharges. However, possible continuing discharges of dioxin in the Harbor area must be further investigated. Our current knowledge indicates numerous potential sources of dioxin (including incinerators, other high-temperature industrial processes, other chemical industry sources, and the wood and paper industry). Recent studies which analyze the mixtures of various congeners of dioxin present in sediments of the Newark Bay Complex also indicate multiple sources.

To begin assessing continuing discharges of dioxin, USEPA, using the same Clean Water Act Section 308 letters noted above, required nine STPs discharging to the Newark Bay Complex to sample their influent and effluent for dioxin. Sampling was done during two dry weather and two wet weather periods. Analysis was conducted for the 2,3,7,8-TCDD congener. Data reports were recently submitted.

Dioxin was not detected in any samples at the reporting limit required in the Section 308 letters (5 parts per trillion). Recent improvements in analytical techniques, however, allowed quantification at much lower levels (1-100 parts per quadrillion). Even at these detection limits, dioxin was quantified in only one of the 54 samples analyzed, a wet weather influent sample at 45 parts per quadrillion.

Data are not available, however, to assess the environmental significance of these results (i.e., whether municipal discharges contribute significantly to exceedances of criteria for dioxin). There is no quantitative information on loadings of dioxin to the Harbor, other than the value reported above, and currently no model to assess bioaccumulation and fate (i.e., mass balance) of 2,3,7,8-TCDD and other dioxin congeners. HEP has begun an effort to develop such a model (see Action T-13.3 below).

Sources of PAHs to the environment are pervasive. PAHs are present in large quantities in petroleum and related materials and are used in the manufacture of materials such as dyes, insecticides, solvents, and asphalt. Higher molecular weight (heavier) PAHs (including fluoranthene, benzo(b)fluoranthene, benzo(a)pyrene, etc.) are products of combustion. Their presence generally indicates contamination by atmospheric deposition. The lower molecular weight (lighter) PAHs (including naphthalene and fluorene) generally derive from unburned petroleum sources. Based on NYCDEP information showing high levels of PAHs in Jamaica Bay tributaries, and in CSO discharges and CSO sediment mounds throughout the City, CSOs and storm water discharges may be significant sources of PAHs Harbor-wide. There is, however, a need to collect data on levels of continuing discharges of PAHs Harbor-wide. These sources result from runoff and improper disposal of waste oil. In addition, direct spillage of petroleum may also contribute significant amounts of PAHs; large spills can have particularly significant short-term impacts. Petroleum spillage from petroleum transfer operations, shipping, and boat engines also contribute PAHs to the Harbor/Bight. In addition, direct and indirect industrial discharges may contribute significant loads of PAHs. PAHs in sediments of the Bight tend to be the heavier PAHs, indicating that atmospheric deposition may be the principal source.

Tetrachloroethylene, also known as Perc, is a volatile organic chemical used as a solvent in dry cleaning and other industries. It has been detected in New York City STP effluents.

Additional monitoring and model development will be required to further refine the load estimates for PCBs, develop comparable estimates for other organic chemicals, and develop mass balances.

THE PLAN TO SOLVE THE PROBLEMS

The goals of HEP's toxic contamination management plan are to:

- Restore and maintain a healthy and productive ecosystem, with no adverse ecological effects due to toxic contamination.
- Ensure fish, crustacea, and shellfish caught in the Harbor/ Bight are safe for unrestricted human consumption.
- Ensure that dredged sediments in the Harbor are safe for unrestricted ocean disposal.

In order to achieve these goals, HEP's toxics management plan includes objectives to:

- Reduce continuing inputs of toxic chemicals to the Harbor/Bight system (see Objectives T-1 through T-8 below).
- Remediate selected contaminated sediments (see Objective T-9 below).
- Minimize human health risks due to the consumption of fish, crustacea, and shellfish caught in the Harbor/Bight (see Objective T-10 below).
- Better understand the toxic contamination problem and take additional management actions as more is learned (see Objectives T-11 through T-13 below).

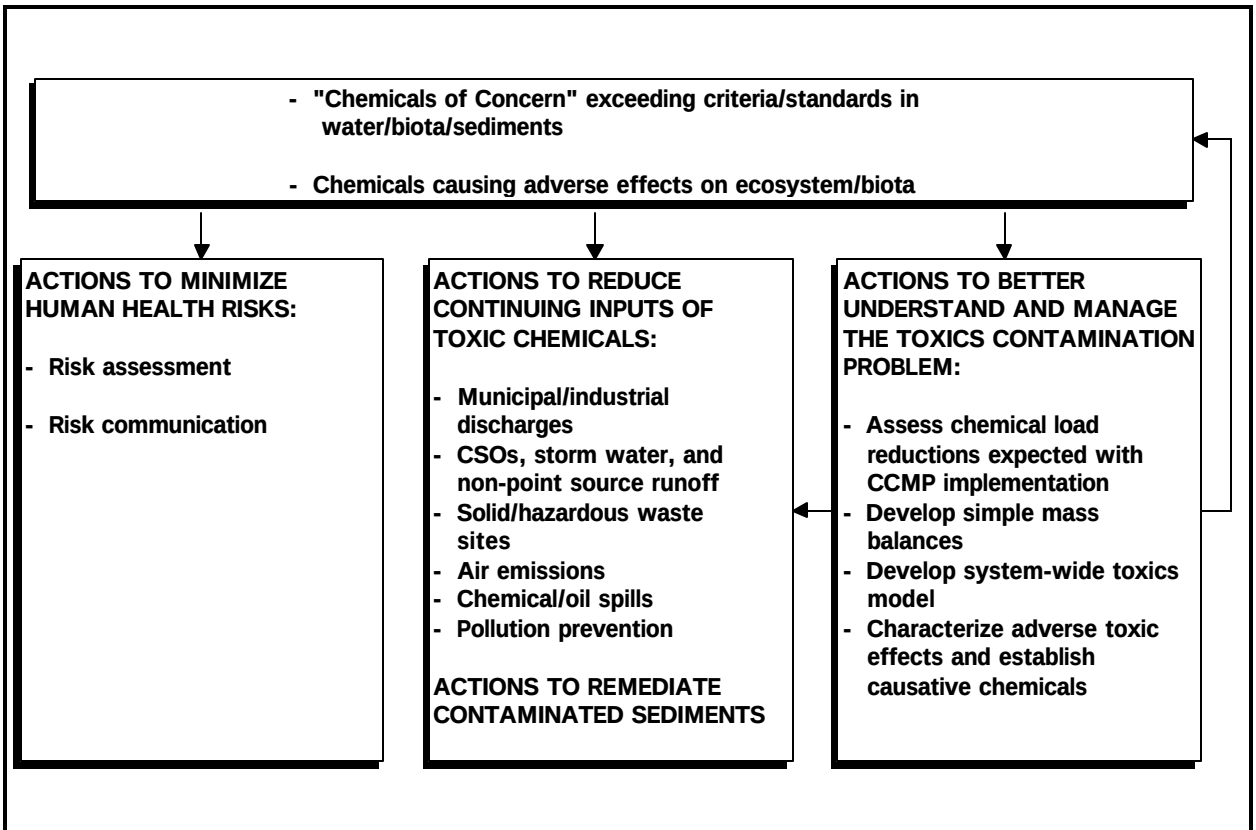

Figure 7. Overview of HEP's Plan for Toxic Contamination

The Harbor Estuary Program's approach to address the toxic contamination problem is illustrated schematically in Figure 7. HEP's Plan calls for actions now to reduce continuing inputs of toxic chemicals and remediate contaminated sediments, while continuing work to understand the contamination problem. The improved understanding gained will be used to develop additional actions to reduce contamination. HEP's Plan also includes actions to minimize human health risks associated with consumption of seafood contaminated with toxic chemicals.

COMMITMENTS AND RECOMMENDATIONS

Actions to Reduce Continuing Inputs of Toxic Chemicals

OBJECTIVE T-1 ***Reduce municipal discharges of chemicals of concern***

Under the Clean Water Act, dischargers are required to meet secondary treatment requirements. Currently, only one STP in the Harbor, the Newtown Creek STP in New York City, is not meeting these requirements; however, a commitment is in place for this facility. For details, see the section on Management of Nutrients and Organic Enrichment.

It is expected that full implementation of secondary treatment will reduce discharges of many of the toxic chemicals of concern. However, this will not be sufficient to eliminate exceedances of water quality standards, restore beneficial uses, or eliminate other adverse ecosystem impacts due to municipal discharges of toxic chemicals.

ACTION T-1.1
Control of Discharges of Metals
Results of HEP-sponsored studies to define water quality-limiting[1] metals indicate that water quality- based control of discharges of two metals (copper and mercury) is necessary. In order to control metals discharges, USEPA, NYSDEC, and NJDEP will implement a phased TMDL approach for water quality-limiting metals by incorporating limits and additional requirements into draft permits by December 1995.

-- Phase I permit limits for municipal discharges will be based on existing effluent quality (EEQ):
  - Harbor-wide for mercury.
  - In Newark Bay, Kills, Raritan Bay/River, Passaic River, and Hackensack River for copper.
-- Phase II may include more stringent permit limits for copper, and limits for nickel and lead, based on additional data collection and modeling (see Action T-13.1 below). These studies are being conducted by the NJHDG.
-- To prepare for possible reductions in metals loadings, based on the additional data collection and modeling, dischargers were required to conduct studies to evaluate the effectiveness of pretreatment, treatment optimization, corrosion control, and pollution prevention in reducing loadings of metals. Dischargers have submitted the required reports.
  - In New York, NYCDEP conducted the required studies under the SPDES permit process.
  - In New Jersey, USEPA required the studies under CWA Section 308 letters (see Table 8(t) below).

ACTION T-1.2
"Track-down and Clean-up" of Significant Discharges of Organic Chemicals of Concern
NYCDEP, NJHDG, and other dischargers in the Harbor area, working with USEPA, NYSDEC, and NJDEP, under the auspices of HEP, will identify, track-down, and abate significant discharges of organic chemicals of concern. USEPA, in coordination with the States and dischargers, has already taken steps to begin implementation of this program.

-- HEP will coordinate development of this program, including identifying the chemicals to be included, the dischargers to be included, and the monitoring techniques and sampling methodologies to be used.
-- HEP will convene seminars to develop the program and assist technology transfer.

An overview of the Track-down and Clean-up program for discharges is presented on the following page. Note that Objective T-6 below describes a similar program where the "track-down" begins with monitoring conducted in the ambient environment (e.g., Harbor tributaries).

-- As discussed previously in this section, there is clear evidence that PCBs exceed fish tissue action levels in the Harbor. Furthermore, as discussed previously, USEPA has already collected preliminary data confirming that municipal discharges of PCBs in the Harbor are significant.
  - Therefore, using CWA Section 308 letters, USEPA required municipal dischargers throughout the Harbor (see Table 8(t)) to identify the levels of PCBs in their discharges,

[1] The concentration of a substance in the water column exceeds, or is predicted by mathematical modeling to exceed, water quality standards.

"TRACK-DOWN AND CLEAN-UP" OF SIGNIFICANT DISCHARGES OF ORGANIC CHEMICALS OF CONCERN

This provides an overview of the Track-down and Clean-up program for discharges. Please refer to Action T-1.2 text and Table 13(ts) below, for specific information on program status and implementation.

Selection of Chemicals to be Considered for Track-down and Clean-up

USEPA, NYSDEC, NJDEP, USACE, NYCDEP, NJHDG, and other dischargers, under the auspices of HEP, will review available ambient data, criteria and testing methods, and results, to determine, by mutual agreement, which chemicals should be considered for Track-down and Clean-up. Chemicals to be considered for Track-down and Clean-up must be organic chemicals documented to cause environmental problems in the Harbor and/or Bight, i.e., the chemical:

- **exceeds enforceable water quality standards, or**
- **exceeds USFDA fish tissue action levels or state advisory levels, or**
- **makes recently deposited sediment unsuitable for unrestricted ocean disposal, or**
- **causes documented adverse impacts on biota (including benthic biota).**

HEP's program for Track-down and Clean-up of significant discharges is focusing on organic chemicals of concern, not metals. This is because municipal and industrial dischargers in the Harbor are subject to requirements for water quality-based control of the water quality-limiting metals (see Action T-1.1 below). Municipal and industrial discharges of mercury in the Harbor are believed to contribute only a small portion of the total mercury load (see Figure 5). However, note that there is a large unidentified source of mercury. Therefore, mercury will be considered for ambient Track-down and Clean-up (see Objective T-6 below). Also note that as additional information becomes available indicating that additional chemicals are of concern, or that municipal and industrial discharges of known chemicals of concern are significant, USEPA, the states, and the dischargers, under the auspices of HEP, will consider augmenting the Track-down and Clean-up program.

Identification of Significant Discharges

For those chemicals meeting any of the above criteria, dischargers, as appropriate, will screen their discharges using sensitive monitoring techniques (e.g., see below); dischargers will initiate the screening if there is a reasonable expectation that they are discharging the chemical(s) in question at elevated levels. Upon examination of the data, USEPA, NYSDEC, NJDEP, NYCDEP, NJHDG, and others, under the auspices of HEP, will determine which, if any, discharges are significantly elevated and have reasonable potential to contribute to a violation of the applicable criteria.

Track-down and Abatement of Significant Discharges

Table 8(t). POTWs in NY-NJ Harbor Subject to USEPA CWA Section 308 Reporting Requirements for Metals, PCBs, and Dioxin (see text for details).

POTW	REQUIREMENT		
	Metals Evaluation	PCB Sampling	Dioxin Sampling
New Jersey			
Rahway Valley Sewerage Authority	X	X	X
Linden-Roselle Sewerage Authority	X	X	X
Joint Meeting of Essex & Union Counties	X	X	X
Middlesex County Utilities Authority	X	X	X
North Bergen Municipal Utilities Authority:			
- Central STP	X	X	X
- Woodcliff STP	X	X	
Edgewater Municipal Utilities Authority	X	X	
Hoboken-Union City-Weehawken Sewerage Authority	X	X	
West New York Municipal Utilities Authority	X	X	
Passaic Valley Sewerage Commission	X	X	X
Bergen County Utilities Authority	X	X	X
Secaucus Municipal Utilities Authority	X	X	X
New York			
Port Richmond STP		X	X
Oakwood Beach STP		X	
Tallmans Island STP		X	
Hunts Point STP		X	
Owls Head STP		X	
Red Hook STP		X	
Wards Island STP		X	
North River STP		X	
Jamaica STP		X	
Bowery Bay STP		X	
Rockaway STP		X	
Newtown Creek STP		X	
Coney Island STP		X	
26th Ward STP		X	
Yonkers Joint Wastewater Treatment Plant		X	

including wet weather influent as a surrogate for CSO discharge. New Jersey dischargers, New York City, and Yonkers Sewer District have submitted the required reports.

- USEPA, NYSDEC, NJDEP, NYCDEP, and NJHDG are using the data collected through the CWA Section 308 letters to identify which municipal discharges of PCBs are significant.
- NYCDEP, NJHDG, and other dischargers as appropriate, will track-down and abate the sources of PCBs to their sewage systems as described previously.
- As of July 1, 1995, NYCDEP, under a consent order with NYSDEC, has deployed 18 Passive In-Situ Concentration Extraction Samplers (PISCES) in the influent streams of the 14 New York City STPs. The devices will be deployed for 12 months to monitor for PCBs and other organic chemicals. By December 1996, NYCDEP will submit a report to NYSDEC on the analytical results. The report will propose the STP drainage basins in which the track-down of PCBs and other chemicals will be pursued. In deciding which basins will be pursued, NYCDEP and NYSDEC will consider the results of the monitoring conducted under the Section 308 letters. NYCDEP is currently committed to an additional two years of follow-up efforts on PISCES track-down.

-- As discussed previously in this section, there is clear evidence that dioxin exceeds fish tissue action levels in the Harbor. However, there was no quantitative data on the levels of dioxin in municipal discharges to the Harbor.

- Therefore, using the same CWA Section 308 letters noted above, USEPA required municipal dischargers in the Newark Bay Complex [Table 8(t)] to identify the levels of dioxin in their discharges. The monitoring was required for dischargers in the Newark Bay Complex because dioxin contamination is worse in this area than in other areas of the Harbor.
- The POTWs listed in Table 8(t) collected influent and effluent samples during two dry weather periods, and influent during two wet weather periods. Analysis of these samples indicated that dioxin concentrations were less than the required reporting limit of five parts per trillion.

-- Available information on other organic chemicals of concern must be reviewed to determine whether those chemicals should be considered for track-down and clean-up.

- USEPA, NYSDEC, NJDEP, NYCDEP, NJHDG, and other dischargers, in consultation with the appropriate HEP work groups, will review available ambient data on the other organic chemicals of concern, using the criteria described previously to determine which chemicals should be considered for track-down and clean-up.
- As appropriate, dischargers will screen their discharges using sensitive monitoring techniques to identify the levels of the chemicals being discharged.
- If significant discharges are found, those dischargers will track-down and abate the chemicals, or USEPA, NYSDEC, and NJDEP will require control of the chemicals quantitatively, through development of TMDLs/WLAs/LAs.

-- Concurrent with updates of the list of chemicals of concern (see Action T-12.3 below), HEP will consider new information and report biennially through HEP CCMP updates (see Objective I-1 below), on whether additional organic chemicals should be considered for track-down and clean-up.

Additional information is needed to fully address the adverse impacts of these and other chemicals of concern. This is addressed in "Actions to Better Understand and Manage the Problem" (see Objectives T-11, T-12 and T-13 below).

OBJECTIVE T-2 Reduce industrial discharges of chemicals of concern

Permits for direct industrial discharges to the Harbor/Bight contain technology-based limits expected to minimize the discharge of toxic chemicals. Indirect industrial discharges to the

Harbor/Bight are subject to the Industrial Pretreatment Program.

ACTION T-2.1
Continuing Compliance with Controls on Industrial Discharges
All industrial facilities regulated under NPDES or approved pretreatment programs are required to self-monitor their effluents to determine compliance with permit requirements. The results of this monitoring are submitted to either the state or the POTW, as appropriate. The state or POTW reviews these reports for violations. Violations are acted upon by various forms of enforcement response, including, but not limited to, phone calls, inspections, notices of violation, and formal enforcement actions (administrative and judicial, including civil and criminal). There is also a routine inspection program where on-site work is conducted to verify that what is reported is accurate.

-- NYSDEC, NJDEP, and ISC will assure continuing compliance with NPDES permit conditions for direct industrial discharges. (While NYSDEC and NJDEP are the permit-issuing agencies, as part of the ISC monitoring program, the Commission performs 24-hour NPDES compliance sampling of major industrial discharges in New York and New Jersey in coordination with the state environmental departments and USEPA. ISC supplies the results of this monitoring to the state environmental departments and USEPA.)
-- For those facilities which have approved local pretreatment programs, the states and USEPA will assure that the local pretreatment programs remain in compliance.
-- The states and USEPA will assure that categorical industrial users which do not discharge to an approved local pretreatment program remain in compliance.

ACTION T-2.2
Pretreatment Program Focus on Significant Industrial Users
USEPA, NYSDEC, and NJDEP will ensure that municipalities in the Harbor/Bight area focus their pretreatment programs on significant industrial users, and additional users as necessary, not just categorical industrial users. This is intended to allow a focus on the most significant indirect industrial dischargers of toxic chemicals.

-- As noted previously, NYCDEP has found significant decreases in loadings of several metals, attributable in part to implementation of the industrial pretreatment program. In New York City, 402 significant industrial users are currently under regulation. These include such industrial categories as electroplating, metal finishing, metals molding and casting, pharmaceutical manufacturing, and organic chemical manufacturing. NYCDEP has been tracking non-regulated businesses to improve information on loadings of metals and toxic organic chemicals. This is helping New York City target the pretreatment program on the most significant contributors. For example, New York City has recently added forty automobile radiator repair shops to the industrial pretreatment program. Also, New York City is developing an industrial control strategy for photo finishers.
-- As discussed above, levels of tetrachloroethylene sometimes exceed the water quality guidance value in some New York City waters in the Harbor. In response to this, New York City is modifying its pretreatment program to reduce discharges of this chemical:
  - New York City has recently amended its Sewer Use Regulations to incorporate a prohibition of still bottom residue and filter material discharges by the dry cleaning industry. NYCDEP will develop an inventory of the industry and notify each facility of the requirements, and will monitor loadings in STP effluent and report on progress.
  - NYCDEP will investigate other potential sources of tetrachloroethylene.

ACTION T-2.3
Additional Requirements for Direct Industrial Dischargers

-- Direct industrial dischargers will be subject to requirements to control loadings of copper and mercury, and nickel and lead as necessary, as described above for municipal discharges:

- Phase I permit limits will be based on EEQ.
  - Harbor-wide for mercury
  - In Newark Bay, Kills, Raritan Bay/River, Passaic River, and Hackensack River for copper.
- Phase II may include more stringent technically defensible permit limits based on additional data collection and modeling (see Action T-13.1 below).

-- Direct industrial dischargers will also be considered for "Track-down and Clean-up" of sources of organic chemicals of concern, as appropriate (see Action T-1.2).

ACTION T-2.4
Effluent Guidelines for Industry Categories
USEPA will promulgate effluent guidelines for toxic and non-conventional pollutants in accordance with schedules established in biennial plans.

-- Rulemaking priorities are being set with public input, based on comparative environmental risk.
-- Rulemaking will place limitations on discharges of pollutants not covered by existing regulations, as well as strengthen existing regulations.

OBJECTIVE T-3 Minimize the discharge of toxic chemicals from CSOs, storm water, and non-point sources

Combined Sewer Overflows
Effective abatement of CSO discharges is expected to be important in reducing the levels of metals in New Jersey tributaries and may be important Harbor-wide in reducing the levels of some of the toxic organic chemicals of concern. Full implementation of the Final National CSO Control Policy and currently planned New York and New Jersey CSO abatement programs are expected to reduce discharges of toxic chemicals. See the section on Rainfall-Induced Discharges for a description of these actions.

-- HEP will, given sufficient funding, assess the load reductions of chemicals of concern expected with implementation of HEP's plan to abate CSO and other rainfall-induced discharges (see Action T-12.13 below).

Storm Water Discharges
Effective abatement of storm water discharges is expected to be important in reducing the levels of metals in New Jersey tributaries and may be important Harbor-wide in reducing the levels of some of the toxic organic chemicals of concern. Implementation of municipal and industrial storm water permit programs is expected to reduce storm water discharges. See the section on Rainfall-Induced Discharges for a description of these actions.

Non-Point Source Runoff
Because most of the Harbor area is sewered, there is very little non-point source runoff. Therefore, on a Harbor-wide basis, non-point source runoff is not a major source of toxic contamination. (Note that storm water and combined sewer overflows, which are point sources, are distinguished from non-point source runoff, as are other types of non-point sources, such as atmospheric deposition, sediment flux, and landfill leachate, not carried by a discrete conveyance such as a pipe). Non-point source runoff may, however, contribute significantly to loads of toxic chemicals entering the Harbor via tributaries and in the Navesink/Shrewsbury drainage area, and may be significant in the Bight. Details of current New York and New Jersey non-point source management programs can be found in the section on Rainfall-Induced Discharges.

Additional Actions to Address Rainfall-Induced Discharges
Currently planned or ongoing investigations by HEP may provide new information indicating the need for additional actions to fully address rainfall-induced discharges of the chemicals of concern. See "Actions to Better Understand and Manage the Problem" (see Objectives T-11, T-12 and T-13 below).

OBJECTIVE T-4 Reduce air emissions of chemicals of concern

Current Clean Air Act (CAA) requirements, such as the National Emission Standards for Hazardous Air Pollutants (NESHAP) and New Source Review (NSR), will significantly reduce toxic loadings into the air. NESHAPs cover air emissions from industrial sources. NSR rules limit emissions of criteria pollutants and many volatile organic compounds, and, in addition, regulate dioxin and furans from municipal waste incinerators. Both New Jersey and New York have 70 to 99 percent control requirements for many hazardous air pollutants (HAPs) under their State Implementation Plan programs.

CAA amendments in 1990 enhanced the authority of USEPA and the states to regulate more than 189 specific HAPs, emitted from approximately 180 source categories, and to regulate a large number of area or small sources of HAPs.

The CAA amendments also established the Great Waterbodies Program, which requires USEPA to determine the contribution of atmospheric deposition to total pollutant loadings to New York-New Jersey Harbor and other "Great Waterbodies" and promulgate appropriate regulations under the CAA to assure protection of these waters (see Action T-12.11 below).

ACTION T-4.0
Implementation of Clean Air Act Requirements

-- USEPA, NYSDEC, and NJDEP will continue to enforce existing air regulations limiting the emissions of toxic pollutants.
-- Under CAA amendments, USEPA will develop emission standards, based on maximum achievable control technology, for all the source categories by the year 2000.
-- USEPA will develop regulations for area or small sources of HAPs by the year 2000.
-- Through implementation of the CAA requirements, USEPA projects an 85 percent reduction in atmospheric deposition of metals, nationwide, over the next 10-15 years. This reduction will contribute to the attainment of ambient water quality standards for mercury in the Harbor/Bight.

OBJECTIVE T-5 Remediate identified solid and hazardous waste sites

Active and inactive solid and hazardous waste sites may contaminate the Harbor/Bight, but the available information has not been analyzed to determine which sites are contributing chemicals of concern. HEP recommends using available information to help set priorities for clean closure or remediation of sites contributing contamination to the Harbor/Bight (Note: Contaminated sediment sites are discussed under Objective T-9 below).

ACTION T-5.1
Waste Site Inventory
HEP recommends that USEPA, NYSDEC, and NJDEP, with assistance from NYCDEP, develop a GIS-based integrated inventory of active and inactive solid and hazardous waste sites in the Harbor/Bight area contributing or potentially contributing toxics, especially chemicals of concern, to the Harbor/Bight. The geographic scope of this effort should include all areas draining to the Harbor/Bight system, including the Hudson River to the Troy Lock and Dam. The inventory should use existing state priority lists for hazardous waste sites. Existing data bases, such as the NJDEP Comprehensive Site List, should be used to develop the integrated inventory. Also, note that NYSDEC is incorporating information on inventoried inactive hazardous waste disposal sites into a GIS. The GIS inventory is complete for sites in New York City. The April 1995 Annual Report of Inactive Hazardous Waste Disposal Sites in New York State includes maps and descriptive information about each inventoried site. NYSDEC will complete the GIS inventory for sites in Long Island and the Hudson Valley

region in 1996. If funded, NJDEP will provide a GIS-compatible inventory of known or suspected contaminated sites within the defined boundaries of the Harbor/ Bight, using existing site remediation program data bases such as the Comprehensive Site List and the Known Contaminated Sites in New Jersey.

ACTION T-5.2
Remediation of Sites Contributing Significant Contamination to the Harbor/Bight
USEPA, NYSDEC, and NJDEP will develop site-specific schedules to expedite closure or remediation of the most significant sites.

-- For publicly funded sites:
  - To the extent feasible, USEPA and the states will adjust schedules to address priority sites in the Harbor/Bight drainage area, within existing resources.
  - To the extent that these priorities cannot be addressed within existing resources, USEPA and the states will identify and seek the additional resources required.
-- For privately funded sites, USEPA, NYSDEC, and NJDEP will negotiate with principal responsible parties to adjust schedules to address priority sites.

OBJECTIVE T-6 Track-down and clean-up of other sources of chemicals of concern

Action T-1.2 describes HEP's program to identify and abate significant municipal and industrial discharges of PCBs, dioxin, and other organic chemicals of concern. The actions below describe a similar program where the "track-down" originates in the ambient environment.

ACTION T-6.1
Organic Chemical and Mercury Screening
HEP recommends that USEPA, NYSDEC, and NJDEP conduct screening for ambient levels of organic chemicals of concern and mercury, in proximity to potential sources, using sensitive sample monitoring techniques (for example, Passive In-Situ Concentration Extraction Samplers [PISCES] for organic chemicals and low-level detection methods for mercury).

ACTION T-6.2
Tracking and Elimination of Chemicals of Concern
Where significantly elevated levels are found, USEPA, NYSDEC, and NJDEP will initiate procedures to track-down and eliminate, or require the elimination of, the sources of the chemicals, giving priority to the most significant sources.

-- Note that HEP's plans to focus pollution prevention activities on chemicals of concern (see Objective T-8 below), including identifying the largest emitters in the Harbor/Bight area, may contribute to track-down and elimination of sources.
-- Note that the proposed screening will also be helpful to focus data collection efforts for developing mass balances (see Objective T-13 below).

ACTION T-6.3
Arthur Kill, New York PCB Trackdown
NYSDEC recently completed an effort to track down sources of PCBs in New York waters of the Harbor using PISCES. Initial Harbor-wide deployment of PISCES in Harbor tributaries in 1991 and 1992 found elevated levels of PCBs in several tributaries to the Arthur Kill. This was confirmed by additional sampling in 1993 and 1994. In one of these tributaries (Mill Creek, Staten Island) several possible discrete sources of PCBs were identified. Sampling at one of these facilities detected PCBs in the storm water discharges.

-- This facility has been the subject of a NYSDEC multi-media pollution prevention effort. A multi-media Order on Consent requires the facility to conduct PCB soil testing in conjunction with an investigative work plan and possible remediation if contamination is found.
-- NYSDEC is developing a SPDES permit for the facility which will not allow detectable PCB discharge.

-- HEP recommends additional follow-up work: 1) to evaluate other possible sources of PCBs to Mill Creek; and 2) in conjunction with the Harbor-wide program recommended in Actions T-6.1 and T-6.2, to identify possible sources of PCBs in the other tributaries where elevated PCB levels were found.

OBJECTIVE T-7 Improve chemical/oil spill response and prevention

In response to several large oil spills in the Harbor, in 1989 and 1990, the Governors of New York and New Jersey and the responsible federal agencies joined with industry to form the New York Harbor Bi-State Oil Spill Response and Prevention Conference. The Bi-State Conference prepared a final report, including findings and recommenda-tions, to prevent oil spills and to more effectively respond when they do occur. Subsequently, in March 1994, the U.S. Coast Guard (USCG) adopted an Area Contingency Plan, incorporating the recommendations of the Bi-State Conference.

ACTION 7.0
Review of Area Contingency Plan and Bi-State Conference Report
HEP will review these documents and incorporate them, as appropriate, into the CCMP.

-- HEP will provide relevant information to USCG and the Bi-State Conference to assist in updates of the Area Contingency Plan (e.g., see Objective H-10).

OBJECTIVE T-8 Focus pollution prevention activities on chemicals of concern

Pollution prevention activities focus on eliminating the generation of waste at the source. Pollution prevention is defined as changes in production technologies, raw materials, or products that result in a reduction in the demand for hazardous substances or in the creation of hazardous substances or wastes prior to treatment, storage, out-of-process recycling, and disposal. HEP's plan for pollution prevention aims to focus programs both geographically (i.e., on the Harbor/Bight), and on HEP's chemicals of concern. For example, currently, some significant emitters may not have pollution prevention plans. Also, for those emitters which do have pollution prevention plans, additional action could be requested for HEP's chemicals of concern. Pollution prevention activities for sources close to the Harbor/Bight should target the most significant emitters of chemicals of concern. USEPA, NYSDEC, and NJDEP should incorporate pollution prevention activities addressing these sources and chemicals into programs across all media. HEP will, given sufficient funding, assess the load reductions of chemicals of concern expected with implementation of HEP's plan for pollution prevention (see Action T-12.13 below).

ACTION T-8.1
Identification of Large Emitters of Chemicals of Concern

-- NYSDEC and NJDEP should review facilities in areas draining to the Harbor core area to identify the largest emitters of chemicals of concern using Toxics Release Inventory (TRI) and other data.
-- To the extent feasible, NYSDEC and NJDEP will give these facilities highest priority for pollution prevention actions, including those found in Actions T-8.3 through T-8.5 below, within existing resources.
-- To the extent priorities in the Harbor/Bight cannot be addressed with existing program resources, NYSDEC and NJDEP will identify and seek the additional resources required.

ACTION T-8.2
Non-Regulatory Pollution Prevention
Pollution prevention should be implemented through non-regulatory measures to the extent feasible.

-- Under the New Jersey State Pollution Prevention Act, priority industrial facilities are preparing, annually, multi-media

pollution prevention plans. These plans are envisioned to build pollution prevention into day-to-day decision-making.

-- HEP, through its liaisons with municipal dischargers and industrial facilities in the Harbor/Bight area, will seek commitments for voluntary reductions in releases of chemicals of concern to all media.
-- HEP's public involvement and education plan emphasizes measures which can be implemented by citizens to reduce releases of chemicals of concern, in particular, petroleum.

ACTION T-8.3
Facility-Wide Permits
NJDEP is evaluating a Facility-Wide Permit (FWP) approach, to integrate air, water, and hazardous waste permits from a facility with its pollution prevention plan.

-- NJDEP is currently conducting a FWP pilot project.
-- If successful, NJDEP will seek legislative approval to implement the FWP program.

ACTION T-8.4
NPDES Pollution Prevention
Currently, NPDES permits may not include pollution prevention plan requirements. For regulatory programs under their purview:

-- NYSDEC will add such requirements, addressing the chemicals of concern, to NPDES renewal permits, permit modifications, and new permits.
-- NJDEP will consider, if given legislative authority, adding pollution prevention requirements addressing the chemicals of concern to NPDES renewals and permit modifications.

[Note: In connection with development of TMDLs for water quality-limiting metals, dischargers were required to evaluate the cost effectiveness of pollution prevention and other measures to reduce metal discharges (see Action T-1.1)].

ACTION T-8.5
RCRA Permitting and Enforcement
USEPA, NYSDEC, and NJDEP will give high priority to those hazardous waste treatment, storage, and disposal facilities in the Harbor/Bight area that manage one or more of the chemicals of concern.

-- Permits issued by USEPA will require stringent waste management measures to prevent releases to the environment, clean-up of any past releases, and submittal of a pollution prevention plan.
-- USEPA, NYSDEC, and NJDEP will target RCRA inspections for those hazardous waste generators in the Harbor/Bight area that manage one or more of the chemicals of concern.

Actions to Remediate Selected Contaminated Sediments

OBJECTIVE T-9 *Identify and remediate selected contaminated sediments*

Objectives T-1 through T-8 address reduction of continuing sources of toxic chemicals to the Harbor/Bight. However, contamination of sediments of the Harbor/Bight from past discharges also contributes significantly to the contamination of seafood and to adverse ecological effects. Contaminated sediments may be significant sources of chemicals of concern, including dioxin, PCBs, and mercury.

HEP endorses a comprehensive management approach to address these contaminants. To assess the public health and ecological significance of all sources of contaminants of concern, HEP is recommending development of mass balances (see Objective T-13 below) and applied research efforts (see Objective T-12 below), which may be expensive and technically complex. However, consistent with our management approach, HEP also endorses action now to address significant known sources of contamination.

The principal authorities for remediating contaminated sediments are the Comprehensive Environmental Response, Compensation and Liability Act, (CERCLA), also known as "Superfund", and related state authorities.

ACTION T-9.1
Remediation of Known Areas
USEPA and other responsible agencies will take appropriate steps to remediate known areas of highly contaminated sediments which are contributing to human health and ecological risks.

Diamond Alkali Superfund Site

The Diamond Alkali Superfund Site includes a land-based portion (i.e., the former pesticides manufacturing factory at 80 and 120 Lister Avenue in Newark, New Jersey) and the adjoining six-mile reach of the Passaic River, known as the Passaic River Study Area. The soil in the land-based portion of the site and the sediments in the Passaic River Study Area are contaminated with dioxin and may contribute significant loads of dioxin to the Estuary as a whole. Occidental Chemical Corporation (OCC), a successor to the Diamond Shamrock Chemicals Company, is required to perform the clean-up activities at the site, with USEPA oversight.

Table 9(t) shows the status of actions at the Diamond Alkali Superfund Site. The interim remedy for the land-based portion of the site will contain the contamination to eliminate potential human exposure to dioxin and other hazardous compounds and eliminate any continuing load of these compounds entering the Passaic River from the site. Possible remedies for the Passaic River Study Area are being investigated.

-- USEPA has reached an agreement with OCC under which OCC will conduct a Remedial Investigation/Feasibility Study (RI/FS) of the Passaic River Study Area. The RI/FS will characterize the contaminated sediments, determine what effect they are having on human health and the environment, and evaluate possible remedial alternatives to mitigate any adverse effects.

Table 9(t). Status of Actions at Diamond Alkali Superfund Site

ACTION	LEAD AGENCY	COMPLETION DATE
Land-based portion of site		
Installation of geotextile fabric over exposed soils.	NJDEP	Completed
Interim remedy under 1990 Consent Decree includes installation of an impermeable cap, in-ground slurry wall, and a system for pumping and treating contaminated groundwater; biennial re-evaluation.	USEPA	Remedial design: 1996 Construction: 1998
Passaic River Study Area		
Remedial Investigation/Feasibility Study and Record of Decision.	USEPA	1997

- Prior to completion of the RI/FS, USEPA will assess available data and information and evaluate interim remedial technologies/ actions likely to apply to the area.
- USEPA will issue a Record of Decision (ROD), specifying the remedial plan for the Passaic River Study Area in 1997.

-- USEPA, in concert with HEP, will take appropriate steps to ensure an effective link between remedial actions at the Diamond Alkali Superfund site and impacts on the Estuary as a whole.

- In developing the ROD, USEPA will assess the current impact of dioxin and other contaminants within the Passaic River Study Area and the impact after the implementation of the remedial action.
- By June 1997, given sufficient funding, HEP will develop improved mass balances for dioxin and other contaminants in the Estuary, and develop preliminary control scenarios, using relatively simple or existing models (see Action T-13.3 below). The

effort should include data collection to support assessment of dioxin and other contaminant loadings to the Estuary and model calibration.

- USEPA will provide relevant data and/or a model to HEP for use in HEP's effort to assess the impact of dioxin and other contaminants from the Passaic River Study Area on the Estuary as a whole.
- If HEP's effort is completed prior to issuance of the ROD, USEPA will consider the results in selecting a remedy for the Passaic River Study Area.
- USEPA has indicated that HEP's effort should be completed at least 60 days prior to issuance of the ROD, in order to facilitate effective use of the information in USEPA's decision. HEP will work closely with USEPA to ensure that information is timely.

Upper Hudson River PCBs Sites

Several sites which may contribute loads of PCBs to the lower Hudson River have been identified in the upper Hudson River basin. These include the Hudson River PCBs Superfund Site, the Remnant Deposits, which are part of the Hudson River PCBs Site, and three sites upstream [Table 10(t)]. Responsible agencies have taken a number of interim or final remedial actions at these sites to reduce the loads of PCBs reaching the river; additional investigations are continuing.

-- USEPA is conducting a Reassessment RI/FS for the Hudson River PCBs Superfund Site.
- USEPA will submit a proposed remedial plan for public review by March 1997.
- USEPA will issue a ROD by September 1997.

-- USEPA, in concert with HEP, will take appropriate steps to ensure an effective link between remedial actions in the upper Hudson River basin and impacts on the lower River and Estuary. The goal of HEP is to ensure no transport down-river of a PCB load which would result in deposition of sediments that would violate human health advisories and protection levels for aquatic life and fish-eating wildlife.

Table 10(t). Sites Contaminated with PCBs in the Upper Hudson River Basin

SITE	LEAD AGENCY	STATUS
Hudson River PCBs Superfund Site	USEPA	USEPA is conducting a Reassessment RI/FS; will select a remedial action for the PCB-contaminated sediments by September 1997.
-- Remnant Deposits	USEPA	Capped in 1990-91 pursuant to USEPA/GE consent decree; post-construction monitoring continues.
General Electric Co. Hudson Falls Plant Site	NYSDEC	Interim remedial measures implemented including: eliminating water flow through an abandoned mill structure; removal of contaminated sediments in the mill; installation of seep collection systems and a water pretreatment system; and sealing fractured bedrock. GE is continuing investigations.
General Electric Co. Fort Edward Plant Outfall	NYSDEC	Interim remedial measure implemented: pipe installed to prevent discharge water from coming into contact with contaminated soils. GE is continuing investigations.
Niagara-Mohawk Site	NYSDEC	Site being investigated; impacts thought to be localized.

- In developing the ROD, USEPA will estimate the current flux of PCBs from the upper Hudson River to the lower River, and the flux based on implementation of remediation planned at all the upper Hudson River basin PCBs sites.
- By June 1996, HEP will develop an improved mass balance for PCBs in the Estuary, using relatively simple or existing models and existing data; by June 1997, given sufficient funding, HEP will further refine and update the mass balance for PCBs, including congener-specific behavior (see Action T-13.3 below). The effort should include data collection to support assessment of PCBs loadings to the Estuary and model calibration.

- USEPA will consider the results of HEP's efforts in selecting a remedy for the Hudson River PCBs Superfund Site, to the extent completed prior to issuance of the ROD.
- USEPA has indicated that HEP's effort should be completed at least 60 days prior to issuance of the ROD, in order to facilitate effective use of the information in USEPA's decision. HEP will work closely with USEPA to ensure that information is timely.

Marathon Battery Site

-- With USEPA oversight, the principal responsible parties have completed the clean-up of the Marathon Battery site. The clean-up included remedial dredging of the Hudson River in the Cold Spring, New York pier area, remedial dredging of East Foundry Cove, remedial dredging and restoration of East Foundry Cove Marsh, and remediation of the upland portion of the site.
- Remediation was completed in June 1995.
- Long-term monitoring will begin in fall 1995.

ACTION T-9.2
Identification of Additional Areas
USEPA, NYSDEC, NJDEP, and USACE should identify additional areas of highly contaminated sediments for more in-depth assessment, including the feasibility of and need for remediation.

-- As discussed in the section on dredged material management, USEPA and USACE are conducting studies under Section 405 of the Water Resources Development Act, which may help to develop remedial plans for contaminated sediments. For example, the decontamination technologies being evaluated may prove useful for sediments in areas which will not be dredged for navigational purposes.
-- If funded, NJDEP will provide a GIS-compatible inventory of known or suspected sites with contaminated sediments as part of the information supplied under Action T-5.1.

Other actions on contaminated sediments are in the section on dredged material management.

Actions to Minimize Human Health Risks

OBJECTIVE T-10	***Establish consistent methodology to assess risks and improve communication of fish advisories***

Risk Assessment

The States of New York and New Jersey set fishing advisories and restrictions intended to protect the public, including local fishing communities, from health risks due to consumption of locally caught seafood which may be contaminated with toxic chemicals. With some exceptions, these advisories are based on criteria promulgated nationally by the Food and Drug Administration (FDA) of the U.S. Department of Commerce (called FDA action levels). The FDA action levels reflect the balancing of human health risks with factors such as the economic and social consequences of closing or restricting fisheries.

In developing water quality criteria for protection of human health, USEPA applies a risk assessment methodology which is more stringent than FDA's. USEPA's approach is intended for use in establishing pollution control objectives. Although USEPA has not published fish tissue criteria, it has used the risk assessment methodology to calculate fish tissue values associated with the published water quality criteria. These "criteria values" have been applied in HEP's evaluation of chemicals of concern. There is concern about whether FDA's approach is adequately protective of higher-risk segments of the fish-consuming public. The methods used by New York and New Jersey to set advisories and restrictions are different.

ACTION T-10.1
Risk Assessment Methodology
The States of New York and New Jersey should establish a consistent methodology, as appropriate, to assess human health risks from consumption of locally-caught seafood and to set fish advisories and restrictions.

-- The states should prepare a report documenting their methodologies for assessing health risks.

ACTION T-10.2
Fish Tissue Criteria
USEPA and the States of New York and New Jersey should review available fish tissue criteria, and recommend necessary steps to adopt and implement revised criteria as appropriate (see Objectives T-11 and T-12 below).

Furthermore, additional information on the levels of contamination in various edible species in the Harbor/Bight is needed. This information is important to help develop and modify fish advisories and restrictions. HEP and others are taking steps to address this (see Action T-12.3 below).

Risk Communication

Effective communication of advisories is essential to minimize public health risks. Current efforts routinely conducted by both New York and New Jersey include: 1) providing advisory information to all those who are licensed to fish (Note, however, that in both New York and New Jersey, recreational fishing licenses are not required for marine waters, including most of the Harbor); 2) issuing press releases of advisories, including changes in advisories; and 3) providing advisory information to local environmental groups, local health departments, fishing organizations, bait and tackle shops, etc.

However, recent studies indicate that these efforts have not been sufficient to enable the public to make an informed choice regarding consumption. For example, a survey of anglers conducted along the Hudson River found that less than half of this group (42%), who indicate that they eat their catch, were aware of any advisories. Less than seven percent of those surveyed had an accurate knowledge of the advisories. Almost half (49%) of those surveyed thought that they could determine, by visual observation or previous experience, whether fish are safe to eat.

In addition, there are segments of the public that are not being adequately informed. These include people who fish but are not licensed, people below licensing age, or people who fish in marine waters (where no licensing is required). People who are non-English speaking or have little formal education are also of concern since they are less likely to comprehend, and therefore utilize, advisory information. Moreover, these groups often include people who fish for subsistence, whose diet is primarily locally caught seafood. Recipients of fish caught by others are also of concern, since they may not fish themselves and, therefore, may not be aware of existing health advisories.

ACTION T-10.3
Risk Communication Activities
The States of New York and New Jersey should target additional risk communication efforts to those sub-populations at greatest risk and develop, with USEPA's assistance, a regional approach to advisory communication.

-- NYSDEC and NJDEP are conducting pilot projects to develop and evaluate advisory communication plans tailored to the needs of specific localities in the Harbor area. The projects include developing improved communications materials (e.g., in languages spoken by local populations) and training local authorities and grass-root organizers in advisory communications. The states will consider implementing favored approaches Harbor-wide.

Actions to Better Understand and Manage the Problem

As noted throughout this section, additional information is needed to better understand and manage the toxics contamination problem in the Harbor/Bight. The following action descriptions provide an overview of information needs, followed by recommendations and commitments to address the needs, including a description of ongoing efforts. Both the chemical-specific approach and the ecosystem approach are discussed.

