



## **New York/New Jersey Harbor Estuary Program**

### **New York/New Jersey Beach Closures and Monitoring Information**

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By Cathy Yuhas, NJ Sea Grant College Extension Program/NY-NJ Harbor Estuary Program

## **Introduction**

### **General Beach Information**

Beaches are a valuable part of the NY/NJ Harbor Estuary (Harbor) since they are used for swimming and recreation for area residents and tourists, and are vital access points to the Harbor. Beaches that are part of the Harbor can be found in the counties of Richmond and Kings in NY and in NJ they can be found in Monmouth County. The official beach season begins Memorial Day Weekend and ends Labor Day. Since the beaches are valuable to our environment and economy to the lives of many that live along the coast, they have been monitored for years to check bacterial levels to ensure that they are safe for public use.

Pathogens, disease-causing microorganisms, can cause human health problems when people are exposed to them through swimming or any water-related recreational activities by ingestion, inhalation, or direct contact. High pathogen levels can result in beach closures and communicable diseases. The bacterial standard that is generally used is fecal or total coliform depending on the state. The EPA in 1986 recommended new water quality criteria for bacteria, which would require the bacterial standard to be enterococci for marine waters and *E. coli* or enterococci for fresh waters instead of fecal and total coliform. These water quality criteria have, for the most part, not been implemented by the states (Connecticut started in 1989), but the BEACH Act of 2000 will enforce the use of the new bacterial standard by April 2004. Using enterococci or *E. coli* should reduce the cases of gastroenteritis from contact with polluted waters, but this new bacterial standard still does not convey anything about the levels of organisms in the water that cause skin, eye, ear, nose, respiratory illness, or throat infections (USEPA 2000). The primary sources of pathogens entering the waterways are anticipated and unanticipated bypasses; combined sewer overflows (CSOs) and polluted storm water runoff after a rainfall. The pathogens found in sewage are bacteria, viruses, protozoa, and worms, and these can cause gastroenteritis to the common cold.

The Clean Water Act (CWA) was enacted to set the stage for great steps in improving the nation's waterways. In 1972, the CWA was passed and this commenced a national strategy for the reduction of pollutants such as raw sewage from entering the waterways. Raw sewage came to be treated by sewage treatment plants and this prevented the sewage from being discharged untreated into waterways. CSOs discharge raw sewage and storm water into waterways when the treatment plants and collection systems become over loaded during a rain storm and the contents overflow. CSOs are not the only source of pathogens in the water. Some of the other sources are

illegal sewage connections, sewage treatment plant bypasses, infrastructure failures, releases of untreated sewage by sewage treatment plants, storm water outfalls, non-point sources (e.g., storm runoff and leaking septic tanks), and domestic and wild animal waste.

The NY Harbor Water Quality Survey shows that the water quality of the Harbor has improved since the 1990's due to construction, expansion, and upgrades of POTWs and reduction of CSOs. An enhanced Industrial Pretreatment Program was created in order to control commercial discharges that required certain industries to treat their wastewater (NYCDEP Internet). Industrial pretreatment programs are in effect in Rockland and Westchester Counties. As a result of these improvements, public beaches in New York City have been opened since 1992 and the amount of wet weather swimming advisories has been reduced (NYCDEP 2001).

The EPA formed the Beaches Environmental Assessment, Closure and Health (BEACH) Program in 1997. The goal of the BEACH Program is to reduce the risk of disease to those that use the recreational waters throughout the U.S. and this would occur through the improvements of recreational water programs, communication, and scientific advances (USEPA 1999). The Beach Action Plan created by the EPA reinforces the goal of the BEACH Program. The BEACH Watch Web Site ([www.epa.gov/ost/beaches](http://www.epa.gov/ost/beaches)) was established by the EPA and this web page includes information on beach monitoring, the National Beach Health Survey, and various information from the BEACH Program.

The Regional Bypass Work Group, formed in 1997, has members from the three states' environmental and health departments, Interstate Environmental Commission, US Environmental Protection Agency, US Food and Drug Agency, New York City Department of Environmental Protection, US Coast Guard, National Park Service and county health officials. The Work Group has been using the Regional Bypass model since 1998 to predict which areas may be affected by a particular bypass. Through good science and practical engineering, the emotional and political response to buzz words like "sewage" and "sludge" can be alleviated and have been since the inception of this tool. Other types of releases can impact beaches and notification protocols have expanded to include many pollutants including, but not limited to diesel and fuel oil, gasoline and other chemicals.

The Floatables Action Plan — a federal, state, interstate and municipal agency effort — was developed to avert the reoccurrence of the extensive beach closings during the 1988 bathing season. The Plan's goals are: (1) to minimize the amount of debris escaping from the NY-NJ Harbor Complex, (2) to set up an effective communications network to coordinate debris removal activities and respond to slicks, (3) to notify beach operators of potential wash-ups, and (4) to minimize beach closures due to floating debris. Harbor-wide, during the first year, the US Army Corps of Engineers captured 543.7 tons of material of which 90% was wood. For 2000, the estimated total was 5,399 tons of floatable debris. All floatables are transported out-of-state for disposal; wood is transported to an out-of-state recycling facility. NJDEP's Clean Shores Program, which utilizes prison labor, collected 2,563 tons of floatables and wood in 2000. These efforts addressed 114.2 miles of shoreline statewide, with the greatest efforts in the New York - New Jersey Harbor Complex. Daily helicopter surveillance fly-overs of the New York - New Jersey Harbor Complex, 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. The vessel was commissioned through funding by a US EPA Marine Combined Sewer Overflow and Construction Grant. During 2000, 320 tons (81% wood) was collected by this vessel. NYCDEP has established four zones in the Boom and Skim Program. Booms and a fleet of four small skimmer vessels captured over 613 cubic yards of floatables. Additionally, area volunteer groups, as well as organizations around the world, conduct beach and underwater debris cleanups during the spring and fall seasons.

## **Materials and Methods**

### New York Beach Monitoring

NY beaches are monitored by the county health departments. The NYS Department of Health (NYSDOH) in their State Sanitary Code state that if there is a potential risk to human health, then bathing beaches should not be open for public use (IEC 2002). The county health departments decide on the frequency of monitoring. All of the coastal counties in NY regularly test for bacteria and monitor the ocean and bay beaches (NRDC 2001). The indicator organisms for pathogens used in NY are total coliform and fecal coliform. The NYS bacterial standards are (1) total coliform: log mean for five or more samples in a 30-day period shall not exceed 2400 and 20 percent of samples in a 30-day period shall not exceed 5000 and (2) fecal coliform: log mean of five or more samples in a 30-day period shall not exceed 200 and a single sample shall not exceed 1000 (IEC 2002). The testing method used is either membrane filtration or multiple tube fermentation (IEC 2002). If a sample exceeds the standard, resampling is required. If the resampling also produces levels above the standard, then the beach is closed (IEC 2002).

### *Nassau County Beach Monitoring*

Nassau County does not have any permitted beaches in the Core Harbor Area (Map 1), but they do have beaches along the Atlantic Coast that are directly outside the Core Harbor Area. There have been no closures at these beaches due to water quality in regards to high bacteria counts in a minimum of 10 years (J. Jacobs, Nassau County Health Department, personal communication, 2002).

### *Westchester County Beach Monitoring*

Westchester County does not have any permitted beaches in the Harbor. There are two beaches that are outside of the Harbor that are sited on the Hudson River, but above the Tappan Zee Bridge. They are Phillips Manor Beach Club and Croton Point Park.

### *Rockland County Beach Monitoring*

Rockland County does not have any public beaches in the Harbor. According to the Interstate Environmental Commission (IEC), there once were beaches in Rockland County on the Hudson River in the 1940s or 1950s, but those beaches have not been open since then. IEC conducted

# New York/New Jersey Harbor Estuary Program Location of Beaches



Map 1

- HEP Core Area
- HEP Beaches

**NJ Beaches**

- 1-Ideal Beach
- 2-Thompson Avenue
- 3-Conner's Street
- 4-Recreation Center
- 5-Miller Street
- 6-South Bay Avenue

**NY Beaches**

- 7-Wolfe's Pond Park
- 8-Great Kills Park
- 9-Midland Beach
- 10-South Beach
- 11-Camp Pouch
- 12-The Sea Gate Association
- 13-Coney Island
- 14-Brighton Beach
- 15-Manhattan Beach
- 16-Kingsborough Community College
- 17-Kiddie Beach



Note: Coordinates of beaches were provided by New Jersey Department of Environmental Protection, Interstate Environmental Commission, and New York City Department of Health. Coordinates were not available for Camp Pouch, The Sea Gate Association, Brighton Beach, and Kingsborough Community College therefore locations for these beaches are inaccurate. The coordinates supplied for Wolfes Pond Park are inaccurate as well.

