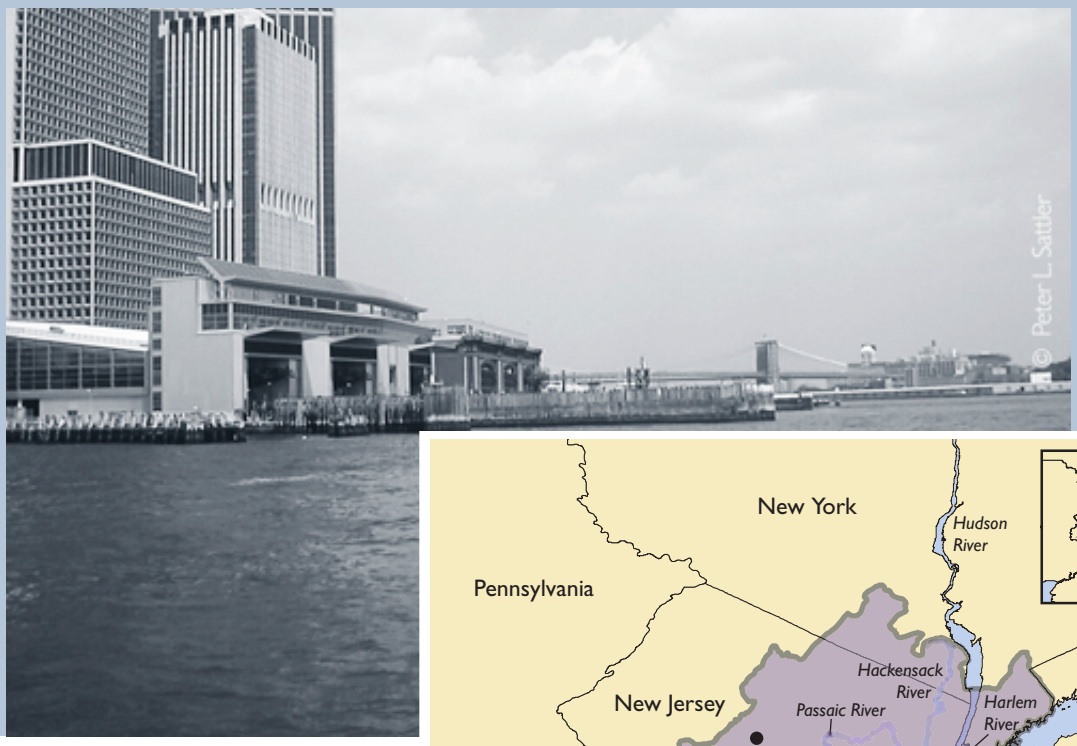
This document contains overall and specific condition of the New York/New Jersey Harbor Estuary Program from the National Estuary Program Coastal Condition Report. The entire report can be downloaded from ***http://www.epa.gov/owow/oceans/nepccr/index.html***

National Estuary Program Coastal Condition Report

Chapter 3: Northeast National Estuary Program Coastal Condition, New York/New Jersey Harbor Estuary Program

June 2007

New York/New Jersey Harbor Estuary Program



New York - New Jersey
Harbor Estuary Program
www.harborestuary.org

Background

The core area of the New York/New Jersey Harbor extends from the tidal waters of the Hudson-Raritan Estuary to Sandy Hook, NJ, and Rockaway Point, NY, at the mouth of the Harbor. This core area includes the Hudson River, Upper Bay, Lower Bay, Arthur Kill, Kill Van Kull, and Raritan Bay. The NEP study area also includes the East and Harlem rivers and Jamaica Bay in New York, and the Hackensack, Passaic, Raritan, Shrewsbury, Navesink, and Rahway rivers and Newark and Sandy Hook bays in New Jersey. The actual drainage basin or watershed of the Harbor encompasses about 16,300 mi^2, including much of eastern New York, northern New Jersey, and small parts of western Connecticut, Massachusetts, and Vermont. The quality of the estuary's water is affected not only by activities occurring directly in the Harbor and New York Bight (the ocean area that extends approximately 100 miles beyond Harbor waters), but also by industry, agriculture, and other individual practices throughout this larger watershed (NY/NJ HEP, 2006).

The New York/New Jersey Harbor Estuary Program (also known as the HEP) was designated an Estuary of National Significance in 1988 by EPA, in response to a

request by the two states' Governors. The HEP was convened as an interstate partnership of federal, state, and local governments; scientists; civic and environmental advocates; the fishing community; business leaders; and educators. In 1987, Congress also required the preparation of a restoration plan for the New York Bight; however, because the Harbor and New York Bight are inextricably linked within the larger ecosystem, these two plans were later joined (NY/NJ HEP, 1996; 2006).

Environmental Concerns

Some of the primary environmental concerns in the New York/New Jersey Harbor system include toxic contamination, pathogens, and wetland loss. Levels of mercury are still above the ERM values for sediments in all basins of the estuary, and levels of contaminants in fish have resulted in the issuance of health advisories against fish consumption. In 1988, large improvements made at STPs helped end the discharge of roughly 210 million gallons of untreated sewage per day from Manhattan and Brooklyn and reduced fecal coliform levels in the estuary. CSOs still contribute raw sewage to the Harbor's waterways when it rains, and some shellfish beds have remained closed for decades. Compared to historic acreage levels, about 80% of the estuary's tidal wetlands and most of the 224,000 acres of the urban core's freshwater wetlands are gone. Despite these losses, Clean Water Act regulations have helped reduce wetland losses substantially in the past 10 to 15 years (Steinberg, 2004).