OBJECTIVE T-11 Review and develop criteria for copper and other priority chemicals

The lack of numeric criteria or doubts about the validity or proper application of available numeric criteria (including, in some cases, regulatory criteria and standards) limit our ability to draw conclusions regarding whether a chemical is of concern in the Harbor/Bight. Therefore, management options are also limited:

- There are no generally accepted regulatory criteria for sediment quality. USEPA is developing criteria based on equilibrium partitioning and has recently proposed draft criteria for the protection of benthic organisms for several pesticides and PAH compounds. Many other approaches are available for developing criteria. For example, New York State has developed sediment quality screening criteria for protection of human health, wildlife, and benthic organisms; and NOAA has proposed "Effects Range Values" based on associations between levels of a particular chemical and a variety of observed biological effects.
- FDA's approach for developing action levels for fish, crustacea, and shellfish tissue may not be sufficiently protective of people who regularly consume locally caught seafood.
- There are concerns about the validity of particular criteria, or their application. For example, applying water quality criteria for metals, based on an analysis of total metals, is likely to be overprotective because particulate metal is not as bioavailable as dissolved metal.

ACTION T-11.1
Site Specific Water Quality Criteria for Copper
NYSDEC and NJDEP will adopt site-specific water quality criteria for copper in New York and New Jersey water quality standards regulations.

ACTION T-11.2
New and Revised Priority Criteria
NYSDEC and NJDEP will analyze existing applicable criteria and adopt new and revised criteria as appropriate for priority chemicals.

-- USEPA, NYSDEC, and NJDEP, under the auspices of HEP, will prepare a plan for developing and adopting new and revised criteria for priority chemicals.

USEPA has recommended that the states consider adoption of water quality criteria for dissolved metals:

-- NYSDEC and NJDEP will adopt water quality criteria for dissolved lead and dissolved nickel.
-- As part of their triennial reviews, NYSDEC and NJDEP will consider adoption of water quality criteria for other dissolved metals, as appropriate.

OBJECTIVE T-12 Assess ambient levels, loadings, and effects of chemicals

The principal objective of the assessments, both recommended and ongoing, included in this section is improved problem definition. This includes assessing whether a particular chemical is of concern in water, biota, and sediments, and assessing relative loadings. Assessments for development of mass balances are addressed below. Long-term monitoring to assess the success of CCMP implementation is discussed in the sections on Monitoring and Reporting on Progress in Implementing the Plan.

Ecological Indicators

ACTION T-12.1
Quantitative Ecosystem Goals and Biocriteria
USEPA, NYSDEC, and NJDEP, under the auspices of HEP, should develop ecosystem indicators as quantitative goals and biocriteria, and implement long-term monitoring of the indicators (see sections

on Monitoring and Reporting on Progress in Implementing the Plan below).

-- Based on the Regional Environmental Monitoring and Assessment Program (R-EMAP) (see text and Action T-12.4 below) and other available data, HEP will develop an index of benthic degradation for the Harbor/Bight, to distinguish normal benthic communities from those degraded by pollution, and indicate the relative severity of degradation to the benthic communities.
-- USEPA and the states should develop and implement a long-term monitoring program using the benthic index and other appropriate indicators.
-- As part of their triennial reviews, NYSDEC and NJDEP should adopt biocriteria based on the benthic index and other indicators, as appropriate.

HEP funded a study to compare the reproductive success of several species of fish-eating birds in the Harbor/Bight region. The investigators concluded that reproductive success in several colonies in the Bight area was impaired. The cause(s) of the decreased reproductive success, however, is not clear and may include predation, human disturbance, toxic contamination, and other factors.

-- HEP recommends additional efforts to monitor the size and productivity of local populations of herons, egrets, gulls, and/or terns, focusing on colonies nesting in the Harbor core area. Where impaired productivity and/or declining bird populations are found, HEP recommends analysis of bird tissue contaminant levels.

ACTION T-12.2
Identification of Chemicals Responsible for Adverse Ecological Effects
Where evidence of adverse ecological effects of toxic contamination is found, USEPA, NYSDEC, NJDEP, and other authorities will conduct studies to evaluate whether, and if so which, chemicals are responsible.

-- HEP conducted studies to assess ambient water toxicity in the Harbor using sensitive test organisms (a sea urchin and a red alga). Initial studies indicated that Harbor waters in some areas were sometimes toxic to these organisms, but temporal variability was great. A followup study to characterize the variability on small spatial scales, and evaluate the classes of chemicals responsible for the observed toxicity, called a Phase I Toxicity Identification Evaluation (TIE), was recently completed. This study also found extreme temporal variability in toxicity, which made comparisons among stations and seasons ambiguous. Toxicity was found infrequently; when found, the pattern of toxicity reduction obtained during the Phase I TIE analyses was indicative of toxicity due to cationic metals.
-- USEPA, as part of its ongoing program to develop methods for marine sediment TIE, using Water Resources Development Act (WRDA) funds, is conducting a Phase I TIE to evaluate the classes of chemicals responsible for toxicity in interstitial (pore) water at three sites in the Harbor (Newtown Creek, northern Arthur Kill, and north-central Newark Bay). USEPA, in cooperation with the National Biological Survey of the U.S. Department of the Interior, is also developing whole sediment TIE methods and will conduct Phase I TIEs in conjunction with this effort. The TIEs will use a variety of test organisms including an amphipod, a mysid, and a bivalve. Initial TIE work was completed in October 1995.
-- HEP, in cooperation with USEPA, USACE, NYSDEC, and NJDEP, will, given adequate funding, conduct a sediment TIE program to supplement the above effort. The program should focus on identifying contaminants causing toxicity, or impaired benthos, on a Harbor-wide scale (as a follow up to R-EMAP; see below), with additional emphasis on dredged sediment. The program should include Phase I and Phase II TIEs, to identify specific chemicals causing toxicity, in interstitial water and whole sediment. HEP will develop a work plan for this effort.

Synthesis of Chemical-Specific Information

ACTION T-12.3
Revision to List of Chemicals of Concern
HEP will, on a biennial basis, and given sufficient resources, revise and update the list of chemicals of concern based on new information, including new and revised criteria (e.g., see Objective T-11), and new data on levels of chemicals in water, biota, and sediments (e.g., see Objective T-12).

Sediment Quality

Background

HEP is currently assessing sediment quality in coordination with R-EMAP. The objectives of the assessment are: 1) to estimate the extent and magnitude of sediment degradation in the study area using biological and chemical measures; and 2) to identify statistical associations among chemical contaminants, other stressors, such as low dissolved oxygen, and degraded benthos or toxic sediments. The assessment involves synoptic measurement of sediment toxicity, benthic community structure, and bulk sediment chemistry (including dioxin and PCB congeners, chlorinated pesticides, PAHs, metals, organotins), at stations selected randomly throughout the New York-New Jersey Harbor complex, western Long Island Sound, and Bight Apex (total of approximately 170 stations). The study will be complete in March 1996. The data will be useful to:

- Provide a baseline to evaluate the effectiveness of management strategies implemented to resolve sediment contamination issues (e.g., by comparing R-EMAP data to future studies to assess trends).
- Provide a perspective on the relative significance of contamination and other stressors, locally versus larger-scale phenomena (e.g., by comparing R-EMAP data to studies conducted on smaller spatial scales).

There are several additional ongoing or recently completed studies which attempt to characterize sediment contamination and biological effects. These include the NOAA Bioeffects Program and recent studies by the Maxus Corporation focusing on the Newark Bay Complex.

ACTION T-12.4
Completion of R-EMAP Assessment
HEP will complete the R-EMAP project by March 1996.

ACTION T-12.5
Additional Sediment Quality Studies

-- HEP will, given sufficient funding, conduct additional studies to assess sediment quality. Priorities are:
  - Assessment of ambient sediment bioaccumulation potential (i.e., the potential for organisms to accumulate contaminants in their tissues from ambient sediments).
  - Assessment of trophic transfer of contaminants and effects on higher trophic levels, including fundamental research, and studies supporting development of mass balance models. (Note: The Hudson River Foundation is funding research to address PCBs).
  - Evaluation of the chemicals causing sediment toxicity or impaired benthos (Note: USEPA is funding a sediment and pore water Toxicity Identification Evaluation; see Action T-12.2).
  - Characterization of sediment quality on small spatial scales, e.g., to identify "hot spots" and assess sources and sinks for contaminants in sediments.
-- HEP will develop a work plan, including cost estimates, for these studies.
-- HEP will recommend further management actions based on all available sediment quality assessment information. To the extent information is available, the actions will address:
  - Defining system-wide and basin-wide source control and remediation priorities.
  - Providing a basis for developing regional ecological indicators and biocriteria.
  - Developing regional and/or site specific sediment quality and management criteria for

the protection of marine life, wildlife, and human health.

Fish, Crustacea, and Shellfish Tissue Quality

ACTION T-12.6
Studies to Assess Tissue Quality

-- HEP is assessing levels of toxic contaminants in edible fish, crustacea, and shellfish throughout the Harbor. The States of New York and New Jersey are collaborating on this effort. A wide variety of species is being sampled for all the chemicals of concern noted above. This effort will be complete in December 1995 at a cost of $450,000.
-- USEPA, USACE, and NMFS are conducting an assessment of contamination of several species of edible fish caught by the recreational fishing community (completed at a cost of $200,000), and an assessment of contamination in lobsters in the Bight Apex (complete March 1996 at a cost of $300,000).
-- New York State is also assessing levels of PCBs in striped bass throughout its marine waters.
-- HEP will, given sufficient funding, conduct future periodic fish tissue monitoring based on these studies. HEP will develop work plans and seek funding for these studies.

ACTION T-12.7
Modification of Advisories and Restrictions

-- New York State will use the information from the above studies, as appropriate, to modify fishing advisories and restrictions and to identify additional data collection needs.
-- New Jersey will use the information to identify additional data collection needs, ultimately resulting in modifications to advisories and restrictions.

Water Quality

ACTION T-12.8
New York Harbor Water Quality Survey
NYCDEP will continue its New York Harbor Water Quality Survey at current levels of effort.

ACTION T-12.9
Long-Term Monitoring Program in New Jersey
NJDEP should develop a long-term water quality monitoring effort similar in design to New York City's.

Loadings

In general, additional information on continuing loads of organic chemicals of concern to the Harbor/Bight is needed to identify the most significant sources and source categories. This will help focus management attention on reducing and eliminating these sources.

-- Data collection associated with development of mass balances for specific chemicals of concern, discussed in Actions T-13.2 and T-13.3 below, is expected to be instrumental in improving loadings information for organic chemicals of concern.
-- USEPA required dischargers to identify the levels of PCBs and dioxin being discharged from municipal STPs and CSOs (see Action T-1.2).
-- Additional information from HEP's pollution prevention plan (Objective T-8), and track-down and clean-up plan (Objective T-6) may help set priorities for quantitative assessments of loads of chemicals of concern.

ACTION T-12.10
Principal Components Analyses
USEPA is conducting Principal Components Analyses for PCBs, dioxin, and PAHs for sediment samples from R-EMAP and several other available data sets. This effort is expected to help clarify the source categories responsible for the contamination.

ACTION T-12.11
Atmospheric Loadings under "Great Waterbodies" Program
Section 112(m) of the Clean Air Act of 1990, which establishes the Great Waterbodies Program, may provide an opportunity to assess and control atmospheric deposition of toxic chemicals and nitrogen compounds to the Harbor/Bight. Under this program, USEPA, in coordination with NOAA, is required to determine the contribution of atmospheric

deposition to the total pollutant loading to the Great Waterbodies (which includes all HEP waters), determine whether loadings of hazardous air pollutants (HAPs) cause or contribute to water quality violations, and promulgate regulatory revisions to the CAA and other federal laws necessary to assure protection of the waters. The USEPA Administrator will promulgate the regulatory revisions based on a determination of need as described in a report to Congress, prepared in 1993 and biennially thereafter.

-- HEP will, given sufficient funding, assess atmospheric loadings of the chemicals of concern to the Harbor/Bight, as part of an expedited quantification of chemical loadings (see Action T-13.3 below); given sufficient funding, HEP will also assess expected reductions in atmospheric loadings of these chemicals with implementation of the Clean Air Act (see Action T-12.13 below).
-- Within two years, given sufficient funding, HEP will develop simple mass balances to assess the relative contribution of all sources of the chemicals of concern, including atmospheric deposition.
-- USEPA will review this information and, in coordination with HEP, will incorporate it into the Great Waterbodies Report to Congress biennial update not later than 1997. The report update will specify additional steps and regulatory revisions, as appropriate, to address atmospheric deposition of toxic chemicals to the Harbor/Bight.

ACTION T-12.12
Low-Level Detection Methods for Loadings
Assessments of loadings for the purpose of identifying the most significant sources and developing mass balances will require high quality data, often involving chemical analyses at very low levels of detection. Currently, most regulated parties are not prepared to conduct such analyses for several chemicals, including metals, PCBs, and dioxin.

-- USEPA, NYSDEC, and NJDEP should develop guidance specifying appropriate methods, and work with regulated parties as necessary to ensure the collection of high quality loadings data. NJDEP is currently developing such guidance for metals; NYCDEP has implemented "clean techniques" for metals.
-- USEPA, NYSDEC, and NJDEP will incorporate the methods for metals into monitoring requirements for NPDES, CSO, and storm water permits.

ACTION T-12.13
Assessment of Load Reductions Expected with CCMP Implementation

-- In parallel with development of simple mass balances for mercury and organic chemicals of concern (see Action T-13.3 below), HEP, given sufficient funding, will conduct an engineering assessment to estimate the load reductions of chemicals of concern expected with implementation of HEP's plan to reduce continuing inputs of toxic chemicals, and to control rainfall-induced discharges. In particular, expected load reductions with implementation of the following programs will be assessed:
  - The nine minimum control measures of the Final National CSO Control Policy (see Objective CSO-1 below)
  - Current CSO abatement programs (see Objective CSO-2 below)
  - Municipal and industrial storm water management programs (see Objective SW-1 below)
  - Full secondary treatment (see Objective N-1 below)
  - Pollution prevention (Objective T-8)
  - "Track-down and Clean-up" (Action T-1.2 and Objective T-6)
  - Focusing industrial pretreatment programs on significant industrial users (Action T-2.2)
  - Clean Air Act (Objective T-4)
-- HEP would use this assessment to help determine whether the above actions will result in attainment of quantitative load reduction goals for the chemicals of concern, established under Action T-13.3 below, and how long it will take. If it is determined that goals will not be attained

in a timely fashion, HEP will identify additional actions to meet the goals.

-- Data on loadings of chemicals of concern from important source categories (see Action T-13.3 below) should be used to help generate load reduction estimates.

OBJECTIVE T-13 Develop mass balances for metals and organic chemicals

ACTION T-13.1
Monitoring and Modeling for Metals other than Mercury
Consistent with the phased TMDL approach for water quality-limiting metals:

-- The New Jersey Harbor Dischargers Group is conducting additional ambient and effluent monitoring and modeling, to support Phase II TMDLs for the waterbodies where copper, nickel, and lead may be water quality-limiting (see Objectives T-1 and T-2).
-- NJHDG is currently conducting monitoring to determine which metals are water quality-limiting. They will submit data by February 1996.
-- NJHDG will submit a work plan for additional Phase II monitoring and modeling studies by September 1996.
-- NJDEP will review and approve this work plan, in coordination with HEP, by December 1996.
-- NJHDG will conduct the studies and submit load matrices for determining TMDLs by June 1998.
-- USEPA, NYSDEC, and NJDEP will, by December 1998, revise TMDLs as appropriate.

ACTION T-13.2
Comprehensive System-wide Model for Mercury and Organic Chemicals
HEP recommends development of mass balances to assess the significance of current sources of organic chemicals and bioaccumulative mercury, as well as sediment flux, in causing exceedances of criteria.

-- HEP is working with USACE to develop a comprehensive toxics model. USACE prepared a "straw" proposal, which was reviewed by HEP. USACE developed a work plan in response to HEP comments. The work plan includes a data collection program for mercury and organic chemicals of concern and model development initially focusing on PCBs.
-- Model development and calibration for PCBs would take five years.
-- A comprehensive data collection program addressing PCBs, dioxin, PAHs, pesticides, and mercury would take three years, and given adequate funding, will include:
  - A comprehensive quantitative assessment of loads of chemicals;
  - An assessment of levels of chemicals in water, biota, and sediments of the Harbor/Bight; and
  - An assessment of environmental transport and fate of chemicals.
-- The model would be "state-of-the-art", and, as appropriate, would be used to help define optimal management approaches to address exceedances, including reduction and elimination of continuing discharges and potential remediation of contaminated sediments, on a geographically specific basis.
-- HEP recommends that USACE seek funds to continue the development of the model, including revising the modeling work plan to include a detailed data collection plan and cost estimates.
-- HEP will develop and seek funding for a program of research to complement the toxics modeling effort.
-- HEP recommends that USACE seek authorization and funding to conduct modeling and monitoring to address toxic contamination in the Harbor/Bight, not tied to dredged material management.

ACTION T-13.3
Simple Mass Balance for Mercury and Organic Chemicals
In parallel with development of the comprehensive System-Wide Toxics Model described in Action T-13.2, HEP recommends development of simple mass balances for mercury and organic chemicals of concern within one to three years, to be used to support interim management assessments of dredged sediment contamination.

HEP would use the simple mass balances to assess major sources of chemicals of concern on a Harbor-wide scale; whether significant reduction of the chemicals in dredged sediments can be achieved by reducing continuing inputs, and, if so, which sources and how long it will take; and to set quantitative load reduction goals. HEP will, given sufficient funding, assess whether implementation of actions in the CCMP will result in attainment of these goals (see Action T-12.13). Note that the simple mass balances which are developed primarily to meet dredged material management objectives can also be used to meet ambient water and biota tissue objectives.

-- The Hudson River Foundation (HRF), under the auspices of HEP, and with support from USACE, the Port Authority of New York and New Jersey, and USEPA, has initiated a project to develop and validate an integrated mathematical model for the transport, fate, and bioaccumulation of PCBs, dioxin, and PAHs in the Estuary. An existing model will be updated with new data and expanded to include PCB congener-specific behavior. The effectiveness of various control scenarios will be evaluated using recent data on chemical loadings, in terms of effect on striped bass tissue contaminant levels, sediment contamination, and water quality. The project is a three-year effort; full funding is in place for the first year. Key products and time frames are as follows:
  - Updated predictions of PCB striped bass response given recent data and refined model (one year);
  - Development, application, and calibration of model to PCB congener-specific behavior, dioxin, and PAHs (within two years);
  - Preliminary evaluations of various control scenarios on toxics response (two years); and
  - Final evaluations of control scenarios and final report (three years).
-- A complete model development program, however, must include data collection to calibrate the model. In particular, to develop substantially improved mass balances, data on loadings of chemicals of concern from important source categories at low detection levels are needed; it also may be necessary to collect data on ambient levels of the chemicals. This data collection program should be complete within one year.
-- Following model development, HEP will use the model to assess control strategies. As noted above, some of this work is planned under the HRF project, but full funding has not been identified. Also, additional model runs may be required.
-- HRF, USACE, and USEPA, under the auspices of HEP, are developing a work plan, including cost estimates, for the overall modeling program, to supplement the HRF project.
-- USACE has indicated willingness to fund the model development program and will seek funds as necessary based on the work plan for the overall modeling program.
-- HRF, the Port Authority of New York and New Jersey, and USACE are already committed to partial funding of the model development program. HEP recommends they continue to fund the program.
-- HEP recommends that USEPA and/or other appropriate sponsors fund the portions of the overall modeling program related to use of the model to assess control scenarios.

ACTION T-13.4
Whippany River Comparative Mass Balance Study
NJDEP will conduct a comparative study to evaluate two differing strategies used to develop soil clean-up standards for hazardous waste sites. Both strategies use fate and transport modeling to assess mass balance of toxics originating from hazardous waste sites. NJDEP will assess mass balances of metals and organic chemicals originating from numerous

waste sites in the Whippany River basin, and estimate the contribution of the waste sites to contaminant levels in water, sediments, and biota. This project will be an additional component of NJDEP's Whippany River non-point source management program (see Action NPS-1.1 below) and related pilot projects (see Action H-2.1) and may help to focus implementation of management measures.

COSTS OF IMPLEMENTING THIS PLAN

Many of the commitments and recommendations in the Toxics section of the CCMP can be accomplished through the effective use of base program resources. In fact, full implementation of the CCMP relies, in large part, on continued operation, and funding at current levels, of existing programs to address toxic contamination. The toxics management component of the CCMP itemizes 38 new HEP-driven commitments operating through base programs. These actions represent a major commitment to CCMP implementation.

The toxics management component of the CCMP also includes 44 significant commitments and recommendations that entail enhanced program funding. As shown in Table 11(tc) below:

- The Plan includes 16 actions for which a total of $4.531 million plus $80,000 per year has been committed by the responsible entities.
- The Plan includes 21 actions for which increased funding of $1.915 million plus $1.75 million per year is recommended.
- The Plan includes 7 additional commitments and recommendations for action for which cost estimates will be developed during the continuing planning process.

The toxics management component also includes 9 actions that will or may require the expenditure of project implementation funds by responsible entities. As shown in Table 12(tc) below:

- The Plan includes 1 action for which $30,000 will be required to be committed, and an additional 3 actions for which funds will be required to be committed, by the responsible entities, based on regulatory requirements now being developed or finalized.
- The Plan includes 5 actions for which additional funds may be required to be expended by responsible entities, based on the potential outcomes of several ongoing or planned HEP efforts.

The costs of implementation actions to address toxic contamination may be large. Cost estimates for these actions will be developed during the continuing planning process.

Table 11(tc). Enhanced Program Costs for Management of Toxic Contamination

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION T-1.1: Evaluate metals reduction in connection with Phase II TMDLs (NJ).	$100,000			
ACTION T-1.2: Conduct monitoring per §308 letters for PCBs and dioxin.	$200,000			
ACTION T-1.2: Conduct additional CWA §308 monitoring as required.			*	
ACTION T-1.2: Deploy PISCES to monitor for PCBs and other organic chemicals in NYC STP drainage areas.	$216,000			
ACTION T-2.2: Focus pretreatment program on significant industrial users (NYC).	$80,000	$80,000		
ACTION T-5.1: Develop waste site inventory for chemicals of concern in the Harbor/Bight area.			$150,000	
ACTION T-5.2: Expedite remediation of the most significant sites (actions beyond existing program resources).			*	
ACTION T-6.1: Track-down sources of chemicals of concern.				$200,000
ACTION T-6.3: Track-down PCB sources in NY tributaries to the Harbor using PISCES.	$32,000			
ACTION T-8.1: Identify the largest emitters of chemicals of concern in the Harbor/Bight area.			$50,000	
ACTION T-8.1: Give these facilities priority for pollution prevention actions (actions beyond existing program resources).			*	
ACTION T-9.2: Identify additional areas of highly contaminated sediments; use available information and develop work plan for additional studies.			$100,000	

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION T-10.1: Establish consistent risk assessment methodology.			$100,000	
ACTION T-10.2: Review fish tissue criteria.			$100,000	
ACTION T-10.3: Conduct advisory communication pilot projects.	$129,000			
ACTION T-10.3: Implement favored approaches Harbor-wide.			*	
ACTION T-10.3: Develop regional approach to advisory communication.			$75,000	
ACTION T-11.2: Prepare plan for developing and adopting new criteria (NJ).			$45,000	
ACTION T-12.1: Develop ecosystem monitoring plan.			$75,000	
ACTION T-12.1: Implement ecosystem monitoring.				$500,000
ACTION T-12.1: Monitor productivity of local populations of marine birds; analyze tissue contaminant levels where impaired productivity and/or declining populations are found.			$300,000	Cost included in $500,000 estimate above
ACTION T-12.1: Adopt biocriteria as part of triennial reviews.			$90,000	
ACTION T-12.2: Complete Phase I ambient water TIE.	$100,000			
ACTION T-12.2: Conduct Phase I sediment TIE.	$100,000		$200,000	
ACTION T-12.2: Conduct Phase II sediment TIE.			$200,000	
ACTION T-12.3: Update list of chemicals of concern.				$50,000
ACTION T-12.4: Complete R-EMAP assessment.	$1.5 million			
ACTION T-12.5: Conduct additional sediment studies.			*	
ACTION T-12.6: Assess tissue quality: Harbor/Bight.	$450,000		*	
ACTION T-12.6: Assess tissue quality: Bight Apex.	$200,000			
ACTION T-12.6: Assess lobster tissue quality in Bight Apex.	$300,000			
ACTION T-12.6: Assess PCBs in striped bass.	$350,000			

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION T-12.9: Develop and implement NJ water quality monitoring programs.				$1 million
ACTION T-12.10: Conduct principal components analyses.	$75,000			
ACTION T-12.12: Develop methods guidance for organic chemicals.			$75,000	
ACTION T-12.13: Estimate chemical load reductions expected with CCMP implementation.			$100,000	
ACTION T-13.1: Conduct monitoring/modeling for Phase II TMDLs.	$360,000 + *			
ACTION T-13.2: Develop system-wide toxics model.			$100,000 + *	
ACTION T-13.2: Develop and implement complementary research program.			*	
ACTION T-13.3: Develop simple mass balances including improved information on loadings and ambient monitoring.	$339,000		$155,000 + *	
TOTAL	$4,531,000 + *[1]	$80,000/yr	$1,915,000 + *[1]	$1,750,000/yr

* Enhanced program costs to be developed as part of the continuing planning process.
[1] Notation (+ *) indicates cost plus additional costs to be determined.

Table 12(tc). Project Implementation Costs for Management of Toxic Contamination

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION T-1.1: Comply with Phase I TMDLs for metals.	$30,000			
ACTION T-1.1: Comply with Phase II TMDLs for metals.			*	
ACTION T-1.2: Implement track-down and clean-up of discharges of PCBs/dioxin.	*			
ACTION T-1.2: Implement track-down and clean-up of discharges of other chemicals.	*			
ACTION T-6.2: Comply with requirements of ambient track-down, as appropriate.			*	
ACTION T-9.1: Remediate known sites of contaminated sediments.	*			
ACTION T-9.2: Assess/remediate any additional contaminated sediments.			*	
ACTION T-13.2: Comply with any additional controls required as a result of system-wide toxics modeling.			*	
ACTION T-13.3: Comply with any additional actions required as a result of simple mass balances.			*	
TOTAL	$30,000 + *		*	

* Project implementation costs to be developed as part of the continuing planning process.

BENEFITS OF IMPLEMENTING THIS PLAN

HEP's plan to address toxic contamination has two fundamental paths dedicated to solving the toxic contamination problem. These are proceeding concurrently and are closely linked: "Actions to Reduce Continuing Inputs of Toxic Chemicals" (Objectives T-1 through T-9), and "Actions to Better Understand the Toxic Contamination Problem and Take Additional Management Actions as More is Learned" (Objectives T-11 through T-13). With one exception noted below, current information is insufficient for those involved with HEP to know whether full implementation of the former group of actions will result in the achievement of HEP's goals; the latter group of actions is intended to give us this information.

Full implementation of the Actions to Reduce Continuing Inputs of Toxic Chemicals is, however, expected to result in substantial progress toward HEP's goal to establish and maintain a healthy and productive Harbor/Bight ecosystem with no adverse ecological effects due to toxic contamination. This progress may be reflected in a reduction in fishery restrictions due to toxic contamination and an improvement in the quality of newly deposited sediments. Furthermore, implementation of controls required by Phase II TMDLs/WLAs for copper, nickel, and lead will assure the elimination of violations of water quality standards due to these metals throughout the Harbor.

HEP has defined several key actions which will help us assess more precisely what benefits we will achieve with implementation of the Actions to Reduce Continuing Inputs, what additional actions will be necessary to achieve HEP's goals, and how long it will take. Among the key actions are modeling and monitoring efforts to develop mass balances and set quantitative load reduction goals for chemicals of concern on two-year and five-year schedules (Actions T-13.3 and T-13.2, respectively), and an assessment, on a two-year schedule, to determine quantitatively what load reductions of chemicals of concern will be achieved with implementation of the CCMP (Action T-12.13).

Table 13(ts). Summary—Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTIONS TO REDUCE CONTINUING INPUTS OF TOXIC CHEMICALS				
OBJECTIVE T-1: Reduce municipal discharges of chemicals of concern.				
ACTION T-1.1: Control discharges of metals.				
-- Promulgate Phase I TMDLs for metals.	USEPA with concurrence of NYSDEC & NJDEP	Proposed: Completed Final: May 15, 1996	Base program	C/N
-- Incorporate limits based on Existing Effluent Quality into draft permits (Harbor-wide for mercury, and in Newark Bay, Kills, Raritan Bay/River, Passaic River, and Hackensack River for copper.	NYSDEC & NJDEP	Draft permits: Completed Final permits: Jun 30, 1996	Base program	C/N
-- Comply with Phase I TMDLs.	NYCDEP, Yonkers Sewer District, NJ dischargers	Jun 30, 1996	NYC and Yonkers: No additional project implementation cost NJHDG: $30,000	C/N

Note: It is HEP's goal that all the recommendations in the CCMP become commitments.

-- In some cases CCMP actions are recommendations, not commitments, because responsible entities require resources to implement the action. HEP will advocate making these resources available.

-- In other cases, CCMP actions are recommendations because HEP has not obtained the commitment of regulated entities and other responsible entities to implement the action. By issuance of this final CCMP, HEP seeks the commitment of the responsible entities and requests that they step forward to voluntarily agree to implement the actions.

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Phase II TMDLs: Revise/promulgate TMDLs for copper, nickel, and lead to include more stringent permit limits as necessary based on additional data collection and modeling (see T-13.1).	NYSDEC & NJDEP with USEPA assistance	Dec 1998	Base program	C/N
-- Incorporate limits, as necessary, into permits.	NYSDEC & NJDEP	Draft permit modifications: Jan 1999 Final permit modifications: Jul 1999	Base program	C/N
-- Evaluate the effectiveness of pretreatment, treatment optimization, corrosion control, and pollution prevention, to reduce metals loadings.	NJ dischargers	Completed	Enhanced program cost - $100,000	C/N
	NYCDEP	Completed	Enhanced program completed	C/N
	Yonkers Sewer District	Completed	Enhanced program completed	C/N
-- Comply with Phase II TMDLs.	NYCDEP & NJ dischargers	To be determined based on Phase II TMDLs	Project implementation cost of continuing compliance to be provided by dischargers based on Phase II TMDLs	R
ACTION T-1.2: "Track-down and clean-up" significant discharges of organic chemicals of concern (Note: USEPA, NYSDEC, NJDEP, USACE, NYCDEP, NJHDG, and other dischargers, under the auspices of HEP, will coordinate development of this program, including identifying chemicals to be included, dischargers, monitoring techniques, and sampling methodologies. See text for details).				
-- Identify the levels of PCBs and dioxin in municipal discharges (Harbor-wide for PCBs; Newark Bay complex for dioxin).				

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C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
• Require monitoring using CWA Section 308 letters.	USEPA	Completed	Base program	C/N
• Conduct monitoring and submit report.	NYCDEP	Completed	Enhanced program cost - $79,000	C/N
	NJ Harbor Dischargers Group (NJHDG)	Completed	Enhanced program cost - $120,000	C/N
	Yonkers Sewer District	Completed	Enhanced program cost - minimal (less than $1,000)	C/N
• Review data to identify significant municipal discharges of PCBs; develop program to track-down and abate the sources of PCBs to their systems.	USEPA, NYSDEC, NJDEP, NYCDEP, NJHDG, and other dischargers, under the auspices of HEP	Apr 30, 1996	Base program	C/N
• Implement track-down and clean-up program for PCBs.	NYCDEP, Yonkers Sewer District, NJHDG	Apr 30, 1996	Project implementation cost to be estimated by dischargers based on monitoring results	C/N
! Deploy PISCES for a 12-month period in the influent streams of the 14 NYC STPs to monitor for PCBs and other organic chemicals.	NYCDEP	Newtown Creek: Deployed Jun 1995 Other areas: Deployed Jul 1995	Enhanced program cost - $216,000 over 3 yrs	C/O

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
! Submit report to NYSDEC proposing the STP drainage basins in which track-down will be pursued, considering the results of the monitoring conducted under the Section 308 letters.	NYCDEP	Dec 1996	Cost included in above estimate	C/N
! Follow up with additional track-down efforts.	NYCDEP	By Dec 31, 1998	Cost included in above estimate	C/N
• Review the data to assess whether dioxin is being discharged.	USEPA, NYSDEC, NJDEP, under the auspices of HEP	Completed	Base program	C/N
-- Review available information on other organic chemicals of concern to determine whether dischargers should identify the levels of these chemicals in their discharges.	USEPA, NYSDEC, NJDEP, USACE, NYCDEP, NJHDG, and other dischargers, under the auspices of HEP	Jul 1997	Base program	C/N
-- Determine which dischargers should identify the levels of these chemicals in their discharges.	USEPA, NYSDEC, NJDEP, NYCDEP, NJHDG, and other dischargers, under the auspices of HEP	Sep 1997	Base program	C/N
• Conduct screening of these discharges to identify the levels of chemicals being discharged, and submit report, as necessary.	Municipal & industrial dischargers, as appropriate	Sep 1998	Enhanced program cost to be provided by dischargers based on monitoring requirements	R
• Implement program to track-down and abate sources of other chemicals of concern if significant discharges are found, or proceed to develop TMDLs/WLAs/LAs.	USEPA, NYSDEC, NJDEP, and dischargers as appropriate, under the auspices of HEP	Dec 1998	Base program	C/N

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Review new information and report on whether additional chemicals should be considered for track-down and clean-up.	USEPA, NYSDEC, NJDEP, USACE, NYCDEP, NJHDG, and other dischargers, under the auspices of HEP	Dec 1996 & biennially thereafter	Base program	C/N
OBJECTIVE T-2: Reduce industrial discharges of chemicals of concern.				
ACTION T-2.1: Assure continuing compliance with permit conditions for direct industrial discharges.	NYSDEC, NJDEP, ISC	Ongoing	Base program	C/O

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C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION T-2.2: Ensure that municipalities in the Harbor/Bight area focus their pretreatment programs on significant industrial users, and additional users as necessary, not just categorical industrial users.	NYSDEC & NJDEP	Ongoing	Base program	C/O
	NYCDEP	Began Jul 1994	Enhanced program cost - $80,000/yr	C/N
-- Modify pretreatment program to reduce discharges of metals and other chemicals:	NYCDEP			
• Add 40 automobile radiator repair shops to the pretreatment program.		Began Jul 1994	Enhanced program cost - $80,000	C/N
• Develop an industrial control strategy for photo finishers.		Submitted to NYSDEC Jun 1995		
-- Modify pretreatment program to reduce discharges of tetrachloroethylene:	NYCDEP		Base program (NYCDEP has committed $100,000 for this effort)	C/O
• Amend Sewer Use Regulation.		Completed		
• Inventory dry cleaning industry and notify.		Completed Jan 1, 1996		
• Investigate other potential sources.		Dec 31, 1996		
ACTION T-2.3: Direct industrial dischargers are subject to the requirements to control loadings of metals (see T-1.1), as well as consideration for track-down and clean-up of organic chemicals of concern (see T-1.2).				
ACTION T-2.4: Publish biennial plans to identify industries discharging pollutants and establish schedules for promulgation of effluent guidelines; promulgate guidelines.	USEPA	Proposed biennial plan May 1994	Base program	C/O

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C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE T-3: Minimize the discharge of toxic chemicals from CSOs, storm water, and non-point sources (Note: see section on Rainfall-Induced Discharges).				
OBJECTIVE T-4: Reduce air emissions of chemicals of concern.				
ACTION T-4.0: Implement Clean Air Act requirements.				
-- Enforce existing air regulations limiting the emissions of toxic pollutants.	USEPA, NYSDEC, NJDEP	Ongoing	Base program	C/O
-- Develop emission standards for HAPs based on the maximum achievable control technology for major source categories.	USEPA	By Dec 31, 2000	Base program	C/O
-- Develop regulations for area or small sources of HAPs.	USEPA	By Dec 31, 2000	Base program	C/O
OBJECTIVE T-5: Remediate identified solid and hazardous waste sites.				
ACTION T-5.1: Using existing state priority lists for hazardous waste sites, develop a GIS-based integrated inventory of active and inactive solid and hazardous waste sites in the Harbor/Bight area, contributing or potentially contributing toxics to the Harbor/Bight.	USEPA, NYSDEC, NJDEP, with assistance from NYCDEP, under the auspices of HEP	Jun 1996	Enhanced program cost - $150,000	R

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION T-5.2: Develop site-specific schedules to expedite clean closure or remediation of the most significant sites.				
-- For publicly funded sites.				
• As feasible within existing resources.	USEPA, NYSDEC, NJDEP	Begin by Jun 1996	Base program	C/N*
• To the extent existing resources are insufficient to address priority sites in the Harbor/Bight drainage area, identify and seek additional resources.	USEPA, NYSDEC, NJDEP	Jun 1996	Enhanced program costs to be identified based on Action T-5.1[3]	C/N*
-- For privately funded sites.	USEPA, NYSDEC, NJDEP and principal responsible parties	To be negotiated with responsible parties	To be negotiated with responsible parties[3]	R
OBJECTIVE T-6: Track-down and clean-up chemicals of concern.				
ACTION T-6.1: Conduct screening for ambient levels of organic chemicals and mercury in the Harbor/Bight in proximity to potential sources, using sensitive sample monitoring techniques.	USEPA, NYSDEC, NJDEP, under the auspices of HEP	Begin by Jun 1996	Enhanced program cost - $200,000/yr	R
ACTION T-6.2: Where significantly elevated levels are found, initiate procedures to track-down and eliminate or require the elimination of sources, giving priority to the most significant sources.	USEPA, NYSDEC, NJDEP, under the auspices of HEP	Begin by Jun 1996	Enhanced program cost included in estimate for Action T-6.1	C/N**

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[3] Note: Costs may range from $60,000 to $450,000 per acre, depending on the level of closure or remediation needed, and considering prioritization.

* Commitment contingent on completion of Action T-5.1.

** Commitment contingent on completion of Action T-6.1 and funding of the track-down.

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Comply.	Regulated entities	Begin by Jun 1996, as appropriate	Project implementation cost to be determined on case-by-case basis based on sources to be eliminated	R
ACTION T-6.3: Track-down PCB sources in New York tributaries to the Harbor using PISCES.				
-- Screen for elevated PCB levels in Harbor tributaries, and identify possible PCB sources in those tributaries.	NYSDEC	Completed	Enhanced program cost - $32,000	C/O
-- Develop SPDES permit prohibiting storm water discharges of PCBs from identified facility discharging to Mill Creek, SI.	NYSDEC	By Dec 1996	Base program	C/N
-- Conduct additional work to evaluate other possible PCB sources to Mill Creek and to identify possible PCB sources in other Harbor tributaries where elevated levels were found.	NYSDEC	Begin by Jan 1996	Enhanced program cost included in Action T-6.1	R
OBJECTIVE T-7: Improve chemical/oil spill response and prevention.				
ACTION T-7.0: Review the area contingency plan and recommendations of the final report of the Bi-state Oil Spill Response and Prevention Conference, and incorporate, as appropriate, into the CCMP.	HEP	Dec 1996	Base program	C/N
-- Provide relevant information to USCG and the Bi-State Conference to assist updates of the area contingency plan.				

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C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE T-8: Focus pollution prevention activities on chemicals of concern.				
ACTION T-8.1: Review TRI and other data for industrial facilities in areas draining to the Harbor core area to identify the largest emitters of chemicals of concern.	NYSDEC & NJDEP, under the auspices of HEP	Jun 1996	Enhanced program cost - $50,000	R
-- Give these facilities highest priority for pollution prevention actions including those found in T-8.3 through T-8.5, to the extent feasible within existing resources.	NYSDEC & NJDEP	Begin by Jun 1996	Base program	C/N*
-- To the extent existing program resources are insufficient to address Harbor/Bight priorities, identify and seek additional resources.	NYSDEC & NJDEP	Begin by Jun 1996	Enhanced program cost estimate to be developed by NYSDEC & NJDEP based on Action T-8.1	C/N*
ACTION T-8.2: Implement non-regulatory pollution prevention.				
-- Under the NJ State Pollution Prevention law, develop and report annually on a multi-media pollution prevention plan.	Priority industrial facilities in NJ	Ongoing	Base program	C/O
-- Seek commitments for voluntary reductions in releases of chemicals of concern to all media.	HEP	Ongoing	Base program	C/N
-- Promote measures which can be implemented by citizens to reduce releases of chemicals of concern. (Note: see public involvement section).	HEP	Ongoing	Base program	C/N

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R - Recommendation

* Commitment contingent upon completion of Action T-8.1.

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION T-8.3: Evaluate a Facility-Wide Permit (FWP) approach, to integrate the air, water, and hazardous waste permits from a facility with its pollution prevention plan.				
-- Conduct pilot project to evaluate FWP approach.	NJDEP	Complete by Aug 1997	Base program	C/O
-- Seek legislative approval to implement approach as appropriate.	NJDEP	Aug 1997	Base program	C/O
ACTION T-8.4: For regulatory programs under state purview:				
-- Add pollution prevention plan requirements, addressing the chemicals of concern, to NPDES renewal permits, permit modifications, and new permits.	NYSDEC	Begin by Jun 1996	Base program	C/N*
-- Consider, if given the legislative authority, adding pollution prevention requirements addressing the chemicals of concern to NPDES renewals and permit modifications.	NJDEP	Begin by Jun 1996	Base program	C/N*
ACTION T-8.5: Require hazardous waste treatment, storage, and disposal facilities in the Harbor/Bight area, that manage one or more of the chemicals of concern, to submit and implement a pollution prevention plan.	USEPA & NYSDEC	Begin by Jun 1996	Base program	C/N*
-- Target RCRA inspections for RCRA hazardous waste generators in the Harbor/Bight area that manage one or more of the chemicals of concern.	USEPA, NYSDEC, NJDEP	Begin by Jun 1996	Base program	C/N*

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R - Recommendation

* Commitment contingent upon completion of Action T-8.1.

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE T-9: Identify and remediate selected contaminated sediments.				
ACTION T-9.1: Take appropriate steps to remediate known areas of highly contaminated sediments.				
-- Issue ROD for the Passaic River Study Area, considering impacts on the Estuary as a whole. (Note: USEPA will provide relevant data and/or model to HEP and, in selecting a remedy, will consider the results of HEP's effort under Action T-13.3, if completed prior to issuance of the ROD).	USEPA	By Dec 31, 1997	Base program	C/O
• Remediate site, as appropriate.	USEPA & Potentially Responsible Parties	To be determined based on ROD	Project implementation cost to be determined based on ROD	C/O
-- Submit proposed remedial plan for Hudson River PCB site for public review.	USEPA	Mar 1997	Base program	C/O
-- Issue ROD for Hudson River PCBs Superfund site considering impacts on the Estuary. (Note: In developing the ROD, USEPA will provide relevant data to HEP and, in selecting a remedy, will consider the results of HEP's effort under Action T-13.3, if completed prior to issuance of the ROD).	USEPA	Sep 1997	Base program	C/O
• Remediate site, as appropriate.	USEPA & Potentially Responsible Parties	To be determined based on ROD	Project implementation cost to be determined based on ROD	C/O

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Complete remediation of Marathon Battery Superfund site.	USEPA & Potentially Responsible Parties	Completed	Paid by Potentially Responsible Parties	C/O
• Begin long-term monitoring of Marathon Battery site.	USEPA & Potentially Responsible Parties	Fall 1995	Paid by Potentially Responsible Parties	C/O
ACTION T-9.2: Identify additional areas of highly contaminated sediments for more in-depth assessment, including feasibility of and need for remediation.				
-- Identify areas and assess feasibility based on available data and information.	USEPA, NYSDEC, NJDEP, USACE, under the auspices of HEP	Sep 1996	Enhanced program cost - $100,000	R
-- Develop work plan including cost estimate for additional studies to identify areas of highly contaminated sediments.	USEPA, NYSDEC, NJDEP, USACE, under the auspices of HEP	Sep 1996	Enhanced program cost included in above estimate	R
-- Initiate action to assess and remediate additional sites, as appropriate.	USEPA, NYSDEC, NJDEP, Potentially Responsible Parties	Begin by 1996 as necessary	Project implementation cost to be determined as areas identified	R
ACTIONS TO MINIMIZE HUMAN HEALTH RISKS				
OBJECTIVE T-10: Establish consistent methodology to assess risk and improve communication of fish advisories.				
ACTION T-10.1: Establish a consistent methodology as appropriate to assess human health risks due to the consumption of locally-caught seafood, and to set fishing advisories and restrictions.	NYSDOH, NYSDEC, NJDEP, NJDOH	Jun 1996	Enhanced program cost - $100,000	R
-- Prepare report documenting NY & NJ methodologies for assessing health risks.	NYSDOH, NYSDEC, NJDEP, NJDOH	Jun 1996	Cost included in above estimate	R

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION T-10.2: Review fish tissue criteria and recommend steps to adopt and implement revised criteria as appropriate (Note: also see Objectives T-11 and T-12, re: criteria review and development).	NYSDEC, NYSDOH, NJDEP, NJDOH, USEPA	Jun 1996	Enhanced program cost - $100,000	R
ACTION T-10.3: Target additional risk communication efforts to those sub-populations at greatest risk..				
-- Conduct pilot projects to tailor advisory communication plans to local communities.	NYSDEC	Oct 1996	Enhanced program cost - $40,000	C/O
	NJDEP	Sep 1996	Enhanced program cost - $89,000	C/O
-- Implement favored approaches Harbor-wide.	NJDEP	Beginning Oct 1996	Enhanced program cost estimate to be developed by NYSDEC & NJDEP depending on approaches to be implemented	R
	NYSDEC	Oct 1996		
-- Develop regional approach to advisory communication.	NYSDOH, NYSDEC, NJDEP, with USEPA assistance	Oct 1996	Enhanced program cost - $75,000	R
ACTIONS TO BETTER UNDERSTAND AND MANAGE THE PROBLEM				
OBJECTIVE T-11: Review and develop criteria for copper and other priority chemicals.				
ACTION T-11.1: Adopt site-specific water quality criteria for copper in New York and New Jersey water quality standards regulations.	NYSDEC	Apr 1996	Base program	C/N
	NJDEP	Jun 1996	Base program	C/N
ACTION T-11.2: Analyze existing applicable criteria and adopt new and revised criteria as appropriate for priority chemicals.				