WQ surveys in 1988 and 1990 to determine the feasibility of opening beaches at these historic sites. The results of the water quality survey in 1988 and 1990 at the Rockland County stations (Nyack Beach, Hook Mountain State Park, Foot of Main Street, and Iona Island Bird Sanctuary) were that in 1988 all four of the stations met the swimming criteria for fecal and total coliform standards, but in 1990 only one station met the swimming criteria for fecal and total coliform while two only met it for total coliform levels (IEC 1991). According to IEC's (1991) rainfall records, there were higher rainfalls recorded in 1990 than in 1988, which could lead to more releases of raw sewage from CSOs as well as more non-point source runoff that could result in higher coliform values for 1990. Rockland County Health Department (RCHD) samples every summer, taking shore grabs at these sites, and coliform data does exist for the period 1989 to present. Orangetown Sewer District and Rockland County District discharge a combined design flow of 29.2 MGD near these sites.

### *New York City Beach Monitoring*

The NYC Department of Health (NYCDOH) monitors the public and private beaches in Richmond, Kings, Queens, and Bronx Counties. The NYC counties that have beaches that fall into the Harbor are Richmond and Kings. These beaches are monitored once a week and are resampled if the standard is exceeded. They confirm that there is a problem and then they close the beach. Beaches are also closed when there is a significant bypass by a sewage treatment plant in the area, which results in the water being sampled (J. Luke, NYCDOH, personal communication, 2002). NYCDOH also issues wet weather advisories for three public beaches, which are South Beach and Midland Beach on Staten Island and Manhattan Beach in Brooklyn. In 2001 the advisory notified the public against swimming for 12-hours after rainfall that is greater than 1½ inches during the previous six hours (NYCDOH 2001). The private beaches in Bronx County along the Eastchester Bay are also under a wet weather advisory, and it states that swimming is advised against at these beaches for 48 hours following rainfall of 0.2 inches in two hours, or 0.4 inches in the previous 24 hours. This advisory in the Bronx is more stringent because rain water does not flush quickly from the swimming areas. It is not an official beach closure defined by the health department if the advisory is exceeded although the beaches do have to close and can get a violation if they do not. NYCDOH randomly checks the beaches when it rains to see if they are closed. NYCDOH does not keep track of how many times the advisory is exceeded during the summer season (L. Huang, NYCDOH, personal communication, 2002). Swimming is also prohibited at all of the waterfronts not because of high bacteria levels, but due to safety and liability concerns, as well as turbidity and treacherous currents and this applies to the East River, Hudson River, Upper New York Bay, the Kill Van Kull, Arthur Kill, and Jamaica Bay, including Plum, Howard and Canarsie Beaches, and Broad Channel. In 1997 NYC Department of Environmental Protection (NYCDEP) created the Enhanced Beach Protection Program (EBPP). The EBPP is a supplement to the regular monitoring that the NYCDOH conducts and it is only conducted between May 26 and September 15 (NYCDEP 2000). The goal of the EBPP is to minimize beach closures by shortening sewage bypass detection time, duration, and volume (NYCDEP 2000).

### *National Park Service: Gateway National Recreation Areas Beach Monitoring*

The Gateway National Recreation Areas conduct monitoring at Great Kills Park and Riis Park, which are a part of the Harbor. Monitoring at these beaches is conducted weekly and they monitor for fecal and total coliform by using the membrane filtration method (IEC 2002). If a sample has a bacteria level of 200/100ml for fecal coliform or 2400/100ml for total coliform, then the water is resampled. Bacterial levels that exceed the standards for three consecutive days would result in a beach closure. There were closures at Great Kills Park in 1998 and 1999 due to an unknown source of fecal and total coliform contamination. In 2000, Great Kills Park did not have any closures, but the seasonal average of fecal coliform was 985 coliforms/ml, which exceeds the fecal criteria, but the total coliform seasonal average was 1689 coliforms/ml, which does not exceed the total coliform criteria. There were no closures because three consecutive high samples did not occur (US Department of the Interior 2000).

### New Jersey Beach Monitoring

New Jersey has had a statewide mandatory beach program, the Cooperative Coastal Monitoring Program, since 1986. The program is jointly conducted by the NJ Department of Health (NJDOH), NJ Department of Environmental Protection (NJDEP), the county health departments of all four Atlantic coastal counties, as well as Middlesex County, and seven local environmental health agencies. The indicator organism for pathogen levels in NJ is fecal coliform and the bacterial standard is a 200/100ml sample. Some of the sampling stations are monitored for both fecal coliform and enterococcus bacteria. Membrane filtration or multiple tube fermentation is the method used to determine bacteria levels. Beaches are sampled once a week. When a sample exceeds the standard, it is resampled and if this exceeds the standard as well, then the beach is closed. NJ closes beaches for high bacteria levels and precautionary reasons. A high bacteria closure indicates that the 200/100ml standard was exceeded two days in a row. These closures usually correspond to rainfall, but the source is not always identifiable (V. Loftin, NJDEP, personal communication, 2002). A precautionary closure does not necessarily indicate a high bacteria count, but it could be the result of an environmental factor. NJ not only monitors the recreational bathing beaches, but they also sample at environmental monitoring stations that are not bathing beaches. These stations are just for background data and information on the water quality. They are not resampled if the standard is exceeded.

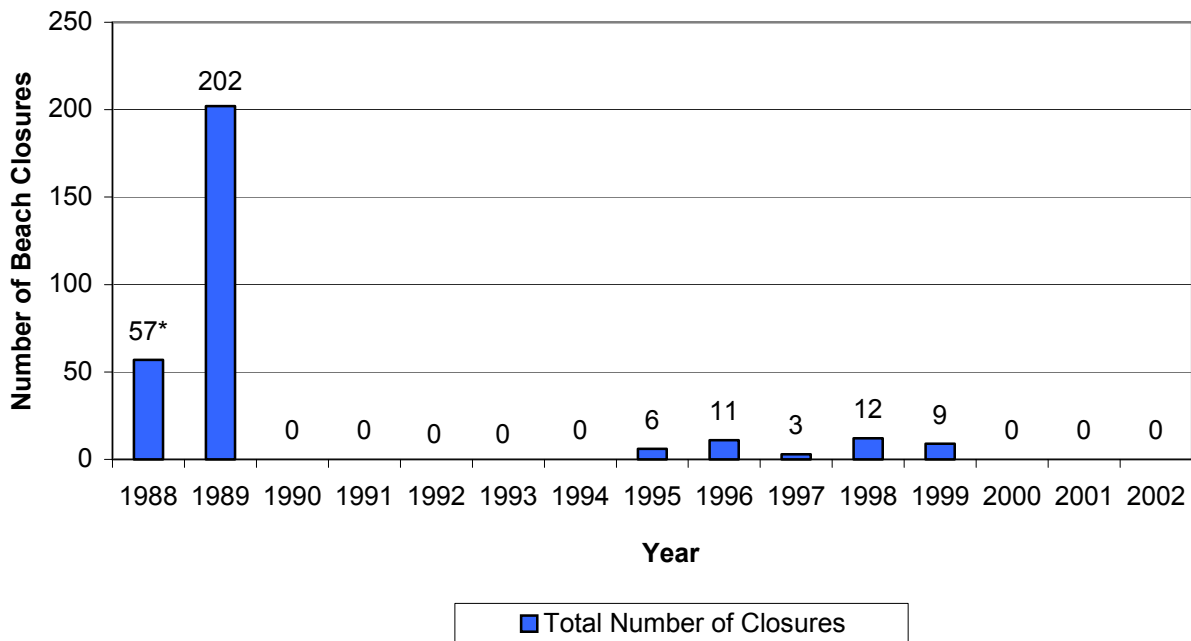
## Results

NY and NJ beach monitoring data cannot be directly compared due to different water quality standards, bacteria standards, and monitoring procedures.