Population Pressures

The population of the 21 NOAA-designated coastal counties coincident with the HEP study area increased by 13% during a 40-year period, from 15 million people in 1960 to almost 16.9 million people in 2000 (Figure 3-67) (U.S. Census Bureau, 1991; 2001). This rate of population growth for the HEP study area is about half the population growth rate of 24% for the collective NEP-coincident coastal counties of the Northeast Coast region. In 2000, the population density of these 21 NEP-coincident coastal counties (3,097 persons/mi^2) was the highest density calculated for any of the Northeast NEP study areas and was three times higher than the population density of 1,055 persons/mi^2 for the collective NEP-coincident coastal counties of the Northeast Coast region (U.S. Census Bureau, 2001). Population pressures for the HEP study area are extremely high because this estuary serves the major metropolitan area of New York City—one of the largest port facilities on the East Coast and a center for international commerce and banking.

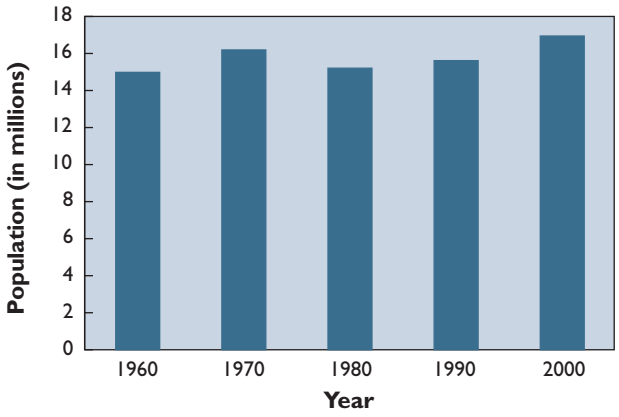


Figure 3-67. Population of NOAA-designated coastal counties of the HEP study area, 1960–2000 (U.S. Census Bureau, 1991; 2001).

NCA Indices of Estuarine Condition—New York/New Jersey Harbor

The overall condition of the New York/New Jersey Harbor is rated poor based on the four indices of estuarine condition used by the NCA (Figure 3-68). All four indices—the water quality index, sediment quality index, benthic index, and fish tissue contaminants index—are also rated poor for the New York/

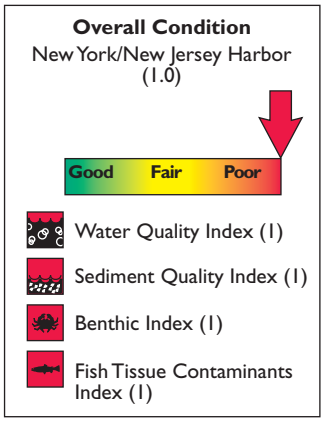


Figure 3-68. The overall condition of the HEP estuarine area is poor (U.S. EPA/NCA).

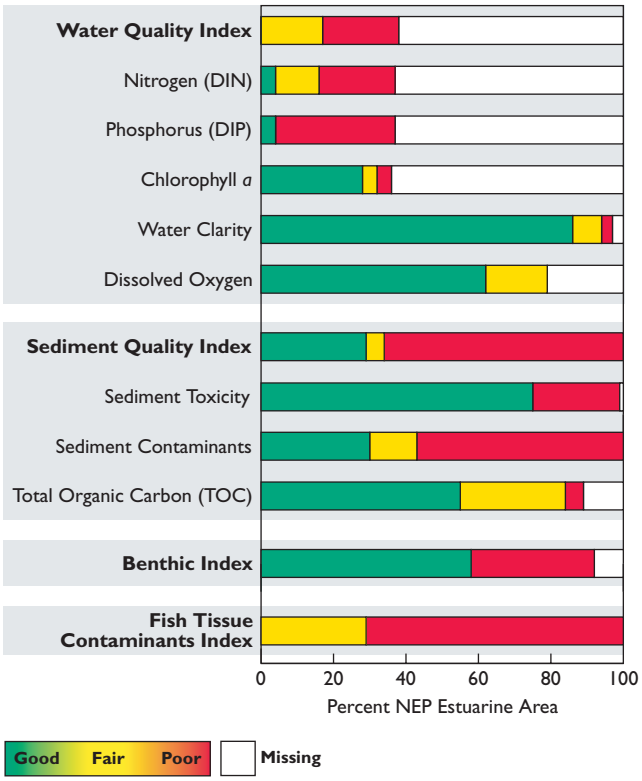


Figure 3-69. Percentage of NEP estuarine area achieving each rating for all indices and component indicators — New York/New Jersey Harbor (U.S. EPA/NCA).

New Jersey Harbor. Figure 3-69 provides a summary of the percentage of estuarine area rated good, fair, poor, or missing for each parameter considered. This assessment is based on data from 32 NCA sites sampled in the HEP estuarine area in 2000 and 2001. Please refer to Tables 1-24, 1-25, and 1-26 (Chapter 1) for a summary of the criteria used to develop the rating for each index and component indicator.

Water Quality Index

The water quality index for the New York/New Jersey Harbor is rated poor. This index was developed using NCA data on five component indicators: DIN, DIP, chlorophyll *a*, water clarity, and dissolved oxygen. None of the estuarine area was rated good for water quality, and 38% of the area was rated fair or poor (Figure 3-70). Water quality data were unavailable for 62% of the HEP estuarine area; therefore, this water quality index rating is only tentative. The available data show a wide occurrence of elevated concentrations of DIN and DIP and relatively few sites where chlorophyll *a* levels were elevated. Water clarity was largely satisfactory in the Harbor, with 11% of the estuarine area in fair or poor condition for this component indicator. This finding is a departure from the tendency for Northeast Coast NEP estuaries to have relatively clear water conditions, and the first indication of the degraded clarity that is usually found in estuaries in the southern part of the Northeast Coast region. Dissolved oxygen concentrations were satisfactory in 62% of the HEP estuarine area.