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C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Prepare a plan for developing and adopting new and revised criteria.	USEPA, NYSDEC, NJDEP, under auspices of HEP	Jul 1996	USEPA & NYSDEC: Base program	C/N
			NJDEP: Enhanced program cost - $45,000	R
-- Adopt water quality criteria for dissolved lead and nickel.	NYSDEC	Apr 1996	Base program	C/N
	NJDEP	Dec 1996		
-- Consider adopting water quality criteria for other dissolved metals as appropriate as part of triennial review.	NYSDEC	Jan 1996	Base program	C/N
	NJDEP	Dec 1996		
OBJECTIVE T-12: Assess ambient levels, loadings, and effects of chemicals.				
ACTION T-12.1: Develop ecosystem indicators as quantitative goals and biocriteria, and implement long-term monitoring of the indicators.				
-- Develop benthic index based on R-EMAP and other data.	HEP	Apr 1996	Part of R-EMAP assessment (See Action T-12.4)	C/N
-- Develop long-term monitoring program for benthic index and other indicators.	USEPA, NYSDEC, NJDEP, under auspices of HEP	Jun 1996	Enhanced program cost - $75,000	R
-- Implement long-term monitoring program.	USEPA, NYSDEC, NJDEP, under auspices of HEP	Begin by summer 1996	Enhanced program cost - $500,000/yr	R

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Monitor size and productivity of local populations of herons, egrets, gulls and/or terns, focusing on colonies in the Harbor core area.	HEP, NYSDEC, NJDEP, USDOI/NPS	Spring 1996	Enhanced program cost - $15,000/yr (Note: included in above estimate)	R
-- Analyze contaminants in bird tissues in cases of low productivity and/or declining bird populations.	HEP, NYSDEC, NJDEP, USDOI/NPS	Initiate in 1997; Complete by Dec 31, 1998	Enhanced program cost - $300,000 over two years	R
-- Adopt biocriteria based on the benthic index and other indicators as appropriate as part of triennial review.	NYSDEC & NJDEP	Begin by Dec 31, 1997	Enhanced program cost - $90,000	R
ACTION T-12.2: Where evidence of adverse ecological effects of toxics is found, conduct studies to evaluate whether, and if so which, chemicals are responsible.				
-- Complete Phase I TIE on ambient water.	HEP	Completed	Enhanced program cost - $100,000	C/N
-- Conduct Phase I TIE on interstitial water and whole sediment from several sites in the Harbor.	USEPA	Completed	Enhanced program cost - $100,000	C/O
-- Conduct Phase I sediment TIE program to identify contaminants causing toxicity or impaired benthos Harbor-wide, including dredged sediment.	HEP, in coordination with USEPA, USACE, NYSDEC, NJDEP	Jun 1996	Enhanced program cost - $200,000	R
-- Conduct Phase II sediment TIE program to identify contaminants causing toxicity or impaired benthos Harbor-wide, including dredged sediment.	HEP, in coordination with USEPA, USACE, NYSDEC, NJDEP	Dec 1996	Enhanced program cost - $200,000	R

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION T-12.3: Revise and update the list of chemicals of concern in the Harbor/Bight based on new information including new and revised criteria and new data on levels of chemicals in water, biota, and sediments.				
-- Modify list based on readily available and summarized new data and information.	HEP	Dec 1995 & annually thereafter	Base program	C/N
-- Modify list based on comprehensive data assessment.	HEP	Dec 1996 & biennially thereafter	Enhanced program cost - $50,000/yr (work to be conducted biennially)	R
ACTION T-12.4: Complete R-EMAP baseline sediment quality assessment.	USEPA in coordination with HEP	Apr 1996	Enhanced program cost - $1.5 million	C/O
ACTION T-12.5: Conduct additional studies to assess sediment quality.				
-- Develop work plan including cost estimates for priority studies.	HEP	Mar 1996	Base program	C/N
-- Conduct studies.	HEP	Begin by Sep 1996	Enhanced program cost to be determined based on work plan	R
ACTION T-12.6: Assess fish, shellfish, and crustacea tissue quality.				
-- Assess levels of chemicals in tissues of edible fish, shellfish, and crustacea in the Harbor/Bight.	HEP	Draft reports: Completed Final reports: Jul 1996	Enhanced program cost - $450,000	C/N

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(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Assess levels of chemicals in recreational finfish in Bight Apex.	NMFS, USEPA, USACE	Completed	Enhanced program cost - $200,000	C/O
-- Assess levels of chemicals in lobsters in Bight Apex.	NMFS, USEPA, USACE	Mar 1996	Enhanced program cost - $300,000	C/O
-- Assess levels of PCBs in striped bass in NY State marine waters.	NYSDEC	Completed	Enhanced program cost - $350,000	C/O
-- Conduct future periodic fish tissue monitoring based on the results of the above studies.				
• Develop work plans and seek funding.	HEP	Jul 1996	Base program	C/N
• Conduct monitoring.	HEP or other responsible entity	Beginning Fall 1996	Enhanced program cost to be determined based on above work plan	R
ACTION T-12.7: Use new information on tissue quality to identify additional data collection needs to support modifications to fishing advisories and restrictions.	NYSDEC, NYSDOH, NJDEP, NJDOH	Mar 1996	Base program	C/N
-- Use new information on tissue quality to modify fishing advisories and restrictions, as appropriate.	NYSDEC & NYSDOH	Feb 1996	Base program	C/N
ACTION T-12.8: Continue New York Harbor Water Quality Survey at current levels of effort.	NYCDEP	Ongoing	Base program	C/O
ACTION T-12.9: Develop and implement a similar long-term water quality monitoring program.	NJDEP	Dec 1995	Enhanced program cost - $1 million/yr	R

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R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION T-12.10: Conduct principal components analyses for PCBs, dioxin, and PAHs for sediment samples from R-EMAP and several other available data sets.	USEPA	Apr 1996	Enhanced program cost - $75,000	C/O
ACTION T-12.11: Review available information on atmospheric deposition to the Harbor/Bight developed by HEP under Actions T-12.13 & T-13.3, and incorporate in Great Waterbodies Report to Congress biennial update; specify additional steps and regulatory revisions, as appropriate, to address atmospheric deposition of toxic chemicals to the Harbor/Bight.	USEPA, in coordination with HEP	By Dec 31, 1997	Base program	C/N
ACTION T-12.12: Implement low-level detection methods for loadings.				
-- Develop guidance specifying appropriate methods, and work with regulated parties as necessary to ensure the collection of high quality loadings data [Note: Effort ongoing in connection with CWA Section 308 letters (See Actions T-1.1 and T-1.2)].				
• For metals.	USEPA, NYSDEC, NJDEP	Ongoing	Base program	C/N
• For organic chemicals such as PCBs and dioxin.	USEPA, NYSDEC, NJDEP	Jun 1996	Enhanced program cost - $75,000	R
-- Incorporate the methods for metals into monitoring requirements for NPDES, CSO, and storm water permits.	USEPA, NYSDEC, NJDEP	Jun 1996	Base program	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION T-12.13: Estimate chemical load reductions expected with implementation of HEP CCMP.	HEP	Sep 1996	Enhanced program cost - $100,000	R
-- Use the information to help determine whether CCMP actions will result in attainment of load reduction goals (see Action T-13.3) and how long it will take; identify additional actions to meet the goals as necessary.		Dec 1996 (See Action T-13.3)		
OBJECTIVE T-13: Develop mass balances for metals and organic chemicals.				
ACTION T-13.1: Conduct additional monitoring and modeling to support revised (Phase II) TMDLs for water quality-limiting metals.	NJ Harbor Dischargers Group (NJHDG)	Complete Jun 1998	Enhanced program cost - $360,000	C/N
-- Submit water and sediment quality data.	NJHDG	Feb 1996	Cost included in above estimate	C/N
-- Submit work plan for Phase II monitoring and modeling studies.	NJHDG	Sep 1996	Cost included in above estimate	C/N
-- Approve work plan for Phase II studies.	NJDEP	Dec 1996	Base program	C/N
-- Submit load matrices for determining TMDLs.	NJHDG	Jun 1998	Enhanced program cost to be determined based on work plan	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION T-13.2: Develop a comprehensive toxics model, including defining goals and objectives, scope, and costs. Work plan to include monitoring program.				
-- Develop work plan.	USACE, under the auspices of HEP	Completed	Base program	C/N
-- Revise work plan, including monitoring plan.	USACE, under the auspices of HEP	Sep 1996	Enhanced program cost - $100,000	R
-- Seek authorization and funding to conduct modeling and monitoring to address toxic contamination in the Harbor/Bight, not tied to dredged material management.	USACE	Ongoing	Base program	C/N
-- Conduct monitoring and develop the model, and use as appropriate, to help define optimal approaches to reduce and eliminate discharges of toxic chemicals and potential remediation of contaminated sediments.	USACE under auspices of HEP	By Dec 31, 2000	Enhanced program cost to be determined based on detailed revised work plans	R
-- Develop and seek funding for a program of research to complement the toxics modeling effort.	HEP	Sep 1996	Base program	C/N*
-- Comply with controls which may be required as a result of improved understanding.	Regulated parties	By Dec 31, 2000	Project implementation cost to be determined based on controls required	R

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

* Commitment contingent on funding for completing modeling work plans.

(Continued)

Table 13(ts). Summary —Management of Toxic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION T-13.3: Develop simple mass balances for mercury and organic chemicals of concern (Note: see text for details).				
-- Develop and validate an integrated model of organic chemical transport, fate, and bioaccumulation using an existing model.	Hudson River Foundation, under the auspices of HEP & with USACE, Port Authority, and USEPA support	Interim result: Jun 1996	Enhanced program cost - $161,000	C/N
		Final: Jun 1998	Enhanced program cost - $178,000	C/N
			Enhanced program cost - $155,000	R
-- Develop overall modeling program work plan to supplement the above effort.	HRF, USEPA, and USACE, under the auspices of HEP	Feb 1996	Base program	C/N
-- Collect data for model development, including chemical loadings and ambient levels.	USACE or other sponsors, under the auspices of HEP	Complete Dec 1996	Enhanced program cost to be determined based on work plan	R
-- Use the model to assess control scenarios.	USEPA or other sponsors, under the auspices of HEP	Jun 1997 through Jun 1998	Enhanced program cost to be determined based on work plan	R
ACTION T-13.4: Conduct comparative study in the Whippany River Basin to assess the use of two mass balance strategies in development of soil cleanup standards for hazardous waste sites.	NJDEP	Dec 1996	Base program	C/O

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

IMPORTANT NOTE:

Due to major changes in dredged material management policy that have taken place since the *Management of Dredged Material* chapter was written, this chapter is not being implemented as written but is instead in the process of being revised. For more information about the revised version, contact Bob Nyman at the HEP office.

PROBLEMS

The presence of contaminants of concern in material that needs to be dredged and disposed and the dispersal of the material throughout the Estuary.

Potential ecological risks, such as bioaccumulation and degradation of benthic community structure, which may be associated with sediment contamination and dredging and disposal operations.

Potential human health risks which may be associated with dredging and disposal operations.

Potential economic effects of dredging and disposal on the shipping industry, fish and shellfish industry (commercial and recreational), tourism, and recreation.

Regulatory delays due to the myriad of agencies regulating dredged material, the lack of available disposal alternatives, and uncertainties related to the implementation of revised testing protocols.

SOURCES CONTRIBUTING TO THE PROBLEMS

Existing, in-place contaminated sediments

Continuing inputs of toxic chemicals

- *Municipal discharges*
- *Industrial discharges*
- *Combined sewer overflows*
- *Storm water*
- *Non-point sources of pollution (including hazardous and solid waste disposal sites)*
- *Atmospheric deposition*
- *Chemical and oil spills*
- *Transport of contaminated sediment from upstream rivers and tributaries*

Lack of non-ocean disposal options

GOALS

To establish environmentally sound, economically feasible, dredged material disposal alternatives.

To have ongoing coordinated and integrated efforts with various state and federal groups and dredged material management task forces.

To maintain the contribution of the Port to the economy and quality of life of the Region.

To improve dredged material management plans for the Harbor.

To evaluate and implement, where practicable, alternative methods of dredged material disposal including those with beneficial uses, such as habitat restoration, landfill cover, etc.

To determine, and where practicable use, the best available technologies/methods for dredging and disposal.

To control continuing sources of toxic chemicals to ensure that all sediment entering

OBJECTIVES

D-1 Develop a future dredged material management structure.
D-2 Reduce continuing inputs of toxic chemicals and upland sediments and soils. Better understand the toxic contamination problem and take additional management actions as more is learned.
D-3 Characterize, categorize, and quantify material to be dredged.
D-4 Identify, evaluate, and select disposal and treatment/decontamination alternatives including beneficial uses of dredged material.
D-5 Develop plans for closure (including remediation and restoration) of the Mud Dump Site and historical disposal areas.
D-6 Improve dredging, transport, and disposal operations.
D-7 Expedite permit decisions.

MANAGEMENT OF DREDGED MATERIAL

THE PROBLEMS

The international Port of New York and New Jersey ("The Port") plays a vital role in the economy of the region, handling more general and containerized cargo than any other East Coast port. The Port is also part of an estuary of national significance. The Harbor is not naturally deep, and rivers continuously transport and deposit sediment, filling in navigation channels and berthing areas. To maintain the Port for modern deep draft vessels, large quantities of sediments (historically 6 million cubic yards/annually) must be dredged. A majority of this material was, and continues to be, disposed at the Mud Dump Site located 6 miles east of Sandy Hook, New Jersey and 11 miles south of Rockaway, New York. This material must be managed in an environmentally sound manner.

The sediments in and around the Harbor contain contaminants at varying concentrations. The presence of contaminants can cause significant environmental problems, including: bioaccumulation within marine organisms (and up the food chain), and changes in benthic community structure. Certain contaminants which may be found in sediments are bioaccumulated in marine organisms and may biomagnify up through the food chain and pose a threat to biota and public (human) health. Dredging contributes to resuspension of these sediments. In addition, ocean disposal raises concerns about exposing additional marine organisms and habitats to these contaminants of concern. Concern has also been expressed regarding the impact of dredged material, and its subsequent disposal, on water-dependent industries such as recreation, tourism, and commercial and recreational fishing.

Scientific concerns about these issues have led to changes in the national testing protocols for dredged materials. Uncertainties related to the implementation of these revised test protocols in the New York/New Jersey Harbor region, coupled with specific concerns about dioxin, and lack of available disposal options, have contributed to delays in regulatory decisions with respect to dredging and disposal.

Numerous regulatory requirements and concerns about resource use may delay the regulatory decisions of the many agencies which are either directly, or indirectly, involved in regulating dredged material. In order to regulate more

efficiently, all parties must work more closely to avoid delays in decision-making.

FACTORS CONTRIBUTING TO THE PROBLEMS

The New York/New Jersey Harbor, including many of the berthing areas and channels, contains primarily fine-grained sediment which may be contaminated with heavy metals, PAHs, PCBs, pesticides, and dioxin. These contaminants of concern may impact the ecosystem, depending on concentration. Not all dredged material is contaminated; however, it may contain contaminants at concentrations which require management, if the dredged material is ocean disposed, or which preclude the material from ocean disposal. The principal cause of the problem is the presence of contaminants of concern in a large portion of the material that needs to be dredged and disposed and the movement of these contaminants throughout the Harbor/Bight complex.

Pollutant Loadings

In addition to contaminated sediments already in the Harbor/Bight, there are sources of pollutants that continue to contaminate fine-grained sediments, water, and biota. Sources include:

- Industrial discharges
- Municipal discharges
- Combined sewer overflows
- Storm water
- Non-point sources of pollution
- Atmospheric deposition
- Chemical and oil spills
- Transport of contaminated sediment from upstream rivers and tributaries

Until these sources are adequately controlled, the problems associated with the Harbor/Bight complex, as well as dredged material management (i.e., contaminated sediment), will continue.

Lack of Disposal Options

Historically, ocean disposal has been the primary disposal option for materials dredged from the Harbor. Other disposal options in the region have generally not been used because of the readily available and relatively low cost of ocean disposal (until recently), as well as conflicting uses and environmental concerns associated with implementing other alternatives.

THE PLAN TO SOLVE THE PROBLEMS

The primary purpose of the dredged material management component of the CCMP is to establish immediate (within 1 year), short-term (1-3 years), and mid-term (3-9 years), environmentally sound, economically feasible, dredged material disposal alternatives. The U.S. Army Corps of Engineers (USACE) is developing a New York Harbor Dredged Material Management Plan (DMMP). The DMMP will include short-, mid-, and long-term alternatives. USACE, through existing programs and the DMMP, will provide technical support to achieve the objectives of this CCMP.

The dredged material component of the CCMP provides immediate and short-term disposal alternatives for dredged material which meet ocean dumping criteria while allowing for the selection, design, and implementation of mid- and long-term non-ocean disposal alternatives for dredged material not suitable for ocean disposal.

Consistent with the current practices of HEP, early implementation of selected elements of the dredged material management plan will be undertaken, including the pursuit and implementa-tion of non-ocean dredged material

disposal alternatives. In accordance with the Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972, ocean disposal will be denied if it can be demonstrated that there are practicable alternative locations for disposal which would have fewer environmental impacts or potential risks to other parts of the environment than ocean dumping.

The dredged material management component of the CCMP plays a critical role in establishing and maintaining a healthy and productive Harbor/Bight ecosystem with full beneficial uses. This component of the Plan has the following **goals**:

- To establish environmentally sound, economically feasible, dredged material disposal alternatives.
- To have ongoing coordinated and integrated efforts with various state and federal groups and dredged material management task forces.
- To maintain the contribution of the Port to the economy and quality of life of the Region.
- To improve dredged material management plans for the Harbor.
- To evaluate and implement, where practicable, alternative methods of dredged material disposal including those with beneficial uses.
- To determine, and where practicable use, the best available technologies/methods for dredging and disposal.
- To control continuing sources of toxic chemicals to ensure that all sediment entering the Harbor Estuary will meet Category I criteria (see Action D-3.5 below).
- To restore, whenever possible, areas of the Bight Apex which have been adversely impacted by dredged material disposal activities to pre-disposal conditions.

The interaction of the participants in the Dredged Material Management Forum, as discussed below, has resulted in many proposals to address dredging and disposal concerns. Based on these discussions, materials generated by the Forum, and the goals of the Forum, this plan includes **objectives** to:

- Develop a future dredged material management structure.
- Reduce continuing inputs of toxic chemicals (see Management of Toxic Contamination section) and upland sediments and soils (see Management of Habitat and Living Resources section).
- Characterize, categorize, and quantify material to be dredged.
- Identify, evaluate, and select disposal and treatment/decontamination alternatives.
- Develop plans for closure (including remediation and restoration) of the Mud Dump Site and historical disposal areas.
- Improve dredging, transport, and disposal operations.
- Expedite permit decisions.
- Better understand the toxic contamination problem and take additional management actions as more is learned (see Management of Toxic Contamination section).

USACE, through existing programs and the DMMP, will provide technical support to meet the objectives of this component of the CCMP.

COMMITMENTS AND RECOMMENDATIONS

OBJECTIVE D-1 ***Develop a future dredged material management structure***

In an effort to address the dredged material management problems in the Port, a Dredged Material Management Forum was convened. The Forum brought together a wide spectrum of groups, concerned with issues associated with the dredging and disposal of sediments, to seek cooperative and implementable solutions. The Forum became part of HEP because it was the most efficient and effective way to continue the work of the Forum.

The Forum created the following work groups: (a) Dredging, Transport, and Disposal; (b) Criteria; (c) Mud Dump Site; (d) Containment Facilities (including borrow pits and containment islands); (e) Decontamination Technologies/Site for Decontamination Facilities; (f) Sediment Contamination Reduction; and (g) Dredged Material Management Integration (consisting of the chairs of work groups a-f above as well as representatives of critical stakeholders).

ACTION D-1.1
Dredged Material Management Structure
HEP recently agreed on a long-term management structure, incorporating the work of the Dredged Material Management Forum into HEP (see section on Post-CCMP Management Structure below). In this structure, the Dredged Material Management Integration Work Group (DMMIWG) has several important functions: 1) it helps to support and coordinate the work of the six working groups; 2) it serves as a committee of the whole to work with USACE on the development of the long term management plan; 3) it presents policy positions and concerns to the HEP Policy Committee and the four principal agencies (USEPA, USACE, NYSDEC, and NJDEP); and 4) it serves as an Executive Committee of the Forum. In order to ensure that the DMMIWG can perform these functions effectively, it was agreed that: 1) the DMMIWG may report directly to the HEP Policy Committee without going through the Management Committee; 2) the DMMIWG, at its discretion, may request to meet with or report directly to any one or all of the heads of the four principal agencies; 3) the DMMIWG/Forum/HEP Policy Committee will continue to produce self-standing, independent dredged material management reports, e.g., future straw proposals, as well as the CCMP; 4) the HEP Policy Committee will convene and host the Forum, with USEPA continuing to serve as chair, and the DMMIWG may recommend that the Forum be convened from time to time; 5) the DMMIWG will serve as the Executive Committee of the Forum as well as represent the Work Groups; and 6) there will be no distinction between planning and implementation.

ACTION D-1.2
Responsible Parties for Implementing the Dredged Material Management Plan
The Forum, through the DMMIWG and in consultation with HEP, will identify responsible parties for all actions and commitments and will assist in the development of implementation programs for these recommendations through its work groups.

ACTION D-1.3
Reviewing Parties
Within the HEP structure, the Dredged Material Management Forum will continue to review and comment on work plans, Statements of Work, work products, etc.

ACTION D-1.4
USACE Dredged Material Management Plan

The DMMIWG, on behalf of the Forum, will interact with USACE in the development of the USACE management plan for dredged material in the New York-New Jersey Harbor.

ACTION D-1.5
Coordination
USACE, USEPA, NYSDEC, and NJDEP will coordinate plans, proposals, and alternative courses of action pertaining to any matters that fall within the scope of this document with the relevant work groups of the Forum through the DMMIWG or applicable work group.

The DMMIWG will meet on a regular basis to review and synthesize the progress of the Forum work groups. If necessary, the DMMIWG will prepare an issues paper to be discussed at quarterly meetings with the HEP Policy Committee and/or Forum Principals.

OBJECTIVE D-2	***Reduce continuing inputs of toxic chemicals and upland sediments and soils***

Toxic Chemicals

One goal of this section is that, over the long-term, all dredged materials within the Harbor complex will become sufficiently free of contaminants and, therefore, not pose a problem with respect to disposal.

The major factor constraining the selection of dredged material disposal techniques and disposal site locations is the contamination of Harbor sediments by a wide range of chemicals of concern. Contaminated sediments, demonstrated through toxicity and bioaccumulation testing, have limited disposal options. These sediments pose a potentially serious environmental risk when dredged and disposed and may require costly containment and/or remediation techniques. Therefore, tremendous environmental and economic benefits would accrue if dredged sediments were free of harmful contaminants.

The successful long-range management of dredged sediments is dependent upon aggressive efforts to reduce and eliminate the sources of harmful contaminants, particularly those contaminants with an affinity for sediments. The Management of Toxic Contaminants section of this CCMP is the primary vehicle for addressing toxic contamination in the Harbor/Bight complex. One of the goals of the Toxic Contaminants section is to ensure that dredged sediments in the Harbor are safe for unrestricted disposal. In an effort to achieve that goal, the Management of Toxic Contaminants section contains objectives and associated actions to: 1) reduce continuing inputs of toxic chemicals to the Harbor/Bight; 2) remediate selected contaminated sediments; and 3) better understand the toxic contamination problem and take additional management actions as more is learned about the problems. A work group, the Sediment Contamination Reduction Work Group, has been convened to ensure that this CCMP addresses the reduction of sediment contaminant inputs and contamination. One specific proposal of the work group is that funding be provided to develop better data about the specific contaminants of concern, such as PAHs, for which data are now inadequate.

Actions to address rainfall-induced discharges are also expected to help reduce sediment contamination.

Upland Sediments and Soils

Reducing the amount of sediment entering the

waterways from the upland watershed will reduce the volume of material requiring dredging. Several actions are being taken, through the HEP Habitat and Living Resources component, to control point and non-point loadings of pollutants. These actions include several pilot projects which minimize the export of sediments to the Estuary (Actions H-2.1, H-2.2, and H-2.3).

ACTION D-2.0
Engineering Solutions
USACE will review options that prevent sediments from entering navigational areas through engineering solutions. These options, and the steps required to study and implement them, will be included in the draft "New York Harbor Dredged Material Management Plan (DMMP) Phase 1 Initial Appraisal Report" which was recently completed.

OBJECTIVE D-3 ***Characterize, categorize, and quantify material to be dredged***

There is no single "best" disposal or management option for all dredged material -- a combination of alternatives is needed. Establishing implementable disposal alternatives depends on the quality and quantity of the sediments requiring dredging.

Characterize - Ocean Disposal Criteria

The present bioaccumulation assessment approach uses a statistical comparison of contaminants accumulated by organisms exposed to test and reference sediments. If there is a statistically significant increase in test values compared to reference values, test values are then compared to "matrix" values. Matrix values were developed in the early 1980s by assessing biological tissue levels and the potential for bioaccumulation from ambient water in areas around the Mud Dump Site. Values for four Bioaccumulative Chemicals of Concern (BCCs) -- PCB, DDT, Hg, and Cd -- were established .

Currently, there are no evaluative criteria available for regional BCCs, except for dioxin and the matrix values. A chemical-specific bioaccumulation assessment approach is necessary. USEPA, USACE, and the Criteria Work Group are developing an interim regional chemical-specific approach which utilizes an index of toxicological significance derived through risk-based methodology. Reference and background level databases will also be used in the decision-making framework (i.e., for evaluating and categorizing dredged material). After the approach is developed, it will be

subject to peer and public review. Based on comments received, USEPA and USACE will make a decision to implement all, none, or part of the guidance. The present approach will be used until the regional chemical-specific approach is implemented by USEPA and USACE.

USEPA is developing a national guidance document to assist regions in bioaccumulation decision-making. The interim regional approach will be employed until USEPA develops this guidance. The national guidance will then be considered for regional implementation, and the use of the interim regional approach will be reevaluated. The national guidance will not contain numerical bioaccumulation threshold values but will provide specific cancer and non-cancer effect levels to the extent that data are available for bioaccumulative contaminants; state-of-the-art ecological risk assessment will also be included. The result of this effort will not be pass/fail bioaccumulative threshold values, but will provide the basis for conducting a site-specific risk assessment of the dredged material disposal actions.

ACTION D-3.1
Development of Chemical-Specific Bioaccumulation Assessment Approach

-- The Criteria Work Group will develop a plan to implement the interim chemical-specific bioaccumulation evaluation methodology. This includes assessing the adequacy of preliminary databases and identifying additional reference and background studies which may be necessary to develop the regional approach. Steps include the following:

  - Ë Develop draft approach based on existing data, if possible by April 1996.
  - Ë USEPA and USACE provided funds for a May 1995 survey to facilitate finalizing the chemical-specific bioaccumulation decision framework. Additional surveys were completed in September 1995.
  - Ë Conduct peer and public review by June 1996.
  - Ë Make a decision (USEPA and USACE) on whether to implement the approach, with regards to risk levels and factors in the approach, by July 1996.

ACTION D-3.2
Reference Site and Database

-- USEPA and USACE will, by February 1996, recommend an appropriate reference site.

-- USEPA and USACE, in consultation with the Criteria Work Group, will, by February 1996, recommend an approach for establishing a reference sediment database.

ACTION D-3.3
National Guidance for Bioaccumulation Decision-Making
HEP recommends that USEPA develop, by June 1997, a national guidance document to assist the regions in bioaccumulation decision-making.

ACTION D-3.4
Incorporation of Interim Approach into Mud Dump Site Monitoring and Management Plan
USEPA and USACE will modify, by October 1996, the Mud Dump Site monitoring and management plan to incorporate the regional chemical-specific, bioaccumulation approach.

Characterize - Upland Criteria

One dredged material disposal option is upland disposal. The states have the regulatory authority for this option. To date, there are no criteria established for upland disposal of dredged material.

ACTION D-3.5
Criteria for Upland Disposal
NJDEP and NYSDEC, in conjunction with the Criteria and Containment Work Groups, will identify draft criteria for upland disposal. This will include, but not be limited to, siting, sediment types, sampling and testing, and facility operation. Formal rulemaking may be necessary in New Jersey.
Categorize
As previously discussed, dredged material is characterized through a series of physical, chemical, and biological tests which determine the suitability of material for ocean disposal. Based on the results of these tests, USACE and USEPA have historically classified material into categories according to its suitability for ocean disposal as follows:

Category I - Sediments which meet ocean dumping criteria. Test results indicate no unacceptable toxicity or bioaccumulation in biological test systems. These sediments are acceptable for "unrestricted" ocean disposal. There are no potential short-term (acute) impacts or long-term (chronic) impacts; no special precautionary measures are required during disposal.

Category II - Sediments which meet ocean dumping criteria. Test results indicate no significant toxicity but a **potential** for bioaccumulation. To protect from this potential for bioaccumulation, USEPA and USACE will require appropriate management practices such as capping. This is referred to as "restricted" ocean disposal.

Category III - Sediments which do **not** meet ocean dumping criteria. These sediments are those that fail acute toxicity testing or pose a threat of signifi-cant bioaccumulation that cannot be addressed through available disposal management practices. These sediments cannot be disposed in the ocean.

Dredged material would be placed into one of the above categories, based on a characterization of suitability. These categories are important because of the disposal implications and options associated with each one. For example, Category I material should always be used for beneficial purposes, such as beach nourishment, or as an interim or final cap for borrow pits or ocean disposal sites. Category II material is suitable for ocean dumping with capping used as a management tool, but also may be suitable for disposal at

landfills, as daily or interim landfill cover, or for disposal in borrow pits or containment facilities. Category III material may be suitable for treatment and disposal at confined facilities, for sanitary landfill cover, or for borrow pit disposal.

Quantify Dredged Material In Each Category

Volume estimates, by category, are necessary for projecting future disposal requirements and the combination of alternatives necessary for dredged material management. It will be necessary to estimate immediate, short, and long-term proportions and quantities of dredged material falling within each dredged material category based on the regional approach. The estimates should initially be used to establish the implementability of alternatives to ocean disposal. USEPA and USACE will assess the type and amount of data that may be available or necessary to establish these estimates.

ACTION D-3.6
Dredged Material Categorization and Quantity Estimate
USACE will, by March 1996[1], categorize dredged material based on the regional bioaccumulation approach. USACE will then **estimate** the quantities of dredged material currently pending that could be expected using the above chemical-specific approach for evaluating bioaccumulation test results.

ACTION D-3.7
Additional sampling and testing
USEPA, USACE, and NYSDEC, will, by March 1996[1], perform pro-active sampling and testing (if necessary) to estimate quantities of dredged material in each Category. This is contingent upon available, allocated funds.

ACTION D-3.8
Disposal Alternatives vs. Category Table
USEPA, USACE, NYSDEC, and NJDEP will, by March 1996[1], develop a table which matches dredged material disposal alternatives with respect to the regional chemical-specific bioaccumulation approach for the dredged material categories. Use of additional approaches will be needed.

[1] Provided a second peer and public review is not necessary. If necessary, the target date is May 1996.

OBJECTIVE D-4 Identify, evaluate, and select disposal and treatment/ decontamination alternatives

It is imperative that implementable, environment-ally sound alternatives to the existing Mud Dump Site (MDS) be identified now because the MDS is quickly reaching capacity, and new testing protocols may increase the proportion of Category II and III materials to be disposed. Equally import-ant is the selection and implementation of suitable mid-term and long-term disposal operations. For Category I material, disposal alternatives with beneficial use are recommended, as appropriate.

Ocean Disposal Site[1]

Dredged material has been disposed in the New York Bight Apex since 1914. Consequently, large areas of the Apex floor have been, at a minimum, physically impacted. Additional impacts may have resulted from contaminants present in the dredged material. An expansion of the existing MDS may offer the potential opportunity for 1) providing remediation of contaminated areas by disposal of normal Harbor maintenance and new work dredged material, and 2) as a goal, restoring contaminated areas by disposal of materials which are beneficial to the marine environment.

The MDS, adjacent impacted areas, and historical disposal areas should be covered. USACE-Waterways Experiment Station (WES) is evaluating the erosion risks associated with creating mounds at the MDS if water depths, capping thickness, and storm event magnitudes are varied. Based on study recommendations, a depth will be determined at which little sediment resuspension or movement takes place. Areas with depths greater

than this depth may be used for disposal of Category II sediments **with an added measure of environmental protection -- subsequent expeditious capping with Category I material**. Areas with depths between the recommended depth and a controlling depth of -45 feet Mean Low Water (MLW) will be used only for the disposal of Category I materials. Should the MDS be expanded, the results of this expansion could include: 1) short-term disposal of Category II material below the recommended depth, while disposal alternatives are implemented; 2) remediation of contaminated areas by disposing of Harbor maintenance and new work dredged material; and 3) as a goal, restoration of contaminated areas by promoting the disposal of materials which are beneficial to the marine environment. Category I disposal will continue indefinitely (until closure requirements are met) as cover, thereby serving as a beneficial use.

ACTION D-4.1
Confirmation of Controlling Depth
USEPA and USACE, in consultation with the Mud Dump Site Work Group, will, by April 1, 1996, confirm a controlling depth for Category II materials at the MDS and surrounding environs.

ACTION D-4.2
Criteria for Mounds
USACE will, by August 1, 1996, provide design criteria for various mound placement and capping options to USEPA.

Action D-4.3
Preparation of SEIS and Site Designation Rulemaking
In order to provide for the orderly phase-out of ocean disposal of Category II material, USEPA, USACE, NJDEP, and NYSDEC are proposing to expand the MDS (USEPA has designation authority), through the EIS process described

[1] USEPA, as requested by the majority of the DMMIWG, will provide a legal interpretation of the laws,

regulations, and policies governing the ocean disposal of dredged material. The text of the CCMP may be modified based on this interpretation and further discussions/negotiations. However, no policy decision has yet been made regarding this issue.

below, for the disposal of Category I and II materials. On February 3, 1995, USEPA issued a public announcement for the SEIS for expansion of the MDS for remediation and restoration. The use of the expanded MDS for Category II material will be restricted to a specified period of time; this period will be determined prior to the issuance, by USEPA, of the proposed site designation. The time period will be specified in the final designation rulemaking package and will be based on a number of factors listed below, including the amount of time required to develop and implement environmentally and economically feasible disposal alternatives. As part of the analysis and EIS process, alternatives will be evaluated, including the no-action alternative (i.e., no expansion of the site). In all cases where environmentally preferred, practicable non-ocean disposal alternatives exist for Category II materials, the use of the MDS will be denied. The Mud Dump Site Work Group will consider and make recommendations (to USEPA, USACE, NJDEP, and NYSDEC) regarding the number of years that an expanded Mud Dump Site could remain open for disposal of Category II material, the maximum volumes, and site monitoring activities. In doing this, the Work Group should take into account the anticipated volumes of Category II material based on the testing criteria, the pace of development of alternatives, detoxification techniques, pilot project implementation schedules, volume reduction and containment input abatement opportunities, and disposal incentive fees.

Non-Ocean Disposal Alternatives

There is no single "best" disposal or management alternative for all dredged material. All concerned parties will work within HEP to promote beneficial uses of dredged material including, but not limited to, enhancement of habitat, landfill daily cover, etc. The Forum and USACE are examining the use of multiple disposal alternatives, including:

- pits excavated in, or adjacent to, areas of highly contaminated sediments;
- pits excavated in the process of sand mining;
- existing subaqueous borrow pits;
- confined disposal facilities (CDFs);
- ocean subaqueous borrow pits (ocean disposal);
- containment islands;
- upland disposal; and
- beneficial uses such as habitat creation.

USACE is developing a long-term management plan (DMMP) that evaluates all disposal alternatives including ocean and near-shore borrow pits, containment islands, CDFs, beneficial uses, and upland disposal. The Dredged Material Management Integration Work Group will work directly with USACE in developing the long-term management plan. USACE expects that its plan will provide the technical support for Forum recommendations.

One component of the long-term management plan is the evaluation of the development and construction of containment areas/islands in the near-shore, offshore, and ocean. USACE and the Port Authority have begun to assess the feasibility and logistics of containment areas/island creation. These areas/ islands should be designed to promote beneficial purposes such as habitat, recreation, or port operations uses.

USACE has issued a Record of Decision on its Final Environmental Impact Statement for operational scale borrow pits and has requested water quality certification (WQC) from NYSDEC for the existing borrow pits in the Lower Harbor. NYSDEC has expressed a number of concerns, including a potential conflict between the USACE proposal and sand mining proposals. It

is recommended that, if NYSDEC cannot issue a WQC for an operational scale pit, it consider issuing a conditional WQC for a USACE demonstration scale study of subaqueous borrow pit disposal using an existing pit, preferably the Lower East Bank Pit. With satisfactory monitoring and conclusive results, this could be implemented as a short-term disposal alternative.

The Port Authority of New York and New Jersey is studying the possible use of upland disposal sites within the region. The states will aid the Port Authority by providing active regulatory guidance.

Neither of the states will undertake an upland disposal site pilot project; however, the states will develop upland criteria (siting and disposal). In addition, the states will monitor the progress of private sector applicants seeking to site or operate upland disposal areas with respect to legal, political, and social factors.

ACTION D-4.4
Dredged Material Management Plan
USACE will, in consultation with USEPA, DMMIWG, NYSDEC, and NJDEP, by July 1996, prepare an interim report on the comprehensive management plan for dredged material, which evaluates alternatives. This interim report is based on a broad one year investigation and siting of alternatives. The second stage is a focused two year detailed investigation culminating in the design and optimization of those alternatives and sites identified in the interim report. The selected alternatives will be based on ability to meet the immediate and projected dredged material management needs of the region and agreement by the decision makers. The final plan will be produced by July 1998.

New York and New Jersey will review USACE's 1989 recommendations for siting containment islands and provide initial input as to whether these sites, or other sites within the Harbor/Bight complex, should be considered for detailed review in the USACE Dredged Material Management Plan. The target date for this activity is October 1996.

ACTION D-4.5
Newark Bay Borrow Pits
Following up on a recommendation of the Containment Work Group to the New Jersey Governor's Dredging Task Force, several studies are being conducted related to development of borrow pits in Newark Bay.

-- The Port Authority of New York and New Jersey will act as lead to implement a subaqueous borrow pit in Newark Bay as an applicant to the USACE. Environmental and engineering studies are being performed.

-- The Containment Work Group has conducted a comparison analysis of federal and non-federal sponsorship for implementing subaqueous borrow pits in Newark Bay and will continue to make recommendations to the Forum. The Port Authority is currently assessing operation and maintenance costs of the pits. The issues of ownership, ownership transfer, and liability are being reviewed by a committee of the NJ Governor's Dredged Material Management Team.

ACTION D-4.6
Existing Borrow Pits

-- New York State will expedite its WQC determination and consider requiring that USACE plan a demonstration program for existing borrow pits in the Lower Harbor.

-- Should the project (operational or demonstration) be approved, USACE will implement the project as soon as possible.

-- Should a conditional WQC allow for a demonstration project, then within six months of demonstration project completion and data submittal and review, the State of New York will review the demonstration project and make a determination on whether the WQC conditions were satisfied to allow for an operational scale borrow pit program.

ACTION D-4.7
Consideration of Sand Mining Practices to Create Suitable Pits For Dredged Material Disposal
USACE, NYSDEC, and NJDEP should assess the feasibility of soliciting modified sand mining proposals so that suitable borrow pits, outside of navigation channels, might be created through sand mining practices. This should take place in consultation with the Dredging, Transport, and Disposal Work Group. Consideration of sand mining proposals must include an assessment of how to best manage the sand resource to gain environmental use and benefits. Environmental benefits could be conditions of permits issued for sand mining.

ACTION D-4.8
Upland Disposal
Small-scale upland disposal may be feasible on a case-by-case basis.

-- The States of New Jersey and New York will monitor the progress of private sector applicants seeking to site and operate upland disposal areas in the Port region. These actions will take place in consultation with the Criteria, Containment, and Dredging, Transport, and Disposal Work Groups.

-- The Port Authority will continue to seek regional upland disposal sites.

Treatment Methods

Treatment (including, but not limited to, decontamination, physical separation, etc.) is not a disposal alternative. Rather, it is a method which may facilitate the management of contaminated dredged material within the Harbor (whether dredged for navigation and/or remediation). The main purpose of current investigations is to identify effective technologies, which may be readily applied to large volumes of contaminated dredged material, in a cost-effective and environmentally sound manner, and which yields products which may be used beneficially. The implementation of operational scale treatment technologies may require a processing site, possibly a large site, on or adjacent to a waterway.

The Water Resources Development Act (WRDA) of 1992 mandated that the USACE and USEPA jointly select decontamination technologies for contaminated sediments. Resources of $2.7 million and $2.3 million were appropriated to USEPA in fiscal years (FY) 1993 and 1994, respectively. Additional funding of $1.8 million was appropriated by Congress in FY 1995.

ACTION D-4.9
Base Catalyzed Decomposition (BCD) Study
Bench-scale studies have been completed. There was greater than 98 percent destruction of chlorinated organics (dioxins and PCBs). Removal of PAHs and mercury was 89 percent and 95 percent, respectively. An accompanying pilot-scale design report demonstrated full-scale treatment costs at $108 per cubic yard, not including additional treatment train costs. A decision to expand to a pilot study has been postponed and will be considered based on the outcome of other studies described in Action D-4.10 below.

ACTION D-4.10
Innovative Technologies Study
Contracts were awarded for 7 bench-scale technologies in August 1995. Field collections were completed in October 1995. Bench-scale demonstrations were underway in November 1995 and were completed in January 1996. Based upon the success of the bench-scale effort, pilot-scale demonstrations will commence in March 1996, if indoor siting facilities are made available. If not, and again depending on the technology, the demonstration may commence in early spring 1996, with a total project completion date of December 1996.

OBJECTIVE D-5 Develop plans for closure (including remediation and restoration) of the Mud Dump Site and historical disposal areas

As previously discussed, the MDS, adjacent areas, and historical disposal areas need to be managed in the short-term and eventually closed, when practicable non-ocean alternatives become available. Large areas of the ocean floor have been, at a minimum, physically impacted from dredged material disposal, occurring since 1914. Prior to 1977, dredged material was

disposed without bioassay/bioaccumulation analysis and very little chemical analysis.

In October 1994, USEPA and USACE conducted a sediment toxicity/chemistry survey (utilizing USEPA's Ocean Survey Vessel PETER W. ANDERSON) within the 23 square nautical mile area (MDS and historical disposal areas) proposed for expansion. The survey was conducted in support of the MDS expansion SEIS and remediation/restoration of historical disposal areas. Forty-four samples were collected and analyzed for toxicity (using the amphipod *Ampelisca*), sediment chemistry, and benthic community structure. Worms were also collected and archived for future body burden analyses. Of the 44 samples analyzed, 27 samples (9 inside the MDS and 18 outside the MDS) exhibited toxicity. The 27 samples represent an area of approximately 10.2 square nautical miles, out of the 23 square nautical mile study area.

The areas inside the MDS can be remediated immediately by USEPA and USACE by directing Category I dredged material to the desired locations. Some of the areas sampled in October have already been covered with Category I dredged material. The areas outside the MDS require formal designation prior to any disposal of dredged material for remediation. This supports the Dredged Material Management Forum's plan to prepare an SEIS to expand the MDS into historical disposal areas for purposes of remediation/restoration.

The chemical and biological impact of dredged material in areas outside of the existing MDS is, at present, unknown. Dredged material disposed prior to the implementation of water pollution control laws may contain higher concentrations of contaminants of concern than dredged materials disposed at the MDS today. The expansion of the MDS offers the potential opportunity for providing remediation of contaminated areas and, as a goal, restoration of contaminated areas (from disposal of sands, muds, large rubble, etc.).

MDS Site Management and Monitoring Plan
A plan will be developed to evaluate all dredged material disposal areas and determine if they have been adversely impacted by disposal activities. The plan will address remediation (and restoration) of the impacted areas, for the protection of human and ecological health, using Category I materials. The value of sand or other material as a final cap will be reviewed. It is the expressed consensus of the Dredged Material Management Forum to seek opportunities to restore, to the maximum extent practicable (considering cost, logistics, technology availability), areas of the Bight Apex which have been adversely impacted by dredged material disposal.

ACTION D-5.0
Pre- and Post-Closure of Ocean Disposal Sites

-- USEPA, in consultation with USACE and the Mud Dump Site Work Group, will develop closure management and monitoring plans for the MDS, adjacent areas, and historical disposal sites. Pre- and post-closure monitoring plans will include physical, chemical, and biological sampling. The following issues will be addressed: remaining capacity, frequency of post-closure surveys, costs and funding, and the erosion potential of the existing mounds. Plans will incorporate the controlling depth strategy for Category I and II materials, as previously described in the "Identify and Select Disposal Alternatives" section. Plans will be hierarchial in nature: remediation activities will be the primary concern and restoration opportunities will be considered a goal, when suitable materials are available.

-- USEPA, in consultation with USACE, will implement the closure monitoring and management plan, when appropriate.

OBJECTIVE D-6 Improve dredging, transport, and disposal options

Operations

Improved dredging, transport, and disposal operations will reduce the potential environmental risks posed by these operations. Information on the selection of dredging equipment and on the advantages and limitations of various types of dredging equipment is available. However, its applicability to the Harbor region is uncertain. There are two concerns associated with dredging: resuspension of sediments and removal precision. Resuspension can be caused by excavation, barge/hopper overflow, spillage, leakage, spud movement, barge movement, etc. Removal precision refers to how accurately a given dredge can remove desired areas and thicknesses of contaminated sediment. Precision is important from the standpoint that contaminated and uncontaminated materials might be segregated so that each may be handled in the most appropriate manner possible. The ability to use improved or innovative disposal techniques depends, in part, on the disposal site selected.

Containment of dredged material in geotextile containers has helped solve several difficult construction problems in the past few years. More recently, the focus has turned to large-scale contaminated dredged material disposal in these containers. Engineering and environmental studies concerning geotextile containment are being conducted by USACE-WES to develop and demonstrate dredged material containment systems that are technically feasible, environmentally sensitive, and cost effective. The Port Authority of New York and New Jersey developed a pilot project utilizing the geotextile containers. Monitoring was performed and results are expected March 1, 1996.

ACTION D-6.1
Improvements in Equipment
The Dredging, Transport, and Disposal Work Group will continue to recommend specific improvements for equipment and methods used in dredging, transport, and disposal operations.