### Beach Monitoring Data from 1988-1993

#### *New York*

There were beach closures (Figure 1) in the Core Harbor Area of NY in 1988 and 1989. There were no beach closures between 1990 and 1993 beach seasons. During the years that the beaches did have closures, they were never closed for more than 33.33 percent (Figure 2) of the time based on a 101-day beach season and the number of beaches available for bathing in the Harbor Area of NY. Reasons for closures were treatment plant bypasses, medical debris, and floatables (Table 1). The closures were in Richmond and Kings Counties. In 1988 there were beach closures at the ocean beaches (Breezy Point, Riis Park, and Rockaway Beach) on the Atlantic that are directly outside the Core Harbor Area although there were no closures at the two beaches (Phillips Manor Beach Club and Croton Point Park) that are directly outside of the Core Harbor Area on the Hudson River in Westchester County.



**Figure 1:** Total Number of Beach Closures-1988 to 2001

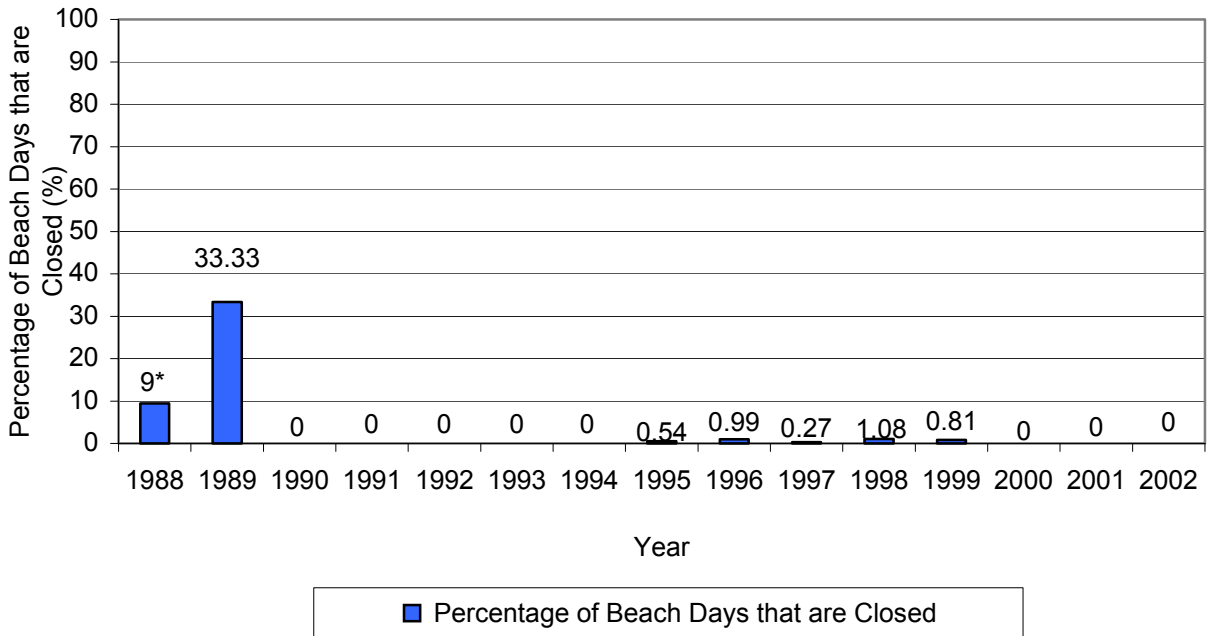
New York Beaches located in the NY/NJ Harbor Estuary

Note:

\*Since the duration of closure is unknown for some of the beaches, then each closure entry that was unknown was counted as one day therefore the total number of closures for 1988 has been approximated.

The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).

All data has been provided by the Interstate Environmental Commission and the Gateway National Recreation Area.



**Figure 2:** Percentage of Beach Days that are Closed-1988 to 2001  
 New York Beaches Located in the NY/NJ Harbor Estuary

Note:

\*Since the duration of closure is unknown for some of the beaches, then each closure entry that was unknown was counted as one day therefore the total number of closures for 1988 has been approximated.

The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).

All data has been provided by the Interstate Environmental Commission and the Gateway National Recreation Area.

**Table 1: New York Beach Closures- Core Harbor Area -1988-1993**

YEAR	DATE	COUNTY	AREA	WATERWAY	DURATION OF CLOSURE (DAYS)	REASON FOR CLOSURE
<b>1988</b>	7/12/1988	Kings	All Beaches (6)	Lower New York Bay/Jamaica Bay	2	Treatment plant bypass
	8/?/88	Kings	Brighton Beach	Lower New York Bay	?	Medical debris
	8/?/88	Kings	Coney Island Manhattan Beach	Lower New York Bay	?	Medical debris
	8/?/88	Kings	South Beach	Lower New York Bay	?	Medical debris
	7/7/1988	Richmond	Midland Beach	Lower New York Bay	?	Medical debris
	7/12/1988	Richmond	All Beaches (5) Great Kills Beach	Lower New York Bay	2	Treatment plant bypass Medical debris/high bacteria densities
	7/12/1988	Richmond	Great Kills Beach	Lower New York Bay	29	
	6/15/1988	Richmond	Great Kills Beach	Lower New York Bay	?	High bacteria densities
1988 Total Number of Closures**	<b>57</b>					
1988 Percentage of Beach Days that are Closed	<b>9.41</b>					
<b>1989</b>	1989	Richmond	Midland Beach	Lower New York Bay	101*	Floatables
	1989	Richmond	South Beach	Lower New York Bay	101*	Floatables
1989 Total Number of Closures	<b>202</b>					
1989 Percentage of Beach Days that are Closed	<b>33.33</b>					
<b>1990</b>		New York City (1)	No beach closures			
		New York City (1)	No beach closures			
<b>1991</b>						

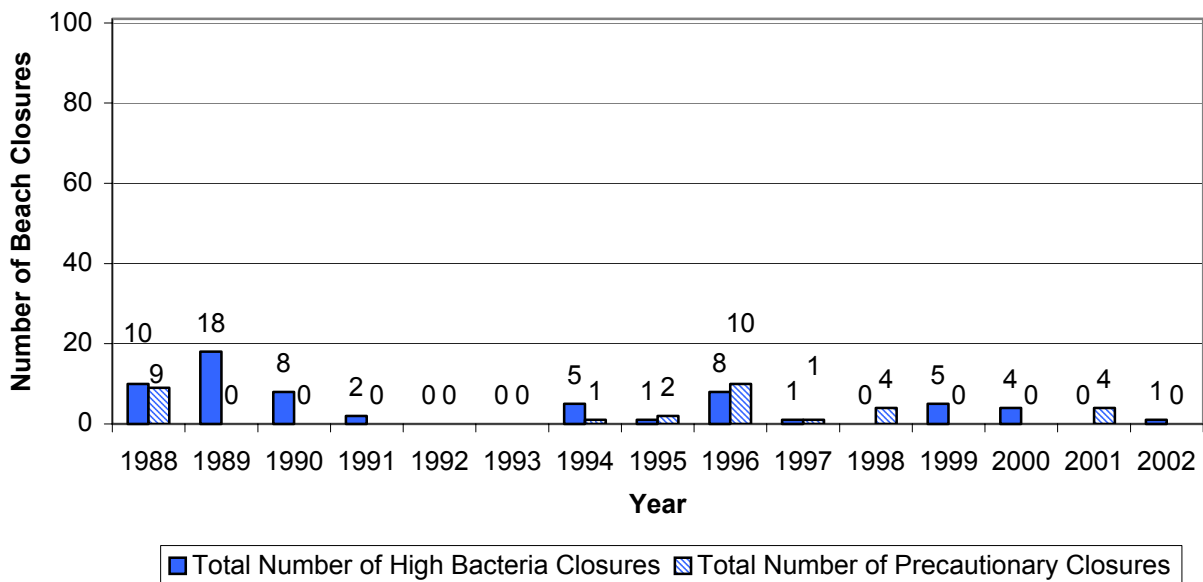
\*Indicates permanently closed due to constant wash up of debris

\*\*Since the duration of closure is unknown for some of the beaches, then each "?" was counted as one day therefore the total number of closures for 1988 has been approximated.