Dissolved Nitrogen and Phosphorus

The New York/New Jersey Harbor is rated fair for DIN concentrations. Four percent of the estuarine area was rated good for DIN concentrations, 12% of the area was rated fair, and 21% of the area was rated poor. NCA data on DIN concentrations were unavailable for

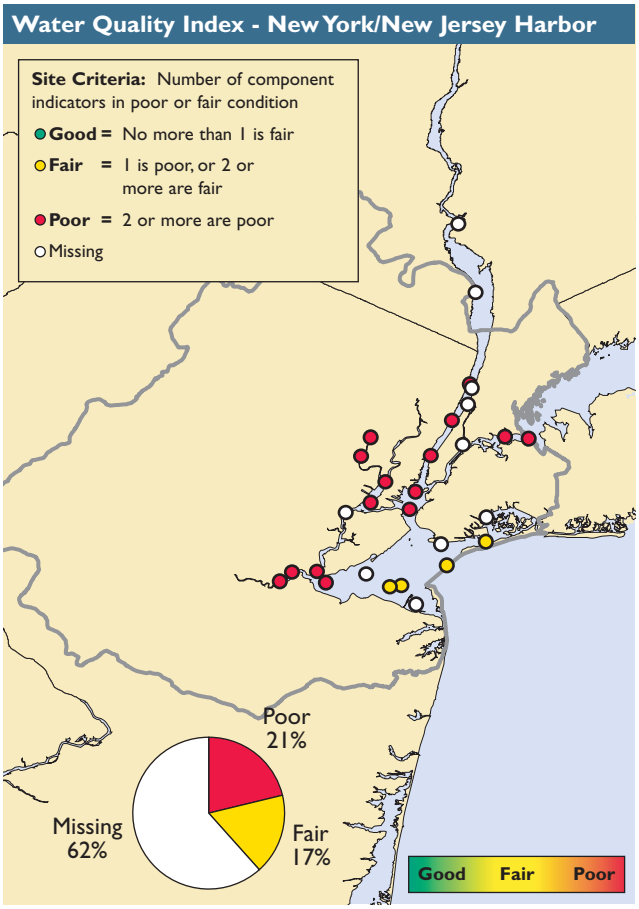


Figure 3-70. Water quality index data for New York/New Jersey Harbor, 2000–2001 (U.S. EPA/NCA).

63% of the HEP estuarine area. The New York/New Jersey Harbor is rated poor for DIP concentrations, with 4% of the estuarine area rated good for this component indicator and 33% of the area rated poor. NCA data on DIP concentrations were unavailable for 63% of the HEP estuarine area.

Chlorophyll a | The New York/New Jersey Harbor is rated good for chlorophyll *a* concentrations, with 28% of the estuarine area rated good for this component indicator, 4% of the area rated fair, and 4% of the area rated poor. NCA data for chlorophyll *a* concentrations were unavailable for 64% of the HEP estuarine area.

Water Clarity | Water clarity in the New York/New Jersey Harbor is rated good. Water clarity was rated poor at a sampling site if light penetration at 1 meter was less than 10% of surface illumination. Eighty-six percent of the estuarine area was rated good for water clarity, 8% was rated fair, and only 3% was rated poor. NCA data on water clarity were unavailable for 3% of the HEP estuarine area.

Dissolved Oxygen | The New York/New Jersey Harbor is rated good for dissolved oxygen concentrations, with 62% of the estuarine area rated good for this component indicator and none of the area rated poor. NCA data on dissolved oxygen concentrations were unavailable for 21% of the HEP estuarine area.

Sediment Quality Index

The sediment quality index for the New York/New Jersey Harbor is rated poor, with 65% of the estuarine area rated poor for sediment quality condition (Figure 3-71). This index was developed using NCA data on three component indicators: sediment toxicity, sediment contaminants, and sediment TOC. Three survey sites (accounting for 25% of the HEP estuarine area) showed toxicity toward amphipods; metals and PCBs were most often responsible for contamination at impaired sites; and about a third of the estuarine area had elevated TOC levels in sediment.