ACTION D-6.2
Borrow Pit Disposal Techniques
USACE will determine if hydraulic dredging is feasible for borrow pit disposal and very confined sites.

ACTION D-6.3
Geotextile Containers
The Port Authority of New York and New Jersey selected a pilot project for dredged material disposal in geotextile bags. Monitoring was performed and results will be available March 1, 1996. This and other experiments are continuing.

Volume Reduction/Selective Dredging

Any reduction in the volume of material to be dredged is important because it provides greater flexibility with respect to the disposal alternatives available and because of the limited capacity of these disposal alternatives. General criteria to be considered in every dredging permit evaluation are the need for the proposed work and the practicability of using reasonable alternative methods to accomplish the objective of the proposed work when there are unresolved conflicts as to resource use. Prior to issuing any dredging permit, the need for the dredging must be established. It may, in some instances, be feasible to dredge only limited areas of a facility and still not affect facility operations. Many federal navigation channels, including their physical dimensions, were designated at a time when the number of ships utilizing the Harbor

was greater than at present. A channel assessment and reconfiguration in Norfolk, Virginia, using a computer simulation of ship movement, significantly reduced the cost of maintaining channels in that region.

ACTION D-6.4
Volume Reduction/Innovative Dredging Techniques USACE will, in coordination with the appropriate state agencies, review each permit application and federal project to ensure that volume reduction and dredging techniques have been considered.

ACTION D-6.5
Channel Assessment and Reconfiguration
The Maritime Administration (MARAD) will assess the impact of reducing the width or depth of specific channels.

Tipping Fees

The potential exists for the establishment of tipping fees for all new and existing disposal areas. These fees could be directed to the dredging program to offset general management and operational costs. Tipping fees might provide a financial incentive to reduce the amount of dredging. However, studies must be conducted to better understand the regional economic impacts of dredging before any tipping fee system could be considered.

ACTION D-6.6
Economic Assessment of Tipping Fees
DMMIWG will identify a responsible entity, by October 31, 1996, to sponsor an economic assessment of tipping fees in the Port of New York and New Jersey. The target date for completion of the assessment is January 1997.

ACTION D-6.7
Assessment of Implementation of Tipping Fees
DMMIWG will identify a responsible entity, by October 31, 1996, to seek Congressional input on the establishment of tipping fees.

OBJECTIVE D-7 Expedite permit decisions

There are many complex federal, state, and local laws, Executive Orders, and regulations governing dredging and dredged material, with overlapping jurisdictions. The result is a cumbersome and sometimes conflicting regulatory process. The keys to expediting this process are appropriate regulatory coordination and the availability of disposal sites for the type (category) of dredged material to be disposed.

USEPA and USACE have prepared a regional Memorandum of Understanding (MOU) to effectively execute statutory responsibilities associated with technical and administrative procedures under MPRSA pertaining to: monitoring and management of ocean disposal sites; dredging and disposal permit review and approval, including regionally appropriate sediment testing and evaluation protocols; dredging and ocean disposal permit compliance and enforcement; and appropriate reporting and record keeping of documents pertaining to MPRSA activities. It is the intent of the agencies to minimize duplication of effort, paperwork, and delays in the management of ocean disposal sites and dredging and disposal permits and authorizations.

Joint permit information packages for federal and state regulatory agencies and the development of consistent testing requirements would likely expedite permit processing and regulatory decisions. In addition, a unified regional regulatory guidance document which clearly and concisely identifies all resource agencies' concerns (e.g., seasonal restrictions and reaches affected, endangered species) should be developed and include generic and specific permit conditions. This will allow regulatory agencies to identify and resolve, if possible, conflicts early in the process.

ACTION D-7.1
Memorandum of Understanding
USACE and USEPA will, by September 1996, finalize an MOU for ocean disposal site management and site designation. Site management plans will be subject to full public review and comment.

ACTION D-7.2
Joint Permit Applications
USACE, NJDEP, and NYSDEC, in cooperation with DMMIWG, are exploring development of joint permit information packages for projects proposing ocean and/or non-ocean disposal.

ACTION D-7.3
Federal Regulatory Guidance
USACE, USEPA, NOAA-NMFS, USFWS, NYSDEC, NJDEP, and others, in cooperation with DMMIWG, are exploring development of a federal regional regulatory guidance document which addresses the concerns of the federal resource agencies with appropriate generic, and recommended specific, special permit conditions for federal permits.

ACTION D-7.4
State Regulatory Guidance
NYSDOS, NYSDEC, and NJDEP, in cooperation with DMMIWG, are developing a regional state regulatory guidance document which addresses the concerns of the state resource agencies with appropriate generic, and recommended specific, special permit conditions for state permits.

ACTION D-7.5
Integration Task Force
USACE, in cooperation with DMMIWG, will explore, by April 1996, the formation of a federal and state interagency group to integrate federal and state regulatory guidances.

ACTION D-7.6
Conflict Resolution
USACE, USEPA, NOAA-NMFS, USFWS, NYSDEC, NJDEP, and others, in cooperation with DMMIWG, are exploring establishment of a unified regulatory process for resolving resource use concerns.

ACTION D-7.7
Consistent Testing Requirements
USEPA, USACE, NJDEP, and NYSDEC will explore, by June 1996, development of consistent testing requirements for dredged material disposal. Separate requirements may be needed for ocean, non-ocean, and upland alternatives.

ACTION D-7.8
Status of Streamlining Efforts
USACE will provide a status report to the Dredged Material Management Forum every six months on the efforts of the regulatory agencies to streamline permit processing. If any of the above recommended actions cannot be implemented, USACE will provide an explanation as to the reasons, including any obstacles encountered.

COSTS OF IMPLEMENTING THIS PLAN

Many of the commitments and recommendations in the Dredged Material Management section of the CCMP can be accomplished through the effective use of base program resources. In fact, full implementation of the CCMP relies, in large part, on continued operation, and funding at current levels, of existing programs to address dredged material management issues. The Dredged Material Management component of the CCMP itemizes 33 new HEP-driven commitments operating through base programs. These actions represent a major commitment to CCMP implementation.

As shown on Table 14(dc) below, the Dredged Material Management component of the CCMP also includes 9 significant commitments and recommendations that entail enhanced program funding of $14.4 million, plus target dates for additional cost estimates.

The Dredged Material Management component of the CCMP also includes 7 actions that will or may require the expenditure of project implementation funds by responsible entities. As shown in Table 15(dc) below:

- The Plan includes 4 actions for which funds, totaling $126.730 million, have been committed by the responsible entities.
- The Plan includes 3 actions for which additional funds may be required to be expended by responsible entities, based on the potential outcome of several ongoing or planned efforts.

The costs of implementation actions to address Dredged Material Management may be large, particularly for the longer-term alternatives not discussed in this Plan. Cost estimates for the actions discussed in this Plan will continue to be developed as part of the continuing planning process.

Table 14(dc). Enhanced Program Costs for Dredged Material Management

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION D-3.1: Conduct surveys, as necessary, to develop interim chemical specific bioaccumulation evaluation methodology.	$300,000			
ACTION D-3.7: Perform pro-active sampling and testing to categorize and quantify dredged material.			*	
ACTION D-4.3: Consider expansion of the Mud Dump Site.	$1.3 million			
-- Perform necessary studies/surveys in support of a Supplemental Environmental Impact Statement.				
-- Publish a Supplemental Environmental Impact Statement.				
-- Publish Rulemaking.				
ACTION D-4.4: Develop Dredged Material Management Plan (Phases I and II).	$12.8 million			
ACTION D-4.8: Seek regional upland disposal sites.	*			
ACTION D-6.5: Perform computer simulation and assessment of necessary channel dimension.	*			
ACTION D-6.6: Perform economic assessment of tipping fees.	*			
TOTAL	$14,400,000 + *[1]		*	

* Enhanced program costs to be developed as part of the continuing planning process.
[1] Notation (+ *) indicates cost plus additional costs to be determined.

Table 15(dc). Project Implementation Costs for Dredged Material Management

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION D-4.5: Implement a Newark Bay subaqueous borrow pit.**	**	*		
ACTION D-4.6: Perform demonstration pilot project using an existing subaqueous borrow pit.**	**			
ACTION D-4.6: Implement operational scale use of an existing subaqueous borrow pit.**	$80 million for large pit $40 million for small pit	*		
ACTION D-4.9: Conduct bench-scale studies and, if promising, pilot-scale studies of BCD technology.	$1 million			
ACTION D-4.10: Conduct bench- and pilot-scale studies of innovative treatment technologies.	$5.48 million (to date) + *			
ACTION D-5.0: Implement the Mud Dump Site Closure Monitoring and Management Plan.***	***	*		
ACTION D-6.3: Perform pilot disposal project using geotextile containers.	$250,000			
TOTAL	$126,730,000 + *[1]	*		

* Project implementation costs to be developed as part of the continuing planning process.
** Costs to be included in the EIS.
*** To be included in closure management and monitoring plan 9/96.
[1] Notation (+ *) indicates cost plus additional costs to be determined.

BENEFITS OF IMPLEMENTING THIS PLAN

HEP's Plan to address dredged material management will assist in attaining our vision to establish and maintain a healthy Harbor/Bight ecosystem and to implement dredged material disposal alternatives that promote beneficial uses. While the Plan is multi-faceted, all facets move along parallel tracks. The Plan provides environmentally reasonable immediate and short-term disposal alternatives for dredged material while allowing for the selection, design, and implementation of mid- and long-term non-ocean disposal alternatives for dredged material not suitable for ocean disposal. The Plan aggressively sets forth an integrated approach stressing coordinated and expeditious regulation of dredged material and early implementation of alternate disposal options and pollution control measures.

Full implementation of the actions associated with the Dredged Material Management component of this Plan is expected to ensure that the contribution of the Port to the economy and quality of life of the Region is maintained. The outcome of implementation of this Plan may, among other things, be demonstrated through an improvement in the quality of sediments deposited in the Estuary, remediation and restoration of areas adversely affected by dredged material disposal, the development of alternatives to ocean disposal, more efficient regulation of dredged material, the development of treatment technologies for dredged material, and the growth of water-dependent industries such as tourism and commercial and recreational fishing.

Table 16(ds). Summary—Management of Dredged Material

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE D-1: Develop a future dredged material management structure (also see section on Post-CCMP Management Structure).				
ACTION D-1.1: Evaluate alternatives and determine Forum/HEP structure.				
-- Suggest options for Forum/HEP structure.	Chairs - HEP PC reps, HEP CAC, Forum DMMIWG	Completed	Base program	C/N
-- Determine Forum/HEP structure.	HEP Policy Committee	Completed	Base program	C/N
ACTION D-1.2: Identify responsible parties for all actions and commitments and assist in the development of implementation programs for these actions.	Forum, through the DMMIWG, in consultation with HEP	Ongoing	Base program	C/N
ACTION D-1.3: Review and comment on work plans, SOW, work products, etc.	DMMIWG	Ongoing	Base program	C/N
ACTION D-1.4: Interact with USACE in the development of the long-term plan for dredged material in the New York-New Jersey Harbor.	DMMIWG on behalf of the Forum	Ongoing	Base program	C/N

Note: It is HEP's goal that all the recommendations in the CCMP become commitments.

-- In some cases CCMP actions are recommendations, not commitments, because responsible entities require resources to implement the action. HEP will advocate making these resources available.

-- In other cases, CCMP actions are recommendations because HEP has not obtained the commitment of regulated entities and other responsible entities to implement the action. By issuance of this CCMP, HEP seeks the commitment of the responsible entities and requests that they step forward to voluntarily agree to implement the actions.

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 16(ds). Summary—Management of Dredged Material

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION D-1.5: Coordinate plans, proposals, and alternative courses of action pertaining to any matters that fall within the scope of this document with the relevant workgroups of the Dredged Material Management Forum.	USACE, USEPA, NJDEP, NYSDEC	Ongoing	Base program	C/N
OBJECTIVE D-2: Reduce continuing inputs of toxic chemicals and upland sediments and soils (see Management of Toxic Contamination section and the Management of Habitat and Living Resources section, Actions H-2.1, H-2.2, H-2.3).				
ACTION D-2.0: Review options that prevent sediments from entering navigational areas.	USACE	Draft: Completed Interim: Jul 1996 Final: Jul 1998	Base program	C/O
OBJECTIVE D-3: Characterize, categorize, and quantify material to be dredged.				
ACTION D-3.1: Develop interim chemical specific bioaccumulation evaluation methodology.				
-- Develop plan for implementation.	USEPA & USACE, in consultation with the Criteria Work Group	Completed Feb 1995	Base program	C/N
-- Develop draft guidance.		Apr 1996		
-- Seek authorization/appropriations for surveys, as necessary, to facilitate the chemical-specific bioaccumulation decision framework.	USEPA & USACE	Completed	Base program	C/N
-- Conduct surveys as necessary.	USEPA & USACE	Initial survey: May 1995 Final surveys: Sep 1995	Enhanced program cost - $300,000	C/N
-- Conduct peer and public review of guidance.	USEPA & USACE	Comments due: Jun 1996	Base program	C/N
-- Make decision to adopt all, part, or none of guidance.	USEPA & USACE	Jul 1996	Base program	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 16(ds). Summary—Management of Dredged Material

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Implement guidance, as appropriate.	USEPA, USACE, regulated community	Oct 1996	Base program	C/N
ACTION D-3.2: Recommend reference site and reference sediment database.	USEPA & USACE	Feb 1996	Base program	C/N
-- Recommend an appropriate reference site.				
-- Recommend an approach for establishing a reference sediment database.				
ACTION D-3.3: Develop a national guidance document to assist the USEPA regions in bioaccumulation decision-making.	USEPA	Jun 1997	Base program	R
ACTION D-3.4: Modify the Mud Dump monitoring and management plan to incorporate the interim chemical-specific, bioaccumulation approach.	USEPA, USACE, in consultation with Mud Dump Work Group	Oct 1996	Base program	C/N
ACTION D-3.5: Develop draft criteria for upland disposal.	NJDEP, NYSDEC, Criteria and Containment Work Groups	NJ: Jan 1996 NY: To be determined	Base program	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 16(ds). Summary—Management of Dredged Material

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION D-3.6: Categorize and quantify dredged material.	USACE	Mar 1996	Base program	C/N
-- Categorize sediments based on the regional bioaccumulation approach.				
-- Estimate the quantities of dredged material currently pending in each category using the interim chemical-specific approach.		Jul 1996		
ACTION D-3.7: Determine need for pro-active sampling and testing.	USEPA, USACE, NYSDEC	Mar 1996	Base program	C/N
-- Collect data if necessary.			Enhanced program costs to be estimated by Jan 1996	R
-- Estimate quantities of dredged material in each category.			Base program	C/N
ACTION D-3.8: Develop a table which matches dredged material disposal alternatives to regional dredged material categories.	USACE, USEPA, NJDEP, NYSDEC, Forum work groups	Mar 1996	Base program	C/N
OBJECTIVE D-4: Identify, evaluate, and select disposal and treatment/decontamination alternatives.				
ACTION D-4.1: Determine a recommended depth and controlling depth for dredged material at the MDS and its environs.	USEPA & USACE, in consultation with the Mud Dump Work Group	Apr 1, 1996	Base program	C/O
ACTION D-4.2: Provide design criteria for various mound placement and capping options.	USACE & USEPA	Aug 1, 1996	Base program	C/O

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 16(ds). Summary—Management of Dredged Material

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION D-4.3: Prepare SEIS and site designation rulemaking for expanded Mud Dump Site.			Enhanced program - total cost of designating a new, expanded site is estimated at $1.3 million	
-- Perform necessary studies.	USEPA & USACE, in consultation with Mud Dump Site Work Group	Initiated: Oct 1994 Completed: Sep 1995		C/N
-- Publish a supplemental EIS.	USEPA	Oct 1996		C/N
-- Publish rulemaking.	USEPA	Post-Nov 1996		C/N
ACTION D-4.4: Develop management plan for dredged material. (Phase I - completed).	USACE	Final: Jul 1998 Interim: Jul 1996	Enhanced program cost - $12.8 million (Note: Cost for implementation of the plan to be estimated by Jul 1996.)	C/O
-- Review USACE recommendations for siting containment islands and provide input.	NY & NJ	Oct 1996	Base program	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 16(ds). Summary—Management of Dredged Material

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION D-4.5: Make decisions on Newark Bay subaqueous borrow pit.				
-- Act as lead to implement subaqueous borrow pits.	Port Authority as an applicant to USACE, in consultation with the Containment Work Group & NJ Governor's Task Force	Ongoing	Base program; included in EIS	C/N
-- Conduct comparison analysis of federal and non-federal sponsorship for implementation.	Containment Work Group	Completed	Base program	C/N
-- Conduct EIS.	USACE or Port Authority	Dec 1996	Project implementation cost to be included in EIS	C/N
-- Determine appropriate cooperating agency.	USACE, NJDEP, Port Authority	Dec 1996		
ACTION D-4.6: Make decisions on existing subaqueous borrow pits.				
-- Lower Bay Demonstration Scale Borrow Pit.				
• Make state regulatory decisions on WQC.	NYSDEC	To be determined	Base program	C/O
• Implement.	USACE	To be determined	Project implementation cost to be determined within 3 months of decision on WQC	C/O*

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

* Contingent upon receipt of State Water Quality Certification.

(Continued)

Table 16(ds). Summary—Management of Dredged Material

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Lower Bay Operational Scale Borrow Pit.				
• Make state regulatory decisions on WQC.	NYSDEC	Within 6 months of demo project completion	Base program	C/O
• Implement (including design and construction).	USACE	To be determined	$80 million for a pit with 9.3 million cy capacity $40 million for a pit with 4.7 million cy capacity	C/O*
ACTION D-4.7: Assess feasibility of modifying sand mining practices for the purpose of creating new borrow pits.	USACE, NJDEP, NYSDEC, in consultation with the Dredging, Transport & Disposal Work Group	Ongoing	Base program	C/O
ACTION D-4.8: Monitor upland disposal.				
-- Monitor the progress of private sector applicants seeking to site and operate upland disposal areas.	NJDEP & NYSDEC	Ongoing	Base program	C/O
-- Seek regional upland disposal sites.	Port Authority	Ongoing	Enhanced program cost to be determined	C/N

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[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

* Contingent upon receipt of State Water Quality Certification.

(Continued)

Table 16(ds). Summary—Management of Dredged Material

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION D-4.9: Conduct studies of the Base-Catalyzed Dechlorination (BCD) technology.	USEPA, in consultation with USACE and the Decontamination/ Siting Work Group		Total project cost - $1 million	
-- Complete bench-scale studies.		Completed		C/O
-- Begin pilot-scale studies (if promising).		As appropriate		C/O
ACTION D-4.10: Arrange for bench- and pilot-scale studies of viable technologies for treating sediments.	USEPA & USACE, in consultation with the Decontamination/ Siting Work Group		$5.48 million	C/O
-- Award contracts for 7 bench-scale technologies.		Awarded Aug 1995		
-- Collect sediments.		Collected Oct 1995		
-- Complete bench-scale studies.		Completed Jan 1996		
-- Begin pilot-scale studies (if promising).		Initiate pilot: Mar 1996 Project finished: Dec 1996 Feasibility report for full scale operation: Dec 1996		

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C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 16(ds). Summary—Management of Dredged Material

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE D-5: Develop plans for closure of the Mud Dump Site and historical disposal areas.				
ACTION D-5.0: Develop and implement closure plans for ocean disposal sites.				
-- Develop closure management and monitoring plans for the MDS, adjacent areas, and historical disposal sites. This includes remediation and restoration.	USEPA & USACE, in consultation with the Mud Dump Site Work Group	Sep 1996	Base program	C/N
-- Implement the closure management and monitoring plan.		As appropriate	Base program + project implementation cost to be determined by Sep 1996	C/N
OBJECTIVE D-6: Improve dredging, transport, and disposal operations.				
ACTION D-6.1: Recommend specific improvements for equipment and methods used in dredging, transport, and disposal operations.	Dredging, Transport, and Disposal Work Group	Ongoing	Base program	C/N
ACTION D-6.2: Determine if hydraulic dredging is feasible for borrow pit disposal and very confined sites.	USACE	To be determined	Base program	C/N
ACTION D-6.3: Conduct pilot dredging projects for disposal in geotextile containers.	Port Authority & USEPA, in consultation with the Dredging, Transport, and Disposal Work Group	Completed Results Mar 1, 1996	$250,000	C/N
-- Determine need for full scale use of geotextile containers.		Ongoing	Base program	
ACTION D-6.4: Ensure consideration of volume reduction and innovative dredging techniques (if warranted).	USACE, NYSDEC, NYSDOS, NJDEP	Ongoing	Base program	C/O
ACTION D-6.5: Assess the impact of reducing the width or depth of specific channels through computerized simulations.	MARAD	Ongoing	Enhanced program cost to be estimated by Jan 1996	C/O

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C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 16(ds). Summary—Management of Dredged Material

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION D-6.6: Sponsor an economic assessment of tipping fees in the Port.	DMMIWG will identify responsible entity to complete	Oct 1996; Completion by Jan 1997	Enhanced program cost to be estimated by Jan 1996	C/N
ACTION D-6.7: Seek Congressional input on the establishment of tipping fees.	DMMIWG will identify responsible entity to complete	Oct 1996; Completion by Jan 1997	Base program	C/N
OBJECTIVE D-7: Expedite permit decisions.				
ACTION D-7.1: Finalize a draft MOU for ocean disposal site management and site designation.	USEPA & USACE	Draft completed Sep 1995 Final by Sep 1996	Base program	C/O
ACTION D-7.2: Explore development of joint permit information packages for projects proposing ocean and/or non-ocean disposal.	USACE, NYSDEC, NJDEP, in cooperation with DMMIWG	Ongoing	Base program	C/N
ACTION D-7.3: Explore development of a federal regional regulation/guidance document addressing the concerns of the federal resource agencies.	USEPA, NOAA-NMFS, USFWS, NYSDEC, NJDEP, USACE, in cooperation with DMMIWG	Ongoing	Base program	C/N
ACTION D-7.4: Develop a regional state regulatory/guidance document which addresses the concerns of the state resource agencies.	NYSDOS, NYSDEC, NJDEP, in cooperation with DMMIWG	Ongoing	Base program	C/N
ACTION D-7.5: Explore the formation of a federal and state interagency group to integrate federal and state regulatory guidances.	USACE in cooperation with DMMIWG	Apr 1996	Base program	C/N

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C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 16(ds). Summary—Management of Dredged Material

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION D-7.6: Explore establishment of a unified regulatory process for resolving resource use concerns.	USACE, USEPA, NMFS, USFWS, NYSDEC, NJDEP, in cooperation with DMMIWG	Ongoing	Base program	C/N
ACTION D-7.7: Explore development of consistent testing requirements for dredged material disposal for both ocean and non-ocean disposal alternatives. This will be coordinated with the Criteria Work Group and the Dredged Material Management Forum.	USEPA, USACE, NJDEP, NYSDEC, Criteria Work Group, Forum	Jun 1996	Base program	C/N
ACTION D-7.8: Report on status of efforts to streamline permitting.	USACE	Every 6 months	Base program	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

MANAGEMENT OF PATHOGENIC CONTAMINATION

PROBLEMS
Beach closures
Shellfish bed closures

SOURCES
Municipal discharges
Combined sewer overflows
Storm water
Vessel discharges
Other non-point sources

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

GOALS *Preserve, restore, and maintain human uses of Harbor and coastal waters for bathing and shellfishing.*
Ensure protection of human health from ingestion of pathogens.
Protect marine and coastal resources from adverse pathogenic effects.

OBJECTIVES ***Reduce Loadings***
P-1 Reduce loadings of pathogens from CSOs, storm water discharges, and non-point sources to levels protective of public health.
P-2 Reduce or eliminate the discharge of raw or inadequately treated sewage due to sewage treatment plant malfunctions and illegal connections.
P-3 Establish marina pumpout facilities and no discharge zones to reduce impacts of vessel discharges.

Understand and Manage Risk
P-4 Develop additional indicators of pathogenic contamination.
P-5 Continue interstate dialogue on beach closure policies to ensure reasonably consistent approach.
P-6 Optimize disinfection practices.
P-7 Continue appropriate research, environmental monitoring, and modeling to identify remediation activities and support recovery of uses.

THE PROBLEMS

Pathogens are disease causing micro-organisms, such as bacteria, protozoans, and viruses, that are present in untreated or inadequately treated human sewage and domestic and wild animal wastes.

Human sewage and related discharges have for a long time impaired the water quality of the Harbor/Bight. This contamination affects the public when recreational beaches are closed, waters for recreational boaters are degraded, and shellfish beds are closed or restricted. Unhealthy water quality conditions may also pose risks to living marine resources.

Currently, no portion of the Harbor core area is approved for the direct harvesting of shellfish; on the other hand, all public bathing areas, which are primarily in the outer reaches of the Harbor core area, are currently approved for recreational bathing. In the Bight, waters are generally approved for shellfishing, except for a Federal Shellfish Closure Area around the former municipal sewage sludge disposal site; all ocean beaches are approved for bathing.

In the back bays adjacent to the Bight, closed and restricted shellfish areas are common in the more heavily developed areas and in tidal tributaries. Storm water and non-point source runoff periodically cause closures of back bay area

bathing beaches which are particularly sensitive to such contamination sources.

Assessment Based on Existing Water Quality Standards

Fecal and total coliform bacteria are water quality indicators that have been used since the early 1920s to protect the public from such waterborne bacterial diseases as typhoid fever. Water quality suitable for bathing and shellfishing is determined by measuring the concentration of these fecal and total coliform indicators, which are associated with sewage contamination (see highlighted text box). Samples are not routinely taken for pathogenic organisms because they typically exist only sporadically and in low concentrations, making their detection difficult and costly. New York and New Jersey are two of only four states in the Nation that monitor the entire length of their marine coastlines for bacterial indicators.

Shellfish

Water quality impairments in New York-New Jersey Harbor have adversely affected shellfish resources since the mid-1920s. Currently no area of the Harbor is approved for direct shellfish harvesting, but restricted harvesting is permissible for portions of the Lower, Raritan, and Sandy Hook Bays and the Shrewsbury and Navesink Rivers. Restricted harvesting means that shellfish must be cleansed before being marketed for human consumption. Pathogenic organisms (as measured by bacterial indicators) are purged, either at a depuration plant or in clean marine waters. Water quality standards for waters used for harvesting for depuration are less stringent than water quality standards for waters used for direct harvesting. There are no specific water quality standards for waters used for relay harvesting. Jamaica Bay, New York also has a significant shellfish resource, but its waters are closed because of water quality concerns and wildlife protection mandates of the U.S. National Park Service. Hard and soft-shell clams are currently the most commercially valuable molluscan shellfish in the Harbor.

Beyond the mouth of the Harbor, in the Bight Apex, there is a Federal Shellfish Closure Area at the former 12-mile ocean dump site for municipal sewage sludge. The closure area is generally a circle, six nautical miles in radius, and includes portions of the adjacent shore areas of Long Island and New Jersey. Sewage sludge dumping ceased at this site in 1987, and a three-year monitoring study conducted by the National Marine Fisheries Service has demonstrated progressive environmental recovery of the site. Currently, bacterial indicator levels in the Bight Apex waters meet the standards for direct shellfish harvesting, but the U.S. Food and Drug Administration has not yet taken administrative action to reopen the

Water quality, including the choice of water quality indicators, is only one of several factors that must be considered in a discussion of bathing and shellfishing use impairments. To evaluate the potential for restoration of historic uses within the Harbor/Bight, the states must also consider:

- ***proximity to effluent discharges;***
- ***extent and nature of shoreline modification;***
- ***navigation lanes and berthing areas; and***
- ***current and circulation patterns.***

Thus, despite the improvements that are possible in Harbor/Bight water quality, full recovery of historic uses is not an attainable goal. For example, shellfish areas are closed around each sewage treatment plant outfall, regardless of effluent quality, as a precautionary measure. The regulating authority must avoid potential human health risks associated with even a temporary violation of water quality standards. These types of factors are used by both states in setting policies for permanent and temporary closures of shellfish and bathing beach areas.

Federal Closure area. Both states administer other precautionary closure areas around ocean outfalls and some inlets. New Jersey also designates shellfish closure areas to protect spawning stock. The most commercially valuable molluscan shellfish in ocean waters are surf clams, ocean quahogs, and sea scallops.

In the back bay regions, closed and restricted shellfish areas are common in the more heavily developed areas and in tidal tributaries. In recent years, New Jersey has restored some back bay waters to less-restrictive shellfish classifications. A continuing trend in Long Island back bays is more restrictive classifications and larger closure areas. Commercially significant shellfish in back bay waters include hard and soft-shell clams, oysters, blue mussels, and bay scallops.

Beaches

New York City manages 24 miles of public beaches along its Harbor and ocean shores, and all are approved for bathing. Recent declines in total coliform loadings have led to the reopening of Seagate Beach on Coney Island and South Beach and Midland Beach on Staten Island. Furthermore, NYCDOH has dropped rainfall advisories completely from seven of the ten New York City public beaches and reduced the advisories for the remaining three. Water quality is a concern and continues to affect a number of private or historical beach sites in New York City and other municipalities along the Upper East River, western Long Island Sound, Jamaica Bay, and Raritan Bay.

Ocean beaches in New York and New Jersey are generally approved for swimming. Temporary beach closures, in 1987 and 1988, stimulated action to address washups of floatable debris and sewage treatment plant malfunctions. These actions have resulted in reduced incidences of ocean beach closures since 1988.

Some Bight back bay area bathing beaches have been periodically closed. Storm water and non-point sources, such as boat discharges and waterfowl, have a greater effect on the quality of these back bay beaches than on ocean beaches or Harbor beaches.

Assessment Based on Additional Pathogenic Indicators

Fecal and total coliform indicators are useful surrogates for bacterial disease-causing organisms. Currently, however, it is believed that the most common marine pollution-related disease agents are viruses. Coliforms are not as persistent in the water environment as viral pathogens and may not reflect the actual presence of pathogenic viruses and, thus, health risk. Studies are underway at both the federal (National Indicator Study) and state (New Jersey Alternative Pathogenic Indicator Study) levels to evaluate indicators that may better assess public health risk or track and identify sources of contamination.

A first study conducted by NJDEP with HEP funds assessed the utility of a specific viral indicator, F+RNA coliphage. This type of indicator may better trace the fate of pathogenic viruses in coastal waters than conventional bacterial indicators. The following conclusions resulted from this study:

- The F+RNA coliphage is a promising indicator, and it demonstrates a relationship to the expected degree of fecal contamination for significant population sources.
- The F+RNA coliphage can potentially differentiate human from animal fecal contamination.
- The F+RNA coliphage does not correlate well with other, conventional, bacterial indicators of water quality.
- The monitoring of waters for F+RNA coliphage is possible through routine quantitative testing procedures.

New Jersey is currently undertaking a follow-up study to further assess the potential of the F+RNA coliphage as a practicable microbial water quality indicator and to detect the presence of human enteric (pathogenic) viruses in Harbor/Bight waters.

SOURCES CONTRIBUTING TO THE PROBLEMS

Based on Bacterial Indicators

Pathogens of human origin enter the aquatic environment by a number of pathways. The public health significance of each will vary depending on the kinds and concentrations of micro-organisms present, the volume of the effluent discharged relative to the volume of the receiving waters (the dilution factor), and the uses to be made of the affected waters. It is important to distinguish between contamination as measured by fecal coliforms (FCOLI) and actual pathogenic contamination. The term pathogenic contamination refers to the full suite of disease causing micro-organisms (viruses, bacteria, protozoans, etc.) in the wastestream, but these are not routinely measured. Characterization of pathogenic water quality conditions in the Harbor/Bight is determined primarily by the coliform bacterial indicators, which are routinely measured, associated with pollution sources, and applied conservatively to protect public health.

Sources of pathogens to the Harbor/Bight, based on conventional pathogenic indicators, include: 1) sewage treatment plant effluents, 2) combined sewer overflows, 3) storm water discharges, 4) non-point source runoff, 5) tributary sources, 6) vessel discharges, and 7) ocean dump sites. The relative importance of these sources varies among the several geographically distinct components of the regional ecosystem: the Harbor core area including the Lower Bay Complex and other waters; the Bight; and the back bays. Table 17(p) presents a comparison of the major pathogenic sources, and their relative significance to resource impairment in the Harbor/Bight, for shellfish beds and bathing beaches. Resource impairment is rated by relative FCOLI contributions from the sources, in combination with the extent to which additional precautionary actions are considered necessary to protect public health.

The tributary flow into the Estuary is greater than any other source contribution, representing 80 percent of the entire flow, but this source contributes only 1.8 percent of FCOLI. Municipal flow is secondary in volume at 14 percent but contributes very small quantities of FCOLI (0.04%). On the other hand, CSO flows are low(1.3%) but contribute 89 percent of the FCOLI levels; storm water flows are also low (3.5%) and contribute 8.9 percent of the FCOLI levels.

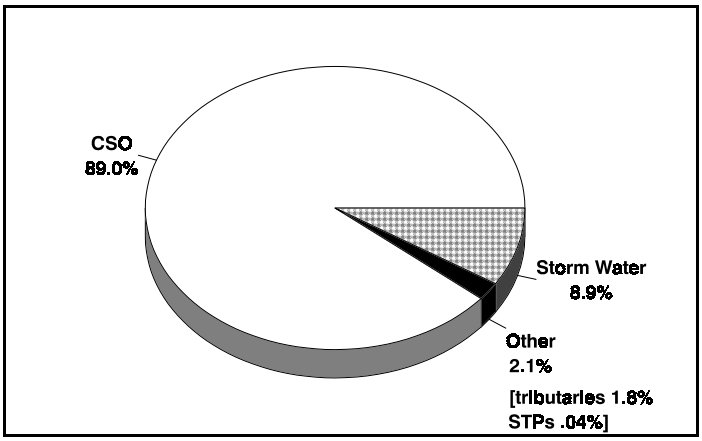

Figure 8. Loadings of Fecal Coliform to the Estuary

Sources in Table 17(p) are rated high (H), medium (M), or low (L) for their significance to use impairments. A source rated high (H1) significantly degrades waters for bathing or shellfishing uses; a source rated H2 requires precautionary closures affecting a wide area. A medium-rated source (M) contributes measurable contamination to a water body, which may restrict uses, but leads to closures for only short durations. A source rated low (L) contributes little or nothing to the pathogenic contamination problem of a water body. In general, a given source is more significant in terms of shellfish impairment than bathing beach impairment because water quality standards for shellfishing waters are much stricter. This analysis does not directly consider current water quality classifications for the Harbor/Bight. Information on each of the major pollution sources follows Table 17(p).

Table 17(p). Use Impairments by Bacterial Pathogenic Indicator Sources in the Harbor/Bight (for use in understanding relative contributions to use impairments)

SHELLFISH

SOURCE	HARBOR		BIGHT	BACK BAYS
	LOWER BAY COMPLEX*	OTHER WATERS**		
STPs	M	H2	M	M(LI) n/a(NJ)
CSOs	H1	H1	M	n/a
Storm water	H1	H1	M	H1
Non-point	M	H1	M	H1
Tributaries	L	M	L	M
Vessels	L	M	L	M
Dump Sites	n/a	n/a	?	n/a

BATHING BEACHES

SOURCE	HARBOR		BIGHT	BACK BAYS
	LOWER BAY COMPLEX*	OTHER WATERS**		
STPs	L	M	L	L
CSOs	M	H1	L	n/a
Storm water	M	H1	M	H1
Non-point	L	M	L	M
Tributaries	L	M	L	M
Vessels	L	L	L	L
Dump Sites	n/a	n/a	n/a	n/a

A source rated high (H1) significantly degrades waters for bathing or shellfishing uses; a source rated H2 requires precautionary closures affecting a wide area. A medium-rated source (M) contributes measurable contamination to a water body, which may restrict uses, but leads to closures for only short durations. A source rated low (L) contributes little or nothing to the pathogenic contamination problem of a water body.

* Lower Bay Complex -- Lower Bay, Raritan Bay and Sandy Hook Bay
** Other Harbor Waters -- Generally, Jamaica Bay, Shrewsbury and Navesink Rivers, and west Long Island Sound. There is little potential for shellfishing and bathing uses elsewhere in Harbor and New York City waters.
n/a = not applicable
LI = Long Island
NJ = New Jersey

1) Sewage Treatment Plants (STPs) - STPs, as currently operated in the region, are not normally a substantial threat to human health based on contributions of FCOLI; however, failures at treatment plant operations can have serious and widespread short-term water quality impacts. As a result, STPs remain a significant source of pathogenic use impairment.

2) CSOs - Under current year-round disinfection practices at area STPs, CSOs represent the greatest discharge of FCOLI to the Harbor. Large volumes of water generated during rain events, when combined with the regular sanitary wastestream, overwhelm the capacity of the STPs and collection systems, and overflow directly into the Harbor. During dry weather, the Harbor generally attains water quality standards, but during wet weather when CSOs are discharging, water quality is seriously degraded. There are no CSOs in the Bight; however, CSOs in the Harbor do contribute to impacts in the Bight Apex.

3) Storm water - Separate storm water lines also contribute FCOLI, although the public health risk varies. Human pathogens may enter storm lines from leaking sanitary lines or through illegal sewer connections, but the level of human pathogens is generally low compared to other sources. Storm water may also carry domesticated animal droppings and other street refuse. Storm water discharge occurs frequently throughout the region, and although its contamination level may be lower than some other sources, it is often sufficient to cause water quality degradation. Even in coastal portions of the Bight, storm water may adversely affect bathing beaches and shellfish beds. For storm water, and for non-point and tributary sources, indicators that can differentiate between human and animal pathogens may better enable

health officials to determine actual public health risk.

4) Non-point Sources - Non-point sources (NPS) of FCOLI include agricultural runoff, which transports animal fecal wastes, and discharges from improperly functioning septic systems. Another NPS may be the resuspension of sediments. NPS, in combination with storm water, is a major source of beach and shellfish contamination in portions of the Harbor and coastal back bays.

5) Tributary Sources - Rivers and freshwater tributary flows contain upstream point and non-point sources. While their volume is the largest of all of the sources, their contribution of FCOLI is relatively low, and effects on water quality tend to be local. While these contributions contain a mix of human and animal pathogens, the public health risk of this source is uncertain at present.

6) Marine Vessel Discharges - These can be locally significant sources of pathogens in coastal waters, particularly in the back bays and protected embayments of the Harbor core area. This source of contamination does not generally have serious effects on bathing beach conditions, but can cause intermittent violations of shellfishing standards or pose the potential for such violations. For example, several thousand acres of potential shellfish waters in the State of New York are restricted based on their proximity to marinas and vessel discharges.

7) Ocean Dump Sites - Ocean dump sites have been sources of FCOLI to the Bight. The most significant of these is the former 12-mile site for municipal sewage sludge, which was active from 1924 to 1987. Ocean sludge dumping led to the federal shellfish closure designation in the Bight Apex. Recent surveys show a substantial recovery of the waters at this site, but any remaining health risk from bottom sediments has not yet been determined.

THE PLAN TO SOLVE THE PROBLEMS

Overview

HEP has identified three major pathogen-related goals:

- Preserve, restore, and maintain human uses of Harbor and coastal waters for bathing and shellfishing.
- Ensure protection of human health from water-borne pathogens.
- Protect marine and coastal resources from adverse pathogenic effects.

The goals for recovery of beneficial uses are targeted to specific geographic areas of the Harbor/Bight region where a potentially recoverable resource is present and other considerations do not preclude those uses. HEP has identified the Bight Apex, the Lower Bay Complex (including Sandy Hook and Raritan Bays) within the Harbor core area, and the western end of Long Island Sound as priority areas for recovery and enhancement of bathing and shellfishing uses. The Shrewsbury and Navesink Rivers and Jamaica Bay also contain viable recoverable resources and are priorities for recovery by the two states. It is noted that shellfishing in Jamaica Bay is restricted due to the wildlife management mandates of the U.S. National Park Service, which has jurisdiction over most of the Bay. Other waterways within the Harbor core area, which are highly developed and urbanized, have only limited, if any, potential for recovery of bathing or shellfishing uses.

Consistent with the goal of preserving, restoring, and maintaining human uses, New York State has identified a subgoal to restore water quality, in those portions of the Harbor core area with viable shellfish resources, to levels that would permit depuration harvesting. Depuration harvesting standards are also protective of bathing beach uses. HEP supports this goal and will seek to achieve it wherever recoverable uses are found in the region.

Based on recent readings of improved estuarine water quality, New Jersey is in the process of evaluating the possibility of upgrading over 1,000 acres of shellfish waters in the Navesink River to the "seasonally approved" classification, which would permit direct harvest and marketing of shellfish during the winter. This development came about through a major interagency initiative in New Jersey, over a period of years, to reduce non-point source bacterial pollution in the Navesink Estuary.

The links between human pathogenic contamination and disease and mortality in marine species are not clear, but it is presumed that measures to improve water quality to promote bathing and shellfishing uses will also benefit the marine environment.

In order to achieve the three pathogen-related goals, HEP has developed a program with seven objectives:

- Reduce loadings of pathogens from CSOs, storm water discharges, and non-point sources.
- Reduce or eliminate the discharge of raw or inadequately treated sewage due to sewage treatment plant malfunctions and illegal connections.
- Establish marina pumpout facilities and no discharge zones to reduce impacts of vessel discharges.
- Develop additional indicators of pathogenic contamination.
- Continue interstate dialogue on beach closure policies to ensure reasonably consistent approach.
- Optimize disinfection practices.
- Continue appropriate research, environmental monitoring, and modeling to identify remediation activities and support recovery of uses.

COMMITMENTS AND RECOMMENDATIONS

OBJECTIVE P-1 Reduce loadings of pathogens from CSOs, storm water discharges, and non-point sources to levels protective of public health

Rainfall-Induced Sources

Three sources of pollution to the Harbor/Bight -- CSOs, storm water discharges, and non-point source runoff -- are associated with runoff induced by rainfall. Effective abatement of these sources is important in reducing pathogenic use impairments in the Harbor/Bight. Details of HEP's plan to address these sources is found in the section on Rainfall-Induced Discharges.

Combined Sewer Overflows

CSOs are the dominant source of bacterial indicators in the Harbor. HEP's plan to abate CSO discharges includes the following actions addressing pathogen contamination:

-- Fully implement the nine minimum control measures of the National CSO Control Policy (see Objective CSO-1 below).

-- Implement additional CSO controls to meet water quality standards and restore beneficial uses (see Objective CSO-2 below).

- New York City is constructing CSO retention facilities and conducting long-term CSO abatement planning (see Action CSO-2.1 below).
- USEPA and NJDEP will obtain commitments from New Jersey CSO owners and operators to develop long-term CSO abatement plans (see Action CSO-2.2 below). HEP encourages the owners/ operators to do this work as a cooperative regional effort.

- HEP is using the New York City water quality model to refine target areas for actions to recover and enhance bathing and/or shellfishing uses (see Action CSO-2.3 below).

Storm Water Discharges

Storm water discharges are important sources of bacterial indicators in back bays of the Bight and in portions of the Harbor. HEP's plan to abate storm water discharges includes the following actions addressing pathogen contamination:

-- Implement measures to control municipal and industrial storm water discharges (see Objective SW-1 below).

- Issue NYC storm water permit (see Action SW-1.1 below).
- Process storm water permit applications from New Jersey local authorities in areas of the Harbor where water quality parameters violate established standards or classifications (see Action SW-1.2 below).
- Incorporate requirements of the general permits that control construction discharges into local codes (see Action SW-1.3 below).
- Expand geographic coverage of the New Jersey Sewage Infrastructure Improvement Act (see Action SW-1.4 below).

Non-Point Source Runoff

Non-point source runoff is an important source of bacterial indicators in back bays of the Bight and in portions of the Harbor. HEP's plan to abate non-point source runoff includes the following actions addressing pathogen contamination:

-- Conduct non-point source management programs for Barnegat Bay, Whippany River, and Navesink River (see Actions NPS-1.1 and NPS-1.2 below).

-- Develop and implement coastal non-point source management programs under the Coastal Zone Act Reauthorization Amendments (see Objective NPS-2 below).

-- Focus the Urban Resources Partnership Initiative on Harbor/Bight watersheds (see Objective NPS-3 below).

OBJECTIVE P-2 Reduce or eliminate the discharge of raw or inadequately treated sewage due to sewage treatment plant malfunctions and illegal connections

Consistent with the requirements of the Clean Water Act and regional disinfection policy, all municipal sewage treatment plants in the region must meet secondary treatment requirements and year-round disinfection requirements. In 1993, sewage flows from the Tottenville area of Staten Island were connected to the Oakwood Beach sewage treatment plant for treatment. This captured 0.7 mgd of sewage previously discharged without treatment, eliminating the last significant known area of raw sewage discharge to the Harbor. Since all of the region's STPs are meeting year-round disinfection requirements, they are no longer major sources of bacterial indicators.

There are, however, continuing problems associated with:

-- Occasional bypasses of raw sewage caused by sewage treatment plant and collection system malfunctions; and

-- Scattered, illegal connections of sanitary sewage to storm sewers and to combined sewers at points where the flow is not intercepted for treatment.

ACTION P-2.1
Beach/Shellfish Closure Action Plan
In response to intermittent closures of bathing beaches associated with occasional bypasses of raw sewage caused by sewage treatment plant and collection system malfunction, USEPA, NYSDEC, and NJDEP are currently implementing a short-term strategy for prevention and mitigation of these closures. This strategy, referred to as the Beach/Shellfish Bed Closure Action Plan, was first implemented in 1989, and has been a continuing

program since then. It includes the following provisions:

-- All short-term beach and shellfish closures are assessed for cause and traceability.

-- Causes that are traceable to discrete sources trigger prompt enforcement corrective action and penalties.

-- These enforcement responses are coordinated between USEPA and the affected states.

-- The lead agencies make public announcements of the enforcement responses as a further deterrent.

ACTION P-2.2
Reduction in Unregulated Sewage Discharges
HEP recommends that all dischargers in the region implement continuing programs to track down and eliminate unregulated discharges of raw sewage, both during dry weather and wet weather (see Rainfall-Induced Discharges section below).

-- Under the 1988 SPDES permit, New York City has increased surveillance and maintenance of its sewerage system, including a shoreline survey program, reducing the discharge of raw sewage from 4.84 mgd in 1989 to 0.4 mgd in 1993.