(1)=New York City Health Department, Bureau of Public Health Engineering  
All data has been provided by IEC

*New Jersey*

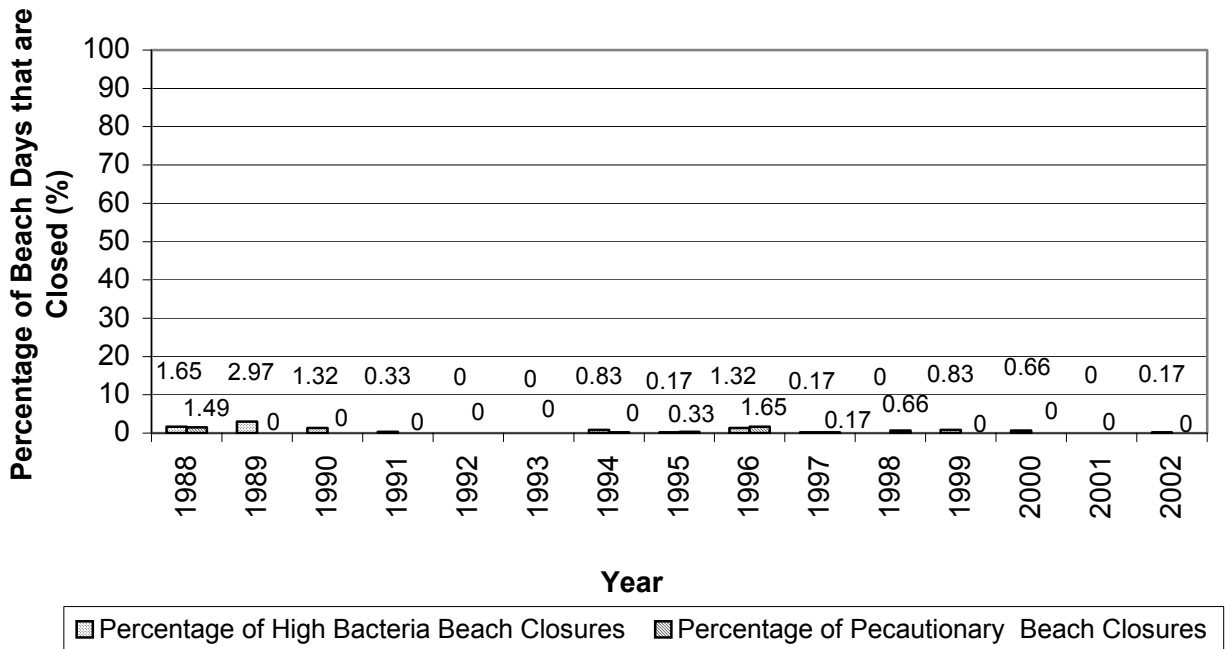
There were beach closures (Figure 3) in the Core Harbor Area of NJ between 1988 and 1991. There were no beach closures due to high bacteria between 1992 and 1993 and there were no precautionary closures between 1989 and 1993 (Table 3 and Table 4). During the years that the beaches did have closures, they were never closed for more than 2.97 percent (Figure 4) of the time due to high bacteria levels and this is based on a 101-day beach season. Beaches were never closed for more than 1.49 percent of the time due to precautionary reasons. The closures were in Monmouth County at the bay beaches. There were beach closures at the ocean beaches (Army Recreational Beach, Fort Hancock, Area E-Visitor Center, and Area C-Surf Beach) on the Atlantic that are directly outside the Core Harbor Area in 1988 and 1989.



**Figure 3:** Total Number of Beach Closures-1988 to 2001  
New Jersey Beaches Located in the NY/NJ Harbor Estuary

Note:

The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days). All data has been provided by the New Jersey Department of Environmental Protection and Interstate Environmental Commission.



**Figure 4:** Percentage of Beach Days that are Closed- 1988 to 2001  
New Jersey Beaches Located in the NY/NJ Harbor Estuary

Note:

The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).

All data has been provided by the New Jersey Department of Environmental Protection and Interstate Environmental Commission.

### Beach Monitoring Data from 1994 to 2001

#### *New York*

The total number of beach closures (Figure 1) in the Core Harbor Area of NY has been minimal between 1994 and 2001. There were no beach closures during the 1994, 2000, and 2001 beach seasons. During the years that the beaches did have closures, they were never closed for more than 1.08 percent (Figure 2) of the time based on a 101-day beach season and the number of beaches available for bathing in the Harbor Area of NY. Reasons for closures were high bacteria levels due to surface runoff, sewage discharge, and rainfall (Table 2). The closures were in Richmond and Kings Counties. There were no beach closures at the ocean beaches (Breezy Point, Riis Park, and Rockaway Beach) on the Atlantic that are directly outside the Core Harbor Area. There were closures at the two beaches (roughly 31 miles and 35 miles north of the Battery, respectively) Phillips Manor Beach Club and Croton Point Park) that are directly outside of the Core Harbor Area on the Hudson River in Westchester County in 1996 and 1998.

## *New Jersey*

The total number of beach closures (Figure 3) in the Core Harbor Area of NJ has been minimal as well between 1994 and 2001. There were no beach closures due to high bacteria in 1998 and 2001 and there were no precautionary closures in 1999 and 2000 (Table 5 and Table 6). During the years that the beaches did have closures, they were never closed for more than 1.32 percent (Figure 4) of the time due to high bacteria levels and this is based on a 101-day beach season. Beaches were never closed for more than 1.65 percent of the time due to precautionary reasons. The closures were in Monmouth County at the bay beaches. There were no beach closures at the ocean beaches (Army Recreational Beach, Fort Hancock, Area E-Visitor Center, and Area C-Surf Beach) on the Atlantic (~ about 12 miles south of the Verrazano Narrows Bridge) that are directly outside the Core Harbor Area.

**Table 2: New York Beach Closures- Core Harbor Area-1994 to 2001**

<b>YEAR</b>	<b>DATE</b>	<b>COUNTY</b>	<b>AREA</b>	<b>WATERWAY</b>	<b>DURATION OF CLOSURE (DAYS)</b>	<b>REASON FOR CLOSURE</b>
<b>1995</b>	July 20	Richmond	Midland Beach	Lower New York Bay	6	High bacteria densities due to surface runoff
1995 Total Number of Closures	<b>6</b>					
1995 Percentage of Beach Days that are Closed	<b>0.54</b>					
<b>1996</b>	July 31-Aug 11	Kings	Kiddie Beach (Brooklyn)	Jamaica Bay	11	Rainfall related elevated bacteria
1996 Total Number of Closures	<b>11</b>					
1996 Percentage of Beach Days that are Closed	<b>0.99</b>					
<b>1997</b>	August 6, 7, and 8	Kings	Kiddie Beach (Brooklyn)	Jamaica Bay	3	Rainfall related elevated bacteria
1997 Total Number of Closures	<b>3</b>					
1997 Percentage of Beach Days that are Closed	<b>0.27</b>					
<b>1998</b>	Aug 15-24, 28, and 29	Richmond	Great Kills Park (Staten Island)	Lower New York Bay	12	Elevated bacteria levels*
1998 Total Number of Closures	<b>12</b>					
1998 Percentage of Beach Days that are Closed	<b>1.08</b>					
<b>1999</b>	July 24, Aug. 27-29 and Sept. 2-6	Richmond	Great Kills Park (Staten Island)	Lower New York Bay	10	Elevated bacteria levels*
1999 Total Number of Closures	<b>9</b>					
1999 Percentage of Beach Days that are Closed	<b>0.81</b>					