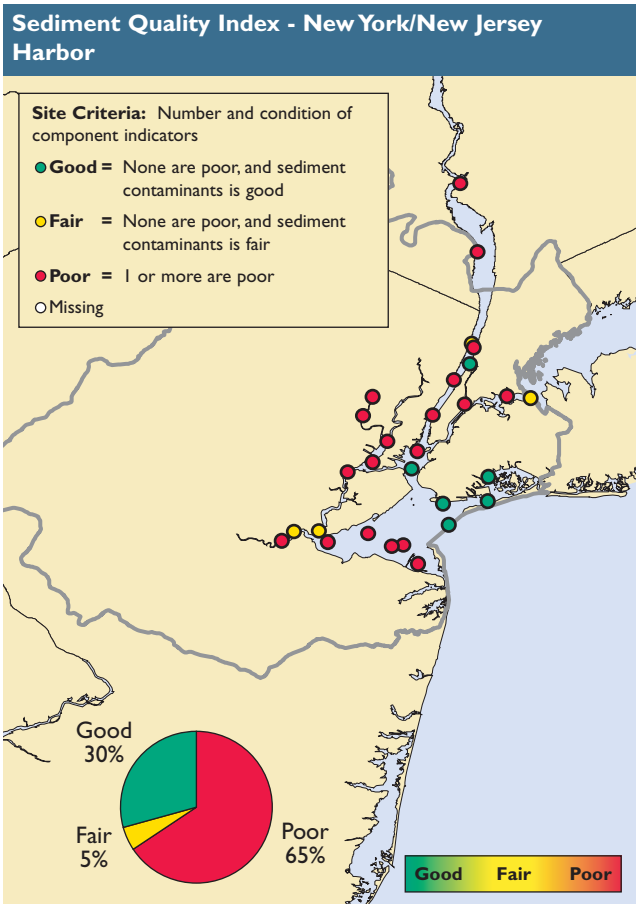


Figure 3-71. Sediment quality index data for New York/New Jersey Harbor, 2000–2001 (U.S. EPA/NCA).

Sediment Toxicity | The New York/New Jersey Harbor is rated poor for sediment toxicity, with 25% of the estuarine area rated poor for this component indicator. NCA data on sediment toxicity were unavailable for 1% of the HEP estuarine area.

Sediment Contaminants | The New York/New Jersey Harbor is rated poor for sediment contaminant concentrations, with more than half (57%) of the estuarine area rated poor for this component indicator and an additional 13% of the area rated fair.

Total Organic Carbon | The New York/New Jersey Harbor is rated good for sediment TOC, with 55% of the estuarine area rated good for this component indicator, 29% of the area rated fair, and only 5% of the area rated poor. NCA data on sediment TOC were unavailable for 11% of the HEP estuarine area.

Benthic Index

Based on NCA monitoring data, the benthic index for the New York/New Jersey Harbor is rated poor. A third of the Harbor's estaurine area had degraded benthic communities, whereas 58% of the area exhibited healthy benthic communities, as judged by the Virginian Province Benthic Index (Figure 3-72).

Fish Tissue Contaminants Index

The fish tissue contaminants index for the New York/New Jersey Harbor is rated poor. Relatively few fish from the Harbor (14 fish samples) were analyzed for fish tissue contaminant concentrations (Figure 3-73). All of the fish analyzed either fell within the range of EPA Advisory Guidance values (29%) or exceeded EPA Advisory Guidance values (71%) for fish consumption, most commonly for PCBs and, occasionally, for DDT and mercury.

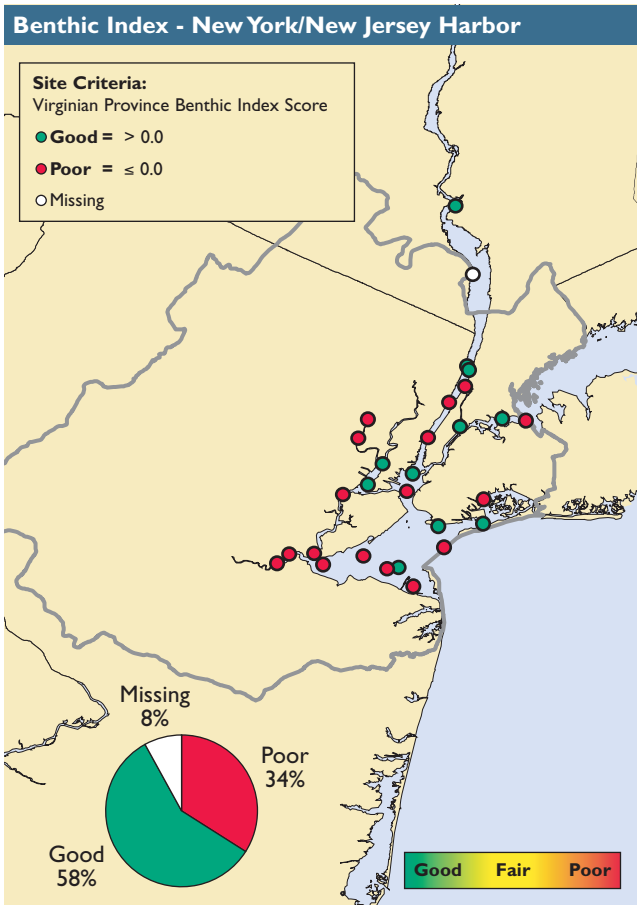


Figure 3-72. Benthic index data for New York/New Jersey Harbor, 2000–2001 (U.S. EPA/NCA).