OBJECTIVE P-3 Establish marina pumpout facilities and no discharge zones to reduce vessel discharges

Marine vessel discharges can have local adverse effects on pathogenic water quality, particularly in tributary areas and small embayments where tidal flushing action is reduced. Since tributary areas and embayments are among the most severely impacted in the Harbor/Bight region, HEP recommends prudent measures to reduce pathogenic inputs from this source.

ACTION P-3.1
Marina Pumpout Stations
The states, using funds available under the Clean Vessel Act, will issue grants to install pumpout stations at marinas statewide to serve the boating community. New York and New Jersey have received $1 million and $700,000, respectively, portions of which will be applied to waterways in the Harbor/Bight region. Both states will apply for additional funds in fiscal years 1995-1997 to meet the need for pumpout facilities in harbors and embayments identified as potential "No Discharge" zones.

ACTION P-3.2
Clean Water Act Amendment
HEP recommends that the Clean Water Act be amended to allow the states to establish "no-discharge" zones and thus eliminate the need for the states to seek USEPA approval prior to the designation of no-discharge zones.

ACTION P-3.3
"No Discharge" Zones
The states, with USEPA concurrence, will designate, under Section 312(f)(3) of the Clean Water Act, "No Discharge" zones, where vessel discharge of sanitary wastes to protected waters is prohibited. The states will make designations on a targeted basis, with USEPA assistance, in the back bay areas tributary to the Bight in order to restore beneficial uses. The steps to designate "No Discharge" zones include:

-- States identify waters that require greater environmental protection than that afforded by existing standards for marine sanitation devices.

-- States request a determination from USEPA that adequate facilities for the pumpout and treatment of vessel sewage are available.

-- USEPA makes determinations on the adequacy of existing pumpout and treatment facilities.

-- States designate "No Discharge" zones to prohibit the discharge of vessel waste in the designated waters, if it is demonstrated that adequate pumpout facilities exist.

-- USEPA approves the "No Discharge" zone designation.

OBJECTIVE P-4 Develop additional indicators of pathogenic contamination

HEP recognizes the need to develop additional indicators of pathogenic contamination and recommends the following:

ACTION P-4.1
NJ Pathogenic Indicator Study
NJDEP will complete the current NJ Pathogenic Indicator Study, ascertain the utility of F+RNA coliphage as an additional pathogenic indicator, and the states will assess it as a diagnostic tool to identify pathogenic pollution source categories.

ACTION P-4.2
Research to Develop Human-specific Indicator
Based on an evaluation of the existing NJ Pathogenic Indicator Study (Action P-4.1), HEP will continue and seek funds, as appropriate, to develop a human-specific indicator that more closely approximates survival of viruses in the marine environment.

ACTION P-4.3
National Shellfish Indicator Study
USEPA, the states, and other HEP Management Conference participants will continue to support the National Shellfish Indicator Study and assess its findings in light of the ongoing HEP study. The states will determine any necessary changes to current shellfish sanitary policies based on these results.

ACTION P-4.4
Research on Relay/Depuration Process
As warranted by ongoing regional and national indicator studies, HEP recommends that research be conducted to determine the effectiveness of the relay and depuration process on the purging of human enteric viruses from shellfish.

ACTION P-4.5
Epidemiological Study of Beaches
In order to assess the efficacy of existing bathing beach sanitary policies, HEP recommends a national epidemiological study of beaches. The study should include data sets from the Harbor/Bight region.

OBJECTIVE P-5 Continue interstate dialogue on beach closure policies to ensure reasonably consistent approach

ACTION P-5.0
Beach Closure Policies
Recognizing that they have differing policies with regard to beach closures, the states will continue their dialogue in order to ensure the protection of public health and to ensure effective risk communication.

OBJECTIVE P-6 Optimize disinfection practices

Disinfection of treated effluent is one way to control the input of pathogenic agents to the Harbor/Bight system. As stated earlier, chlorination as a disinfection method is more effective against indicator bacteria than it is against pathogenic viruses. New York State is considering reducing the permitted discharge concentration of chlorine from STPs, prompting managers to explore alternative disinfection methods.

ACTION P-6.0
Disinfection Methods
HEP supports the use of optimal methods of disinfection and recommends that the states evaluate the results of New York City's investigation, under HEP, of alternative disinfection methods. As appropriate, the states will issue disinfection guidance.

-- NYCDEP will complete a report assessing alternative wastewater disinfection methods.

OBJECTIVE P-7 Continue appropriate research, environmental monitoring, and modeling to identify remediation activities and support recovery of uses

Billions of dollars have been expended over the past 25 years on the improvement of sanitary water quality in the Harbor/Bight region, and recent monitoring results attest to the effectiveness of those measures. In addition, New York City has developed a water quality model of the Harbor to help set priorities for future remedial actions and to predict the outcome of alternative pollution control measures. Since problem areas remain, and other problems become higher priorities as the most significant pollution sources are addressed, HEP recommends a comprehensive program of research and monitoring in the region.

ACTION P-7.1
Research Agenda
Appropriate agencies should conduct the following research activities:

-- Investigate the feasibility, desirability, and cost to attain shellfish depuration standards in specific waters where shellfish resources exist: Raritan Bay, Jamaica Bay, Shrewsbury and Navesink Rivers, and Western Long Island Sound.

-- Assess the residual toxic contamination within the sediments and shellfish of the Bight Apex, and in closed shellfish areas of the Harbor, to determine the suitability of the resource for human consumption (see Toxics section).

-- Review recent studies of marine-specific pathogenic outbreaks to determine potential human-induced causes and develop remediation measures as appropriate.

-- HEP recommends appropriate continuing research, as funds are available, based on an evaluation of New York City's study of alternative wastewater disinfection methods.

ACTION P-7.2
Environmental Monitoring Agenda
NYSDEC, NYCDEP, and NJDEP should continue and enhance pathogen-related monitoring efforts. ISC will continue to assist the states with collection of data for their monitoring programs.

-- The states will continue regular programs of bathing beach and shellfish monitoring as appropriate.

-- New York City will continue its Harbor Survey program.

-- New Jersey should consider supplementing New York City's Harbor Survey program by supplying data from existing supplemental survey stations in New Jersey tributaries to the Harbor core area.

ACTION P-7.3
Modeling Activities
HEP recommends that NJDEP, in cooperation with the responsible dischargers, calibrate and verify a water quality model for pathogen indicators for those waters not adequately addressed in New York City's Harbor Water Quality Model. The model would be used to forecast needed sanitary improvements to recover beneficial uses, design remedial measures, and assess the effectiveness of actions taken. (Note: This action would build upon efforts under Action CSO-2.3 below).

COSTS OF IMPLEMENTING THIS PLAN

A number of the actions in the pathogens component of the CCMP can be accomplished through the effective use of base program resources. The CCMP itemizes 5 new HEP-driven commitments to control pathogenic contamination using base program resources.

The CCMP also includes 9 commitments and recommendations for pathogens control programs that entail enhanced program funding. As shown in Table 18(pc) below:

- The Plan includes 2 commitments for efforts started through the HEP planning process, which total $281,800.
- The Plan includes 3 recommendations for actions which total $325,000 plus $15,000 per year.
- The Plan also includes 3 additional actions for which cost estimates will be developed as part of the continuing planning process.

This component of the CCMP includes another 2 commitments involving implementation costs for special projects. As shown in Table 19(pc) below, both New York and New Jersey will implement marine pumpout station installation programs for a total combined expenditure of $1.7 million. These funds will be distributed statewide in both states, including the Harbor/Bight region.

Table 18(pc). Enhanced Program Costs for Management of Pathogenic Contamination

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION P-4.1: Complete NJ pathogenic indicator study.	$256,800			
ACTION P-4.2: Continue research on human-specific pathogenic indicator.			$145,000	
ACTION P-4.4: Conduct research on relay/depuration process.			$180,000	
ACTION P-4.5: Conduct comprehensive epidemiological study of beaches.			*	
ACTION P-6.0: Complete assessment of optimal methods of disinfection.	$25,000			
ACTION P-7.1: Study recovery of NY Bight Apex (sludge dump site).			*	
ACTION P-7.1: Continue research, as appropriate, on best alternative wastewater disinfection methods.			*	
ACTION P-7.2: Supplement NYC Harbor Survey Program.				$15,000
ACTION P-7.3: Develop water quality model for pathogen indicators.			Cost included in estimate for Action CSO-2.2	
TOTAL	$281,800		$325,000+*[1]	$15,000

* Enhanced program costs to be developed as part of the continuing planning process.
[1] Notation (+*) indicates cost plus additional costs to be determined.

Table 19(pc). Project Implementation Costs for Management of Pathogenic Contamination

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION P-3.1: Implement pumpout station installation program in NY.	$1 million (statewide)			
ACTION P-3.1: Implement pumpout station installation program in NJ.	$700,000 (statewide)			
TOTAL	$1,700,000 (statewide)			

BENEFITS OF IMPLEMENTING THIS PLAN

Implementation of the commitments and recommendations for the management of pathogenic contamination would move the Program toward the fulfillment of goals to:

- Protect the human uses of the Harbor and coastal waters for bathing and shellfishing.
- Ensure the protection of human health from ingestion of pathogens.
- Protect the marine environment from adverse pathogenic effects.

Through implementation of the Clean Water Act, the state and federal governments have helped to:

1) Secure the quality of ocean beaches.
2) Improve the quality of beaches in the Harbor core area, allowing bathing in some areas for the first time in 20 years.
3) Slow the degradation of shellfishing areas, even to the point of restoring shellfish water quality in certain areas.

With the implementation of a number of short-term actions, such as the beach/shellfish closure action plan, participants of HEP have made additional incremental progress toward the attainment of these goals. Aesthetics, recreational opportunities, and the health of the human population and the regional ecosystem will all benefit from the implementation of this Plan component.

Table 20(ps). Summary—Management of Pathogenic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE P-1: Reduce loadings of pathogens from CSOs, storm water discharges, and non-point sources to levels protective of public health (see Rainfall-Induced Discharges section).				
OBJECTIVE P-2: Reduce or eliminate the discharge of raw or inadequately treated sewage due to STP malfunctions and illegal connections.				
ACTION P-2.1: Continue Beach/Shellfish Closure Action Plan.	NYSDEC, NJDEP, USEPA	Ongoing	Base program	C/N
ACTION P-2.2: Reduce unregulated sewage discharges.	NYSDEC & NYCDEP	Ongoing	Base program	C/O
	NJDEP	Ongoing	Base program	C/O
OBJECTIVE P-3: Establish marina pumpout facilities and no discharge zones to reduce impacts of vessel discharges.				
ACTION P-3.1: Ensure the installation of pumpout stations at marinas serving the boating community.	NYSDEC	By Dec 31, 1996	Project implementation cost - $1 million federal funding statewide	C/O
	NJDEP	Ongoing through 1998	Project implementation cost - $700,000 federal funding statewide	C/O

-- In some cases CCMP actions are recommendations, not commitments, because responsible entities require resources to implement the action. HEP will advocate making these resources available.

-- In other cases, CCMP actions are recommendations because HEP has not obtained the commitment of regulated entities and other responsible entities to implement the action. By issuance of this CCMP, HEP seeks the commitment of the responsible entities and requests that they step forward to voluntarily agree to implement the actions.

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 20(ps). Summary—Management of Pathogenic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION P-3.2: Amend CWA to allow "No Discharge" zone designations by the states.	US Congress	By Dec 31, 1996	Base program	R
ACTION P-3.3: Designate "No Discharge" zones, where vessel discharge of sanitary wastes to protected waters is prohibited.	NYSDEC & NJDEP, with USEPA concurrence	Ongoing	Base program	C/N
OBJECTIVE P-4: Develop additional indicators of pathogenic contamination.				
ACTION P-4.1: Complete the current NJ Pathogenic Indicator Study.	NJDEP	Mar 1996	Enhanced program cost - $256,800	C/N
ACTION P-4.2: Continue research to develop a human-specific indicator.	HEP	Post-CCMP	Enhanced program cost - $145,000	R
ACTION P-4.3: Support the National Shellfish Indicator Study.	NYSDEC, NJDEP, USEPA	Ongoing	Base program	C/N
ACTION P-4.4: Conduct research on relay/ depuration process.	Federal and state agencies	Beginning by Dec 31, 1996	Enhanced program cost - $180,000	R
ACTION P-4.5: Conduct comprehensive epidemiological study of beaches across the Harbor/Bight region.	NYSDOH & NJDEP	Post-CCMP	Enhanced program cost to be developed prior to conducting study	R
OBJECTIVE P-5: Continue interstate dialogue on beach closure policies to ensure a reasonably consistent approach.				
ACTION P-5.0: Continue dialogue on beach closure policies.	Interstate Sanitation Commission, NYSDOH, NJDEP, local health agencies	Ongoing	Base program	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 20(ps). Summary—Management of Pathogenic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE P-6: Optimize disinfection practices.				
ACTION P-6.0: Issue guidance on optimal methods of disinfection.				
-- NYC Report.	NYCDEP	Completed	Enhanced program cost - $25,000	C/N
-- Guidance.	NYSDEC & NJDEP	Mar 1996	Base program	C/N
OBJECTIVE P-7: Continue appropriate research, environmental monitoring, and modeling to identify remediation activities and support recovery of uses.				
ACTION P-7.1: Research Agenda.				
-- Assess residual toxic contamination in Bight Apex and Harbor shellfish beds.	Federal agencies (NOAA lead), NYSDEC & NJDEP	Begin by Dec 31, 1996	Enhanced program cost to be developed prior to conducting studies	R
-- Review studies of marine-specific pathogenic outbreaks.	Federal agencies	Sep 1996	Base program	R
-- Continue research, as appropriate, on best alternative wastewater disinfection methods.	NJDEP & NYCDEP	Sep 1996	Enhanced program cost to be developed based on results on NYC report (Action P-6.0) and other information	R

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 20(ps). Summary—Management of Pathogenic Contamination

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION P-7.2: Continue and enhance pathogen-related monitoring efforts.	NJDEP, NYSDEC, NYCDEP, local authorities	Ongoing	Base program	C/O
-- Continue bathing beach and shellfish monitoring as appropriate.	NYSDEC, NJDEP, ISC, some local health authorities	Ongoing	Base program	C/O
-- Continue Harbor Survey Program.	NYCDEP	Ongoing	Base program	C/O
-- Consider supplementing Harbor Survey Program by supplying data from existing supplemental survey stations in New Jersey tributaries to the Harbor core area.	NJDEP	By Dec 31, 1995	Enhanced program cost - $15,000/yr	R
ACTION P-7.3: Calibrate and verify a water quality model for pathogen indicators. (Note: This effort would build upon Action CSO-2.3).	NJ dischargers	By Dec 31, 1996	Enhanced program cost included in project implementation cost estimate for Action CSO-2.2; project-specific cost to be developed prior to conducting study.	R

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

MANAGEMENT OF FLOATABLE DEBRIS

PROBLEMS
Beach closures
Adverse impacts on commercial and recreational boating
Adverse impacts on coastal species

SOURCES
Combined sewer overflows
Storm water discharges
Non-point sources including littering, landfill practices, and marine transfer operation
Decaying shoreline structures and sunken vessels
Vessel discharges

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

GOALS
Eliminate floatable-related beach closures.
Prevent adverse impacts on coastal species resulting from floatables.
Prevent adverse impacts on commercial and recreational boating resulting from floatables.

OBJECTIVES
F-1 Continue and enhance implementation of the successful short-term floatables action plan.
F-2 Expand the USACE Harbor Drift Removal Program without compromising important habitat.
F-3 Implement beach and shoreline cleanups.
F-4 Assess and control landfill and solid waste practices.
F-5 Communicate impacts of marine debris and appropriate disposal practices.
F-6 Reduce loadings of floatables from CSOs, storm water discharges, and non-point sources.

THE PROBLEMS

When the Bight Restoration Plan was enacted in 1987, there was a significant floatable debris problem in the Harbor/Bight system. By the summer of 1989, an interagency floatables workgroup, convened under the auspices of the Bight Restoration Plan, had developed and implemented a short-term floatables action plan, effectively controlling the problem. The extent of ocean beach closures declined from over 70 cumulative miles in 1988 to less than 4 miles in 1989.

Floatable debris is waterborne waste material that is buoyant. Examples include wood, beach litter, aquatic vegetation, and detritus; street litter (cans, bottles, polystyrene cups, sheet plastic, straws, and paper products); sewage-related wastes (condoms, sanitary napkins, tampon applicators, diaper liners, grease balls, tar balls, and fecal material); fishing gear (nets, floats, traps, and lines); and medical wastes (hypodermic needles, syringes, bandages, red bags, and enema bottles). The primary source of floatable materials in the Bight is the Hudson-Raritan Plume, which carries Harbor discharges into ocean waters. However, much litter is also generated by beach-goers.

Beach Closures

The wash-up of floatable materials on bathing beaches is offensive. Although the real threat to public health posed by inadvertent contact with these floatable materials is small, the perceived threat is large. In 1976, wash-ups of floatable debris were responsible for the closing of 60 miles of New York beaches. In 1987, wash-ups were responsible for the closing of 25 miles of New Jersey beaches in May and 50 miles in August. In 1988, floatable materials were again responsible for the closing of 60 miles of beaches in New York. These beach closures generally lasted for periods ranging from several hours at a time to days, and the economic and social impacts were enormous. The SUNY Waste Management Institute estimates a loss between $990 million and $4 billion in New Jersey and between $950 million and $2 billion in New York in the 1987-1988 time frame.

Adverse Impacts on Commercial and Recreational Boating

Floating debris, particularly driftwood, poses hazards to shipping and recreational boating in the Harbor/Bight, but quantifying the damage is difficult. A U.S. Army Corps of Engineers (USACE) briefing paper on damages to vessels in the New York/New Jersey Harbor estimated that the damage from floating debris in 1987 was $48 million and involved 17,800 vessels. No comparable data are available for the Bight, although damages are thought to be much less. The USACE conducts two programs to address floating debris: 1) collection of debris already floating and 2) dismantling deteriorating structures before they fall apart and become drift.

Drift materials include timbers, pilings, plastics, rubber tires, fiberglass boats, polystyrene, rafts, floating drums, construction materials, and parts of barges, docks, sheds, and other shore structures.

Adverse Impacts on Coastal Species

Birds, mammals, and sea turtles are found seasonally throughout the Bight and portions of the Harbor. These living resources are vulnerable to entrapment and entanglement in plastic waste including six pack rings, fishing line, and nets. Turtles and mammals are also vulnerable to ingestion of plastic items, such as bags, that are mistaken for squid, jellyfish, or other prey. This ingestion often leads to suffocation or intestinal blockage and death. While the frequency of debris-related deaths of marine wildlife is difficult to quantify, the fact that several species are threatened and endangered makes this issue significant for the region. In addition, accumulations of floatable debris in coastal marshes and shorelines can effectively smother productive vegetated areas.

SOURCES CONTRIBUTING TO THE PROBLEMS

The sources of floatable debris in the ecosystem and the problems caused by this debris are fairly well understood. The sources of floatable debris include:

- Combined sewer overflows;
- Storm water;
- Non-point sources including littering, landfill practices, and marine transfer operations;
- Decaying shoreline structures such as piers, pilings, sunken barges, and bulkheads; and
- Vessel discharges.

THE PLAN TO SOLVE THE PROBLEMS

The floatables component of the CCMP plays an important role in establishing and maintaining a healthy and productive Harbor/Bight ecosystem with full beneficial uses. This component of the plan has three goals:

- To eliminate floatable-related beach closures;
- To prevent adverse impacts on commercial and recreational boating resulting from floatable debris; and
- To prevent adverse impacts on coastal species resulting from floatable debris.

In order to achieve these goals, HEP decided to address the floatables problem on two tracks. A "fast" track, or expedited action plan, was developed and implemented in 1989, and included specific actions to clean up existing debris after it entered the system. A longer term strategy, to reduce the amount of debris entering the system, is incorporated in this CCMP.

Expedited Short-Term Action

Because of the ongoing beach closures in the summers of 1987 and 1988, the fast track Action Plan was developed in 1989 and has been implemented each year since then. The intent of this plan is to minimize beach wash-ups of floatables in the Bight. Its success can be measured by the reduced number of floatables-related beach closures since 1989, as well as by the improved communication which enables the agencies to intercept debris slicks before they reach the beaches. In spite of abnormally heavy rainfall in 1989, only two floatables-related ocean beach closures occurred. There were no closures of ocean beaches in New Jersey or New York during the summers of 1991 to 1994 as a result of floatables wash-ups. As shown in Table 21(f), thousands of tons per year of floatable debris have been collected as part of the Floatables Action Plan and New Jersey's Operation Clean Shores.

This fast track plan contains four key elements:

Surveillance - NJDEP, USEPA, and the U.S. Coast Guard (USCG) conduct helicopter and fixed-wing aircraft patrols of the Harbor complex to look for slicks of floating debris. In addition, there are daily vessel patrols of the Harbor complex by USEPA and USCG, weekly patrols of the Bight by USCG, and daily overflights of the Bight by NJDEP. Continued funding for the USEPA Region II helicopter is in jeopardy.

Regular Cleanups - USACE has an ongoing program to capture loose timbers and other navigation hazards in the Harbor complex. As part of this program, USACE cleans up floatable slicks, employing specially designed nets to collect small debris. These cleanups are regularly scheduled at the Verrazano Narrows and Arthur Kill (locations where garbage slicks tend to form, according to USEPA) during and following new and full moon high tides and following storms that cause combined sewer overflows. During the summer bathing season (mid-May to mid-September), these cleanups occur daily rather than according to tide or storm conditions. Starting in 1993, New York City supplemented USACE efforts with its own skimmer vessels to clean up tributaries to the Harbor. New Jersey supplements USACE's efforts with a program called "Operation Clean Shores", initiated in 1989, to remove shoreline debris from the New Jersey side of the Harbor complex in order to prevent resuspension of debris. This program, staffed by Department of Corrections inmates and NJDEP personnel, with assistance from local municipalities, operates year-round from the George Washington Bridge to Raritan Bay; over 10 million pounds of debris are collected each year. There is no similar program in New York State.

Table 21(f). Debris Collected

	Floatables Action Plan (tons)	NJDEP Operation Clean Shores (tons) (miles)
1989	541*	3000 (45)
1990	795**	4800 (48)
1991	701**	4688 (74)
1992	958**	5789 (84)
1993	1088**	5750 (67)
1994	1298**	3700 (62)

* May 15 to September 15 only.
** Year round collection.

Nonroutine Cleanups - USACE attempts to capture additional slicks within the Harbor complex, when these conditions are brought to its attention. In 1989, NJDEP also contracted with fishing vessels to capture slicks. State coordinators notify local authorities and beach operators of potential wash-ups.

Communications Network - USEPA coordinates a reporting network as well as cleanup activities (See Figure 9). USEPA, NYSDEC, NJDEP, New York City Department of Sanitation (NYCDOS), USACE, and USCG are on-call 24 hours a day. Hotline numbers are available for citizen telephone calls.

The Medical Waste Tracking Act of 1988 defined medical waste; established the requirements for packaging, labeling, and transporting the wastes; and specified a system to track the medical waste from generation to final disposal. Although this federal legislation expired in 1992, the need to educate the public on the proper disposal of home medical waste continues (see Action F-4.5 below).

There are many other ongoing efforts which remove debris from the shoreline. One such example is the National Beach Cleanup Program, in which an ever increasing number of public interest and youth groups (e.g., Boy Scouts, school children) conduct annual cleanups at local beaches.

Longer Term Plan

The HEP Management Conference recognizes the need to supplement the short-term action plan with a longer term strategy to control the sources of floatable debris, preventing the debris from entering the system. The management approach for this longer term strategy is as follows:

- Continue and improve the successful short-term floatables action plan;
- Develop and implement a long-term source-oriented strategy to reduce the amount of floatables entering the ecosystem; take action as soon as there are commitments and mechanisms in place for implementation; take additional actions, over time, as mechanisms and commitments are developed; and
- Expand public education and outreach efforts to foster lifestyle changes that will reduce the public's contribution to the floatable debris problem.

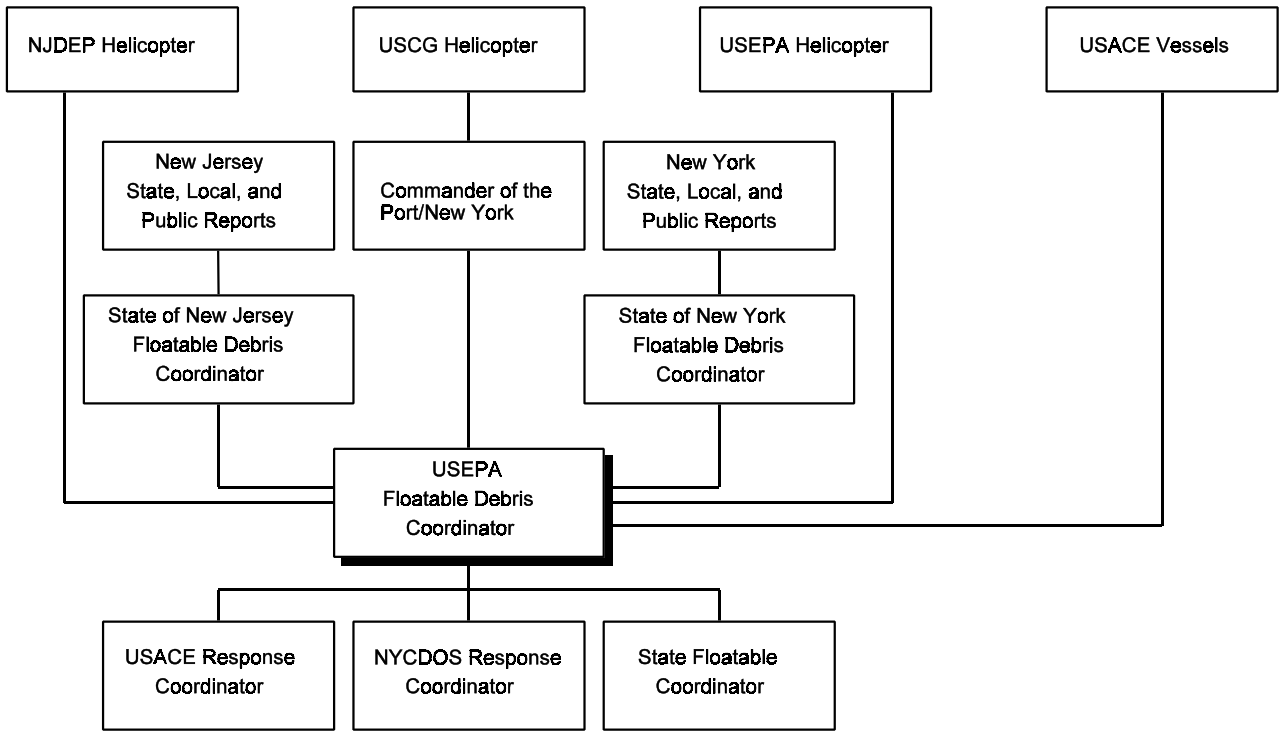

Figure 9. Communications Network for Reporting and Responding to Floatable Debris Slicks

COMMITMENTS AND RECOMMENDATIONS

OBJECTIVE F-1 Continue and enhance implementation of the successful short-term floatables action plan

ACTION F-1.1
Short-term Floatables Action Plan
USEPA, USCG, USACE, NYSDEC, NJDEP, NYCDEP, and NYCDOS will continue to implement the short-term floatables action plan.

-- In order to ensure that USEPA continues its active involvement in Harbor/Bight surveillance, HEP recommends that USEPA Region II continue to receive base program funding for its helicopter.

ACTION F-1.2
New Jersey "Operation Clean Shores" Program
New Jersey will continue annual implementation of the "Operation Clean Shores" program.

ACTION F-1.3
New York Companion Program to "Operation Clean Shores"
HEP recommends that NYSDEC work with other state agencies to develop and implement a companion program to New Jersey's "Operation Clean Shores" in the New York portion of the Harbor.

ACTION F-1.4
New York City Skimmer Vessels and Use of Booms
New York City acquired a large open water skimmer vessel, which became operational in October 1993, to complement the USACE Harbor drift collection vessels. New York City also purchased two small skimmer boats, for Flushing and Jamaica Bays, which have been operating since May 1993. New York City has recently acquired two additional small skimmer vessels for tributary areas of the Harbor. In addition, New York City is using booms to catch floatables in the four CSO abatement tributary planning areas.

ACTION F-1.5
Additional Measures in New Jersey
NJDEP is requiring that, as part of their permits to manage floatables, the New Jersey discharge permittees evaluate the need for additional floatables control measures, including skimmer vessels, for New Jersey tributaries to the Harbor.

OBJECTIVE F-2 Expand the USACE Harbor Drift Removal Program without compromising important habitat

USACE, to date, has awarded 18 construction contracts with a total value of $40 million. This effort has removed over 320,000 tons of debris from the waters and shorelines of the Harbor core area.

ACTION F-2.1
Prioritization of Sites
The States of New York and New Jersey and USACE will establish priority sites for USACE's Harbor Drift Removal Program based on an area's potential to contribute significant quantities of floatable debris to the Harbor, without compromising habitat or navigational safety.

ACTION F-2.2
Implementation of Drift Removal Projects
USACE, with cost-sharing by the states, should implement Harbor drift removal projects in accordance with the prioritization in Action F-2.1. Implementation of these projects is dependent on annual appropriations by Congress.

OBJECTIVE F-3 Implement beach and shoreline cleanups

ACTION F-3.1
Routine Beach Cleanups
Beach operators should conduct routine beach cleanups at private and public beaches in New York and New Jersey in the off-season.

ACTION F-3.2
National Beach Cleanup Expansion
States should encourage public interest groups to continue and expand ongoing national beach cleanups to include the back bay and tributary areas. New York and New Jersey are committed to improving cleanup coordination.

OBJECTIVE F-4 Assess and control landfill and solid waste practices

ACTION F-4.1
New York City Solid Waste Enforcement
New York City marine transfer stations are now all enclosed, and procedures are established to prevent spillage while loading. The barges are all netted for the trip to the Fresh Kills landfill in Staten Island, as a measure to prevent floatables from entering the Harbor during trips from marine transfer stations to Staten Island.

Until a long-term solution is implemented, interim measures are presently in place to reduce the amount of floatables escaping from the Fresh Kills landfill.

NYSDEC and ISC will continue to monitor the provisions stipulated in permits and consent orders, issued to the New York City Department of Sanitation for solid waste handling at landfills and marine transfer stations, to ensure compliance.

ACTION F-4.2
Continuation of NJ Solid Waste Program
NJDEP will continue its existing solid waste disposal program, which requires solid waste to be disposed at specific facilities based on the source of waste generation.

ACTION F-4.3
Expansion of Marina Recycling
New York and New Jersey coastal communities should review the results of demonstration projects on recycling at marinas and work to expand these recycling programs regionwide. In 1989, HEP sponsored such demonstration projects in New York and New Jersey.

ACTION F-4.4
Beach and Shoreline Waste Handling

-- HEP recommends that entities responsible for managing public open spaces at beaches and shoreline areas continue and expand effective waste collection, recycling, and handling measures. Waste receptacles, including recycling and disposal containers, should be provided in sufficient numbers to accommodate public users and prevent debris dispersal by wind and wildlife.

-- HEP recommends that entities responsible for managing public open spaces at beaches and shoreline areas implement, expand, and improve education efforts on litter control and the effects of plastic debris on marine life. (Objective F-5 below includes specific actions to communicate impacts of debris and appropriate disposal practices.)

-- HEP recommends that legislation at the appropriate government level be enacted to ban or restrict the use of non-degradable plastic products at shore concession stands.

ACTION F-4.5
Education on Disposal of Home Medical Waste
Appropriate agencies should develop educational materials to inform the public of the proper disposal techniques for home medical wastes.

-- The medical and pharmaceutical industries at both the regional and national levels should develop an educational strategy to encourage the proper disposal of home medical wastes. HEP will inform them of this need.

-- NYSDEC and NYSDOH will develop educational materials for the disposal of home sharps.

OBJECTIVE F-5 Communicate impacts of marine debris and appropriate disposal practices

ACTION F-5.1
Signs on Debris Impacts and Waste Disposal
All New York and New Jersey beach and marina owners and operators should post permanent signs at boat launch ramps and other public access sites. Signs should depict the impacts of floatable debris on marine wildlife and provide information on appropriate methods for waste disposal.

ACTION F-5.2
Marine Debris Information in Fishing/Boating Applications
New York and New Jersey should enclose information on marine debris in all applications for fishing and boating licenses or registrations.

ACTION F-5.3
Public Service Announcements
HEP will seek sponsors to develop and broadcast public service announcements throughout New York and New Jersey regarding the proper disposal of beach and boating litter.

ACTION F-5.4
Continue Clean Streets/Clean Beaches Campaign
USEPA, NYSDEC, NJDEP, and NYCDEP will continue the clean streets/clean beaches campaign to educate the public on proper waste disposal.

ACTION F-5.5
Stormdrain Stenciling
HEP and its member regulatory agencies will encourage local user groups to engage in stormdrain stenciling activities. Stormdrain stencils inform the public that materials thrown into the sewers discharge into local waterways.

ACTION F-5.6
MARPOL V Enforcement
USCG will communicate and enforce provisions of MARPOL V for at-sea disposal of solid waste.

OBJECTIVE F-6 Reduce loadings of floatables from CSOs, storm water discharges, and other non-point sources

Three sources of pollution to the Harbor/Bight -- CSOs, storm water discharges, and non-point source runoff -- are associated with runoff induced by rainfall. These three sources are significant contributors of floatables to the Harbor/Bight system. Effective abatement of these sources is therefore important in reducing use impairments and adverse ecosystem impacts associated with floatables. HEP's plan to address these sources is found in the section on Rainfall-Induced Discharges below. The Plan includes the following actions addressing floatables:

Combined Sewer Overflows

-- Fully implement the nine minimum control measures of the National CSO Control Policy (see Objective CSO-1 below).

-- Implement additional CSO controls to meet water quality standards and restore beneficial uses (see Objective CSO-2 below).

- New York City is implementing CSO control measures, including constructing retention facilities, and conducting long-term CSO abatement planning (see Action CSO-2.1 below).
- HEP recommends that New Jersey CSO dischargers cooperate in a regional effort to develop long-term CSO abatement plans (see Action CSO-2.2 below).

Storm Water Discharges

-- Implement measures to control municipal and industrial storm water discharges (see Objective SW-1 below).

- Issue NYC storm water permit modifications (see Action SW-1.1 below).

- Incorporate requirements of the general permits that control construction discharges into local codes (see Action SW-1.3 below).
- Expand geographic coverage of the New Jersey Sewage Infrastructure Improvement Act (see Action SW-1.4 below).

Non-point Source Runoff

-- Develop and implement coastal non-point source management programs under the Coastal Zone Act Reauthorization Amendments (see Objective NPS-2 below).

-- Focus the Urban Resources Partnership Initiative on Harbor/Bight watersheds (see Objective NPS-3 below).

COSTS OF IMPLEMENTING THIS PLAN

Many of the commitments and recommendations in the floatables component of the CCMP are being accomplished through the effective use of base program resources. The CCMP itemizes 5 new HEP-driven commitments to control floatable debris using base program resources. These actions represent a continuing and expanding commitment to CCMP implementation.

The CCMP also includes 10 commitments and recommendations for floatable debris control programs that entail enhanced program funding. As shown in Table 22(fc) below:

- ♦ The Plan includes 4 commitments to continue and expand existing short-term initiatives, which total $1.750 million per year.
- ♦ The Plan includes 4 recommended actions for which increased funding of $200,000 plus $1.35 million per year is required.
- ♦ The Plan also includes 2 additional recommended actions for which cost estimates will be developed as part of the continuing planning process.

This component of the CCMP includes 4 additional actions that require implementation costs for special projects. As shown in Table 23(fc) below:

- ♦ The Plan includes 2 actions for which a total of $7.4 million has been committed by the responsible entities.
- ♦ The Plan includes 1 recommended action for an existing federally authorized program with an estimated cost of $2.5 million per year.
- ♦ The Plan includes 1 recommended action for which cost estimates will be developed as part of the continuing planning process.

Table 22(fc). Enhanced Program Costs for Management of Floatable Debris

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION F-1.1: Implement the short-term floatables action plan.		$1 million		
ACTION F-1.2: Implement "Operation Clean Shores".		$600,000		
ACTION F-1.3: Complement "Operation Clean Shores" within NYS.				$1.2 million
ACTION F-3.2: Continue existing national beach cleanups.		$50,000		
ACTION F-3.2: Expand national beach cleanups to new areas.				$9,000
ACTION F-4.3: Expand recycling demonstration projects at marinas.				$140,000
ACTION F-4.5: Develop educational strategy to inform public of proper medical waste disposal.				*
ACTION F-5.1: Post signs advising of proper marine debris disposal.				*
ACTION F-5.3: Develop and broadcast public service announcements.			$200,000	
ACTION F-5.4: Continue Clean Streets/Clean Beaches Campaign.		$100,000		
TOTAL		$1,750,000/yr+*[1]	$200,000	$1,349,000/yr+*[1]

* Enhanced program costs to be developed as part of the continuing planning process.
[1] Notation (+*) indicates cost plus additional costs to be determined.

Table 23(fc). Project Implementation Costs for Management of Floatable Debris

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION F-1.4: Operate open water skimmer vessel in New York City to clean up Harbor debris.	$4 million (capital cost)			
ACTION F-1.4: Operate 4 skimmer boats in New York City to clean up Harbor tributaries.	$3.4 million			
ACTION F-1.4: Use booms to catch floatables in the four CSO abatement tributary planning areas in New York City.	Included in the estimate for Action CSO-2.1			
ACTION F-2.2: Implement Harbor drift removal projects.				$2.5 million
ACTION F-3.1: Perform routine beach cleanups during off-season.				*
TOTAL	$7,400,000			$2,500,000/yr

* Project implementation costs to be developed as part of the continuing planning process.

BENEFITS OF IMPLEMENTING THIS PLAN

Full implementation of the commitments and recommendations for management of floatable debris would result in:

- Elimination of floatable-related beach closures;
- Prevention of adverse floatable-related impacts on coastal species; and
- Prevention of adverse impacts on commercial and recreational navigation.

With the implementation of the short-term floatables action plan, the participants of HEP have made substantial headway in the attainment of these goals. Continued commitment to the implementation of a long-term strategy to control floatable debris will ensure continued progress toward the attainment of these goals. Aesthetics, recreational opportunities, navigational safety, and the regional ecosystem will all benefit from the implementation of this component of the Plan.

Table 24(fs). Summary—Management of Floatable Debris

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE F-1: Continue and enhance implementation of successful short-term floatables action plan.				
ACTION F-1.1: Implement the short-term floatables action plan.	USEPA, USCG, USACE, NYSDEC, NJDEP, NYCDOS, NYCDEP	Ongoing	Enhanced program cost - $1 million/yr total, including $126,800 for USEPA helicopter	C/N
ACTION F-1.2: Implement "Operation Clean Shores" program.	NJDEP	Ongoing	Enhanced program cost - $600,000	C/O
ACTION F-1.3: Develop and implement a companion program to "Operation Clean Shores".	NYSDEC	Summer 1996	Enhanced program cost - approximately $1.2 million/yr	R

Note: It is HEP's goal that all the recommendations in the CCMP become commitments.

-- In some cases CCMP actions are recommendations, not commitments, because responsible entities require resources to implement the action. HEP will advocate making these resources available.

-- In other cases, CCMP actions are recommendations because HEP has not obtained the commitment of regulated entities and other responsible entities to implement the action. By issuance of this CCMP, HEP seeks the commitment of the responsible entities and requests that they step forward to voluntarily agree to implement the actions.

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 24(fs). Summary—Management of Floatable Debris

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION F-1.4: Continue use of skimmer boats and booms in New York City.				
-- Open water vessel.	NYCDEP	Ongoing	Project implementation cost - $4 million capital cost (55% USEPA grant)	C/N
-- Four skimmer boats.	NYCDEP	Ongoing	Project implementation cost - $3.4 million over 3 yrs	C/N
-- Use booms to catch floatables in the four CSO abatement tributary planning areas.	NYCDEP	Ongoing	Project implementation cost included in estimate for Action CSO-2.1	C/O
ACTION F-1.5: Require the evaluation of need for other floatables control measures including additional skimmer boats.	NJDEP	Completed	Base program	C/N
OBJECTIVE F-2: Expand the USACE Harbor Drift Removal Program without compromising important habitat.				
ACTION F-2.1: Establish priority sites for the drift removal program.	NY, NJ, USACE	Completed	Base program	C/N
ACTION F-2.2: Implement drift removal projects.	NY, NJ, USACE	By Dec 31, 1996	Project implementation cost - $2.5 million/yr	R
OBJECTIVE F-3 Implement beach cleanups.				
ACTION F-3.1: Perform routine beach cleanups off-season.	Beach operators (Federal, state, local, and private)	Beginning by Dec 31, 1995	Project implementation cost to be estimated prior to implementation of program	R

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[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 24(fs). Summary—Management of Floatable Debris

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION F-3.2: Continue and expand national beach cleanups.				
-- Continue existing beach cleanups. (Adopt-a-Beach program in NJ)	NY & NJ	Ongoing	Enhanced program cost - $25,000/yr (NJ) $25,000/yr (NY)	C/O
-- Expand existing programs to include back bays and tributary areas.	NY, NJ, private sector	By Dec 31, 1996	Enhanced program cost - NYS: $6,000/yr NJ: cost included above Private: $3,000/yr	R
OBJECTIVE F-4: Assess and control landfills and solid waste practices.				
ACTION F-4.1: Monitor provisions of NYCDOS permits and consent orders for solid waste handling at landfills and marine transfer stations to ensure compliance.	NYSDEC & ISC	Ongoing	Base program	C/O
ACTION F-4.2: Continue NJ solid waste program.	NJDEP	Ongoing	Base program	C/O
ACTION F-4.3: Conduct recycling demonstration projects at marinas.	NYSDEC & NJDEP	Completed 1990	Enhanced program cost - $140,000 (FY89 Demo project)	C/N
-- Expand such projects.	Coastal communities in NY and NJ	By Dec 31, 1996	$140,000/yr	R

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 24(fs). Summary—Management of Floatable Debris

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION F-4.4: Provide for beach and shoreline waste handling.				
-- Ban use of non-degradable plastic products at shore concession stands.	Appropriate government legislators	By Dec 31, 1996	Base program	R
-- Continue, expand, and adopt effective waste handling practices at public shoreline areas, as required.	Open space managers	By Dec 31, 1996	Base program	R
-- Provide waste receptacles sufficient for public need and adequate to prevent debris dispersal.	Open space managers	By Dec 31, 1996	Base program	R
ACTION F-4.5: Develop educational materials to inform the public of proper disposal techniques for home medical waste.				
-- Inform medical and pharmaceutical industries of need to develop educational strategy.	HEP	By Dec 31, 1996	Base program	C/N
-- Develop educational strategy.	Medical and pharmaceutical industries	By Dec 31, 1997	Enhanced program cost to be provided by medical and pharmaceutical industries	R
-- Develop educational materials for the disposal of home sharps.	NYSDEC & NYSDOH	Ongoing	Base program	C/O

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 24(fs). Summary—Management of Floatable Debris

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE F-5: Communicate impacts of marine debris and appropriate disposal practices.				
ACTION F-5.1: Post signs depicting proper waste disposal methods.				
-- Inform beach and marina owners and operators.	HEP	By Dec 31, 1996	Base program	C/N
-- Post signs.	Beach and marina owners and operators	By Dec 31, 1996	Enhanced program cost to be provided by beach/marina owners/operators	R
ACTION F-5.2: Enclose information on marine debris in all fishing applications and/or boating licenses.	NY & NJ	By Dec 31, 1996	Base program	R
ACTION F-5.3: Develop and broadcast public service announcements on proper disposal of beach and boating litter.				
-- Seek sponsors.	HEP	By Dec 31, 1996	Base program	C/N
-- Develop and broadcast PSAs.	Sponsors	By Dec 31, 1996	Enhanced program cost - $200,000	R
ACTION F-5.4: Continue Clean Streets/Clean Beaches campaign.	USEPA, NYSDEC, NJDEP, NYCDEP	Ongoing	Enhanced program cost - $100,000/yr	C/N
ACTION F-5.5: Encourage local user groups to engage in storm drain stenciling activities.	HEP	Ongoing	Base program	C/O
ACTION F-5.6: Enforce provisions of MARPOL V for at-sea disposal of solid waste.	USCG	Ongoing	Base program	C/O
OBJECTIVE F-6: Reduce loadings of floatables from CSOs, storm water discharges, and non-point source discharges [see Rainfall- Induced Discharges section].				

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

MANAGEMENT OF NUTRIENTS AND ORGANIC ENRICHMENT

PROBLEMS

Potential damage to living marine resources caused by low dissolved oxygen and other eutrophic effects

Noxious water quality conditions

Novel algal blooms

SOURCES

Nitrogen is the limiting nutrient in the Harbor/Bight system; significant sources of nitrogen include:
- Municipal discharges
- Tributary inputs
- Sediment flux
- Atmospheric deposition
Other Contributing Sources Include:
- Combined sewer overflows
- Storm water
- Other non-point sources

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

GOALS *To eliminate adverse impacts of eutrophication, including hypoxia, resulting from human activities.*
To better understand the causes of eutrophication and its symptoms including hypoxia, algal blooms, and changes in the abundance and diversity of marine organisms.

OBJECTIVES

N-1 Upgrade municipal sewage treatment plants to achieve full secondary treatment.
N-2 Establish environmental objectives for the Harbor/Bight.
N-3 Develop and implement, as appropriate, low-cost nitrogen reduction actions.
N-4 Develop and implement additional actions necessary to eliminate adverse effects of eutrophication, including hypoxia, on marine life in the Harbor, Bight, and Long Island Sound.
N-5 Conduct additional studies to understand the causes of hypoxia, algal blooms, and other eutrophication effects.

THE PROBLEMS

Overview

Eutrophication, or the excessive enrichment of a waterbody by nutrients and organic materials, is a problem in the Harbor/Bight and Long Island Sound. The most tangible symptoms of eutrophication in the Harbor/Bight and Sound are low dissolved oxygen (DO), noxious water quality conditions, and novel algal blooms. Eutrophication may occur naturally or as a result of human activity.