**Table 3: New Jersey Beach Closures- Core Harbor Area- Reason for Closure: High Bacteria -1988-1993**

YEAR	DATE	COUNTY	MUNICIPALITY	BEACH	DURATION OF CLOSURE	REASON
1988	7/29/1988	Monmouth	Middletown	Ideal Beach (1)	1	High bacteria densities
	8/3/1988	Monmouth	Middletown	Ideal Beach (1)	5	Fish kill, high bacteria densities
	8/9/1988	Monmouth	Middletown	Ideal Beach (1)	1	High bacteria densities
	7/29/1988	Monmouth	Middletown	Leonardo Beach (1)	1	High bacteria densities
	8/4/1988	Monmouth	Middletown	Leonardo Beach (1)	2	High bacteria densities
	<b>10</b>					
1988 Total Number of Closures	<b>1.65</b>					
1988 Percentage of Beach Days that are Closed						
1989	5/18/1989	Monmouth	Middletown	Ideal Beach (1)	2	High bacteria densities
	6/5/1989	Monmouth	Middletown	Ideal Beach (1)	2	High bacteria densities
	7/18/1989	Monmouth	Middletown	Ideal Beach (1)	2	High bacteria densities
	5/18/1989	Monmouth	Middletown	Leonardo Beach (1)	2	High bacteria densities
	6/5/1989	Monmouth	Middletown	Leonardo Beach (1)	2	High bacteria densities
	6/26/1989	Monmouth	Middletown	Leonardo Beach (1)	2	High bacteria densities
	7/6/1989	Monmouth	Middletown	Leonardo Beach (1)	2	High bacteria densities
	7/18/1989	Monmouth	Middletown	Leonardo Beach (1)	2	High bacteria densities
	7/24/1989	Monmouth	Middletown	Leonardo Beach (1)	2	High bacteria densities
	<b>18</b>					
1989 Total Number of Closures	<b>2.97</b>					
1989 Percentage of Beach Days that are Closed						
1990	8/15/1990	Monmouth	Middletown	Ideal Beach	1	High Bacteria
	8/21/1990	Monmouth	Middletown	Ideal Beach	1	High Bacteria
	8/22/1990	Monmouth	Leonardo	Thompson Beach	1	High Bacteria
	8/22/1990	Monmouth	Middletown	Ideal Beach	1	High Bacteria
	8/22/1990	Monmouth	Highlands	All beaches-4	1	High Bacteria
	<b>8</b>					
1990 Total Number of Closures	<b>1.32</b>					
1990 Percentage of Beach Days that are Closed						

**Table 3 Continued: New Jersey Beach Closures- Core Harbor Area- Reason for Closure: High Bacteria -1988-1993**

<b>1991</b>	8/22/1991	Monmouth	Highlands	Miller Street	1	High Bacteria
	8/22/1991	Monmouth	Highlands	South Bay Avenue	1	High Bacteria
1991 Total Number of Closures	2					
1991 Percentage of Beach Days that are Closed	0.33					
<b>1992</b>	No beach closures					
<b>1993</b>	No beach closures					
*(1)=Township of Middletown, Department of Health Information provided by IEC for 1988, 1989, 1992, and 1993. Data supplied by New Jersey Department of Environmental Protection for 1990 and 1991.						

**Table 4: New Jersey Beach Closures- Core Harbor Area- Reason for Closure: Precautionary-1988-1993**

YEAR	DATE	COUNTY	MUNICIPALITY	BEACH	DURATION OF CLOSURE	REASON
<b>1988</b>	6/18/1988	Monmouth	Middletown	Ideal Beach (1)	1	Sludge balls/glass
	6/21/1988	Monmouth	Middletown	Ideal Beach (1)	1	Brown algae bloom
	7/28/1988	Monmouth	Middletown	Ideal Beach (1)	2	Medical debris
	6/23/1988	Monmouth	Middletown	Leonardo Beach (1)	4	Fish kill
	7/26/1988	Monmouth	Middletown	Leonardo Beach (1)	1	Thunderstorm
1988 Total Number of Closures	9					
1988 Percentage of Beach Days that are Closed	1.49					
<b>1992</b>	No beach closures					
<b>1993</b>	No beach closures					
*(1)=Township of Middletown, Department of Health All data has been provided by IEC.						

**Table 5: New Jersey Beach Closures- Core Harbor Area- Reason for Closure: High Bacteria-1994 to 2001**

YEAR	DATE	COUNTY	MUNICIPALITY	BEACH	RECREATIONAL/ ENVIRONMENTAL	REASON
<b>1994</b>	06/22/94	Monmouth	Highlands	Rec Center	R	High Bacteria
	06/23/94	Monmouth	Highlands	Rec Center	R	High Bacteria
	08/24/94	Monmouth	Highlands	Rec Center	R	High Bacteria
	08/24/94	Monmouth	Highlands	South Bay Ave	R	High Bacteria
	08/24/94	Monmouth	Highlands	Conner's Beach	R	High Bacteria
1994 Total Number of Closures		<b>5</b>				
1994 Percentage of Beach Days that are Closed		<b>0.83</b>				
<b>1995</b>	08/09/95	Monmouth	Highlands	Rec Center	R	High Bacteria
	1995 Total Number of Closures		<b>1</b>			
	1995 Percentage of Beach Days that are Closed		<b>0.17</b>			
<b>1996</b>	08/14/96	Monmouth	Highlands	Rec Center	R	High Bacteria
	08/15/96	Monmouth	Highlands	Rec Center	R	High Bacteria
	08/17/96	Monmouth	Highlands	Rec Center	R	High Bacteria
	06/19/96	Monmouth	Middletown	Ideal Beach	R	High Bacteria
	06/20/96	Monmouth	Middletown	Ideal Beach	R	High Bacteria
	06/21/96	Monmouth	Middletown	Ideal Beach	R	High Bacteria
	06/22/96	Monmouth	Middletown	Ideal Beach	R	High Bacteria
1996 Total Number of Closures		<b>8</b>				
1996 Percentage of Beach Days that are Closed		<b>1.32</b>				
<b>1997</b>	06/04/97	Monmouth	Leonardo	Thompson Ave	R	High Bacteria
	1997 Total Number of Closures		<b>1</b>			
	1997 Percentage of Beach Days that are Closed		<b>0.17</b>			

**Table 5 Continued:** New Jersey Beach Closures- Core Harbor Area- Reason for Closure: High Bacteria-1994 to 2001

<b>1999</b>	07/08/99	Monmouth	Leonardo	Thompson Avenue	R	High Bacteria
	07/09/99	Monmouth	Leonardo	Thompson Avenue	R	High Bacteria
	07/10/99	Monmouth	Leonardo	Thompson Avenue	R	High Bacteria
	07/11/99	Monmouth	Leonardo	Thompson Avenue	R	High Bacteria
	07/12/99	Monmouth	Leonardo	Thompson Avenue	R	High Bacteria
1999 Total Number of Closures	<b>5</b>					
1999 Percentage of Beach Days that are Closed	<b>0.83</b>					
<b>2000</b>	07/06/00	Monmouth	Highlands	Recreational Beach		High Bacteria
	07/07/00	Monmouth	Highlands	Recreational Beach		High Bacteria
	07/13/00	Monmouth	Highlands	Miller St. Beach	R	High Bacteria
	07/14/00	Monmouth	Highlands	Miller St. Beach	R	High Bacteria
2000 Total Number of Closures	<b>4</b>					
2000 Percentage of Beach Days that are Closed	<b>0.66</b>					

R=Recreational bathing beaches  
All data has been supplied by New Jersey Department of Environmental Protection

**Table 6:** New Jersey Beach Closures- Core Harbor Area- Reason for Closure: Precautionary-1994 to 2001

YEAR	DATE	COUNTY	MUNICIPALITY	BEACH	RECREATIONAL/ ENVIRONMENTAL	REASON
1994	08/15/94	Monmouth	Highlands	Miller Beach	R	Precautionary
	1					
1994	0.17					
	0.17					
1995	07/25/95	Monmouth	Highlands	Rec Center	R	Precautionary
	07/26/95	Monmouth	Highlands	Rec Center	R	Precautionary
1995	2					
	0.33					
1996	08/16/96	Monmouth	Highlands	Rec Center	R	Precautionary
	08/18/96	Monmouth	Highlands	Rec Center	R	Precautionary
1996	08/19/96	Monmouth	Highlands	Rec Center	R	Precautionary
	08/20/96	Monmouth	Highlands	Rec Center	R	Precautionary
1996	08/21/96	Monmouth	Highlands	Rec Center	R	Precautionary
	08/22/96	Monmouth	Highlands	Rec Center	R	Precautionary
1996	08/23/96	Monmouth	Highlands	Rec Center	R	Precautionary
	08/24/96	Monmouth	Highlands	Rec Center	R	Precautionary
1996	08/25/96	Monmouth	Highlands	Rec Center	R	Precautionary
	08/26/96	Monmouth	Highlands	Rec Center	R	Precautionary
1996	10					
	1.65					
1997	08/07/97	Monmouth	Middletown	Ideal Beach	R	Precautionary - extensive algae bloom
	1					
1997	0.17					
	0.17					