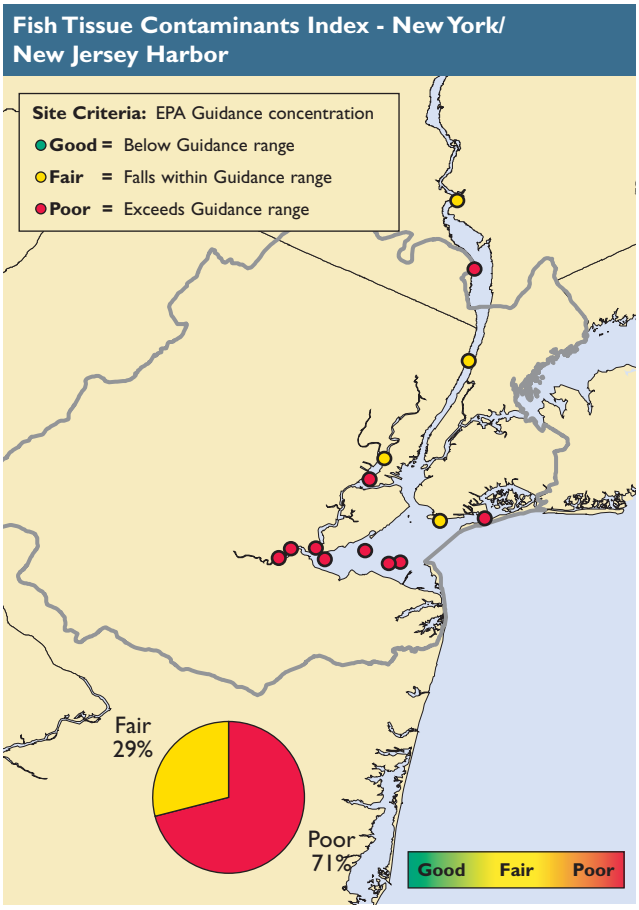


Figure 3-73. Fish tissue contaminants index data for New York/ New Jersey Harbor, 2000–2001 (U.S. EPA/NCA).

HIGHLIGHT

New York/New Jersey Harbor–Wide Water Quality Survey

The HEP reports that it has collaborated with numerous federal, state, and municipal agencies to initiate a long-term water quality monitoring program that covers all of the waters of the New York/New Jersey Harbor. New York City has monitored the New York side of the Harbor for nearly 100 years, but the HEP has recognized that a previous lack of monitoring data for the New Jersey waters of the Harbor is a significant concern.

To address this issue, the HEP formed an ad hoc monitoring group in 2002 to assess existing water quality monitoring efforts in the Harbor and to make recommendations to fill data gaps. This group included representatives from the New Jersey Harbor Discharges Group (NJHDG), New Jersey Department of Environmental Protection (NJDEP), New York City Department of Environmental Protection (NYCDEP), NYSDEC, National Park Service (NPS), IEC, EPA, and the New Jersey Sea Grant.

Although the collective monitoring group made recommendations about what needed to be done to fill data gaps, the NJHDG made the long-term commitment to the New Jersey data-collection program. The NJHDG is convinced that a robust water quality database is needed to allow the member agencies to make informed decisions about future needs and to allow the group to be confident that regulatory decisions are made based on high-quality environmental measurements.

The water quality surveys now conducted by the NJHDG and the NYCDEP are entirely complementary, and staff from all the participating agencies continue to collaborate on common issues. Parameters measured include dissolved oxygen, total suspended solids, fecal coliform bacteria, nitrogen, phosphorus, and salinity. Efforts are also underway to investigate adding real-time data collection to the monitoring effort.

Through these combined efforts, the data from the more than 60 stations in the HEP estuarine area can now be used to represent the water quality of the entire Harbor and will form the basis for documenting changes in water quality over time. Additional information on these programs is available from the HEP at www.harborestuary.org.

Passaic Valley Sewerage Commissioners (PVSC) vessel collecting water quality data as part of the Harbor-wide survey (PVSC).

New York/New Jersey Harbor Estuary Program Indicators of Estuarine Condition

Water and Sediment Quality

Table 3-1 presents trends in the main indicators used by the HEP. The NYCDEP collects water samples every two weeks at a series of stations around the Harbor to measure dissolved oxygen in surface and bottom waters to evaluate changes in water quality in the estuary. Historically, dissolved oxygen levels were routinely below 1.5 mg/L in summer months; however, since the 1970s, dissolved oxygen levels have been above the minimum EPA guideline of 2.3 mg/L at most sites, with mean Harbor-wide dissolved oxygen concentrations fluctuating between 5 and 7 mg/L in the surface and bottom waters of the HEP study area. When dissolved oxygen concentrations are above 4.8 mg/L, an area is considered to achieve objectives for the protection of marine life. Overall, dissolved oxygen levels in the Harbor improved considerably between 1990 and 2000 (Steinberg et al., 2004). The HEP's target is to increase water quality for the area so that dissolved oxygen levels never drop below 4.8 mg/L (30 mi^2 currently achieve this target) (NY/NJ HEP, 2004). Figure 3-74 illustrates changes in dissolved oxygen concentrations in the Harbor from 1946 to 2001.

DIN and total nitrogen levels are monitored to evaluate water quality changes in the New York/New Jersey Harbor. For both nitrogen and phosphorus, loadings have decreased from most sources except STPs (nutrient loads were higher in 1994–1995 than they were in the same subbasins in 1988–1989). Although nutrient levels have fluctuated over time, they are not considered "limiting" elements for phytoplankton growth in this estuarine system. Total nitrogen levels in the mid-1990s were primarily driven by atmospheric sources, STPs, and tributary loadings. Ammonia and nitrate-nitrite concentrations were fairly stable between 1985 and 2000, averaging between 0.2 and 0.5 µg/L in the Inner Harbor, Lower New York Harbor, and Raritan Bay subbasins, with only slightly higher levels and fluctuations of ammonia nitrogen in Jamaica Bay (Steinberg et al., 2004).