These symptoms often result directly in use impairments. However, eutrophication may have other adverse effects on marine ecosystems which, although closely related to the effects noted above, are more subtle or difficult to identify. For example, changes in the forms or concentrations of nutrients may result in changes in the species composition and diversity of phytoplankton. These

changes may affect higher trophic levels, potentially leading to an altered ecosystem.

Identifying these changes and understanding their causes is difficult because of the confounding effects of natural variability in the abundance and composition of marine organisms, and other stressors, such as toxics.

To ensure we meet our goal to eliminate all adverse effects of eutrophication, the Plan includes development of several environmental objectives for eutrophication effects. These objectives will help us determine what actions are necessary and monitor the effectiveness of the actions taken to control nitrogen and organic loadings. The Plan also includes efforts to better understand the effects of eutrophication in the Harbor, Bight, and Sound.

Low Dissolved Oxygen

Low DO concentrations, called hypoxia, often occur in the bottom waters of portions of the New York-New Jersey Harbor, the Bight, and western Long Island Sound during the summer months.

The ecological effects of hypoxia are severe. DO concentrations of 5 mg/l and above are generally believed to be protective of marine life. As concentrations fall below that level, mobile organisms, such as fish, begin to leave the affected area; less mobile organisms can become stressed and may die. At DO concentrations of 3 mg/l and below, effects become progressively more severe. For example, at DO concentrations of 1.5 to 3 mg/l, many organisms leave or die within days to weeks; virtually all organisms die when concentrations below 1.5 mg/l persist for a few days or more.

New York and New Jersey water quality standards for DO range from not less than 3 mg/l, to support fish survival, to not less than 5 mg/l in waters with higher designated uses.

Over the last nine years, the Long Island Sound Study (LISS) has documented extensive areas of severely depressed DO concentrations. During the summer of 1987, 63 percent of the Sound's bottom waters experienced DO levels less than 5 mg/l, and 40 percent of these waters had DO levels less than 3 mg/l. Severe hypoxia also occurred during several subsequent summers, although conditions were not as bad as 1987 (see Figure 10).

Analyses of NYCDEP New York Harbor Water Quality Survey data from 1986-1992 indicate violations of the New York DO standards throughout the Harbor. During each summer from 1986-1991, bottom water DO concentrations lower than the standard were recorded at least once at roughly 80 percent of the 52 stations sampled. Compliance was significantly better in 1992, when violations were recorded at least once at only 50 percent of the sampled stations.

Chronic violations (i.e., mean summer bottom water DO concentration below the standard) were also common, except in 1992, when no chronic violations were found.

Long-term trend analyses reveal that water quality in some areas of the Harbor is improving, while other areas are experiencing a decline in DO concentrations. Over the last 15 years, there have been significant improvements in mean summer DO concentrations in bottom waters in portions of the Harlem River, Kill Van Kull, Arthur Kill, and Upper Bay. However, mean summer DO concentrations in bottom waters have significantly decreased in western Long Island Sound, parts of Jamaica Bay, the lower portion of the Arthur Kill, and the Lower Bay. The general trend over this period of time is improvement in the highly polluted waterways and inner Harbor areas and declines in the relatively cleaner bays and outer reaches of the Harbor. HEP efforts (e.g., see Actions N-4.1 and N-5.1 below) aim to help explain why this trend has occurred.

Figure 10. Areas of Long Island Sound with Minimum Bottom Water Dissolved Oxygen Levels below 5 mg/l in the Summers of 1987, 1989, and 1991

Dissolved oxygen levels in parts of Jamaica Bay are among the lowest in the Harbor (see Figure 11 below); for example, in summer 1993, several tributaries experienced minimum DO concentrations less than 1.5 mg/l. In addition, the Grassy Bay area experienced minimum DO concentrations less than 3.0 mg/l. The DO problem in Jamaica Bay has led NYSDEC and NYCDEP to implement low-cost nitrogen reductions for New York City's sewage treatment plants discharging to the Bay (see Action N-3.4 below). Raritan Bay has also experienced hypoxia, and other eutrophication-related effects, as shown in Figure 12 below.

Areas of the Bight routinely experience hypoxia during the summer, and the Bight has also experienced severe hypoxic conditions. Conditions are generally worse along the New Jersey coast and along the Long Island coast west of Fire Island Inlet. An analysis of data from 1977-1985 (see Figure 13 below) shows summer minimum DO concentrations less than 3 mg/l primarily inshore of the 20 meter depth contour in the Bight Apex. DO levels less than 1.5 mg/l regularly occur along the New Jersey coast inshore of the 20 meter depth contour.

A particularly severe and widespread anoxic (lack of DO) event occurred in the summer of 1976 in the Bight. The collapse of a massive bloom of the dinoflagellate C*eratium tripos* resulted in anoxia over an 8,600 km^2 area off New Jersey and mass mortalities of shellfish. This appears to have been an isolated occurrence which is attributed to a coincidence of meteorological and oceanographic conditions.

Recent reports of the USEPA Bight Monitoring Program have noted a general trend of improving water quality since 1985. Bottom DO levels in the Bight in recent summers (1992 and 1993) were generally good. Levels below 3 mg/l were recorded infrequently and persisted for only a short time. In contrast, water quality was particularly poor in the mid to late summer of 1985. During this period approximately 1,600 mi^2 of ocean bottom off the New Jersey coast experienced DO concentrations below 4 mg/l. The summer of 1990 was also a period of relatively poor water quality, although low DO was not as widespread or persistent as the summer of 1985.

It is important to note, however, that DO levels in the Bight, since 1985, may not reflect an actual trend of improving water quality, but may instead be due to interannual variability. This interannual variation is partially attributable to the prevalence of storm activity which mixes the water column, promoting aeration of bottom waters. Other investigators have seen no clear trend in DO levels in the Bight over the last 40 years or so.

Field studies have confirmed hypoxic impacts in Long Island Sound. Although effects are less well documented in the Harbor and Bight Apex, summer DO levels are low enough to harm sensitive organisms, as documented, for example, by NJDEP data from Raritan and Sandy Hook Bays.

Noxious Water Quality Conditions

Throughout the Harbor region, water quality has historically been poorest in the inner Harbor areas and tributaries, in particular those with restricted circulation. These areas commonly experience anoxia or severe hypoxia during the summer months. Noxious water quality conditions, such as odors and localized fish kills, are one result.

Novel Algal Blooms

Some algal blooms which have occurred in the New York-New Jersey Harbor region are unusual in terms of the type(s) of phytoplankton present, the persistence of the bloom over long periods of time, the vast area affected, and/or the high concentration of algal cells. These blooms are called novel algal blooms and they can have a variety of effects:

1) They can discolor the water and cause foaming, or release noxious odors.
2) They can release toxic substances which affect marine life.
3) They can block sunlight through the water. For example, the "brown tides" that occurred in Peconic Bay and bays on Long Island's south shore in the 1980s and 1990s, caused by a previously uncommon algal species, *Aureococcus anophagefferens,* blocked

Figure 11. Minimum Bottom Water Dissolved Oxygen Concentrations in Jamaica Bay, 1993

Figure 12. Eutrophication-related effects in Raritan Bay, 1988-1989
Contours showing distribution of surface chlorophyll *a* (µg l^{-1}) [a measure of algal bloom concentration] in the Raritan Bay on June 30, 1989, during the phytoflagellate red tide of June 26 - July 2. Black dots and shading indicate areas of bottom hypoxia (dot $\leq$2mg l^{-1}; shading $\leq$4mg l^{-1}) one to three weeks following the bloom. Black area delineates the portion of shoreline where dead fish were found in summer of 1988.

Figure 13. Minimum Bottom Water Dissolved Oxygen Concentrations (mg/l) in the Bight, July-September, 1977-1985

sunlight through the water, resulting in reduced eel grass beds.

4) These brown tides also decimated bay scallop populations, in part because the eel grass beds provide spawning habitat for the scallop, and also because *A. anophagefferens* is indigestible to the scallop.

5) The bloom that caused the Bight anoxia of 1976 had particularly widespread and severe impacts, as noted above.

Algal blooms, and in particular novel blooms where the composition of phytoplankton species deviates from "normal", may provide an indication of the adverse effects of pollution. As noted previously, subtle changes in phytoplankton may lead to or provide an indication of changes in ecosystem function. Such changes have not been documented in the Harbor/Bight, and are, in general, poorly documented in marine systems. HEP's Plan includes efforts to better document any changes in the Harbor/Bight.

Trends in the incidence of novel blooms in the New York-New Jersey Harbor region, since the 1950s, are not clear due to the lack of regular quantitative measurement of phytoplankton communities. However, anecdotal evidence indicates that blooms occur frequently. During the summer of 1992 and 1993, extensive phytoplankton blooms occurred in the intracoastal bays of New Jersey. Red algal blooms were predominant in Raritan and Sandy Hook Bays. In 1992, an isolated area in Stone Harbor, New Jersey, was affected by the same organism, the dinoflagellate *Gyrodinium aureolum,* that caused widespread green tides along the southern New Jersey coast in 1984 and 1985. The 1992 bloom only persisted for a short time.

SOURCES CONTRIBUTING TO THE PROBLEMS

Low Dissolved Oxygen

There is strong evidence that excessive discharges of nitrogen from both point and non-point sources are contributing to low DO in the Harbor, Bight, and Sound.

Excessive enrichment of waters by nutrients and organic materials can cause low DO concentrations. Waterbodies, and bottom waters in particular, are most prone to hypoxia during the summer because the vertical mixing of water, which replenishes oxygen in bottom waters, is restricted during that season. Nutrients, including nitrogen, fuel the growth of planktonic algae. As the algae die, they sink to the bottom and decompose, consuming additional oxygen.

The LISS has developed a mathematical model, called LIS 2.0, which establishes that 1) nitrogen is the nutrient that limits phytoplankton growth in the Sound, 2) hypoxia in the Sound is caused by excessive discharges of nitrogen directly to the Sound, and 3) the problem in the Sound is exacerbated by both point and non-point discharges of nitrogen in the Harbor. The LISS CCMP summarizes the current knowledge of the hypoxia problem in the Sound.

In most of the Harbor, the causes of low DO are not as clear. There is evidence, however, that both nitrogen and organic materials (i.e., carbon compounds) have a role. HEP studies show that temperature, organic carbon, and ammonia (a nitrogenous compound) are the dominant factors related to DO concentrations in the bottom waters of the Harbor. In virtually all of the data sets examined, inverse relationships were observed between temperature, nutrients, and carbon versus DO levels. In Jamaica Bay, studies show that nitrogen is the limiting nutrient.

A preliminary modeling analysis, conducted by HydroQual Inc. for the Bight Restoration Plan, indicates that nitrogen is the limiting nutrient in the Bight Apex off the New Jersey coast and that the nitrogen flux to the Bight from the Harbor (which includes the movement of water masses from the Harbor to the Bight, called the "Hudson River Plume") causes increased algal production and decreased bottom water DO concentrations in the Bight Apex. However, the analysis is not sufficient to quantify the relative significance of the nitrogen flux from the Harbor versus other sources of nitrogen in causing the hypoxia.

Figure 14. Distribution of the Nitrogen Load to Long Island Sound among Several Source Categories

The sources of nitrogen to Long Island Sound are well documented. Of the 93,600 tons per year, approximately 43 percent is from natural sources and not subject to reductions by management activity (see Figure 14). The remaining 57 percent is associated with human activities and has the potential to be reduced through management actions. Of this load, approximately 20 percent enters the Sound through its boundaries -- the East River in the west and The Race in the east; efforts to reduce the substantial western load are addressed in HEP's Plan. Most of the remaining human-caused load of nitrogen comes from coastal and tributary point (55%) and non-point source (16%) discharges in the Sound's drainage basin and are the subject of the LISS CCMP.

It is clear that municipal point sources are the dominant sources of nitrogen entering the Harbor. HEP studies estimate that municipal STPs contribute approximately 63 percent of the total nitrogen load to the Harbor. Tributary inputs are estimated to contribute approximately 29 percent of the total nitrogen load, while all other sources contribute the remaining 8 percent of the load.[1]

Estimates of total nitrogen loadings to the Bight Apex, prepared for the Bight Restoration Plan, indicate that coastal advective flux (i.e., transport of nitrogen from offshore waters by prevailing coastal currents), which is primarily not human-caused, is the dominant source of nitrogen to the Bight Apex, contributing an estimated 69 percent of the load. (Note: this is a rough estimate). Flux from the New York - New Jersey Harbor (22%) is the dominant source of nitrogen to the Bight Apex, which is primarily human-caused. Other sources of nitrogen estimated include sediment flux (5%); dredged material disposal (2%); atmospheric deposition (1%); and loads from the New Jersey and Long Island coastal zones, including municipal discharges and runoff (1%). It should be noted that some of these sources of loadings may be more significant when viewed on a localized scale.

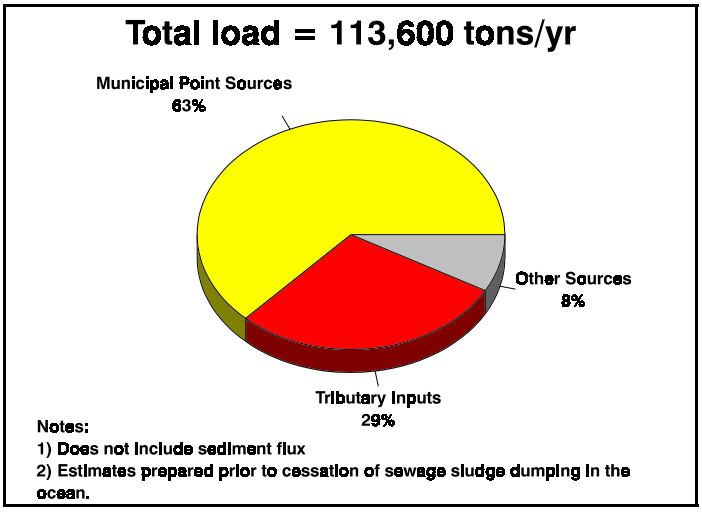


Figure 15. Nitrogen Loadings to New York- New Jersey Harbor

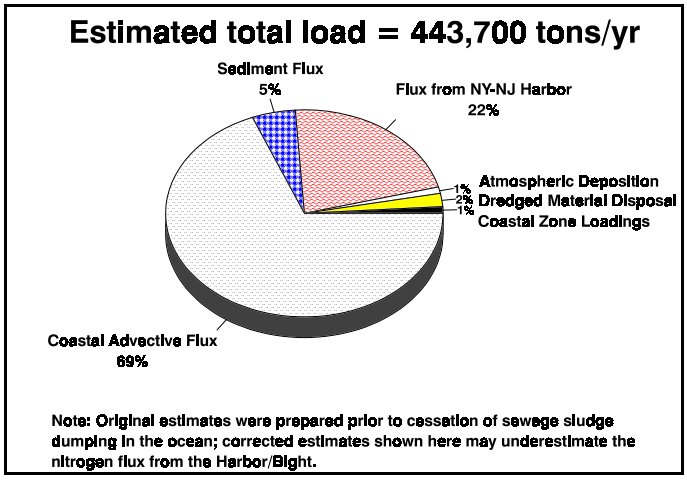


Figure 16. Nitrogen Loadings to Bight Apex

[1] The relative significance of direct groundwater flows in nitrogen contributions to the Harbor and Bight is estimated to be minor. Groundwater influences, to the extent they are significant, are inherently included in tributary flows and loadings developed for the Harbor and Bight. Direct groundwater flow to the Harbor and Bight, in addition to the groundwater flow in the tributaries, is estimated to comprise roughly 1% or less of the total flow to the Harbor and Bight.

These estimates of nitrogen loads were developed prior to implementation of the Ocean Dumping Ban Act (ODBA), which required STPs in the Harbor region to implement land-based disposal alternatives to the dumping of sewage sludge in the Atlantic Ocean. To comply with this requirement, STPs are first dewatering the sludge, which produces a nitrogen-rich centrate. This centrate is being returned to the STPs and discharged into the Harbor. USEPA estimates that such areas as Raritan Bay, Newark Bay, and the Hackensack River are experiencing increases in ambient total nitrogen levels as high as 6.7 percent due to ODBA dewatering operations.

Studies to date point to the need to develop a comprehensive system-wide eutrophication model (SWEM) for the Harbor/Bight/Sound system to predict load reductions necessary system-wide to alleviate hypoxia problems. The LISS has recommended that HEP develop such a model.

An interim step, currently proceeding under HEP, is New York City's development of a Harbor-wide Eutrophication Model (HEM), which will be used to establish the factors causing hypoxia in the Harbor and the relative significance of various sources of nitrogen in causing hypoxia in the Harbor/Bight.

Noxious Water Quality Conditions

Noxious water quality conditions in tributaries and inner Harbor areas may be caused by the decomposition of organic materials present in CSO discharges or may be associated with localized severe eutrophic conditions and poor flushing conditions. The latter is sometimes observed in tributaries without significant CSO discharges.

Novel Algal Blooms

The causes of algal blooms are only generally understood and often may not be related to macro-nutrients, such as nitrogen. Multiple environmental variables appear to contribute to any single bloom. These include winds, rainfall, nutrients, water stratification, and decreased zooplankton grazing. For example, a leading theory attributes the Peconic Bay brown tides to unusual hydrodynamic conditions combined with the presence of micro-nutrients, such as iron. With adequate environmental data, mathematical models can predict the effects of algal processes on hypoxia; however, understanding other adverse effects of algal blooms will require additional research. Investigators have observed that the increased incidence of novel blooms in the Bight Apex off the New Jersey coast is associated with the Hudson River plume.

THE PLAN TO SOLVE THE PROBLEMS

Overview of the Plan

To solve the problems related to nutrient and organic enrichment, HEP recommends the following actions:

- ♦ Complete upgrades of municipal discharges to secondary treatment.
- ♦ Develop a comprehensive program to control nitrogen loadings to the Harbor/Bight.
  - -- Establish environmental objectives including DO targets.
  - -- Develop and implement, as appropriate, low-cost actions to reduce nitrogen loads.
  - -- Develop and implement additional actions as necessary to eliminate the adverse effects of eutrophication, including hypoxia.
- ♦ Control rainfall-induced discharges of organic materials.
- ♦ Develop and conduct additional studies to better understand and manage the problems related to nutrient and organic enrichment.

COMMITMENTS AND RECOMMENDATIONS

Complete Upgrades of Municipal Discharges to Secondary Treatment

Ongoing STP upgrades are expected to continue improving water quality in the Harbor/Bight, by significantly reducing loads of nutrients and organic materials. There are 43 municipal STPs discharging to the Harbor core area and approximately 21 STPs discharging to the Bight, including the back bays.

The Clean Water Act requires all municipal STPs to achieve full secondary treatment. Most municipal

STPs discharging to the Harbor, and all those discharging to the Bight, already meet this requirement. The Owls Head Facility in New York has recently been upgraded, and a commitment is in place for the one remaining facility that does not meet full secondary treatment.

OBJECTIVE N-1 Upgrade municipal sewage treatment plants to achieve full secondary treatment

ACTION N-1.1
Newtown Creek Facility
NYCDEP will upgrade the Newtown Creek facility to full secondary treatment.

ACTION N-1.2
Owls Head Facility
NYCDEP upgraded the Owls Head facility to full secondary treatment in May 1995.

Control Nitrogen Loadings to the Harbor/Bight

The LISS is implementing a phased management approach for dealing with the hypoxia problem in the Sound. The first phase, currently being implemented in New York City, is to freeze nitrogen loadings to the East River from municipal point sources at levels prior to sludge dewatering (i.e., 1990 levels). This step, with similar point source freezes by New York State and Connecticut to waters contributing to Long Island Sound, is expected to prevent hypoxia problems in the Sound from becoming worse. The second phase, detailed in the LISS CCMP, includes significant, low-cost nitrogen reductions at sewage treatment plants, including biological nutrient removal (BNR) retrofits, that begin the process of reducing the severity and extent of hypoxia in the Sound. The third phase will establish nitrogen reduction targets to reduce known lethal and sublethal effects of hypoxia on the Sound's biota and will lay out the approach for meeting these nitrogen reduction targets. The details of the third phase are being developed using the results of a sophisticated water quality model, called LIS 3.0, recently completed.

OBJECTIVE N-2 Establish environmental objectives for the Harbor/Bight

HEP will use various environmental objectives to help determine the actions necessary, and measure the success of actions taken, to solve the eutrophication problems. In developing such objectives, we will gain a better understanding of the ecological significance of the various symptoms of eutrophication.

ACTION N-2.1
Dissolved Oxygen Targets
In parallel with the development of a program to reduce nitrogen loadings, as supported by the Harbor-wide Eutrophication Model (HEM), HEP will develop specific numeric DO targets for the Harbor/Bight, compatible with HEP's goal to eliminate the adverse effects of hypoxia resulting from human activities. HEP's effort will build upon LISS efforts to develop area specific DO targets and USEPA's efforts to develop DO criteria for marine waters.

ACTION N-2.2
Other Ecosystem Objectives for Eutrophication
In parallel with the development of a program to reduce nitrogen loadings, as supported by HEM, HEP will develop specific ecosystem objectives for eutrophication in the form of quantitative indicators and/or indices. These will provide managers with more refined tools by which to determine ecosystem change, providing feedback for adaptive management. In particular, HEP will consider objectives related to phytoplankton and algal community structure, biomass, and growth rates, as well as incidence of novel algal blooms. The objectives will be compatible with HEP's goal to eliminate the adverse effects of eutrophication resulting from human activities. The effort will build upon HEP's ongoing work to document novel algal blooms (see Objective N-5).

(Note: The efforts described in Actions N-2.1 and N-2.2 will proceed in parallel with development of SWEM (see Action N-4.1 below), if HEM results do

not support the need for low-cost nitrogen reduction actions).

OBJECTIVE N-3 Develop and implement, as appropriate, low-cost nitrogen reduction actions

ACTION N-3.1
Harbor-wide Eutrophication Model (HEM)

-- NYCDEP is developing HEM as a preliminary tool to determine the feasibility and effectiveness of management alternatives for New York City point source discharges of nitrogen in the Harbor. If feasible options are found, New York City will use a System-wide Eutrophication Model to fully evaluate management alternatives (see Action N-4.1 below).

-- NYCDEP is committed to completing HEM under the auspices of HEP, with HEP support for data collection, to ensure that HEM meets HEP's needs for a tool to evaluate the necessity of preliminary nitrogen load reductions Harbor-wide.

ACTION N-3.2
Nitrogen Reduction Feasibility Studies and Data Collection
Municipal dischargers to the Harbor core area will conduct studies to identify options and costs for nitrogen reduction and collect data to quantify nitrogen loadings, as necessary, based on the results of HEM.

-- NYCDEP has evaluated low-cost process controls and has conducted additional feasibility studies for nitrogen control and pilot-scale implementation.

-- WCDEF and NJ dischargers should conduct feasibility studies for low-cost nitrogen reduction actions and collect loadings data if HEM supports the need to implement low-cost reduction actions.

(Note: Nitrogen reduction feasibility studies for additional nitrogen reductions may be necessary in parallel with SWEM).

ACTION N-3.3
LIS Nitrogen Load Reduction
New York City, under the LISS CCMP, is committed to implementing specific low-cost actions to reduce nitrogen loads from STPs in the Harbor which discharge in close proximity to the Sound. New York City will reduce its aggregate annual nitrogen load from six STPs by 25 percent (approximately 6,500 tons/year). The reductions are being accomplished by low-cost retrofits and/or operational changes at five STPs (completed); centrate treatment, or equivalent, at either the Hunts Point or Wards Island STP (by 2000); and installation of step denitrification at the Newtown Creek STP (by 2007), as part of the upgrade to full secondary treatment and expansion of the facility. Note that, under LISS interim actions, NYSDEC and New York City have reached full agreement on STP permit limits which freeze nitrogen loads (i.e., no net increase in load) from the four NYC STPs discharging to, or in close proximity to, the Sound at 1990 levels. Permits to implement the "no net increase" are final; the effective date is January 1, 1997.

ACTION N-3.4
Jamaica Bay Nitrogen Reduction
Consistent with the January 28, 1994, decision of the NYSDEC Commissioner, New York City will implement low-cost nitrogen reductions for STPs discharging to Jamaica Bay. New York City will reduce its aggregate annual nitrogen load from four STPs by approximately 500 tons/year. The actions will be achieved by the end of 1996.

ACTION N-3.5
Additional Low-cost Nitrogen Reduction
NYSDEC and NJDEP will seek commitments from STPs discharging to the Harbor/Bight to implement additional low-cost nitrogen reductions, such as process modifications and BNR retrofits, as supported by HEM.

Upon completion of HEM, nitrogen reduction feasibility studies, and associated monitoring and research, NYSDEC, NJDEP, and dischargers as appropriate, in consultation with HEP, will define the nitrogen reductions to be implemented and prepare a plan to implement them, as appropriate. The states and dischargers, in consultation with HEP, will also define any further research, monitoring, modeling, or studies needed to help attain HEP's goals related to nutrients and organic enrichment.

ACTION N-3.6
Pilot Projects for Nitrogen Reduction
In parallel with a program to reduce nitrogen loadings, as supported by HEM, HEP will develop and seek funding for a program of pilot studies to demonstrate innovative nitrogen reduction techniques in the Harbor, including wetlands restoration. (Note: This action will proceed in parallel with development of SWEM (see Action N-4.1 below) if HEM results do not support the need for low-cost nitrogen reduction actions).

-- The section of the CCMP on Habitat and Living Resources includes several actions for ongoing or planned habitat restoration efforts (e.g., see Actions H-12.3, H-12.4, and H-12.5). These may provide an opportunity to develop pilot projects for nitrogen reduction. HEP will work to ensure such opportunities are explored and implemented.

OBJECTIVE N-4 Develop and implement additional actions necessary to eliminate adverse effects of eutrophication, including hypoxia, on marine life in the Harbor, Bight, and Long Island Sound

ACTION N-4.1
System-wide Eutrophication Model
Develop a comprehensive system-wide eutrophication model to identify actions necessary to eliminate the adverse impacts of hypoxia and other eutrophic effects.

-- NYCDEP has initiated the development of SWEM in parallel with the Harbor-wide Eutrophication Model and with HEP oversight. New York City is developing SWEM to evaluate its options as part of facility planning for the Newtown Creek STP. However, New York City's effort will substantially, though not completely, meet HEP's need for a tool to identify the actions necessary to eliminate the adverse effects of hypoxia and other eutrophic effects, system-wide.

-- HEP is working to ensure that SWEM fully meets HEP's needs. An initial evaluation by HEP's Modeling Evaluation Group (MEG) indicates the need to address model kinetics (e.g., zooplankton), and to ensure adequate data collection to support model calibration (e.g., for tributary loads, atmospheric inputs, and algal species enumerations). In particular, MEG identified a shortfall in data on ambient levels and loadings of nitrogen, and related parameters, in the New Jersey areas of the Harbor/Bight.

- New York City is addressing these concerns with the exception of data collection for the New Jersey areas of the Harbor/Bight.
- The New Jersey Harbor Dischargers Group (NJHDG), composed of the 11 New Jersey municipal sewerage authorities in the Harbor core area, is collecting the data in the New Jersey areas of the Harbor/Bight.

-- If NYCDEP decides not to complete SWEM, HEP will evaluate options to achieve its goals, including completing SWEM. This will include identifying suitable sponsors, such as USACE, and/or funding.

--HEP recommends that USACE seek authorization and funding to conduct modeling and monitoring to address nutrients and organic enrichment in the Harbor/Bight, not tied to dredged material management.

--SWEM is HEP's primary vehicle to understand the relationships among nitrogen loadings, algal biomass, and dissolved oxygen in the Harbor, Bight, and Sound. However, HEP recognizes that SWEM will be insufficient to fully evaluate the steps necessary to meet HEP's goal to eliminate the adverse impacts of eutrophication resulting from human activities. For example, SWEM will

not be suitable to predict the incidence and severity of novel algal blooms. HEP is therefore committed to developing and seeking funding for a program of research, in parallel with SWEM, to better understand and manage all the adverse impacts of eutrophication (see Objective N-5).

ACTION N-4.2
Further Nitrogen Reduction Actions
NYSDEC and NJDEP will require dischargers to implement nitrogen reductions to eliminate the adverse effects of hypoxia in the Harbor, Bight, and Sound, if there is adequate technical justification.

-- Upon completion of SWEM, and associated monitoring, research, and studies, NYSDEC and NJDEP, in consultation with HEP, NYCDEP, NJHDG, and other dischargers as appropriate, will define the additional nitrogen reductions to be required and prepare a plan to implement them, as appropriate. The states, in consultation with HEP and the dischargers, will also define any further research, monitoring, modeling, or studies needed to fully attain HEP's goal to eliminate the adverse impacts of eutrophication caused by human activities in the Harbor, Bight, and Sound.

Control Rainfall-Induced Discharges of Organic Material

The section on Rainfall-Induced Discharges below includes actions to control CSO and storm water discharges. This includes remediating noxious water quality conditions in inner Harbor areas and tributaries.

Develop and Conduct Additional Studies

HEP will work to understand and minimize the adverse effects of algal blooms and to better understand the causes and impacts of hypoxia. Actions to address nutrient-induced hypoxia are expected to reduce the adverse effects of algal blooms in general by reducing the nutrients limiting phytoplankton growth. The effect of these actions on the occurrence and severity of novel blooms is unknown. HEP is therefore conducting studies and will develop a research program to better understand the causes of algal blooms and their relationship to water quality factors, including hypoxia.

OBJECTIVE N-5 Conduct additional studies to understand the causes of hypoxia, algal blooms, and other eutrophic effects

ACTION N-5.1
Evaluation of Past Changes in Water Quality
HEP has computerized historical water quality data from NYCDEP's New York Harbor Water Quality Survey. NYCDEP will use these data to evaluate changes in water quality as a result of past management actions.

ACTION N-5.2
Historical Occurrences of Novel Algal Conditions
Using historical data, HEP is documenting the past occurrences of novel algal conditions and their relationship to water quality conditions.

ACTION N-5.3
"Normal" Phytoplankton Community Composition
HEP will, given sufficient funding, conduct a study to describe "normal" phytoplankton community composition for the Harbor/Bight area and document deviations from it.

ACTION N-5.4
Research on the Causes of Low Dissolved Oxygen
HEP will develop, and seek funding for, a program of basic research on the causes of low DO to complement SWEM. The program will build upon the ongoing HEP studies, described above.

ACTION N-5.5
Research on Causes and Dynamics of Algal Blooms
HEP will develop, and seek funding for, a program of basic research on the causes and dynamics of algal blooms. The program will build upon the ongoing HEP studies, described above.

COSTS OF IMPLEMENTING THIS PLAN

Many of the commitments and recommendations in the nutrients and organic enrichment component of the CCMP can be accomplished through the effective use of base program resources. In fact, full implementation of the CCMP relies, in large part, on continued operation, and funding at current levels, of existing programs to address nutrients and organic enrichment. The CCMP itemizes 10 new HEP-driven commitments to control nutrients and organic enrichment operating through base programs. These actions represent a major commitment to CCMP implementation.

The nutrients and organic enrichment component of the CCMP also includes 10 significant commitments and recommendations that entail enhanced program funding. As shown in Table 25(nc) below:

- The Plan includes 4 actions for which a total of $9.975 million has been committed by the responsible entities.
- The Plan includes 2 actions for which increased funding of $325,000 is recommended.
- The Plan includes 4 additional recommendations for action for which cost estimates will be developed during the continuing planning process.

This component of the CCMP also includes 7 actions that require or may require the expenditure of project implementation funds by responsible entities. As shown in Table 26(nc) below:

- The Plan includes 4 actions for which $132.5 million is being committed by New York City.
- The Plan includes 3 actions for which additional funds may be expended or be required to be expended by responsible entities, based on potential outcomes of several ongoing or planned HEP efforts. The costs of these actions to address nutrients and organic enrichment may be great. Cost estimates for these actions will be developed during the continuing planning process.

Table 25(nc). Enhanced Program Costs for Management of Nutrients and Organic Enrichment

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION N-3.1: Complete HEM.	$1.4 million			
ACTION N-3.2: Conduct nitrogen reduction feasibility studies.			$275,000+*	
ACTION N-4.1: Develop SWEM.	$8.44 million		*	
ACTION N-4.1: Conduct modeling (USACE) as necessary to supplement SWEM.			*	
ACTION N-5.1: Computerize NYC data; use to evaluate changes in water quality as a result of past management actions.	$88,000			
ACTION N-5.2: Document algal blooms.	$47,000			
ACTION N-5.3: Describe "normal" phytoplankton community.			$50,000	
ACTION N-5.4: Conduct research on low DO.			*	
ACTION N-5.5: Conduct research on phytoplankton blooms.			*	
TOTAL	$9,975,000		$325,000+*[1]	

* Enhanced program costs to be developed as part of the continuing planning process.
[1] Notation (+*) indicates cost plus additional costs to be determined.

Table 26(nc). Project Implementation Costs for Management of Nutrients and Organic Enrichment

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION N-3.2: Conduct NYC nitrogen reduction feasibility studies.	$5 million			
ACTION N-3.2: Conduct NYC nitrogen reduction pilots.	$10 million			
ACTION N-3.3: Implement NYC actions under LISS.	$102.5 million			
ACTION N-3.4: Implement NYC Jamaica Bay nitrogen reduction actions.	$15 million			
ACTION N-3.5: Implement additional low-cost nitrogen reduction actions, per HEM.			*	
ACTION N-3.6: Develop innovative nitrogen reduction pilot projects.			*	
ACTION N-4.2: Implement nitrogen reductions per SWEM.			*	
TOTAL	$132,500,000		*	

* Project implementation costs to be developed as part of the continuing planning process.

BENEFITS OF IMPLEMENTING THIS PLAN

- Completion of upgrades of municipal discharges to secondary treatment (Newtown Creek and Owls Head STPs) will result in improvements in DO in the areas near the affected discharges. (Note: Owls Head upgrade was recently completed).
- Implementation of low-cost actions to reduce nitrogen loads is expected to result in additional improvements in DO, thus reducing the adverse impacts of hypoxia. Under the LISS plan, New York City will achieve approximately 25 percent aggregate annual reductions in nitrogen loads from six STPs with implementation of low-cost controls. HEP hopes to achieve a similar percentage reduction with low-cost controls in the Harbor. However, these nitrogen reductions are not expected to be sufficient to achieve HEP's goal to eliminate the adverse impacts of eutrophication, including hypoxia, resulting from human activities. HEM will enable us to better predict the benefits of low-cost nitrogen reductions actions in reducing hypoxia.
- Additional nitrogen reduction actions based on SWEM would be intended to achieve HEP's goal for hypoxia throughout the Harbor, Bight, and Sound. These actions are also expected to reduce other adverse impacts of eutrophication.
- Actions to control rainfall-induced discharges of organic materials will eliminate violations of water quality standards due to these discharges.
- HEP's program of additional studies will help us to ensure that actions taken based on SWEM will have the benefits in reduced hypoxia predicted and will enable us to better address the other adverse impacts related to nutrient and organic enrichment.

Table 27(ns). Summary—Management of Nutrients and Organic Enrichment

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE N-1: Upgrade municipal sewage treatment plants to achieve full secondary treatment.				
ACTION N-1.1 : Upgrade Newtown Creek facility to full secondary treatment.	NYCDEP	By Dec 31, 2007	Base program, core CWA requirement[3]	C/O
ACTION N-1.2: Upgrade Owls Head facility to full secondary treatment.	NYCDEP	Completed	Base program, core CWA requirement[3]	C/O
OBJECTIVE N-2: Establish environmental objectives for the Harbor/Bight.				
ACTION N-2.1: Develop specific numeric DO targets for the Harbor/Bight.	HEP	Dec 1996	Base program	C/N
ACTION N-2.2: Develop specific ecosystem objectives for eutrophication.	HEP	Dec 1996	Base program	C/N

Note: It is HEP's goal that all the recommendations in the CCMP become commitments.

-- In some cases CCMP actions are recommendations, not commitments, because responsible entities require resources to implement the action. HEP will advocate making these resources available.

-- In other cases, CCMP actions are recommendations because HEP has not obtained the commitment of regulated entities and other responsible entities to implement the action. By issuance of this final CCMP, HEP seeks the commitment of the responsible entities and requests that they step forward to voluntarily agree to implement the actions.

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

[3] Table does not include costs of compliance with core elements of the Clean Water Act, specifically secondary treatment

(Continued)

Table 27(ns). Summary—Management of Nutrients and Organic Enrichment

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE N-3: ***Develop and implement, as appropriate, low-cost nitrogen reduction actions.***				
ACTION N-3.1: Complete Harbor-wide Eutrophication Model.	NYCDEP with HEP & USEPA support for data collection	Completed	Enhanced program cost - NYC: $1 million; HEP/USEPA: $400,000	C/O
ACTION N-3.2: Conduct feasibility studies to identify options and costs for nitrogen reduction, and collect data to quantify nitrogen loadings for STPs discharging to the Harbor core area.				
-- Conduct feasibility studies for low-cost nitrogen reduction such as BNR retrofits and process modifications.	NYCDEP	Completed	Base program	C/O
-- Conduct additional feasibility studies for other nitrogen reduction options.	NYCDEP	Completed	Project implementation cost - $5 million	C/O
-- Conduct pilot-scale implementation of nitrogen reduction options.	NYCDEP	Completed	Project implementation cost - $10 million	C/O
-- Conduct feasibility studies as necessary based on the results of HEM.	WCDEF	Dec 1996	Enhanced program cost to be provided by WCDEF as necessary	R
-- Conduct feasibility studies as necessary based on the results of HEM.	New Jersey Harbor Dischargers Group (NJHDG)	Dec 1996	Enhanced program cost - $275,000	R

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 27(ns). Summary—Management of Nutrients and Organic Enrichment

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION N-3.3: Under LISS CCMP, reduce aggregate annual nitrogen load from 6 STPs in NYC by 6,500 tons/year (Note: permit limits freezing the nitrogen loads from four of these STPs at levels prior to the de-watering of sludge are currently in force).	NYCDEP	5 actions completed; 1 action by Dec 31, 2000; Newtown Creek by Dec 31, 2007.	Project implementation cost - $102.5 million	C/O
ACTION N-3.4: Per recent NYSDEC decision, reduce aggregate annual nitrogen load from 4 STPs discharging to Jamaica Bay by 500 tons/year (Note: permit limits freezing the nitrogen loads from these STPs at levels prior to the de-watering of sludge are currently in force).	NYCDEP	Dec 1996	Project implementation cost - $15 million	C/O
ACTION N-3.5: Develop and implement additional low-cost nitrogen reductions such as process modifications and biological nutrient removal (BNR) retrofits, as supported by HEM.				
-- Upon completion of HEM, feasibility studies, and associated monitoring and research, define and develop an implementation plan for low-cost nitrogen reductions, as appropriate. This will include defining any additional research, monitoring, modeling, and studies necessary to help attain HEP's goals related to nutrients and organic enrichment.	NYSDEC, NJDEP, NYCDEP, NJHDG, WCDEF as appropriate, in consultation with HEP	Mar 1997	Base program	C/N
-- Seek commitments to implement reductions.	NYSDEC & NJDEP	Jun 1997	Base program	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 27(ns). Summary—Management of Nutrients and Organic Enrichment

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Implement.	NYCDEP, WCDEF, NJHDG as appropriate	Beginning Jun 1997	Project implementation cost to be provided by dischargers based on results of HEM and feasibility studies	R
ACTION N-3.6: Develop and seek funding for a program of pilot studies to demonstrate innovative nitrogen reduction techniques in the Harbor, including wetlands restoration.	HEP	Dec 1996	Base program	C/N
-- Implement program.	HEP, in concert with responsible agencies	Begin by Dec 1996	Project implementation cost to be developed based on above work program	R

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 27(ns). Summary—Management of Nutrients and Organic Enrichment

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE N-4: Develop and implement additional actions necessary to eliminate adverse effects of eutrophication, including hypoxia, on marine life in the Harbor, Bight, and Sound.				
ACTION N-4.1: Develop a comprehensive system-wide eutrophication model (SWEM) to identify actions necessary to eliminate adverse effects of hypoxia and other eutrophic effects on marine life in the Harbor, Bight, and Sound.				
-- Develop SWEM to meet NYC facility planning needs, and also substantially, though not completely, meet HEP's needs.	NYCDEP*	Dec 1997	Enhanced program cost - $8 million	C/O*
-- Collect data necessary for model calibration for NJ areas of the Harbor/Bight, to ensure NYC's effort to develop SWEM fully meets HEP's needs.	NJHDG	Ongoing	$442,000	C/N
-- Seek authorization and funding to conduct modeling and monitoring to address nutrients and organic enrichment in the Harbor/Bight, not tied to dredged material management.	USACE	Ongoing	Base program	C/N
-- Supplement NYC modeling effort as necessary.	USACE under the auspices of HEP	Target date to be developed as necessary	Enhanced program cost estimate to be determined based on need to supplement NYC modeling effort	R

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

* NOTE: NYCDEP has initiated development of SWEM in parallel with HEM, under the auspices of HEP. If NYCDEP chooses not to complete SWEM, HEP will evaluate options to meet its goals including completion of SWEM.

(Continued)

Table 27(ns). Summary—Management of Nutrients and Organic Enrichment

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION N-4.2: Require dischargers to implement additional nitrogen reductions to eliminate the adverse effects of hypoxia in the Harbor, Bight, and Sound if there is adequate technical justification.				
-- Upon completion of SWEM and associated monitoring, research, and studies, define and develop an implementation plan for additional nitrogen reductions to be required, as appropriate. This will include defining any additional research, monitoring, modeling, or studies necessary to fully attain HEP's goal to eliminate the adverse impacts of eutrophication caused by human activities in the Harbor, Bight, and Sound.*	NYSDEC & NJDEP, in consultation with HEP and dischargers as appropriate	By Dec 31, 1998	Base program	C/N
-- Modify permits as necessary.	NYSDEC & NJDEP	By Dec 31, 2000	Base program	C/N
-- Comply.	NYCDEP, WCDEF, NJHDG and other dischargers, as appropriate	Begin by Dec 31, 2000	Project implementation cost to be developed by dischargers based on SWEM results and feasibility studies	R

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

* NOTE: NYCDEP has initiated development of SWEM in parallel with HEM, under the auspices of HEP. If NYCDEP chooses not to complete SWEM, HEP will evaluate options to meet its goals including completion of SWEM.

(Continued)

Table 27(ns). Summary—Management of Nutrients and Organic Enrichment

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE N-5: Conduct additional studies to understand the causes of hypoxia, algal blooms, and other eutrophication effects.				
ACTION N-5.1: Computerize historical data from NY Harbor Water Quality survey.	HEP	Completed	Enhanced program cost - $28,000	C/N
-- Use the data to evaluate changes in water quality as a result of past management activities.	NYCDEP	May 1996	Enhanced program cost - $60,000	C/N
ACTION N-5.2: Document past occurrences of novel algal conditions.	HEP	Feb 1996	Enhanced program cost - $47,000	C/N
ACTION N-5.3: Describe "normal" phytoplankton community composition and document deviations from it.	HEP	Begin by Dec 31, 1996	$50,000	R
ACTION N-5.4: Conduct a program of basic research on the causes of low DO to complement SWEM.	HEP	Dec 1996	Enhanced program cost to be developed by HEP through work program (below)	R
-- Develop program and seek funding.	HEP	Jul 1996	Base program	C/N
ACTION N-5.5: Conduct program of basic research to better understand causes and dynamics of phytoplankton blooms.	HEP	Dec 1996	Enhanced program cost to be developed by HEP through work program (below)	R
-- Develop program and seek funding.	HEP	Jul 1996	Base program	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

RAINFALL-INDUCED DISCHARGES

PROBLEM
Much of the pollution entering the Harbor/Bight is associated with runoff induced by rainfall

SOURCES
Combined sewer overflows
Storm water discharges
Non-point source runoff

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

GOALS *To minimize the loads of pollutants entering the Harbor/Bight from combined sewer overflows, storm water discharges, and non-point source runoff.*
To eliminate the adverse environmental effects of combined sewer overflows, storm water discharges, and non-point source runoff on the Harbor/Bight.

OBJECTIVES
CSO-1 Implement the nine minimum measures of the National CSO Control Policy.
CSO-2 Implement additional CSO controls to meet water quality standards and restore beneficial uses.
SW-1 Implement measures to control municipal and industrial storm water discharges.
NPS-1 Focus Clean Water Act non-point source programs on Harbor/Bight watersheds.
NPS-2 Develop and implement coastal non-point source management programs under Coastal Zone Act Reauthorization Amendments.
NPS-3 Focus the Urban Resources Partnership Initiative on Harbor/Bight watersheds.
NPS-4 Continue and enhance education programs for control of non-point source pollution.

Three major sources of pollution to the Harbor/Bight are associated with runoff induced by rainfall. Two of these sources -- combined sewer overflows (CSOs) and storm water discharges -- are regulated as point sources under the Clean Water Act's National Pollutant Discharge Elimination System (NPDES) permit program. The third source -- non-point source runoff -- is not currently regulated by federal or state permit requirements. Problems and actions associated with these rainfall-induced discharges are described in this section to avoid redundancy throughout the CCMP.

COMBINED SEWER OVERFLOWS

The Problem

Most of the Harbor is served by "combined sewers", which combine sanitary sewage and storm water. Combined sewer overflows occur when large volumes of water generated during rain events combine with the regular sanitary waste stream, overwhelming the capacity of sewage treatment plants. The resultant sewage overflow goes directly into the Harbor with little or no treatment.

There are approximately 730 CSO discharge points which discharge to the Harbor, including 460 in New York City; 22 from the Yonkers Sewer District, Westchester County; and 248 from New Jersey (from over 20 municipal entities). There are no CSOs discharging to the Bight or to the back bays adjacent to the Bight.

CSOs are the dominant source of pathogens and important contributors of floatables, toxic metals, and settleable solids to the Harbor. They also contribute toxic organic chemicals, nutrients and organic contamination, and cause degradation of habitat.