**Table 6 Continued:** New Jersey Beach Closures- Core Harbor Area- Reason for Closure: Precautionary-1994 to 2001

<b>1998</b>	07/22/98	Monmouth	Leonardo	Thompson Ave	R	Precautionary *
	07/23/98	Monmouth	Leonardo	Thompson Ave	R	Precautionary *
	07/22/98	Monmouth	Middletown	Ideal Beach	R	Precautionary *
	07/23/98	Monmouth	Middletown	Ideal Beach	R	Precautionary *
1998 Total Number of Closures	<b>4</b>					
1998 Percentage of Beach Days that are Closed	<b>0.66</b>					
<b>2001</b>	08/28/01	Monmouth	Highlands	Rec Center	R	Precautionary **
	08/28/01	Monmouth	Highlands	Miller Beach	R	Precautionary **
	08/28/01	Monmouth	Highlands	South Bay Ave	R	Precautionary **
	08/28/01	Monmouth	Highlands	Conner's Beach	R	Precautionary **
2001 Total Number of Closures	<b>4</b>					
2001 Percentage of Beach Days that are Closed	<b>0.66</b>					
*Due to 7.9 MG secondary effluent to Raritan Bay from Monmouth County Bay Outfall Association (MCBOA)						
**Closure due to sewage spill to the Shrewsbury River						
R=Recreational bathing beaches						
All data has been supplied by New Jersey Department of Environmental Protection						

## Beaches Outside the Core Harbor Area

This section discusses the beaches outside of the Core Harbor Area. The beaches included here are the ones that fall directly outside the area along the ocean in NY and NJ; the beaches above the Tappan Zee in Westchester County along the Hudson River; and the beaches in Bronx and Queens County that are along the Eastchester Bay and Little Neck Bay.

### **Ocean Beaches**

The beaches outside the Core Harbor Area may be affected by the Harbor Estuary water quality. The beaches that are of concern are the ones that fall directly outside the area along the ocean in NY and NJ.

#### *New York*

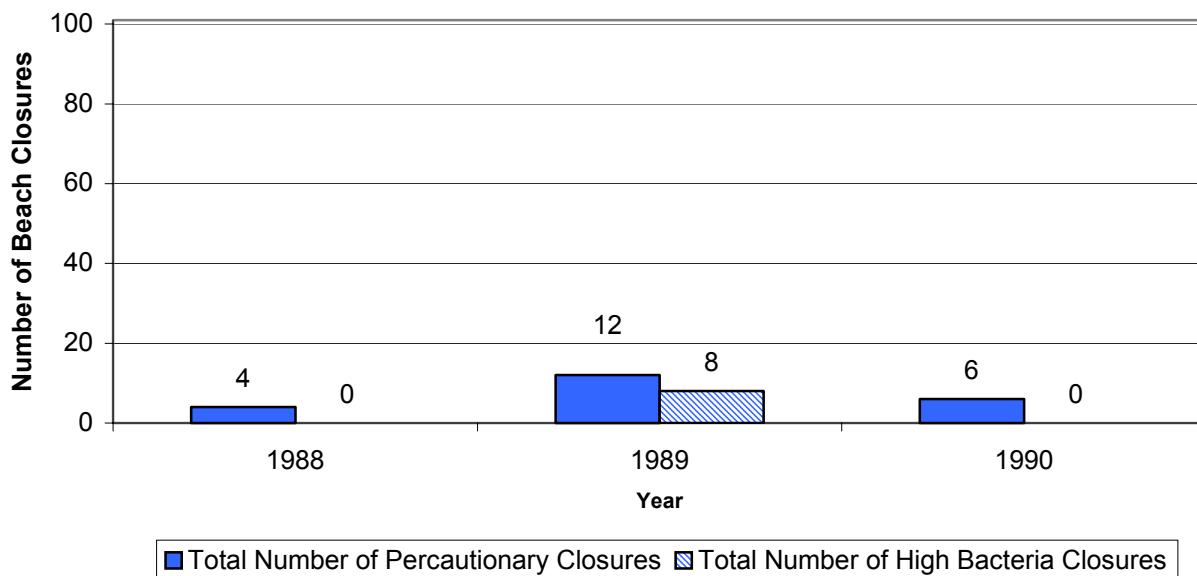
In NY, the ocean beaches include those along the Rockaway Peninsula (Breezy Point, Jacob Riis Park, and Rockaway Beach). The total number of beach closures at the ocean beaches along the Rockaway Peninsula has been minimal since 1988. In fact the only closures that occurred at these beaches were in 1988 when 11 closures occurred due to medical debris and treatment plant bypasses (Table 7).

**Table 7:** New York Beach Closures- Outside of Core Harbor Area-Ocean Beaches-1988-2001

YEAR	DATE	COUNTY	AREA	WATERWAY	DURATION OF CLOSURE (DAYS)	REASON FOR CLOSURE
1988	7/12/1988	Queens County	All Beaches-3 beaches on the Atlantic Ocean	Atlantic Ocean	2	Treatment plant bypass
	7/17/1988	Queens County	Jacob Riis Park	Atlantic Ocean	4	Medical debris
	7/26/1988	Queens County	Rockaway	Atlantic Ocean	?	Medical debris
1988 Total Number of Closures*	11					
1988 Percentage of Beach Days that are Closed	3.63					
<p>All data has been provided by the Interstate Environmental Commission.            *Since the duration of closure is unknown for some of the beaches, then each "?" was counted as one day therefore the total number of closures for 1988 has been approximated.            The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).</p>						

*New Jersey*

In NJ, the beaches along the coast of Sandy Hook and down to Sea Bright are of concern for bacteria closures (D. Rosenblatt, NJDEP, Pathogens Work Group Meeting, June 4, 2002). For precautionary closures due to floatables, the beaches that are of concern are those along the coast of Sandy Hook (~ about 12 miles south of the Verrazano Narrows Bridge) down to Island Beach State Park. The total number of beach closures at the ocean beaches along the coast of NJ has also been minimal since 1988 (Table 8). The precautionary closures due to floatables have occurred between 1988 and 1990 for the beaches between Sandy Hook and Island Beach State Park. The floatables included medical debris, floatables, and tarballs. The tarballs washed up on the beaches of Island Beach State Park in Ocean County and they were from an oil spill that occurred in the Kill van Kull in July 1990 (NJDEP 1990). There were eight high bacteria closures (Figure 5) in 1989 at four beaches on Sandy Hook and these beaches were closed for 1.58 percent of the summer season (Figure 6).