Chlorophyll *a* is used as an index of phytoplankton biomass in this system by the NYCDEP and the NJDEP. Excessive phytoplankton conditions are defined based on the abundance and extent of HABs. A HAB index is used to quantify the severity and extent of blooms (5 rating levels) in the Harbor and to characterize the severity of the impact. These monitoring

Table 3-1. Trends in Water Quality Indicators Measured by the HEP (Steinberg et al., 2004)

Toxic Contamination	
Contaminant levels	Improving trend
Contaminant loadings	Improving trend
Sediment toxicity	No trend
Contaminants in fish tissue	Improving trend
Pathogens	
Acres of shellfish beds open	Improving trend
Disease linked to contaminated shellfish	Improving trend
Levels of coliform bacteria	Improving trend
Beach closures	No trend
Floatable Debris	
Floatable debris	No trend
Nutrients and Organic Enrichment	
Nutrient levels and loadings	Mixed trend
Dissolved oxygen	Improving trend
Chlorophyll *a*	No trend
Transparency	No trend
Harmful algal blooms	Improving trend

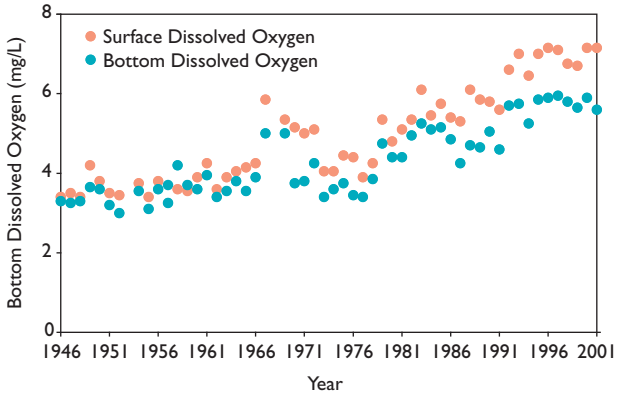


Figure 3-74. Trends in dissolved oxygen levels in surface and bottom waters of the New York/New Jersey Harbor (Steinberg et al., 2004).

agencies correlate water quality and a host of other environmental variables (e.g., temperature, salinity) with chlorophyll *a* levels in the estuary's waters (NY/NJ HEP, 2006). Since 2000, chlorophyll *a* levels have been highest in Jamaica Bay, with some levels measured at more than 50 µg/L (Steinberg et al., 2004). HABs are monitored closely, but are not a formal indicator of water quality in the Harbor. The NYCDEP, NJDEP, IEC, and NPS are all involved in recording HABs in the estuary (NY/NJ HEP, 2006). Most blooms in this system discolor the water and reduce water clarity, with only rare cases of blooms occurring that are severe enough to cause food poisoning in humans. Outbreaks of brown tides have not been observed in New York/New Jersey Harbor (HRF, 2002).

The number of beach closures is another primary indicator of water quality in the HEP study area. New York beaches are monitored by the state's county health departments. The New York City Department of Health and Mental Hygiene (NCY DOHMH) Sanitary Code requires that if there is a potential risk to human health, then bathing beaches should not be open for public use. The NYC DOHMH monitors public and private beaches once a week in Richmond, Kings, Queens, and Bronx counties; county health departments decide on the frequency of monitoring. All of the coastal counties in New York regularly test for total coliform, fecal coliform, and *Enterococci* bacteria and monitor ocean and bay beaches. New Jersey has one of the most comprehensive beach monitoring programs in the country, and some sampling stations are currently monitored for both fecal coliform and *Enterococci* bacteria. New Jersey not only monitors the recreational bathing beaches, but also samples environmental monitoring stations that are not bathing beaches. There were beach closures in the core area of the New York portion of the Harbor in 1988 and 1989 and in the core area of the New Jersey portion the between 1988 and 1991. In the New York portion of the core area, no beach closures occurred between 1990 and 1993. In the New Jersey portion, there were no beach closures due to high bacteria between 1992 and 1993 and no precautionary closures between 1989 and 1993 (Yuhas, 2002a). Figure 3-75 illustrates trends in beach closures over time in the New Jersey portion of the Harbor area.

Concentrations of toxics in New York/New Jersey Harbor sediments and fish tissue are the primary indicators used to evaluate water and sediment quality. An objective of the HEP is to complete characterization of sediment loadings by 2005 and to ensure that suitable reduction targets are achieved by 2009, including a specific goal to reduce sediment hot spots to the point that the levels of toxics in newly deposited sediments do not inhibit a thriving healthy ecosystem or threaten oyster reef habitats. The HEP has also set a guideline that all dredged materials from the estuary will have beneficial uses. By 2009, the HEP hopes to increase the areal extent of Harbor surface sediments below the

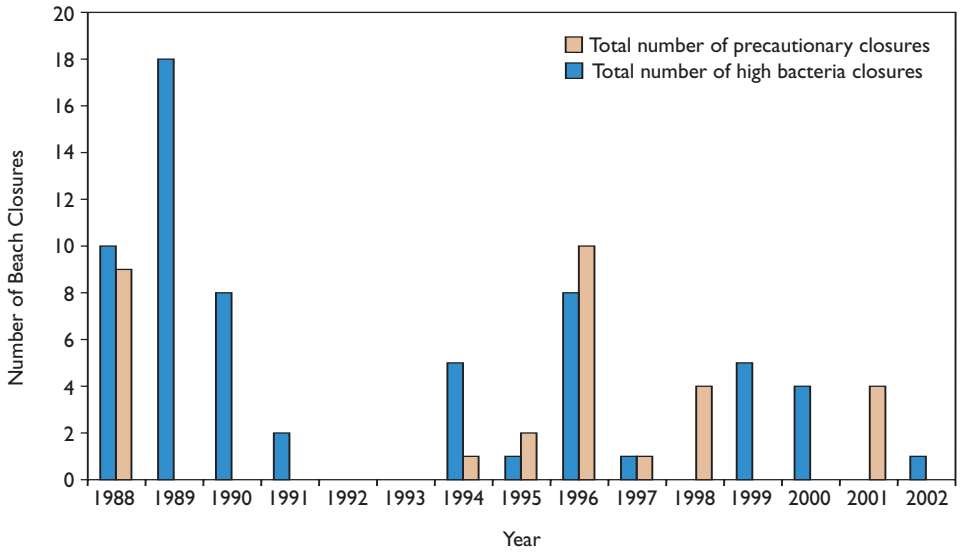


Figure 3-75. Number of beach closures by year at New Jersey beaches located in New York/New Jersey Harbor (Yuhas, 2002a).