The Plan to Solve the Problem

USEPA recently issued a final National CSO Control Policy which prescribes nine measures that constitute a minimum recommended level of CSO control:

- Proper operation and regular maintenance programs for the sewer system and CSO pipes.
- Maximum use of collection systems for storage.
- Review and modification of pretreatment programs to assure CSO impacts are minimized (i.e., minimization of non-domestic user discharges during wet weather periods).
- Maximization of flow to sewage treatment plants for treatment.
- Prohibition of CSO discharges during dry weather.
- Control of floatable materials in CSO discharges.
- Pollution prevention programs that focus on contaminant reduction activities.
- Public notification to ensure that the public receives adequate information on CSO occurrences and impacts.
- Effective monitoring to characterize CSO impacts and the efficacy of CSO controls.

In addition, the Policy calls for permittees to develop long-term CSO abatement plans to eliminate water quality standards violations and restore beneficial uses impaired by CSOs, including project schedules and financing.

The current CSO abatement program in the Harbor/Bight region is described in the following enforceable instruments or draft enforceable instruments: 1) for New York City -- the 1988 State Pollutant Discharge Elimination System (SPDES) permit and the 1992 NYSDEC/NYCDEP CSO Abatement Consent Order; 2) for the Yonkers Sewer District, Westchester County -- the 1994 SPDES permit and the 1989 NYSDEC/ County Consent Order; and 3) for New Jersey communities in the Harbor area -- the final New Jersey Pollutant Discharge Elimination System (NJPDES) CSO General Permit, existing individual NJPDES permits issued to municipalities and sewerage authorities for CSOs, and existing state mandates not appropriately included in either of the above.

COMMITMENTS AND RECOMMENDATIONS

OBJECTIVE CSO-1 ***Implement the nine minimum measures of the National CSO Control Policy***

ACTION CSO 1.1
Assessment of Steps Necessary to Implement the Nine Minimum Measures
HEP reviewed the CSO abatement programs in the Harbor/Bight region to assess the necessary steps to fully meet the nine minimum measures.

HEP has prepared reports which thoroughly assess New York City, Yonkers, and New Jersey communities' CSO abatement programs for the Harbor/Bight region, in relation to the nine minimum measures of the National CSO Control Policy. The reports recommend the steps necessary to ensure the requirements are fully met.

Our assessment of the steps necessary to fully implement the nine measures is as follows:

New York City

-- Implement a floatables control plan, to the extent feasible, for that portion of the City's CSO drainage area that is not currently covered by the Consent Order's interim booming and skimming provisions.

Yonkers Sewer District

-- Include requirements in the SPDES permit to review and modify the pretreatment program to minimize CSO impacts.

New Jersey

-- Modify individual NJPDES permits issued to municipalities and POTWs for CSOs, as necessary, to require implementation of the nine minimum measures.

-- Include requirements to explore the minimization of non-domestic user discharges during wet weather periods, maximize flow to POTWs for treatment, and incorporate pollution prevention (especially for the chemicals of concern), in individual NJPDES permits issued to POTWs for CSOs.

As part of the assessment of steps necessary to meet the nine minimum CSO control measures, HEP encourages the use of shoreline surveys to identify dry weather discharges.

ISC conducts a dry weather monitoring program to supplement the states' efforts to comply with the nine minimum control measures.

ACTION CSO 1.2
Implementation of the Nine Minimum Measures
Through appropriate enforceable instruments, NYSDEC and NJDEP will require dischargers to implement the recommendations in the HEP reports, to achieve full compliance with the nine minimum measures and to document the implementation of the measures.

-- NJDEP and New Jersey dischargers will explore the implementation of the control measure to minimize non-domestic user discharges during wet weather periods, within the context of existing authority and regulations.

Pollution Prevention for Chemicals of Concern

The National CSO Abatement Policy includes pollution prevention as a principal means of CSO abatement. Pollution prevention is expected to be effective in reducing loads of chemicals of concern, including petroleum, to the Harbor/Bight. The key recommendations of the HEP CCMP for pollution prevention can be found in the section on Management of Toxic Contamination. HEP's program involves:

-- Identifying the largest emitters of chemicals of concern, using available data on discharges to all media, and giving these facilities priority for reduction or elimination of emissions through pollution prevention (see Objective T-8).

-- Using sensitive monitoring techniques to identify significant discharges of chemicals of concern for track-down and clean-up, as appropriate (see Action T-1.2 and Objective T-6).

-- HEP will, given sufficient funding, assess the load reductions of chemicals of concern expected with implementation of HEP's plan to abate CSO and other rainfall-induced discharges (see Action T-12.13).

OBJECTIVE CSO-2 ***Implement additional CSO controls to meet water quality standards and restore beneficial uses***

The nine minimum measures of the National CSO Policy establish a basic level of CSO controls. However, these controls will not necessarily achieve the reductions necessary to meet water quality standards, restore beneficial uses, and eliminate adverse ecosystem impacts. The National CSO Control Policy therefore recommends that additional steps be taken to eliminate adverse impacts due to CSOs.

HEP will coordinate the development of these long-term CSO abatement plans in New York-New Jersey Harbor to help ensure a bi-state regional approach to address CSO-related impacts on shared waters. One example of such cooperation is that, at NJDEP's request, NYCDEP has agreed to provide use of its Harbor CSO model to New Jersey. Also, because of its interstate jurisdiction that covers New York and New Jersey in the Harbor area, ISC will continue its regional efforts regarding CSO control strategies.

ACTION CSO-2.1
New York City Long-term CSO Abatement Program
The NYSDEC/NYCDEP CSO Abatement Consent Order commits New York City to a two-track program to abate impacts of CSOs. Track 1 will consist of retention tanks and other appropriate control measures which will be completed by 2005, at a cost of $1-2 billion. Track 1 will eliminate violations of dissolved oxygen and coliform standards due to CSOs. Track 2 will address floatables, settleable solids, and toxics. Comprehensive planning for Track 2 will be completed by 1997; construction is not likely to begin prior to 2005. Costs for Track 2 are uncertain because planning is not complete. Costs could be negligible (e.g., for use of Best Management Practices) or could exceed $3 billion (e.g., for tunnel construction).

ACTION CSO-2.2
New Jersey Long-term CSO Abatement Program
HEP recommends that the owners and operators of combined sewer systems in the New Jersey drainage to the Harbor, and the STPs to which they discharge, cooperate in a regional effort to develop long-term CSO abatement plans to prevent violations of water quality standards, restore and/or maintain beneficial uses, and eliminate adverse ecosystem impacts due to CSOs.

-- In order to facilitate the cooperative development of CSO abatement plans, USEPA and NJDEP have initiated a series of meetings with the responsible parties to seek a broad regional agreement on the most efficient and effective interjurisdictional approach to long-term CSO abatement.

-- By December 31, 1996, USEPA and NJDEP will obtain enforceable commitments from STP owners and operators to carry out their long-term CSO abatement responsibilities.

-- NJDEP will follow up, as necessary, to obtain the commitments of the remaining responsible parties.

In implementing CSO abatement programs, HEP encourages New Jersey CSO dischargers to use the funding available through the New Jersey Wastewater Treatment Trust.

ACTION CSO-2.3
CSO Controls for Pathogens Abatement
Specific pathogen-related actions should be directed toward geographically targeted areas.

-- HEP is conducting regional water quality modeling as a screening tool to examine bacterial contamination sources. Using the New York City water quality model where data are adequate, HEP will develop preliminary target areas for priority action to recover or enhance bathing and/or shellfishing uses.

(Note: Action P-7.3 would build upon this action.)

STORM WATER DISCHARGES

The Problem

Storm water discharges occur when it rains in areas with separate storm and sanitary sewer systems. Although much of the Harbor core area is served by combined sewer systems, significant areas are not. For example, in New York City, approximately 30 percent of the area is served by separate sewers. The entire Bight and back bays are either served by separate sewer systems or are unsewered.

Storm water discharges are important contributors of pathogens, many toxic chemicals, and floatables. They also contribute to nutrients and organic contamination and cause degradation of habitat.

The Plan to Solve the Problem

USEPA issued regulations in 1990 which establish permit application requirements for municipal storm water discharges and for storm water discharges associated with industrial activity. These requirements focus on reducing storm water contamination through implementation of best management practices, such as pollution prevention plans. In addition, municipal requirements seek to eliminate non-storm water discharges, such as illegal sewer hook-ups, to storm sewers.

The 1990 requirements for municipal storm water discharges apply to municipalities with a population of 100,000 or more served by separate sewer systems -- only New York City in the Harbor/Bight area. In April 1995, USEPA proposed additional regulations which address the permitting requirements for industrial and municipal storm water dischargers which were not covered by the 1990 rules. USEPA recently issued the final rule. The rule gives these additional dischargers until August 2001 to file permit applications. USEPA is committed to using an inclusionary process with stakeholders to re-evaluate the storm water permitting requirements for these additional dischargers and to propose revised rules by September 1997.

COMMITMENTS AND RECOMMENDATIONS

ACTION SW-1.1

OBJECTIVE SW-1	***Implement measures to control municipal and industrial storm water discharges***

New York City Storm Water Permit

NYSDEC has reviewed New York City's application for a municipal storm water permit. In April 1996, the state will issue proposed modifications to six of the City's SPDES permits which will establish requirements for the City's storm water management program. The requirements will address toxics, floatables, and pathogens.

ACTION SW-1.2

NJDEP Municipal Storm Water Permit(s)

NJDEP will implement a municipal storm water permitting effort for discharges to the Harbor and its tributaries. In a phased approach, NJDEP will negotiate permits with 46 municipalities draining to the areas of the Harbor where metals are water quality-limiting (see Toxics section for background information). Through this permitting effort, NJDEP and the municipalities will agree on an implementation plan for pollution abatement which could include actions such as floatables reduction, animal waste control, sewer rehabilitation, catch basin repair/maintenance, illicit discharge mitigation, and toxics monitoring.

ACTION SW-1.3

Industry-Specific General Permits for Pollution Prevention

-- To comply with the regulations for storm water discharges associated with industrial activity, both NYSDEC and NJDEP have issued two storm water general permits: 1) to control industrial storm water discharges, and 2) to control construction discharges.

-- HEP recommends that New York City and other local governments in the Harbor/Bight watersheds control construction discharges by adopting the requirements of the general permits into local codes.

-- Both New York and New Jersey will issue statewide industry-specific general permits, establishing specific requirements for pollution prevention activities at certain classes of industrial sites.

ACTION SW-1.4

DELETED

ACTION SW-1.5
Storm Water Projects under the Intermodal Surface Transportation Efficiency Act
NJDEP and NYSDEC will work with local governments, as appropriate, to develop storm water control projects for potential funding under the Intermodal Surface Transportation Efficiency Act (ISTEA) program.

NON-POINT SOURCE RUNOFF

The Problem

Non-point source pollution is created by runoff directly from the land during rain events. As the rainwater moves over land, it picks up and carries away natural and manmade pollutants. Non-point source runoff contributes pathogens, toxic chemicals, nutrients and organic materials, and floatables to the Harbor/Bight, and also causes degradation of habitat.

The Plan to Solve the Problem

The actions below focus primarily on non-point source runoff in the areas of the Harbor/Bight that are unsewered. However, through actions in other sections of the CCMP, HEP is seeking to quantify the relative contribution of non-point sources on a pollutant-specific basis, throughout the Harbor/Bight. For example, several actions involving modeling and monitoring are intended to develop mass balances for various pollutants:

- System-wide Eutrophication Model (SWEM) for nutrients and organic materials (Action N-4.1); and
- Simple mass balances (Action T-13.3) and System-wide Toxics Model (Action T-13.2) for mercury and toxic organic chemicals.

To the extent non-point source pollutant loads are shown to be significant, HEP will adjust its priorities to address these sources. For example, for the purpose of developing the mass balances for the Harbor/Bight, tributary inputs of pollutants are treated as aggregate loads. However, the pollutants entering the Harbor/Bight through its tributaries are from point and non-point sources within the drainage areas of the tributaries. To the extent tributary pollutant inputs to the Harbor/Bight are shown to be significant and require control, HEP will initiate action to develop mass balances for the tributaries. HEP encourages other sponsors to assess pollutant loads in Harbor/Bight tributaries.

COMMITMENTS AND RECOMMENDATIONS

Section 319 of the Clean Water Act requires states

OBJECTIVE NPS-1 ***Focus Clean Water Act non-point source programs on Harbor/ Bight watersheds***

to identify waters impacted by non-point source pollution and to prepare and implement state non-point source management programs. USEPA awards grants to states under section 319(h) to assist with implementation of the state management programs. Both New York and New Jersey have USEPA-approved state non-point source management programs.

ACTION NPS-1.1
New Jersey Focus on Harbor/Bight Watershed
As part of the joint strategic plan in New Jersey, USEPA and NJDEP have agreed to focus on two watersheds in the Harbor/Bight drainage basin, Barnegat Bay and the Whippany River, as part of the non-point source management program.

ACTION NPS-1.2
New Jersey Navesink River Project
NJDEP will complete a Navesink River non-point source demonstration project by March 1996. The purpose of the project is to identify simple best management practices (BMPs) which can be implemented on the municipal level. The project is examining the effectiveness of selected BMPs to control pollutants associated with urban and suburban runoff, boating and marinas, and animal waste.

The section on Management of Habitat and Living Resources identifies additional actions to control non-point source pollution in the Harbor/Bight (see Objective H-2).

OBJECTIVE NPS-2 ***Develop and implement coastal non-point source management programs under Coastal Zone Act Reauthorization Amendments***

Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990 requires states with approved coastal zone management programs to prepare and implement coastal non-point pollution management programs. NOAA establishes the "Coastal Watershed Boundary", which defines the area to be included in the program, and states must follow USEPA's January 1993 guidance.

This guidance provides management measures which specify technology-based requirements for six categories of non-point source pollution, including urban runoff, agricultural runoff, shoreline erosion, and marinas. For many of the management measures, states are required to establish enforceable mechanisms to ensure implementation. States must have submitted approvable coastal non-point programs by July 1995; USEPA and NOAA must jointly review and approve the state coastal non-point programs within six months. Reviews will be based on the steps the states take to implement the measures. Implementation of the programs must occur by 1999. Any state which fails to submit an approvable program will be subject to reduced federal non-point source and coastal zone management funding.

ACTION NPS-2.0
Coastal Non-point Source Programs

-- USEPA and NOAA are working with the States of New York and New Jersey to identify gaps in the states' coastal non-point programs and to develop approvable programs.

-- New York and New Jersey submitted their coastal non-point programs in July 1995.

-- NYDOS and NYSDEC will develop and implement a coastal non-point management program.

-- NJDEP will develop and implement a coastal non-point management program.

(Note: NYSDEC, NYSDOS, and NJDEP will seek authority to implement their coastal non-point source programs as necessary).

OBJECTIVE NPS-3 ***Focus the Urban Resources Partnership on Harbor/Bight watersheds***

The U.S. Department of Agriculture (USDA) has recently begun the Urban Resources Partnership (URP). This partnership, including representatives from USDA's Natural Resources Conservation Service and Forest Service, the U.S. National Park Service and Fish and Wildlife Service of the U.S. Department of the Interior, USEPA, and Cornell Cooperative Extension, is working with local government and community groups to implement natural resource-related projects intended to improve the quality of life in urban areas. New York City is one of four cities chosen to pilot-test the initiative. USDA has allocated $500,000 for the New York City project.

ACTION NPS-3.0
URP Funds
A portion of New York City URP pilot project funds should support non-point source management projects where non-point sources are contributing significantly to human use impairments and other adverse ecosystem impacts.

OBJECTIVE NPS-4 ***Continue and enhance education programs for control of non-point source pollution***

ACTION NPS-4.0
Ongoing Education Programs
NYSDEC and NJDEP will continue and enhance ongoing education programs for control of non-point source pollution.

ADDITIONAL ACTIONS TO REDUCE AND ELIMINATE ADVERSE IMPACTS OF RAINFALL-INDUCED DISCHARGES

Currently planned or ongoing investigations by HEP, such as toxics and nutrient modeling, may provide additional information indicating the need for further control of CSOs, storm water discharges, and non-point source runoff. USEPA, NYSDEC, and NJDEP are committed to using the results of these investigations to develop additional controls, and to require implementation of the controls through enforceable instruments, as necessary.

COSTS OF IMPLEMENTING THE PLAN

Many of the commitments and recommendations in the rainfall-induced discharges component of the CCMP can be accomplished through the effective use of base program resources. In fact, full implementation of the CCMP relies, in large part, on continued operation, and funding at current levels, of existing programs to address rainfall-induced discharges. The rainfall-induced discharges component of the CCMP itemizes 8 new HEP-driven commitments operating through base programs; these actions represent a major commitment to CCMP implementation.

The rainfall-induced discharges component of the CCMP also includes 5 significant commitments and recommendations that entail enhanced program funding. As shown in Table 28(rc) below:

- The Plan includes 2 actions for which a total of $168,000 has been committed by the responsible entities.
- The Plan includes 3 additional recommendations for action for which cost estimates will be developed during the continuing planning process.

This component of the CCMP includes 8 actions that require or may require the expenditure of project implementation funds by responsible entities. As shown in Table 29(rc) below:

- The Plan includes 3 actions for which funds of $1-5 billion plus $100,000 per year are or will be committed by New York City.
- The Plan includes 1 recommended action for New Jersey with an estimated cost of $1.3 billion.
- The Plan includes 5 actions for which additional funds may be required to be expended by responsible entities based on the potential outcomes of several ongoing or planned HEP efforts.

The costs of implementation actions to address rainfall-induced discharges may be large. Cost estimates for these actions will be developed during the continuing planning process.

Table 28(rc). Enhanced Program Costs for Rainfall-Induced Discharges

ACTION		COMMITMENTS		RECOMMENDATIONS	
		Cost	Cost/Year	Cost	Cost/Year
ACTION CSO-2.2: abatement plan.	Develop NJ long-term CSO			*[1]	
ACTION CSO-2.3: for recovering/enhancing bathing and shellfishing.	Develop preliminary target areas	$35,000			
ACTION SW-1.4: DELETED					
ACTION NPS-1.2: point source project.	Complete Navesink River non-	$133,000			
ACTION NPS-4.0: programs for non-point source.	Continue and enhance education			*	
	TOTAL	$168,000		*	

* Enhanced program costs to be developed as part of the continuing planning process.
[1] Note: NJDEP has provided a preliminary cost estimate for the overall NJ CSO abatement program. See Table 29(rc).

Table 29(rc). Project Implementation Costs for Rainfall-Induced Discharges

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION CSO-1.2: Comply with requirements for full implementation of the nine minimum CSO control measures.	*[1]		*[1]	
ACTION CSO-2.1: Implement long-term NYC CSO abatement program.	$1-5 billion			
ACTION CSO-2.2: Implement long-term CSO abatement in NJ.			$1.3 billion	
ACTION SW-1.1: Comply with municipal storm water permit (NYC).		$100,000		
ACTION SW-1.2: Comply with NJ municipal storm water permits, as required.			*	
ACTION SW-1.4: DELETED				
ACTION NPS-2.0: Implement coastal NPS management programs.	*			
TOTAL	$1-5 billion + *[2]	$100,000	$1.3 billion + *[2]	

* Project implementation costs to be developed as part of the continuing planning process.

[1] Note: Responsible parties have committed to do much of what is required to meet the nine minimum control measures. NYCDEP has provided a cost estimate for its overall CSO abatement program (See Action CSO-2.1 below), and NJDEP has provided a preliminary cost estimate for the overall NJ CSO abatement program (See Action CSO-2.2 below). Costs will be further developed as part of the continuing bi-state/regional planning process.

[2] Notation (+*) indicates cost plus additional costs to be determined.

BENEFITS OF IMPLEMENTING THE PLAN

HEP's plan to address CSOs is intended to make stepwise progress in the control of these discharges. Implementation of the nine minimum control measures of the National CSO Control Policy will provide substantial benefits in reducing discharges of pollutants through good management practices. Implementation of long-term CSO abatement plans in New York and New Jersey will achieve HEP's goal to eliminate the adverse impacts of these discharges throughout the Harbor.

Implementation of HEP's plan to address storm water discharges will help minimize the adverse impacts of these discharges in most of the Harbor, through good management practices. HEP's plan will start to address the adverse environmental impacts of storm water discharges; additional actions may be necessary in the future to fully address the impacts.

HEP's plan to address non-point source runoff is expected to significantly reduce these impacts in the areas targeted. Pilot projects are intended to lead to wider implementation.

Additional information on the benefits on minimizing rainfall-induced discharges is discussed in the CCMP sections on pathogen contamination, floatables, toxic contamination, habitat and living resources, and nutrients and organic enrichment.

Table 30(rs). Summary—Rainfall-Induced Discharges: Combined Sewer Overflow Abatement

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE CSO-1: Implement the nine minimum measures of the National CSO Control Policy.				
ACTION CSO-1.1: Prepare reports assessing NYC, Yonkers, and NJ communities' CSO abatement programs in the Harbor/Bight region in relation to the nine minimum measures. Recommend steps necessary to ensure the requirements are fully met.	HEP	Completed	Base program	C/N
ACTION CSO-1.2: Require, through appropriate enforceable instruments, implementation of the recommendations in the reports, including documenting implementation of the minimum measures.				
-- Modify/develop enforcement instruments.	NYSDEC	Apr 1996	Base program	C/N
-- Finalize general permit.	NJDEP	Completed	Base program	C/O
-- Modify/develop individual NJPDES permits issued to municipalities and POTWs for CSOs.	NJDEP	Draft: Completed Final: Jun 30, 1996	Base program	C/N

Note: It is HEP's goal that all the recommendations in the CCMP become commitments.

-- In some cases CCMP actions are recommendations, not commitments, because responsible entities require resources to implement the action. HEP will advocate making these resources available.

-- In other cases, CCMP actions are recommendations because HEP has not obtained the commitment of regulated entities and other responsible entities to implement the action. By issuance of this CCMP, HEP seeks the commitment of the responsible entities and requests that they step forward to voluntarily agree to implement the actions.

R - Recommendation

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP

(Continued)

Table 30(rs). Summary—Rainfall-Induced Discharges: Combined Sewer Overflow Abatement

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
- Comply with above.	NYCDEP, WCDEF, NJ dischargers and municipalities	Jan 1, 1997	Project implementation costs incorporated in cost estimates under Actions CSO-2.1 and CSO-2.2*	R
OBJECTIVE CSO-2: Implement additional CSO controls to meet water quality standards and restore beneficial uses.				
ACTION CSO-2.1: Implement long-term NYC CSO abatement program.				
-- Track 1	NYCDEP	By Dec 31, 2005	Project implementation cost - $1-2 billion	C/O
-- Track 2	NYCDEP	Begin construction by Dec 31, 2005	Project implementation cost - up to $3 billion estimated	C/O
ACTION CSO-2.2: Cooperate in a regional effort to develop long-term CSO abatement plans to prevent violations of water quality standards, restore and/or maintain beneficial uses, and eliminate adverse ecosystem impacts due to CSOs.				
-- Conduct a series of meetings to seek a broad regional agreement on the most efficient and effective interjurisdictional approach to long-term CSO abatement.	USEPA & NJDEP, with NJ combined sewer system owners and operators in the Harbor area and the STPs to which they discharge	Ongoing, through Dec 1996	Base program	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 30(rs). Summary—Rainfall-Induced Discharges: Combined Sewer Overflow Abatement

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Obtain enforceable commitments from STP owners and operators to carry out their long-term CSO abatement responsibilities.	USEPA & NJDEP	Dec 1996	Base program	C/N
-- Follow up, as necessary, to obtain the commitments of the remaining responsible entities.	NJDEP	As necessary beginning by Dec 31, 1997	Base program	C/N
-- Develop plan.	NJ combined sewer system owners and operators in the Harbor area and the STPs to which they discharge	Dates to be negotiated by USEPA & NJDEP with responsible entities	Enhanced program cost incorporated into project implementation cost below	R
-- Implement plan.			Project implementation cost - $1.3 billion*	R
ACTION CSO-2.3: Use the NYC water quality model to develop preliminary target areas for priority action to recover or enhance bathing and/or shellfishing uses. (Note: Action P-7.3 would build upon this action.)	HEP	Draft report: Completed Final report: Mar 1996	Enhanced program cost - $35,000	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

* Note: NJDEP has provided a preliminary cost estimate for overall CSO abatement program. See Action CSO-2.2.

(Continued)

Table 30(rs). Summary—Rainfall-Induced Discharges: Combined Sewer Overflow Abatement

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE SW-1: Implement measures to control municipal and industrial storm water discharges.				
ACTION SW-1.1: Issue modifications to six of NYC's SPDES permits which will establish requirements for the city's storm water management program.	NYSDEC	Apr 1996	Base program	C/O
-- Comply with above.	NYCDEP	Begin by Apr 1996	Project implementation cost - $100,000/yr	C/O
ACTION SW-1.2: Implement a municipal storm water permitting effort for discharges to the Harbor and its tributaries.				
-- In a phased approach, negotiate permits with 46 municipalities draining to the areas of the Harbor where metals are water quality-limiting.	NJDEP, working with municipalities	Ongoing	Base program	C/N
-- Issue permits.	NJDEP	1996 to 2000	Base program	C/N
-- Comply with NJ municipal storm water permits, as required.	NJ municipalities	1996 to 2000, based on negotiated permit requirements	Project implementation cost to be developed by NJ municipalities based on negotiated permit requirements	R
ACTION SW-1.3: Issue industry-specific general permits.	NYSDEC & NJDEP	Ongoing	Base program	C/O
-- Adopt requirements of the general permit to control construction discharges into local codes.	NYC	Dec 1995	Base program	R

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 30(rs). Summary—Rainfall-Induced Discharges: Combined Sewer Overflow Abatement

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION SW-1.4: DELETED				
ACTION SW-1.5: Develop storm water control projects for potential funding under the Intermodal Surface Transportation Efficiency Act (ISTEA).	NYSDEC & NJDEP, working with local governments as appropriate	Beginning by Dec 31, 1996	Base program	C/O
OBJECTIVE NPS-1: Focus Clean Water Act non-point source programs on Harbor/Bight watersheds.				
ACTION NPS-1.1: Implement NPS management program for Barnegat Bay and the Whippany River.	NJDEP	From Dec 31, 1995 to Dec 31, 1998	Base program	C/O
ACTION NPS-1.2: Complete Navesink River non-point source demonstration project.	NJDEP	Mar 1996	Enhanced program cost - $133,000	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP

(Continued)

Table 30(rs). Summary—Rainfall-Induced Discharges: Combined Sewer Overflow Abatement

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE NPS-2: Develop and implement coastal non-point source management programs under Coastal Zone Act Reauthorization Amendments.				
ACTION NPS-2.0: Develop and implement a coastal non-point management program.				
-- Develop program and seek authority to implement as necessary.	NYDOS & NYSDEC with USEPA & NOAA assistance, NJDEP with USEPA & NOAA assistance	Ongoing	Base program	C/O
-- Approve program.	USEPA & NOAA	Jan 1996	Base program	C/O
-- Implement program.	NYDOS, NYSDEC, NJDEP	Full implementation by Dec 31, 2005	Project implementation cost to be developed by responsible entities based on approved program	C/O
OBJECTIVE NPS-3: Focus the Urban Resources Partnership on Harbor/Bight watersheds.				
ACTION NPS-3.0: Use a portion of URP funds to support non-point source management projects in NYC watersheds impacted by NPS pollution.	Urban Resources Partnership (URP)	Ongoing	To be determined by URP	R
OBJECTIVE NPS-4: Continue and enhance education programs for control of non-point source pollution.				
ACTION NPS-4.0: Continue and enhance ongoing education programs.	NYSDEC & NJDEP	Ongoing	Base program plus enhanced program cost estimates as identified by NYSDEC & NJDEP	C/O

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

PUBLIC INVOLVEMENT AND EDUCATION

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

GOALS *To provide for public input to program and policy decision-making on behalf of the diverse stakeholders in the Hudson/Raritan Estuary and the New York Bight.*
To maximize public involvement in the implementation of the CCMP.

OBJECTIVES

- *E-1 Provide for public input to ongoing program and policy decision-making for HEP.*
- *E-2 Build community awareness, appreciation, and understanding of the ecosystem and its importance; and encourage action at the community level.*
- *E-3 Promote understanding of and involvement in the implementation of the CCMP recommendations.*
- *E-4 Increase communication and foster cooperation among stakeholders and others involved with ecosystem management, protection, and stewardship activities.*
- *E-5 Promote individual and group involvement and sponsorship of education and stewardship activities to clean up and restore the ecosystem.*
- *E-6 Enhance educational opportunities for all education levels.*
- *E-7 Secure additional funding and raise awareness of funding sources to increase public involvement and education activities.*

WHY IS PUBLIC INVOLVEMENT AND EDUCATION IMPORTANT?

HEP has recognized, from the earliest days of the program, that an informed and active public is vital to HEP's success, and that the public is composed of various stakeholders, each with differing and often competing interests. Developing and implementing an effective plan requires the imagination, attention, and support of these stakeholders.

A public that understands the water quality, habitat protection, and related natural resource problems of the Harbor/Bight, and possible solutions, can make informed choices about its management. The Harbor/Bight region is fortunate to have such a public, including activists who have led efforts to adopt an ecosystem approach[1] to environmental protection.

[1]The ecosystem approach keeps a comprehensive focus on the environment and living resources of the Harbor/Bight region, rather than looking narrowly at issues in a piece-meal fashion.

Actions included in this Plan recognize that each individual has an opportunity and an obligation to contribute to the solutions. A knowledgeable public is critical to the funding of improvement and restoration actions, and to the creation of a constituency for individual and corporate life-style changes that will be vital to the future integrity of the Harbor/Bight. Our rates may be raised to pay for expanded sewage treatment, and we have to change our habits by sorting our garbage or using less fertilizer on our lawns. Businesses must recycle waste byproducts and improve operating systems. As members of civic and environmental groups, we may be called on to participate in cleanup campaigns and to speak out on important local concerns.

The challenging tasks of developing public understanding, appreciation, and stewardship of the Estuary have been and should continue to be the primary objectives of the HEP public participation program.

WHAT IS THE PUBLIC PARTICIPATION STRATEGY?

HEP has supported an active bi-state public involvement and education strategy since early 1989. This strategy includes tasks to increase public awareness of Harbor/Bight issues and encourage public participation in CCMP development, as well as foster public consensus for long-term support and implementation of the CCMP.

A Citizens Advisory Committee (CAC) has provided a conduit for public involvement in the program, and public education has been promoted through 1) publication of fact sheets, newsletters, and posters; 2) award of mini-grants for community projects; and 3) sponsorship of public meetings and issues forums.

In developing the draft CCMP, HEP offered an unusual opportunity: ***the public was asked to help develop appropriate management actions for the resource, rather than the more traditional approach of merely commenting on a plan prepared by government agencies.***

HOW DOES THE PUBLIC PARTICIPATE?

The Citizens Advisory Committee (CAC)

Individuals may actively participate in HEP through the CAC, which was established as an official committee of the Management Conference at the initiation of the program. The CAC is formally organized as an open, proactive, membership group with a voting steering committee of 24 members, 12 from each state. Members represent geographical sectors of the region and five categories of stakeholders:

- corporate business, commercial, and port interests;
- recreational users - boaters, bathers, and fishing interests;
- environmental organizations;
- civic and local activist groups; and
- educators.

The two co-chairs and two additional designated representatives participate in the Conference Management Committee as well.

The purpose of the CAC, as described in formally adopted By-Laws, is to provide public input to program decision-making on behalf of the diverse stakeholders in the Hudson/Raritan Estuary and New York Bight. To accomplish this purpose, its members participate in formulating work programs, monitor progress of principal investigators, and assist in developing and implementing the CCMP.

The CAC works to promote awareness and understanding of program issues, goals, and recommendations, and to ensure two-way communication between the Management Committee and the public.

Education Mini-grants

One of the more important HEP activities has been the award of mini-grants (up to $4,000 each) to environmental education or community action organizations to 1) expand or broaden their curricula to focus on the Harbor/Bight, or 2) to conduct projects that address specific problems or increase awareness and participation. Since the

inception of this program, 42 grants totaling $153,000 have been competitively awarded. These grants have greatly increased the number of people educated about the Estuary and unified organizers and participants in efforts to enhance and protect regional resources.

Two libraries have been established which feature ecosystem research materials, one at the Hudson River Foundation, and the other at Liberty State Park Interpretive Center.

Through the mini-grant program, HEP has also extended the work of other groups. For example, the New York City Department of Environmental Protection developed public service announcements about the clean streets/clean beaches program. HEP supplemented this work with funds to place posters in the New York City transit system.

Other Public Outreach Activities

A dozen regional conferences and technical seminars have been sponsored at the American Museum of Natural History; Stevens Institute of Technology in Hoboken, New Jersey; Manhattan College in Riverdale, New York; the State University of New York at Stony Brook; Rutgers University; Mohonk House at New Paltz, New York; and the Marine Sciences Research Consortium at Sandy Hook, New Jersey.

The Hudson River Foundation organized a series of "First Tuesday" seminars to highlight scientific research related to the Harbor/Bight; these seminars are now co-sponsored by CAC and the Scientific and Technical Advisory Committee (STAC). A newsletter, **The Tidal Exchange**, is distributed, as well as information sheets on pollution topics such as "Combined Sewer Overflows" and "Pollution in the Harbor".

A series of "tip strips" will be distributed with paychecks or advertisements, and at recreation sites. These are designed to encourage people at home, at work and outdoors, to make choices that can help reduce pollution and protect the Estuary.

Other outreach activities and products include a traveling exhibit, a half-hour television program, **Alive in an Urban Harbor,** festivals and special events, and periodic distribution of literature to a regional mailing list of several thousand.

Attendance by HEP representatives at events and local government meetings has been effective in distributing HEP information and in networking with the interested public. A contact list is being compiled to reach out to local groups and schools participating in or sponsoring stewardship projects within the Harbor/Bight area.

WHAT HAS THE PUBLIC SAID?

During October and November, 1993, the CAC and STAC sponsored eight regional "Help the Harbor" public meetings to assess public concerns with regard to restoring the Harbor/Bight. These meetings were held prior to writing the draft CCMP so that the plan could reflect public priorities. The meetings were co-sponsored by 32 organizations and over 350 people participated.

The primary message from these meetings was "Think globally, act locally". Participants advised HEP that people must be reached where they live, work, and play -- to develop a stewardship for the natural resources they are using.

The Appendix to the proposed CCMP, dated February 1995, included a summary of the comments received at the "Help the Harbor" meetings, as well as responses to how those comments have been addressed.

In March and April, 1995, HEP sponsored an additional 10 regional public meetings, plus one public hearing, to announce, and to receive comments on, the proposed CCMP. The meetings were held at locations throughout the Harbor/Bight region and attracted 58 co-sponsors and a total of nearly 200 participants.

Many of the themes raised by the public at the CCMP meetings echoed and built upon comments made at the earlier "Help the Harbor" meetings. A summary of major comment themes is included in the Summary of Responses to the Public Comments received on the Proposed CCMP (Appendix 7). These themes are addressed

throughout the CCMP; however, several are specifically related to public participation, namely:

- Increase outreach and education for the general public.
- Better involve local governments.
- Make the Plan more locally relevant.
- Improve access and availability of information to the public and others.

Specific priorities of the public for increased involvement and education related to these themes included:

-- Establishment of a HEP "800" telephone number.

-- Improved waterfront access.

-- Expanded environmental education for children.

-- Outreach to municipal officials.

-- A HEP "speakers bureau".

-- An expanded mini-grants program.

-- Participation of grassroots organizations in the dissemination of HEP printed material.

-- Signage identifying rivers and waterways and protection of habitat.

Appendix 7 presents a summary of the public comments at both the "Help the Harbor" meetings and the CCMP public meetings and details how these comments have been addressed in the final CCMP or in the proceedings of the HEP Management Conference.

THE PLAN

The completion of the CCMP will move the program into the implementation phase. With continued funding, HEP proposes to carry out the public participation program as it has proceeded to date. The CAC will continue to be the voice of the public on committees representing the HEP Management Conference. Education mini-grants will continue to be a program priority for available public participation funding. Public outreach activities will also be continued, informing the public and giving updates on program implementation. HEP will seek to maximize the awareness and involvement of all the program stakeholders, from the general public to the business and industrial interests affected by the Plan's commitments and recommendations.

Approach

HEP has identified the following specific objectives:

- Provide for public input to ongoing program and policy decision-making for HEP.
- ♦ Build community awareness, appreciation, and understanding of the ecosystem and its importance; and encourage action at the community level.
- ♦ Promote understanding of and involvement in the implementation of the CCMP recommendations.
- ♦ Increase communication and foster cooperation among stakeholders and others involved with ecosystem management, protection, and stewardship activities.
- ♦ Promote individual and group involvement and sponsorship of education and stewardship activities to clean up and restore the ecosystem.
- ♦ Enhance educational opportunities for all education levels.
- ♦ Secure additional funding and raise awareness of funding sources to increase public involvement and education activities.

Support of public involvement and education is the best long-term investment HEP can make to guarantee the successful restoration and protection of the Harbor/Bight. Public stewardship of the ecosystem is crucial to continued support and funding of improvement programs, and for the lifestyle changes that must occur to ensure a healthy ecosystem for future generations.

The States of New York and New Jersey are receiving HEP funds for public involvement and education and are conducting outreach activities and awarding mini-grants to support all of HEP's public involvement and education objectives.

Commitments and Recommendations

OBJECTIVE E-1 Provide for public input to ongoing program and policy decision-making for HEP

ACTION E-1.1
Public Participation Strategy
HEP's Public Participation Oversight Task Force will review and update the public participation strategy, including the targeted audiences, based on the CCMP.

ACTION E-1.2
Mechanisms for Formal Citizen Participation in HEP Decision-making

-- STAC and CAC will continue to provide representatives to all HEP work groups and committees, including the Management Committee.

-- STAC and CAC will meet regularly to update members on the progress of CCMP implementation and to solicit input for Management and Policy Committee meetings.

-- STAC, CAC, and the states will sponsor activities to share progress with the targeted audiences in HEP's public participation strategy and may recommend amendments to the public participation strategy.

OBJECTIVE E-2 Build community awareness, appreciation, and understanding of the ecosystem and its importance; and encourage action at the community level

HEP will enhance its public involvement and education program and the state public outreach programs. Collectively, these programs will provide consistent public information and ensure that the public receives current information on the implementation of HEP commitments and recommendations.

ACTION E-2.1
Information Development and Distribution
HEP, NYSDEC, NJDEP, NYCDEP, CAC, and STAC will continue development and distribution of information, such as mini-bulletins, fact sheets, fish and seafood advisories (see Objective T-10), and other information addressing the ecosystem and lifestyle issues.

ACTION E-2.2
Traveling Exhibit
HEP's Public Participation Oversight Task Force will schedule use of the traveling exhibit at selected community events and public venues.

-- NJDEP will provide for transportation of the traveling exhibit within a 25-mile radius of Liberty State Park for selected events for one year, June 1995 to June 1996.

ACTION E-2.3
Use of Media to Distribute Information
HEP, NYSDEC, NJDEP, NYCDEP, and CAC will encourage print and broadcast media to distribute information on Estuary issues.

ACTION E-2.4
Ongoing Outreach Activities
Where possible, HEP issues will be incorporated into ongoing outreach activities conducted by all members of the Management Conference, through personal contact, organizational newsletters, and press releases.

ACTION E-2.5
Public Access Opportunities
HEP will encourage waterfront events that feature conservation of the ecosystem and that provide physical and programmatic access to the Harbor's waters and to the water's edge.

OBJECTIVE E-3 Promote understanding of and involvement in the implementation of the CCMP recommendations

ACTION E-3.1
Information on CCMP Actions
USEPA, NYSDEC, NJDEP, NYCDEP, and CAC will provide information on CCMP recommendations and commitments to local government officials and other stakeholders, such as business, industry, and civic groups.

ACTION E-3.2
Cooperation on Plan Implementation
NYSDEC, NJDEP, NYCDEP, and CAC will encourage cooperation among stakeholders to implement the Plan.

ACTION E-3.3
Meetings and Briefings
USEPA, NYSDEC, NJDEP, NYCDEP, and CAC will hold briefings, meetings, and workshops for local officials, user groups, and elected representatives to stimulate action. Meetings and briefings will be tailored to the needs of each audience, and an effort will be made to hold meetings in varying locations within the Harbor core and the Bight program areas.

OBJECTIVE E-4 Increase communication and foster cooperation among stakeholders and others involved with ecosystem management, protection, and stewardship activities

ACTION E-4.1
Citizens Advisory Group
HEP will continue a citizens advisory group within the post-CCMP Management Conference structure to:

- Provide input to the HEP Management and Policy Committees and serve as an organizational link between the community and the Management Conference;
- Encourage annual progress reports to the public on implementation activities; and
- Solicit feedback for enhancements or amendments to the CCMP.

ACTION E-4.2
Science and Technical Advisory Committee
HEP will continue a science and technical advisory committee within the post-CCMP Management Conference structure to:

- Provide input to the HEP Management and Policy Committees;
- Serve as a link between the broader scientific community and the HEP Management Conference; and
- Provide scientific seminars on HEP-related topics.

ACTION E-4.3
Cooperation with Grassroots Organizations
HEP and NJDEP will coordinate with grassroots organizations to develop and exchange data and information, e.g., American Littoral Society National Estuaries Initiative.

OBJECTIVE E-5 Promote individual and group involvement and sponsorship of education and stewardship activities to clean up and restore the ecosystem

ACTION E-5.1
Continuation of Mini-grant Program
NYSDEC and NJDEP will continue to implement a mini-grant program to support HEP education and stewardship initiatives.

-- NJDEP will conduct a mini-grant program for public outreach to New Jersey county governments and other organizations.

ACTION E-5.2
Expansion of Mini-grant Program
NYSDEC and NJDEP will expand the mini-grant program to support a greater number and diversity of education and stewardship projects. Outreach efforts will be expanded to advertise availability of funds and locate eligible recipients.

ACTION E-5.3
Participation in Watershed Planning and Ecosystem Activities
HEP, USEPA, NYSDEC, NJDEP, NYCDEP, CAC, and STAC will encourage groups to organize and participate in watershed planning and ecosystem restoration, protection, and monitoring activities, such as beach grass planting, water watch, and streambank, tributary, and beach cleanups.
See Action H-1.2 for proposed resource center(s).

ACTION E-5.4
Support for Special Events and Exhibits
HEP, USEPA, NYSDEC, NJDEP, NYCDEP, CAC, and STAC will encourage organizations and institutions to reach broad audiences through special events and exhibits that support HEP goals, such as storm drain stenciling projects.

ACTION E-5.5
Continuation of Public Stewardship Activities
HEP recommends that NYSDEC and NJDEP continue their public stewardship activities.

OBJECTIVE E-6 Enhance educational opportunities for all education levels

ACTION E-6.1
Estuary-wide Education Program
HEP's Public Participation Oversight Task Force will encourage development and implementation of an Estuary-wide education program for stakeholder organizations and others.

-- NJDEP will coordinate activities with "Environmental Education in New Jersey: A Plan of Action", 1994.

ACTION E-6.2
Integration of HEP Activities with Educational Programs
NYSDEC, NJDEP, NYCDEP, CAC, and STAC will integrate activities and outreach materials with educational programs for all age levels at both schools and non-formal education institutions, such as museums.

ACTION E-6.3
Use of Libraries and Computer Networks
HEP will make educational materials available through existing libraries and computer networks.

ACTION E-6.4
Phone Line for Public Requests
HEP will consider establishing an "800" number for public information requests. If funding is not available, HEP will seek an appropriate local sponsor.

ACTION E-6.5
Speakers Bureau
HEP will consider establishing a speakers bureau to serve the needs for public information and outreach (see Action E-3.3).

ACTION E-7.1
Outside Funding Sources
HEP's Public Participation Oversight Task Force will encourage all organizations involved in public involvement and education efforts, both

OBJECTIVE E-7 Secure additional funding and raise awareness of funding sources to increase public involvement and education activities

governmental and non-governmental, to seek outside funding sources and opportunities for the HEP program.

♦ Identify potential funding sources, such as USEPA educational grants, foundation funding, and corporate grants.

- Seek opportunities, as appropriate, to apply Supplemental Environmental Project (SEP) funds and natural resources damages accounts to HEP recommendations. The State of New Jersey will consider funding the recommendations identified in the CCMP from appropriate funding sources that currently exist or may arise in the future. Funding such actions can only proceed in accordance with statutory and contractual obligations of the state.
- Publicize HEP and other grant opportunities through personal contacts, organizational newsletters, and press releases.

ACTION E-7.2
Increased Mini-grant Funding
HEP's Public Participation Oversight Task Force will seek additional ways to increase funding to the mini-grant program.

COSTS OF IMPLEMENTING THE PLAN

Many of the commitments and recommendations in the Public Involvement and Education component of the CCMP can be accomplished through the effective use of base program resources. In fact, full implementation of the CCMP relies, in large part, on continued operation, and funding at current levels, of existing programs to meet public involvement and education needs. This component of the CCMP itemizes 11 new HEP-driven commitments; these actions, to be accomplished using base program resources, represent a major commitment to HEP implementation.

The CCMP also includes 16 significant commitments and recommendations for public involvement and education that are associated with enhanced program funding. One commitment of $25,000, one recommendation for $150,000, and additional commitments and recommendations, based on continued funding for HEP, are noted on the table.

Table 31(ec). Enhanced Program Costs for Public Involvement and Education

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION E-1.2: Share progress with targeted audiences and recommend amendments to public participation strategy.		+		
ACTION E-2.1: Continue development and distribution of information addressing the ecosystem and lifestyle issues.		+		
ACTION E-3.2: Encourage cooperation among stakeholders to implement the management plan.		+		
ACTION E-3.3: Hold briefings, meetings, and workshops for local officials, user groups, and elected representatives.		+		
ACTION E-4.1: Continue a citizens advisory group.		+		
ACTION E-4.2: Continue a science and technical advisory committee.		+		
ACTION E-4.3: Coordinate data development and exchange with grassroots organizations.		+		
ACTION E-5.1: Continue a mini-grant program.	$25,000 (NJ)	+		
ACTION E-5.2: Expand the mini-grant program.		+		
ACTION E-5.3: Encourage groups to organize and participate in ecosystem restoration, protection, and monitoring activities.		+		
ACTION E-5.4: Encourage organizations to reach the public through activities that support HEP goals.		+		
ACTION E-5.5: Continue stewardship activities in NY and NJ.			$150,000	
ACTION E-6.1: Encourage development and implementation of estuary-wide education program for stakeholder organizations and others.			*	
ACTION E-6.2: Integrate activities and materials with educational programs for all age levels.			*	
ACTION E-6.3: Make materials available through existing libraries and computer networks.		+		

BENEFITS OF IMPLEMENTING THE PLAN

Full implementation of the commitments and recommendations in the Public Involvement and Education section of the Plan, including the development and implementation of a comprehensive regional strategy, would result in:

- Increased community involvement in and understanding of the ecosystem;
- Increased communication and cooperation between the public and the many groups involved with ecosystem protection; and
- Increased educational opportunities for all age groups.