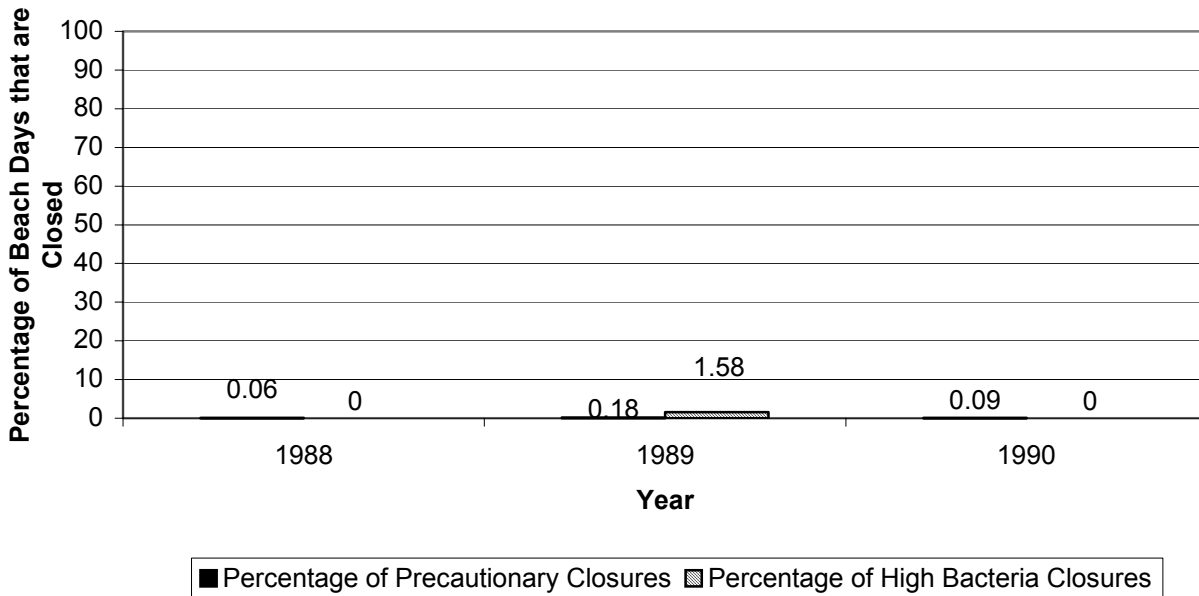


**Figure 5:** Total Number of Beach Closures-1988 to 2001  
New Jersey Beaches Located Outside of the NY/NJ Harbor Estuary  
Ocean Beaches from Sandy Hook to Sea Bright, New Jersey

Note:

The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).

All data has been provided by the New Jersey Department of Environmental Protection.



**Figure 6:** Percentage of Beach Days that are Closed-1988 to 2001  
 New Jersey Beaches Located Outside of the NY/NJ Harbor Estuary  
 Ocean Beaches from Sandy Hook to Island Beach State Park, New Jersey

Note:

The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).

All data has been provided by the New Jersey Department of Environmental Protection.

**Table 8: New Jersey Beach Closures- Outside of Core Harbor Area-Ocean Beaches-1988-2001**

YEAR	DATE	COUNTY	AREA	WATERWAY	DURATION OF CLOSURE (DAYS)	REASON FOR CLOSURE
<b>Precautionary Closures</b>						
<b>1988</b>	7/25/1988	Monmouth County	Gateway National Recreation Area*- 4 beaches on the Atlantic Ocean	Atlantic Ocean	?	Medical debris
1988 Total Number of Closures**	<b>4</b>					
1988 Percentage of Beach Days that are Closed	<b>0.06</b>					
<b>1989</b>						
1989 Total Number of Closures	8/17/1989	Monmouth County	Gateway National Recreation Area*- 4 beaches on the Atlantic Ocean	Atlantic Ocean	3	Medical debris
1989 Percentage of Beach Days that are Closed	<b>12</b>					
	<b>0.18</b>					
<b>1990</b>						
1990 Total Number of Closures	6/14/1990	Ocean County	Island Beach-all ocean beaches (4)	Atlantic Ocean	1	Discretionary for Tarballs***
1990 Percentage of Beach Days that are Closed	6/26/1990	Monmouth County	Allenhurst	Atlantic Ocean	2	Floatables (Timbers)
	<b>6</b>					
	<b>0.09</b>					
<b>High Bacteria Closures</b>						
<b>1989</b>	8/5/1989	Monmouth County	Gateway National Recreation Area (1)-4 beaches on the Atlantic Ocean	Atlantic Ocean	2	High bacteria densities
1989 Total Number of Closures*High	<b>8</b>					
1989 Percentage of Beach Days that are Closed High	<b>1.58</b>					

All data has been provided by the New Jersey Department of Environmental Protection.

\*USEPA: Assessment of the Floatables Action Plan, Summer 1989.

\*\*Since the duration of closure is unknown for some of the beaches, then each "?" was counted as one day therefore the total number of closures for 1988 has been approximated.

\*\*\*Tarballs are from an oil spill that occurred in July 1990 in the Kill van Kull.

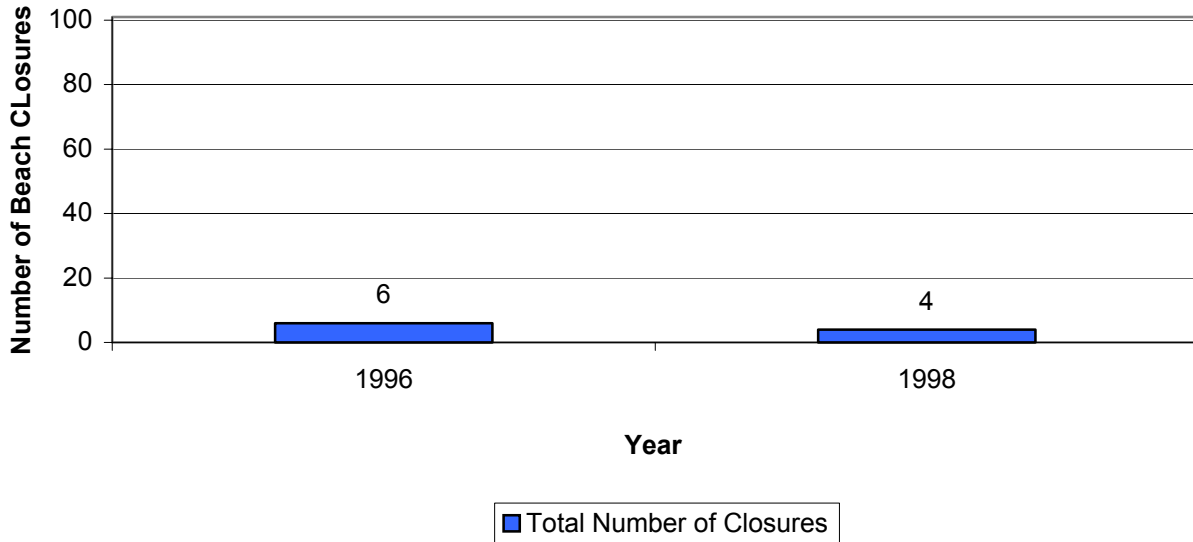
The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).

## North of the Tappan Zee Bridge

There were closures at the two beaches directly outside of the Core Harbor Area on the Hudson River in Westchester County in 1996 and 1998 (Table 9). These beaches, Phillips Manor Beach Club and Croton Point Park, are roughly 31 miles and 35 miles north of the Battery, respectively. In 1996, there were six closures due to a sewage discharge from the Hudson Westchester County Department of Environmental Facilities (WCDEF), and the facility on the Hudson River is the Yonkers Joint Wastewater Treatment Facility. The four closures in 1998 were due to unchlorinated sewage discharges. (Refer to Figures 7 and 8)

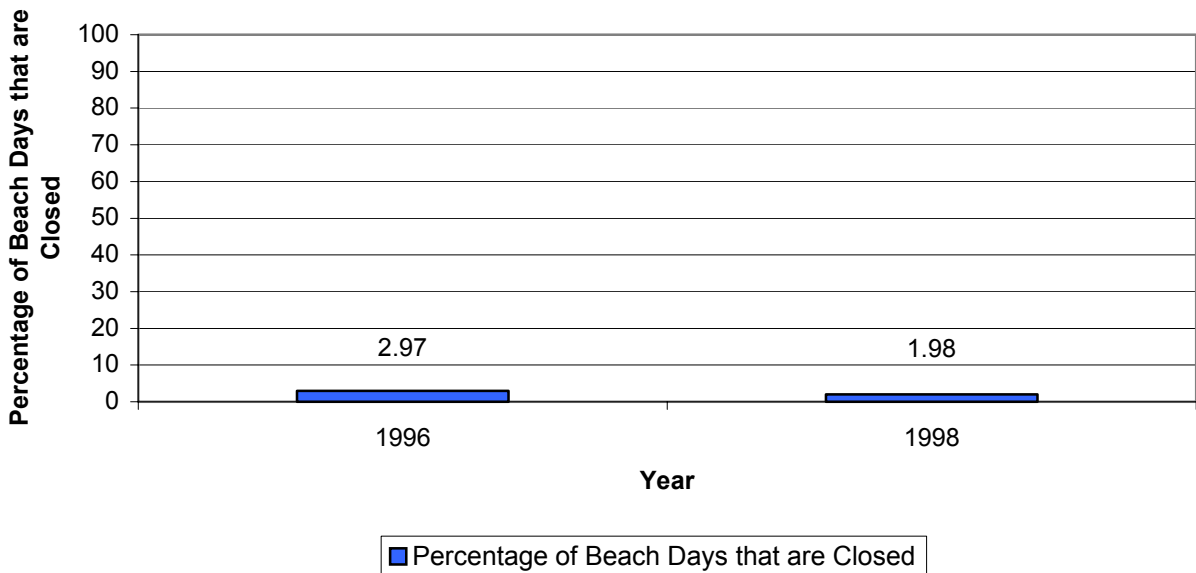
**Table 9:** New York Beach Closures- Outside of Core Harbor Area-North of Tappan Zee Bridge-1988 to 2001