ERM values from the 1993–1994 baseline of 50% to target levels set in 2005 (NY/NJ HEP, 2004). Striped bass are a very popular catch for recreational anglers, and PCB tissue levels in striped bass are an indicator used by the HEP. The HEP has set a target that total PCBs levels in striped bass and other fish shall not exceed the FDA guideline of 2 ppm to protect human health (NY/NJ HEP, 2004). PCB levels recorded in the past have led to closure of the commercial fishery and issuance of fish consumption advisories for striped bass (Steinberg et al., 2004).

Habitat Quality

The acres of wetlands lost or acquired is used to evaluate environmental changes to natural habitat conditions and to track the health of estuary habitat in the New York/New Jersey Harbor. Trends in acreage of various habitat types are monitored over time using aerial photography and GIS technology. Approximately 20,000 acres of tidal wetlands now remain in the Harbor core area of both states (Steinberg et al., 2004). One of the specific targets for habitat improvement is to acquire 2,700 acres of land above the 2001 baseline level by 2009 (NY/NJ HEP, 2004). It is difficult to evaluate the overall function and health of different habitats, other than to study changes in the population sizes of the organisms these habitats support.

About 80% of the tidal wetlands and underwater lands in the Harbor area (300,000 acres) have been altered or destroyed over time, primarily due to filling, dredging, and other human activities. In 1990, an oil spill at Arthur Kill destroyed about 200 acres of salt marsh. New Jersey lost about 2.5% of its wetland acreage statewide between 1984 and 1995. Coastal wetland losses in Jamaica Bay (NY) and Arthur Kill (NJ) have been quite evident, and Little Neck Bay and coastal areas in the southeast Bronx have also suffered substantial losses. Loss of marsh grass islands in Jamaica Bay are some of the most alarming changes reported by the NYCDEP. If losses in this area continue at the present rate, all islands in this subbasin of New York/New Jersey Harbor will be gone by 2024. Habitat loss, dredging, and filling in the Hackensack Meadowlands has affected local populations of osprey, crabs, and juvenile fish, as well as the overall hydrology of this area. About 25% of tidal estuaries in the Hackensack Meadowlands disappeared between 1969 and 1995. In contrast, Newark Bay has exhibited minimal losses in wetland acres during the past 10 years (Steinberg et al., 2004). Table 3-2 shows some of the key trends in habitat loss and species changes over time in the New York/New Jersey Harbor estuarine system.

Table 3-2. Trends in Habitat Quality and Wildlife Indicators Measured by the HEP (Steinberg et al., 2004)

Changes in Habitat Acreage (overall)	**Improving trend**
Wetland acreage	Improving trend
Changes in Newark Bay	Improving trend
Wetlands in Jamaica Bay	Deteriorating trend
Habitat in the Hackensack Meadowlands	Improving trend
Abundance of Wading Birds	**Deteriorating trend**
Abundance of Fish and Crustaceans (overall)	**Mixed trend**
Striped bass	No trend
American shad	Deteriorating trend
Winter flounder	No trend
Summer flounder	No trend
White perch	Deteriorating trend
American eel	Deteriorating trend
Forage fish	No trend
Blue crab	No trend
Benthic Community Health	**Improving trend**
Sediment loading	**Improving trend**

Living Resources

One of the most remarkable characteristics of the New York/New Jersey Harbor is the diverse range of living resources that populate the estuary's waters and coastal wetlands. The HEP, along with the NYSDEC, NJDEP, and other local agencies, is heavily involved in monitoring and assessing the abundance and health of wading birds, fisheries, shellfish populations, and other wildlife. The HEP is currently establishing a list of key plant and animal species that are representative of the biodiversity of the Harbor, and the program is working to set targets for these populations (NY/NJ HEP, 2004).

The HEP study area is home to a variety of finfish and shellfish species, including striped bass, bluefish, freshwater sunfish, sturgeon, shad, winter and summer

flounder, white perch, American eel, and a variety of forage fish. In total, more than 100 species live in the Harbor for some or all of their life cycle, and many are commercially important fish stocks. Generally, an index of abundance is used to evaluate population sizes over time. Overfishing, habitat destruction, and contamination by toxics are the major concerns that affect both fish and blue crab populations in the Harbor.

Many environmental groups and locals in the HEP study area consider the striped bass to be one of the enduring symbols of this system. The striped bass population has remained fairly constant during the past two decades, but abundance of other species such as white perch, American eel, and American shad has been declining. Catches of striped bass in Jamaica Bay have been better than in other subbasins of this estuary, but the reasons for this are not clear. The catch per unit effort (CPUE) of American shad has generally declined since the mid-1980s, and other species, such as the alewife and blueback herring, have exhibited similar declines over this same period. Relative abundance and catch of winter flounder has been a concern in some areas, but catch levels have stabilized in Jamaica Bay and Haverstraw Bay since the early 1990s. The abundance of white perch has been declining since the 1980s, which is likely due to water quality conditions in the Harbor because this ecologically important species spends the entire year in this estuary. Three important forage fish monitored in the HEP estuarine area—bay anchovy, Atlantic silverside, and killifish—are also likely affected by changes in salinity, temperature, river flow, and other factors in the Harbor. Blue crabs are harvested in both the New York and New Jersey waters of this estuary, but total landings are much lower than in the Chesapeake Bay system. The benthic community of the New York/New Jersey Harbor is considered impacted, or of degraded quality, as determined by using species index measures and toxicity tests to assess the health of benthic habitats (Steinberg et al., 2004).