As noted in the preliminary discussion, however, we are a long way from reaching these endpoints. Nevertheless, through the implementation of the commitments and recommendations in this section of the CCMP, HEP will achieve incremental progress toward ecosystem goals on a system-wide basis.

This effort will foster the consideration of ecosystem needs at every level of government and among the public so that the economic progress of the region no longer comes at the expense of the natural ecosystem. Quantifiable benefits of the measures identified in this Plan must be identified on a case-by-case basis, and in consideration of past, present, and future impacts of human activity in the region. It is important to recognize that many of the benefits of ecosystem protection are non-quantifiable and range from aesthetic considerations to the maintenance of a healthful environment for the public.

Table 32(es). Summary—Public Involvement and Education

OBJECTIVE	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE E-1: Provide for public input to ongoing program and policy decision-making for HEP.				
ACTION E-1.1: Review and update the public participation strategy, including the targeted audiences, based on the CCMP.	HEP Public Participation Oversight Task Force (PPTF)[a]	Mar 1996	Base program	C/N
ACTION E-1.2: Mechanisms for formal citizen participation in HEP decision-making.				
-- Continue to provide representatives to all HEP workgroups and committees.	STAC & CAC	Ongoing	Base program	C/N
-- Meet to update members on the progress of CCMP implementation and to solicit input for Management and Policy Committee meetings.	STAC & CAC	Ongoing	Base program	C/N
-- Sponsor activities to share progress with the targeted audiences in HEP's public participation strategy, and recommend amendments to the public participation strategy.	STAC, CAC, NYSDEC, NJDEP	Ongoing	Enhanced program cost - +	C/N

Note: It is HEP's goal that all the recommendations in the CCMP become commitments.

-- In some cases CCMP actions are recommendations, not commitments, because responsible entities require resources to implement the action. HEP will advocate making these resources available.

-- In other cases, CCMP actions are recommendations because HEP has not obtained the commitment of regulated entities and other responsible entities to implement the action. By issuance of this CCMP, HEP seeks the commitment of the responsible entities and requests that they step forward to voluntarily agree to implement the actions.

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

[a] PPTF includes USEPA, the States of NY and NJ, NYC and other NY and NJ local interests, CAC, STAC, and others as may be deemed appropriate for CCMP implementation.

\+ Commitment based on continued funding of minimum core program of HEP at the recommended full amount of $690,000/yr. At present, there is a commitment for only $300,000 (see Objective S-1).

(Continued)

Table 32(es). Summary—Public Involvement and Education

OBJECTIVE	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE E-2: Build community awareness, appreciation, and understanding of the ecosystem and its importance; and encourage action at the community level.				
ACTION E-2.1: Continue development and distribution of information addressing the ecosystem and lifestyle issues.	HEP, NYSDEC, NJDEP, NYCDEP, CAC, STAC	Ongoing	Enhanced program cost - +	C/N
ACTION E-2.2: Use traveling exhibit at community events and public venues.	HEP PPTF	Ongoing	Base program	C/N
-- Provide for transportation of the exhibit within a 25-mile radius of Liberty State Park.	NJDEP	Jun 1995 - Jun 1996	Base program	C/N
ACTION E-2.3: Encourage print and broadcast media to distribute information on estuary issues.	USEPA, NYSDEC, NJDEP, NYCDEP, CAC	Ongoing	Base program	C/N
ACTION E-2.4: Incorporate HEP issues into ongoing outreach activities by all members of the Management Conference.	HEP, USEPA, NYSDEC, NJDEP, NYCDEP, CAC, STAC	Ongoing	Base program	C/N
ACTION E-2.5: Encourage events that provide physical and programmatic access to the Harbor's waters.	HEP, USEPA, NYSDEC, NJDEP, NYCDEP, CAC	Post-CCMP	Base program	C/N
OBJECTIVE E-3: Promote understanding of and involvement in the implementation of the CCMP recommendations.				
ACTION E-3.1: Provide information on CCMP recommendations and commitments.	USEPA, NYSDEC, NJDEP, NYCDEP, CAC	Post-CCMP	Base program	C/N
ACTION E-3.2: Encourage cooperation among stakeholders to implement the management plan.	NYSDEC, NJDEP, NYCDEP, CAC	Post-CCMP	Enhanced program cost - +	C/N
ACTION E-3.3: Hold briefings, meetings, and workshops for local officials, user groups, elected representatives.	USEPA, NYSDEC, NJDEP, NYCDEP, CAC	Ongoing	Enhanced program cost - +	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

\+ Commitment based on continued funding of minimum core program of HEP at the recommended full amount of $690,000/yr. At present, there is a commitment for only $300,000 (see Objective S-1).

(Continued)

Table 32(es). Summary—Public Involvement and Education

OBJECTIVE	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE E-4: Increase communication and foster cooperation among stakeholders and others involved with ecosystem management, protection, and stewardship activities.				
ACTION E-4.1: Continue a citizens advisory group.	HEP	Ongoing	Enhanced program cost - +	C/N
ACTION E-4.2: Continue a science and technical advisory committee.	HEP	Ongoing	Enhanced program cost - +	C/N
ACTION E-4.3: Coordinate data development and exchange with grass roots organizations.	HEP & NJDEP	Ongoing	Enhance program cost - +	C/N
OBJECTIVE E-5: Promote individual and group involvement and sponsorship of education and stewardship activities to clean up and restore the ecosystem.				
ACTION E-5.1: Continue a mini-grant program.	NYSDEC & NJDEP	Ongoing	Enhanced program cost - +	C/N
-- Conduct a mini-grant program for public outreach to NJ County governments, and other organizations.	NJDEP	Through Dec 1996	Enhanced program cost - $25,000	C/N
ACTION E-5.2: Expand mini-grant program.	NYSDEC & NJDEP	Post-CCMP	Enhanced program cost - +	C/N
ACTION E-5.3: Encourage groups to organize and participate in ecosystem restoration, protection, and monitoring activities.	HEP, USEPA, NYSDEC, NJDEP, NYCDEP, CAC, STAC	Ongoing	Enhanced program cost - +	C/N
ACTION E-5.4: Encourage organizations to reach the public through activities that support HEP goals.	HEP, USEPA, NYSDEC, NJDEP, NYCDEP, CAC, STAC	Ongoing	Enhanced program cost - +	C/N
ACTION E-5.5: Continue state-sponsored stewardship activities.	NYSDEC & NJDEP	Post-CCMP	Enhanced program cost - $150,000	R

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 32(es). Summary—Public Involvement and Education

OBJECTIVE	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE E-6: Enhance educational opportunities for all education levels.				
ACTION E-6.1: Encourage development and implementation of an estuary-wide education program for stakeholder organizations and others.	HEP PPTF	By Dec 31, 1996	Enhanced program cost to be determined	R
ACTION E-6.2: Integrate activities and materials with educational programs for all age levels.	NYSDEC, NJDEP, NYCDEP, CAC, STAC	Post-CCMP	Enhanced program cost to be determined	R
ACTION E-6.3: Make materials available through existing libraries and computer networks.	HEP	Ongoing	Enhanced program cost - +	C/N
ACTION E-6.4: Consider establishing an "800" number for public information requests.	HEP PPTF or other appropriate sponsor	Post-CCMP	Enhanced program cost - +	C/N
ACTION E-6.5: Consider establishing a Speakers Bureau.	HEP PPTF	Post-CCMP	Enhanced program cost - +	C/N
OBJECTIVE E-7: Secure additional funding and raise awareness of funding sources to increase public involvement and education activities.				
ACTION E-7.1: Encourage all organizations involved in public involvement and education to seek outside funding for the HEP program.	HEP PPTF	Ongoing	Base program	C/N
ACTION E-7.2: Seek additional ways to increase funding to mini-grant program.	HEP PPTF	Ongoing	Base program	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

\+ Commitment based on continued funding of minimum core program of HEP at the recommended full amount of $690,000/yr. At present, there is a commitment for only $300,000 (see Objective S-1).

IMPLEMENTING THE PLAN

POST-CCMP MANAGEMENT STRUCTURE

OBJECTIVES

S-1 Continue the management conference.
S-2 Review conference membership to ensure adequate participation from implementers.
S-3 Establish a program office.
S-4 Facilitate watershed-based planning and implementation.
S-5 Encourage non-profit organizations to fund estuary protection efforts.

OBJECTIVE S-1 Continue the management conference

The New York-New Jersey Harbor Estuary Program Management Conference was convened by the USEPA Administrator to develop a Comprehensive Conservation and Management Plan. With the completion of the Plan, HEP is the ideal entity to take on responsibility for:

-- tracking, monitoring, and reporting on program implementation and effectiveness;

-- seeking commitments for the implementation of plan recommendations;

-- gaining new information through monitoring, modeling, and research;

-- modifying the Plan, as appropriate; and

-- seeking and advocating adequate funding for plan implementation.

HEP recently agreed on a long-term management structure, incorporating the work of the Dredged Material Management Forum into HEP. This structure is shown in Figure 17.

HEP recommends that, upon approval of the CCMP, the USEPA Administrator extend the Management Conference for a minimum of five years to oversee implementation. Core activities include maintaining full time state coordinators, maintaining a public outreach and education program, continuing the successful mini-grants program, and funding administrative support and other essential items such as printing, peer review, and progress reporting.

<u>Management Conference Implementation Meetings</u>
The committees of the Management Conference will meet as necessary to oversee CCMP implementation. Consistent with the committee roles and responsibilities described in CCMP Appendix 2:

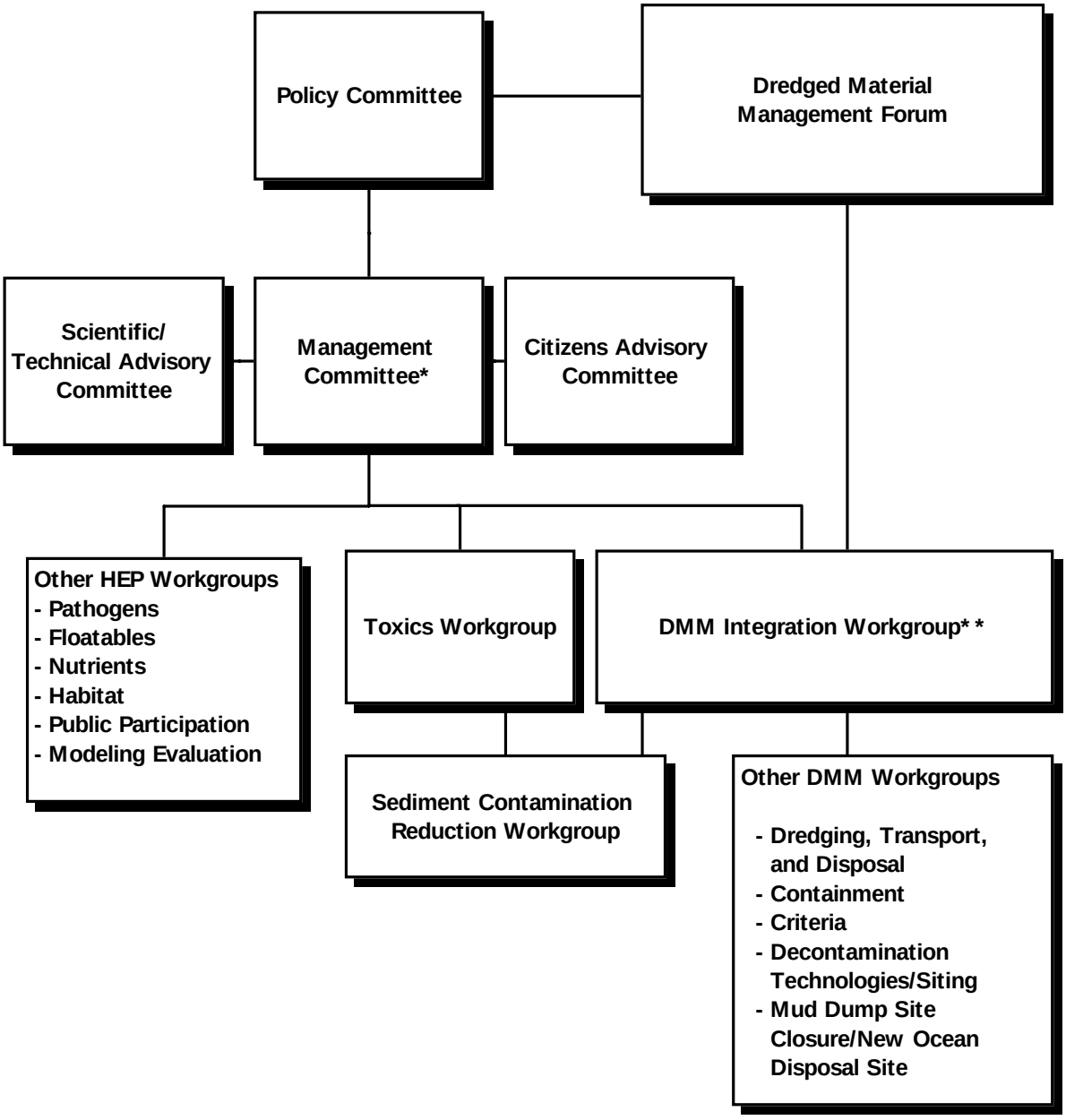
-- The Management Committee will plan to meet quarterly, as appropriate, to review progress and identify issues requiring resolution.

-- The Policy Committee will meet, as necessary, to resolve issues and provide program direction.

-- HEP and the Dredged Material Management work groups will meet, as necessary, to fulfill their responsibilities to implement and oversee actions within their purview.

Note that HEP will formally report to the public on progress and update the CCMP on an annual basis (see Objective I-1 below).

Figure 17. Long-term HEP Management Structure (incorporating the work of the Dredged Material Management Forum)



*A sub-group of the Management Committee consisting of designated representatives of each Policy Committee member will meet as necessary to facilitate the efficient operation of the Management Committee. This sub-group is currently referred to as the Policy Committee representatives.

**In light of the many sensitive policy issues associated with the Dredged Material Management element of the CCMP, the Management Committee will facilitate frequent, direct contact between the DMMIWG and the Policy Committee.

OBJECTIVE S-2 Review conference membership to ensure adequate participation from implementers

The CCMP identifies a wide range of entities, both public and private, to implement specific actions. Some actions already have firm commitments for implementation; others are still at the HEP recommendation stage. As we move from plan development to plan implementation, it is essential that those entities, identified with implementation responsibilities, and not currently represented on the Management Conference, be appropriately involved.

HEP will review Conference membership to Identify those entities with implementation responsibility that are not adequately represented on the Management Conference and solicit their participation.

OBJECTIVE S-3 Establish a program office

In order to reinforce the separate identity of the HEP Management Conference and ensure continuing staff support for the Management Conference, HEP, acting through its member agencies, will establish a New York/New Jersey Harbor Estuary Program Office. There are two options currently being considered by the Management Conference to provide space for the HEP Program Office. The first alternative is to solicit proposals from entities willing and able to provide space and support services at no cost to the Management Conference. The second alternative is for USEPA to provide space and support services for the HEP Program Office in its Region II Office.

At a minimum, staffing will be provided by a full-time USEPA Project Officer. The primary duty station for the state coordinators will be their respective state offices. However, they will be located at the Program Office as necessary. To the extent that additional resources are available, public outreach, data management, and other support staff may also be housed in the Program Office.

OBJECTIVE S-4 Facilitate watershed-based planning and implementation

Since the geographic scope of the Harbor/Bight system is enormous, we should develop and implement programs at the lowest appropriate level.

-- HEP will review other state, regional, and local plans, and identify specific recommendations to support them.

-- HEP will identify the need for additional watershed-based plans and seek appropriate local sponsors.

OBJECTIVE S-5 Encourage non-profit organizations to fund estuary protection efforts

HEP will encourage existing non-profit organizations to fund appropriate recommended CCMP actions (see Action C-2.5 below). This action is one part of HEP's funding strategy for program enhancements and project implementation (see Objective C-2 below).

Table 33(ic). Enhanced Program Costs for Post-CCMP Management Structure

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
OBJECTIVE S-1: Continue the minimum core program of the HEP Management Conference including:		$300,000*		$390,000*
-- Provide full time state coordinators.		($360,000)*		
-- Maintain base public outreach and education program.		($200,000)*		
-- Continue mini-grant program.		(80,000)*		
-- Provide administrative and other essential support.		($50,000)*		
TOTAL		$300,000*		$390,000*

* The minimum core program has been estimated to cost $690,000/yr. Individual tasks are shown in parentheses. HEP currently has a commitment for only $300,000/yr. If the shortfall between estimated costs and available funds is not eliminated, HEP will identify reductions to the minimum core program to comply with available funding.

Table 34(is). Summary—Post-CCMP Management Structure

OBJECTIVE	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE S-1: Continue the Management Conference for a minimum of five years to oversee implementation.	USEPA	Jul 1996	$300,000/yr +	C/N
	HEP	Jul 1996	$390,000/yr +	R
-- Provide full time state coordinators.			($360,000/yr) +	
-- Maintain public outreach and education program.			($200,000) +	
-- Continue mini-grant program.			($80,000) +	
-- Provide administrative and other essential support.			($50,000) +	
-- Meet as necessary to oversee progress in CCMP implementation.	HEP Management Committee, Policy Committee, work groups, other committees	Post-CCMP	Base program	C/N
OBJECTIVE S-2: Review Conference membership to identify those entities with implementation responsibility that are not adequately represented on the Management Conference and solicit their participation.	HEP	Apr 1996	Base program	C/N

Note: It is HEP's goal that all the recommendations in the CCMP become commitments.

-- In some cases CCMP actions are recommendations, not commitments, because responsible entities require resources to implement the action. HEP will advocate making these resources available.

-- In other cases, CCMP actions are recommendations because HEP has not obtained the commitment of regulated entities and other responsible entities to implement the action. By issuance of this CCMP, HEP seeks the commitment of the responsible entities and requests that they step forward to voluntarily agree to implement the actions.

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

\+ The minimum core program has been estimated to cost $690,000/yr. Individual tasks are shown in parentheses. HEP currently has a commitment for only $300,000/yr. If the shortfall between estimated costs and available funding is not eliminated, HEP will identify reductions to the minimum core program to comply with available funding.

(Continued)

Table 34(is). Summary—Post-CCMP Management Structure

OBJECTIVE	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE S-3: Establish a New York/New Jersey Harbor Estuary Program Office.	HEP	Jul 1996	Covered by S-1	C/N
-- Provide HEP office director and support services.	USEPA	Jul 1996	$115,000/yr	C/N
OBJECTIVE S-4: Facilitate watershed-based planning and implementation.	HEP	Ongoing	Base program	C/N
OBJECTIVE S-5: Encourage non-profit organizations to fund estuary protection efforts (see Action C-2.5 below).				

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

MONITORING, MODELING, AND RESEARCH STRATEGY

OBJECTIVE *M-1 Prepare synthesis report.*
M-2 Conduct workshops on monitoring, modeling, and research needs.
M-3 Seek commitments for implementation.
M-4 Develop and implement long-term data management strategy.

Each of the preceding sections of the CCMP identifies monitoring, modeling, and/or research needs. Using this information, HEP sponsored a workshop in August 1995 which resulted in the development of HEP's Environmental Monitoring Plan (EMP) (see Appendix 5). The EMP identifies a comprehensive set of environmental measurements (indicators) which HEP would use to evaluate the success of CCMP implementation:

- to determine whether implementation has resulted in actual environmental improvements; and
- to provide information to help redirect and refocus the CCMP during implementation.

The EMP identifies where existing monitoring programs and special research and modeling programs address HEP's needs, and recommends program enhancements where HEP's needs are not met.

The EMP also includes an evaluation of data management options which HEP will use to develop a long-term data management strategy (see Action M-4.2 below). One key part of the data management options evaluation is a conceptual model of long-term data management, describing how various options relate and how they could be implemented in a step-wise fashion.

HEP will continue work to refine, update, and seek commitments to implement the EMP (see below). HEP will also integrate the EMP into an overall monitoring, modeling, and research strategy, including developing additional research and modeling needs, and the long-term data management strategy. HEP will seek commitments for implementation of the overall strategy. The following actions are the steps in developing the strategy. For more specific information, see Appendix 5.

OBJECTIVE M-1 Prepare synthesis report

HEP has summarized ongoing monitoring, modeling, and research efforts, and needs. This information is incorporated in the EMP.

ACTION M-1.1
Development of Summary Tables
HEP, working through STAC, has developed tables which summarize the needs identified in each of the technical sections of the CCMP.

ACTION M-1.2
Identification of Ongoing Monitoring Efforts
On behalf of HEP, ISC has prepared a report which identifies ongoing monitoring efforts.

OBJECTIVE M-2 Conduct workshops on monitoring, modeling, and research needs

ACTION M-2.1
Workshop on Monitoring, Modeling, and Research Needs
HEP, working through STAC, held a workshop involving appropriate scientists and managers to formulate a monitoring, modeling, and research

plan (i.e., Environmental Monitoring Plan) to address the identified needs (see Appendix 5). At the workshop, data management options were developed, including a conceptual model for data management.

ACTION M-2.2
Additional Issue-Specific Workshops
HEP, working through STAC and other sponsors, with the full participation of USEPA, USACE, NYSDEC, NJDEP, NYCDEP, ISC, CAC, and others, will convene additional issue-specific workshops, to recommend refinements to the EMP.

ACTION M-2.3
Development of Final Environmental Monitoring Plan
HEP, with the full participation of USEPA, USACE, NYSDEC, NJDEP, NYCDEP, ISC, STAC, CAC, and others, will develop the final EMP.

OBJECTIVE M-3 Seek commitments for implementation

ACTION M-3.1
Resource Commitments
HEP will seek commitments from Management Conference members, both governmental and non-governmental, to implement the final EMP, including developing and implementing a long-term data management strategy.

-- HEP, with the full participation of USEPA, USACE, NYSDEC, NJDEP, NYCDEP, ISC, STAC, CAC, and others, will form a monitoring/data management work group to oversee implementation of the EMP and HEP data management strategy.

ACTION M-3.2
Implementation of the Plan
USEPA, USACE, NYSDEC, NJDEP, NYCDEP, ISC, other agencies, and other sponsors to be identified should implement recommendations in the final EMP.

OBJECTIVE M-4 Develop and implement long-term data management strategy

Data management is an important component of a monitoring strategy and plan. HEP and LISS have jointly hired a data management coordinator. HEP is seeking commitments from agencies and institutions to help implement HEP's EMP, including data management.

ACTION M-4.1
Entering Key Data Sets into Data Management System
The data management coordinator is entering, and facilitating the entry of, key data sets into USEPA's Ocean Data Evaluation System (ODES).

This action is intended to archive key data sets in a manner to facilitate future use. The data management system should provide:

-- Rigorous documentation of data set contents and QA/QC procedures; and

-- Easy downloading of data.

The data management coordinator is currently entering key data sets into ODES. Upon completion of data entry, the data management coordinator will prepare a report documenting the data sets entered, including a description of the data sets, costs to enter the data sets, and an evaluation of additional data sets to be considered for entry into ODES, including costs.

ACTION M-4.2
Long-term Data Management Needs
HEP has defined its long-term data management needs:

-- Support reporting on the progress of CCMP implementation (see Objective I-1 below).

-- Provide for storage, retrieval, editing, and QA/QC of HEP/NYBRP and other relevant environmental data, including physical, chemical, and biological types.

-- Fully integrate with LISS for data relevant to system-wide analyses.

-- Provide access to these data to USEPA, states, other agencies, and investigators.

-- Provide appropriate tools to users including a data entry package, statistical package, GIS interface, and STORET interface.

-- Provide a full description of data sets including QA/QC information.

-- Provide collections of relevant reference materials at accessible locations (i.e., existing libraries at the Hudson River Foundation and Liberty State Park).

-- Conduct all activities at low cost and with adequate degree of user friendliness.

HEP's workshop on monitoring, modeling, and research (Action M-2.1) included a data management session to address these needs. The data management coordinator used information developed at the workshop to review and evaluate long-term data management options, and prepared a report for HEP's consideration. Among the options considered in the report are:

-- Development of a meta-database, including such features as HEP program information, a comprehensive data source index for the Estuary and Bight, an on-line forum, etc., and Internet access.

-- Development of a comprehensive data management system for the Estuary and Bight.

-- Establishment of one or more coordinated regional information management and data resource centers.

-- Establishment of a data management/monitoring coordinator for the HEP and LISS.

These options are not mutually exclusive. A conceptual data management model describes the relationships among the options, and how they could be implemented.

HEP, with the full participation of USEPA, USACE, NYSDEC, NJDEP, NYCDEP, ISC, STAC, CAC, and others, will use the information in the report to recommend a long-term data management strategy, considering feasibility and costs. HEP will work to encourage the sharing of environmental data and information on the Harbor/Bight among agencies and institutions generating the data and data users.

ACTION M-4.3
Implementation of Long-term Data Management Strategy
HEP, USEPA, USACE, NYSDEC, NJDEP, NYCDEP, ISC, other agencies, and other sponsors to be identified, in coordination with LISS, should implement recommendations in the long-term data management strategy.

COSTS OF IMPLEMENTING THIS PLAN

Many of the commitments and recommendations in the Monitoring, Modeling, and Research Strategy can be accomplished through the effective use of base program resources.

The Monitoring, Modeling, and Research component of the CCMP itemizes 8 new HEP-driven commitments and 3 recommendations. Four of the new commitments rely on base programs and represent a major commitment to HEP implementation. Eight of the new commitments and recommendations are associated with enhanced program funding. As shown in Table 35(ic) below:

- The Plan includes 4 commitments, which total $90,000, for program enhancements.
- The Plan also includes 3 recommendations for program enhancements for which the cost estimate will be developed during the continuing planning process.

Table 35(ic). Enhanced Program Costs for Monitoring, Modeling, and Research Strategy

ACTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
ACTION M-2.1: Sponsor workshop to develop Environmental Monitoring Plan.	$20,000			
ACTION M-2.2: Sponsor issue-specific workshops on monitoring, modeling, and research needs.	$20,000			
ACTION M-3.2: Implement the Environmental Monitoring Plan.				To be determined based on M-2.3 and M-3.1*
ACTION M-4.1: Enter key data sets into data management system.	$40,000			
ACTION M-4.2: Recommend a long-term data management strategy.	$10,000			
ACTION M-4.3: Implement a long-term data management strategy.				To be determined based on M-4.2*
TOTAL	$90,000 + *[1]			*

* Enhanced program costs to be developed as part of the continuing planning process.
[1] Notation (+ *) indicates cost plus additional costs to be determined.

Table 36(is). Summary—Monitoring, Modeling, and Research Strategy

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE M-1: Prepare synthesis report.				
ACTION M-1.1: Develop tables which summarize needs identified in each of the technical sections of the CCMP.	HEP, working through STAC	Completed	Cost included in Action M-2.1	C/N
ACTION M-1.2: Identify ongoing monitoring efforts.	ISC	Completed	Base program	C/N
OBJECTIVE M-2: Conduct workshops on monitoring, modeling, and research needs.				
ACTION M-2.1: Sponsor a workshop to develop Environmental Monitoring Plan.	HEP, working through STAC	Completed	$20,000	C/N
ACTION M-2.2: Convene additional issue-specific workshops to recommend refinements to the EMP.	HEP, working through STAC and other sponsors, with the full participation of USEPA, USACE, NYSDEC, NJDEP, NYCDEP, ISC, CAC, and others	Apr 1996	$20,000	C/N
ACTION M-2.3: Develop the final EMP.	HEP, with the full participation of USEPA, USACE, NYSDEC, NJDEP, NYCDEP, ISC, STAC, CAC, and others	Jul 1996	Base program	C/N

Note: It is HEP's goal that all the recommendations in the CCMP become commitments.

-- In some cases CCMP actions are recommendations, not commitments, because responsible entities require resources to implement the action. HEP will advocate making these resources available.

-- In other cases, CCMP actions are recommendations because HEP has not obtained the commitment of regulated entities and other responsible entities to implement the action. By issuance of this CCMP, HEP seeks the commitment of the responsible entities and requests that they step forward to voluntarily agree to implement the actions.

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 36(is). Summary—Monitoring, Modeling, and Research Strategy

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE M-3: Seek commitments for implementation.				
ACTION M-3.1: Seek commitments to implement the EMP.	HEP	Ongoing	Base program	C/N
-- Form a monitoring/data management work group.	HEP, with the full participation of USEPA, USACE, NYSDEC, NJDEP, NYCDEP, ISC, STAC, CAC, and others	Mar 1996	Base program	C/N
ACTION M-3.2: Implement the EMP.	USEPA, USACE, NYSDEC, NJDEP, NYCDEP, ISC, other agencies, and other sponsors to be identified	Post-CCMP	To be determined based on M-2.3 and M-3.1	R
OBJECTIVE M-4: Develop and implement long-term data management strategy.				
ACTION M-4.1: Enter key data sets into data management system.	HEP	Feb 1996	$40,000	C/N
ACTION M-4.2: Recommend a long-term data management strategy.	HEP, with the full participation of USEPA, USACE, NYSDEC, NJDEP, NYCDEP, ISC, STAC, CAC, and others	Sep 1996	Base program	C/N
-- Develop data management options report and incorporate into HEP's Environmental Monitoring Plan.	HEP	Completed	$10,000	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP

C/N - A new commitment, driven by the HEP CCMP

R - Recommendation

(Continued)

Table 36(is). Summary—Monitoring, Modeling, and Research Strategy

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION M-4.3: Implement long-term data management strategy.	HEP, USEPA, USACE, NYSDEC, NJDEP, NYCDEP, ISC, other agencies, and other sponsors to be identified, in coordination with LISS	Post-CCMP	To be determined based on M-4.2	R

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

REPORTING ON PROGRESS IN IMPLEMENTING THE PLAN

Reporting the status of CCMP implementation, and redirecting effort as needed, is crucial to successful implementation of the Plan. HEP has recommended continuation of the Management Conference primarily for this purpose.

OBJECTIVE I-1 *Prepare reports on the status of CCMP implementation.*

There are two types of measures of CCMP implementation:

Outputs -- reviews to determine whether CCMP commitments have been met; and

Outcomes -- reviews of progress using appropriate environmental indicators to determine whether the Harbor/Bight is responding as expected to pollution controls, and whether unanticipated environmental problems are emerging.

The CCMP provides a framework for tracking outputs and outcomes:

-- Outputs: Each action in the CCMP identifies what is to be done, by when, and by whom. As explained below, HEP will review these commitments and recommend mid-course corrections as needed. The Finance Plan and Implementation Strategy (Appendix 4) provides details of how this will be done.

-- Outcomes: The Environmental Monitoring Plan (Appendix 5) includes recommendations to periodically measure and report on a number of environmental indicators of the success of CCMP implementation. These indicators will tell us whether our goals and objectives are being met. The most important indicators are those which involve measuring the ambient environment to assess whether beneficial uses are being restored and whether the ecosystem is healthier and more productive as a result of actions taken. Other indicators involve measuring continuing loadings of pollutants to the ambient environment.

ACTION I-1.1
Annual Report
HEP will prepare an annual report on the status and effectiveness of CCMP implementation, focusing on outputs. The annual report will include commitments for redirection of efforts as needed. Commitments for redirection of efforts will be subject to public review.

ACTION I-1.2
Biennial Report
On a biennial basis, HEP will augment the progress report noted in Action I-1.1 to include a full account of the status and effectiveness of CCMP implementation, measured by the environmental outcomes being tracked through implementation of HEP's Environmental Monitoring Plan. As in the annual progress report, the biennial report will include commitments for redirection of efforts as needed; these will be subject to public review.

Table 37(is). Summary—Reporting on Progress in Implementing the Plan

OBJECTIVE	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
ACTION I-1.1: Prepare annual report on the status and effectiveness of CCMP implementation, including commitments for redirection of efforts as needed; include public review.	HEP	First report Dec 1996 and annually thereafter	Included in extension of HEP management conference (Objective S-1)	C/N
ACTION I-1.2 Augment the above report to include a full account of the status and effectiveness of CCMP implementation as measured by the environmental outcomes being tracked through HEP's Environmental Monitoring Plan.	HEP	First report Dec 1997 and biennially thereafter	Included in extension of HEP Management Conference (Objective S-1)	C/N

Note: It is HEP's goal that all the recommendations in the CCMP become commitments.

-- In some cases CCMP actions are recommendations, not commitments, because responsible entities require resources to implement the action. HEP will advocate making these resources available.

-- In other cases, CCMP actions are recommendations because HEP has not obtained the commitment of regulated entities and other responsible entities to implement the action. By issuance of this CCMP, HEP seeks the commitment of the responsible entities and requests that they step forward to voluntarily agree to implement the actions.

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP

C/N - A new commitment, driven by the HEP CCMP

R - Recommendation

COSTS AND FINANCING

OBJECTIVE *C-1 Continue to fund federal, state, and local programs, at a minimum, at current levels.*
C-2 Seek additional funds for project implementation and program enhancements.

The cost of ongoing and proposed Harbor/Bight actions will be significant. This section breaks the costs of implementing the Plan into three categories: 1) base programs, 2) enhanced programs, and 3) projects, such as sewage treatment plant upgrades and land acquisition.

This section also presents an overview of the HEP plan for financing. A detailed Financial Plan and Implementation Strategy is presented in Appendix 4. Funding to cover the costs of restoration and protection efforts must be provided by federal, state, and local governments, and by the private sector, in partnership. The ability to achieve HEP goals and objectives, and the pace at which progress is made, will clearly be a function of the availability of funding.

Base Program Costs

The CCMP includes numerous commitments on the part of NYSDEC, NJDEP, USEPA, other state and federal agencies, local governments, and other implementing entities to continue and enhance the implementation of ongoing programs. These commitments assume that base programs continue to be funded, at a minimum, at current levels.

OBJECTIVE C-1 ***Continue to fund federal, state, and local programs, at a minimum, at current levels***

ACTION C-1.0
Funding Environmental Programs at Current Levels
HEP recommends that the federal, state, and local governments continue to fund agency programs at current levels.

NYSDEC and NJDEP are committed to more actions, by far, than any other agencies. Therefore, it is particularly important to continue base program funding for these two agencies, at a minimum, at current levels.

OBJECTIVE C-2 ***Seek additional funds for project implementation and program enhancements***

Many actions in the CCMP are recommendations. Implementation of these actions is crucial to achieve HEP's goals and will require resources beyond those currently identified. HEP's strategy to seek additional funding is described below.

ACTION C-2.1
Clean Water Act Reauthorization
To fund project implementation and program enhancements, HEP recommends that the Clean Water Act be reauthorized and that grants to the states to help capitalize their State Revolving Fund programs be continued.

ACTION C-2.2
Establishment of Finance Work Group
HEP, in cooperation with USEPA, NYSDEC, and NJDEP, will establish a finance work group to formulate specific recommendations on funding CCMP implementation, including coordinating HEP's strategy to seek additional funding for recommended actions.

ACTION C-2.3
Financial Plan and Implementation Strategy
HEP has formulated a detailed Financial Plan and Implementation Strategy (see Appendix 4), consistent with authorized federal funding levels, to meet the total cost for CCMP implementation. HEP, in cooperation with USEPA, NYSDEC, and NJDEP, will continue to develop and update this plan based on updates of the CCMP and any changes in funding sources. The financial plan includes a specific focus on the ability of local governments to pay for required improvements. The states are committed to providing technical assistance to local governments in this effort. The plan also includes an implementation strategy that describes how HEP will assure CCMP commitments are being met.

ACTION C-2.4
Funding Under Statutes Other Than Clean Water Act
To fund project implementation, HEP, in cooperation with USEPA, NYSDEC, and NJDEP, will also recommend the funding of specific projects using special legislative authorizations and appropriations under non-CWA statutes such as the Water Resources Development Act.

ACTION C-2.5
Encouraging Non-profit Organizations to Fund Estuary Protection Efforts
Funding for proposed program enhancement actions need not always be provided by government agencies. There are many individuals and corporations that are interested in making contributions to implement these types of actions. Non-profit organizations (NPOs) under Section 501(c)(3) of the Internal Revenue Code are ideally suited to receive such contributions and disburse funds, for purposes furthering their missions as well as HEP's.

The missions of many NPOs overlap with those of HEP and these organizations are actively engaged in estuary protection efforts. HEP will encourage NPOs to fund appropriate CCMP recommended actions. To accomplish this, HEP will:

-- Identify those CCMP recommended actions which may be appropriate for funding by NPOs. For example, research studies, environmental monitoring, and educational programs, particularly those that can be accomplished by non-governmental entities, may be appropriate; whereas continuing federal and state environmental programs are not.

-- Identify existing NPOs with missions that overlap HEP's.

-- Seek expressions of interest from the NPOs to work in partnership with HEP to identify those actions they can help implement.

-- Work with the interested NPOs to develop a coordinated, bi-state strategy to further mutual goals, including:

- Soliciting private sector funds.
- Funding appropriate CCMP actions.
- Including NPO activities in CCMP updates.

-- One approach that is encouraged is establishment of separate funds within existing NPOs.

ACTION C-2.6
Supplemental Environmental Project Funds for Priority Recommendations
USEPA and NYSDEC will seek opportunities, as appropriate, to apply Supplemental Environmental Project (SEP) funds to HEP recommendations.

The State of New Jersey and ISC will seek opportunities to fund the recommendations

identified in the CCMP from appropriate funding sources that currently exist or may arise in the future. Funding such actions by the State of New Jersey can only proceed in accordance with statutory and contractual obligations of the state. Funding such actions by ISC can only proceed in accordance with ISC's legal mandates and contractual obligations.

ACTION C-2.7
Additional Public Sector Funding for Program Enhancements
HEP encourages agencies to step forward to fund program enhancements recommended in the CCMP, as funding becomes available. HEP will actively seek such funding. To facilitate this, HEP will develop a list which matches CCMP recommendations with the missions and authorities of various government agencies.

ACTION C-2.8
USACE Enforcement Actions
In directing actions for violation remediation, USACE will seek opportunities to the maximum extent practicable to implement recommendations of the CCMP.

Table 38(is) below summarizes 11 new commitments and 3 recommendations pertaining to this component of the Plan. Thirteen of these actions can be accomplished using existing base program resources.

Table 38(is). Summary—Costs and Financing

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
OBJECTIVE C-1: Continue to fund federal, state, and local programs, at a minimum, at current levels.				
ACTION C-1.0: Fund federal, state, and local environmental programs at current levels.	Federal, state, local governments	Post-CCMP	Base program	R
OBJECTIVE C-2: Seek additional funds for project implementation and program enhancements.				
ACTION C-2.1: Reauthorize Clean Water Act.	Federal government	By Dec 31, 1996	Base program	R
ACTION C-2.2: Establish Finance Work Group.	HEP, USEPA, NYSDEC, NJDEP	Mar 1996	Base program	C/N
ACTION C-2.3: Formulate detailed financial plan and implementation strategy.	HEP, USEPA, NYSDEC, NJDEP	Completed	Base program	C/N
-- Update this plan based on CCMP updates and changes in funding sources.	HEP, USEPA, NYSDEC, NJDEP	Annually, as necessary	Base program	C/N
ACTION C-2.4: Seek funds under statutes other than CWA.	HEP, USEPA, NYSDEC, NJDEP	Ongoing	Base program	C/N
ACTION C-2.5: Encourage non-profit organizations (NPOs) to fund estuary protection efforts.				
-- Seek expressions of interest from existing §501(c)(3) NPOs to work with HEP to identify CCMP recommendations they can help implement.	HEP, USEPA, NYSDEC, NJDEP	Jul 1996	Base program	C/N

Note: It is HEP's goal that all the recommendations in the CCMP become commitments.

-- In some cases CCMP actions are recommendations, not commitments, because responsible entities require resources to implement the action. HEP will advocate making these resources available.

-- In other cases, CCMP actions are recommendations because HEP has not obtained the commitment of regulated entities and other responsible entities to implement the action. By issuance of this CCMP, HEP seeks the commitment of the responsible entities and requests that they step forward to voluntarily agree to implement the actions.

[1] Responsible entities may accomplish the actions directly or via contract or grant.

[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

(Continued)

Table 38(is). Summary—Costs and Financing

ACTION	RESPONSIBLE ENTITY[1]	TARGET DATE	ESTIMATED COST	STATUS[2]
-- Develop a coordinated bi-state funding strategy.	HEP & interested NPOs	Dec 1996	Base program	C/N*
-- Implement funding strategy and fund appropriate CCMP recommendations.	Interested NPOs, HEP (coordination)	Beginning Dec 1996	Enhanced program cost to be determined by NPOs	R
ACTION C-2.6: Seek opportunities, as appropriate, to apply supplemental environmental project funds to HEP recommendations.	USEPA, NYSDEC, other agencies	Post-CCMP	Base program	C/N
-- Seek opportunities to fund the recommendations identified in the CCMP from appropriate funding sources that currently exist or may arise in the future, in accordance with legal and contractual obligations.	NJDEP & ISC	Post-CCMP	Base program	C/N
ACTION C-2.7: Seek additional public sector funding for recommended program enhancements.	HEP, USEPA, NYSDEC, NJDEP	Ongoing	Base program	C/N
-- Develop a list matching CCMP recommendations with the missions and authorities of various agencies.	HEP & NJDEP	Jul 1996	Base program	C/N
ACTION C-2.8: In directing actions for violation remediation, seek opportunities to the maximum extent practicable to implement recommendations of the CCMP.	USACE	Post-CCMP	Base program	C/N

[1] Responsible entities may accomplish the actions directly or via contract or grant.
[2] C/O - An ongoing commitment, not driven by the HEP CCMP
C/N - A new commitment, driven by the HEP CCMP
R - Recommendation

Summary of Total Enhanced Program and Project Implementation Costs for the CCMP

The CCMP includes commitments and recommendations for enhancements to base programs which entail additional funding. Some of these actions have firm commitments for enhanced program resources. Other actions are recommendations. In some cases, CCMP actions are recommendations because the responsible entities require resources to implement the action. HEP will advocate making these resources available. In other instances, CCMP actions are recommendations because HEP has not obtained the commitments(s) of the regulated entities or responsible entities to implement the action.

While the proposed CCMP was undergoing public review, there was a concurrent review by the entities that have implementation responsibilities. This resulted in the confirmation of many commitments, and the addition of numerous commitments to the Plan, and turning some recommendations into commitments. Through the continuing planning process, HEP will work with these entities to confirm commitments to the actions specified in this document and, to the extent possible, to turn recommendations into commitments. In preparing the final CCMP, many estimated costs and target dates for the completion of commitments and recommendations were refined by the HEP Management Conference. HEP will continue to refine this information. Note that cost estimates have been made for two types of costs: One-time costs, e.g., for special studies or construction of facilities: and costs recurring on an annual basis (cost per year), e.g., for continuing environmental programs or operation and maintenance or facilities. These two types of costs are tallied separately.

As summarized in Table 39(ic) below:

- The Plan includes commitments for enhanced program funding totaling $36,466,000 and for $2,130,000/year.
- The Plan includes recommendations for enhanced program funding totaling $3,989,000 and for $4,045,000/year.
- The Plan includes numerous additional commitments and recommendations for program enhancements for which costs will be developed during the continuing planning process.

The CCMP also includes commitments and recommendations for the implementation of specific pollution control and habitat restoration projects. As summarized in Table 40(ic) below:

- The Plan includes commitments for projects totaling between $1.28 and $5.28 billion and for $100,000/year.
- The Plan includes recommendations for additional projects totaling $1.3 billion and $3,500,000/year.
- The Plan includes numerous additional commitments and recommendations for projects for which costs will be developed during the continuing planning process.

Table 39(is). Summary of Enhanced Program Costs

CCMP SECTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
Habitat	$6.995 million	0	$1.074 million + *	$550,000
Toxics	$4.531 million	$80,000	$1.915 million + *	$1.75 million
Dredged Material	$14.4 million + *	0	0	0
Pathogens	$282,000	0	$325,000 + *	$15,000
Floatables	0	$1.750 million	$200,000	$1.349 million
Nutrients	$9.975 million	0	%325,000 + *	0
Rainfall0Induced Discharges	$168,000	0	0	0
Public Involvement and Education	$25,000	**	$150,000 + *	***
Post-CCMP Management Structure	0	$300,000	0	$390,000
Monitoring, Modeling, and Research	$90,000 + *	0	0	0
Reporting Progress	0	**	0	0
Financing	0	0	0	0
TOTAL	[1] $36,466,000 + *	$2,130,000/yr	[1] $3,989,000 + *	[1] $4,054,000/yr + *

* Total does not include additional enhanced program costs for actions to be developed during the continuing planning process
** Included in $300,000/yr commitment for post-CCMP management structure
*** Included in $390,000/yr recommendation for post-CCMP management structure
1 Notation (+*) indicates cost plus additional costs to be determined.

Table 40is). Summary of Project Implementation Costs

CCMP SECTION	COMMITMENTS		RECOMMENDATIONS	
	Cost	Cost/Year	Cost	Cost/Year
Habitat	$15.6 million + *	0	$500,000 + *	$1 million
Toxics	$30,000 + *	0	0	0
Dredged Material	$126.730 million + *	0	0	0
Pathogens	$1.7 million**	0	0	0
Floatables	$7.4 million	0	0	$2.5 million
Nutrients	$132.5 million	0	0	0
RainfallOInduced Discharges	$1-5 billion	$100,000	$1.3 billion + *	0
Public Involvement and Education	0	0	0	0
Post-CCMP Management Structure	0	0	0	0
Monitoring, Modeling, and Research	0	0	0	0
Reporting Progress	0	0	0	0
Financing	0	0	0	0
TOTAL	1 $1,283,960,000 to $5,283,960,000 + *	$100,000/yr	1 $1,300,500,000 + *	$3,500,000/yr

* Total does not include additional project implementation costs for actions to be developed during the continuing planning process
** Total represents statewide funding.
1 Notation (+ *) indicates cost plus additional costs to be determined.