Shellfish bed closures and shellfish landings are also monitored in the HEP study area. Shellfish beds are classified using the guidelines of the National Shellfish Sanitation Program. The direct harvesting of shellfish is only permitted in portions of the Navesink and Shrewsbury rivers between November and April. Although direct shellfish harvesting is prohibited in all other portions of the study area, several shellfish beds are designated as "special restricted." In these waters, shellfishers may harvest shellfish and transport them either to a purification plant in a process known as depuration harvesting, or to clean waters approved for shellfishing in a process known as relay harvesting. After purification at the depuration plant or in the clean waters, the shellfish are sent to market. In New York, hard clams are relay harvested in areas of the Great Kills Harbor and Raritan Bay between April and October, and more than 77,000 bushels of hard clams were produced in 2001. These shellfish beds were closed to relay harvest in 2002 due to an outbreak of the shellfish parasite QPX. A limited portion of the beds was reopened for relay harvest in 2005, and approximately 17,600 bushels of hard clams were produced that year (IEC, 2006; Personal communication, Hoffman, 2006). In New Jersey, both relay harvest and depuration programs are active year-round in parts of Raritan Bay, Sandy Hook Bay, Navesink River, and Shrewsburg River. In 2002, 5,425 acres of shellfish beds in the New Jersey portion of Raritan Bay were upgraded from "prohibited" to "special restricted" (Yuhas, 2002b). More than 38.8 million clams were collected through these harvesting programs from Raritan and Sandy Hook bays in 2004 (Personal communication, Celestino, 2006).

Double-breasted cormorant populations have increased in the New York/New Jersey Harbor (Lee Karney, FWS).

Although there were virtually no wading birds in this estuary in the 1960s, populations of herons, egrets, ibises, and other birds can be seen in New York/New Jersey Harbor today. The abundance of herring gulls declined substantially between 1995 and 2001 (Steinberg et al., 2004). Double-breasted cormorants have increased in population numbers, expanding their nesting area on a number of Harbor islands (Bernick et al., 2005). Populations of black-crowned night heron, yellow-crowned night heron, glossy ibis, snowy egret, and great egret all showed significant population declines between 1997 and 2001; however, the resurgence of ospreys is a good indicator that some areas of the Harbor are cleaner and healthier than in the past (Steinberg et al., 2004).

Environmental Stressors

Floatable trash is another major indicator of water and near-coastal conditions in the HEP study area. The NJDEP's Clean Shores Program, which utilizes prison labor, collected 2,563 tons of floatables and wood in 2000. These efforts addressed about 115 miles of shoreline statewide, with the greatest efforts in the New York/New Jersey Harbor area (Yuhas, 2002a). The HEP has set a goal to decrease floatables discharged from CSOs in New York/New Jersey Harbor to an average of 679 cubic yards of trash by 2009 (NY/NJ HEP, 2004). In 1988, the *Short-term Action Plan for Addressing Floatable Debris in the New York Bight* (U.S. EPA, 1989) was developed by federal and state entities, and the USACE captured 543 tons of material that year, 90% of which was wood. For 2000, the estimated total captured was 5,399 tons of floatable debris. All floatables are transported out-of-state for disposal, and wood is transported to out-of-state recycling facilities. Daily helicopter surveillance fly-overs of the New York/New Jersey Harbor area, the south shore of Long Island, and the New Jersey coastline are conducted by state and federal agencies. The NYCDEP deploys a skimmer boat for daily floatables collection, commissioned via funding from an EPA Marine CSO Construction Grant. During 2000, 320 tons (81% wood) were collected by this vessel. In addition, area volunteer groups and organizations conduct beach and underwater debris cleanups during the spring and fall seasons (Yuhas, 2002a).

Current Projects, Accomplishments, and Future Goals

Some of the major environmental accomplishments of the HEP include the following:

- The successful restoration of habitat in the Arthur Kill area of the New York/New Jersey Harbor following the Exxon *Byway* oil spill in 1990.
- The Rahway River Association's restoration project (1996–2002) resulted in the creation of a new park in Rahway, NJ, the demolition of 11 unoccupied homes, and the restoration of 4 acres of urban land area (Barnes, 2002).
- Vast improvements in the study area's water quality due to the construction of and upgrades to publicly owned treatment works (POTWs) (Steinberg et al., 2004).

Conclusion

The overall condition of New York/New Jersey Harbor is rated poor based on the four indices of estuarine condition used by the NCA. The HEP has found that, although some measures of estuarine health in the study area have demonstrated improvements over time (including increases in dissolved oxygen levels and reductions in nutrient loadings), other trends, such as ongoing fish consumption advisories and declines in some fish and wading bird populations, have not been as positive. The inadequate availability of data is still a significant barrier to properly interpreting indicators in this estuary system. Some indicators that were once used are no longer monitored, and some data gaps and inconsistencies exist among available spatial and temporal monitoring data for this estuary. Comprehensive monitoring of water quality on the New York side of the Harbor has produced data for nearly 100 years. The NJDEP has an excellent system for reporting closures and beach conditions over time; however, the collection of comprehensive water quality data on the New Jersey side of the Harbor has occurred only recently. Citizens, regulators, and scientists must continue to work together to realize the HEP's vision to maintain a healthy and productive Harbor ecosystem with full beneficial uses.