YEAR	DATE	COUNTY	AREA	WATERWAY	DURATION OF CLOSURE (DAYS)	REASON FOR CLOSURE
<b>1996</b>	June 21-26, 1996	Westchester County	Phillips Manor Beach	Hudson River	6	Sewage discharge from Hudson WCDEF
1996 Total Number of Closures	<b>6</b>					
1996 Percentage of Beach Days that are Closed	<b>2.97</b>					
<b>1998</b>	July 14-15, 1998	Westchester County	Phillips Manor Beach	Hudson River	2	Unchlorinated sewage discharge
	July 14-15, 1998	Westchester County	Croton Point Park	Hudson River	2	Unchlorinated sewage discharge
1998 Total Number of Closures	<b>4</b>					
1998 Percentage of Beach Days that are Closed	<b>1.98</b>					
All data was supplied by the Interstate Environmental Commission. The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).						



**Figure 7: Total Number of Beach Closures-1988 to 2001**  
 New York Beaches Located Outside of the NY/NJ Harbor Estuary-North of Tappan Zee Bridge

Note:  
 The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).  
 All data has been provided by the Interstate Environmental Commission.

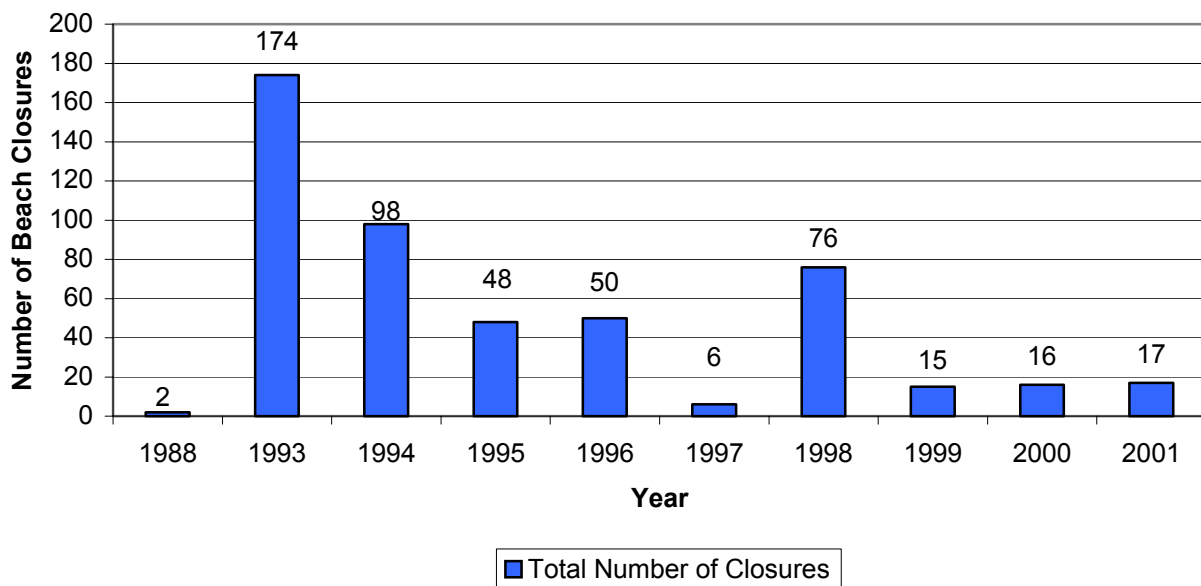


**Figure 8: Percentage of Beach Days that are Closed-1988 to 2001**  
 New York Beaches Located Outside of the NY/NJ Harbor Estuary-North of Tappan Zee Bridge

Note:  
 The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).  
 All data has been provided by the Interstate Environmental Commission.

## Western Long Island Sound

The beaches along Eastchester Bay and Little Neck Bay in Bronx and Queens County are directly outside the Harbor Core Area and these beaches are part of the Long Island Sound Study's area in the western end of Long Island Sound. There were closures in 1988, 1993 to 2001 (Table 10). During the years that there were reported closures, the summer season of 1993 had the most closures. There were 174 days (Figure 9) that the beach was closed due to high bacteria, which was 14.36 percent (Figure 10) of the 1993 summer season. Closures at these beaches throughout the years have been the result of high bacteria due to surface runoff; rainfall related elevated bacteria levels; and untreated discharges of sewage.

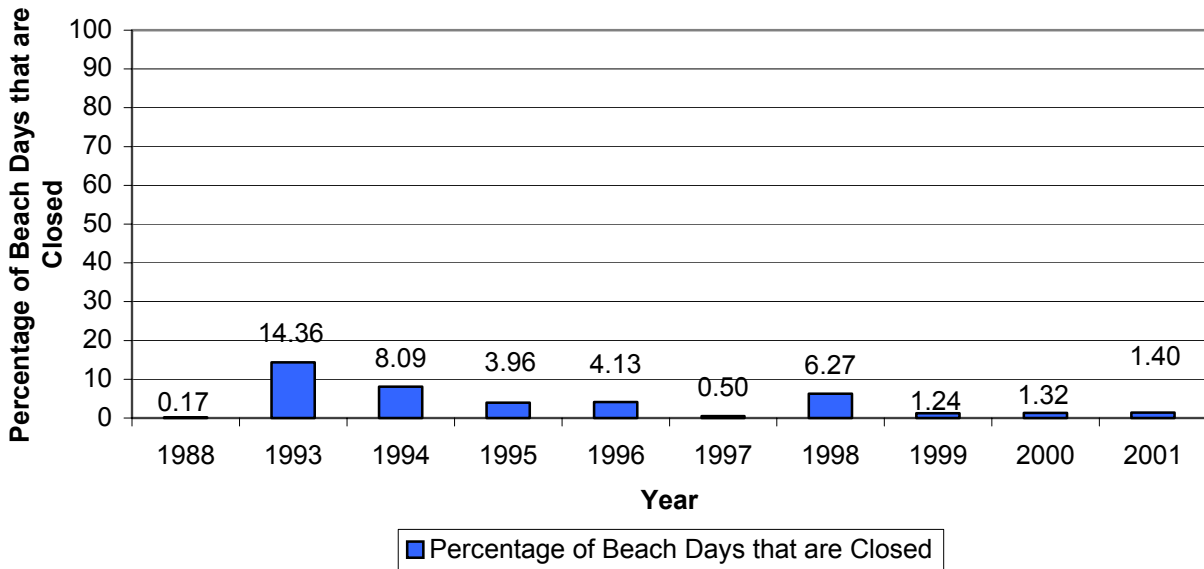


**Figure 9:** Total Number of Beach Closures-1988 to 2001  
New York Beaches Located Outside of the NY/NJ Harbor Estuary  
Western Long Island Sound

Note:

The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).

All data has been provided by the Interstate Environmental Commission.



**Figure 10:** Percentage of Beach Days that are Closed-1988 to 2001  
 New York Beaches Located Outside of the NY/NJ Harbor Estuary  
 Western Long Island Sound

Note:

The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).  
 All data has been provided by the Interstate Environmental Commission.

**Table 10:** New York City Beach Closures- Outside of Core Harbor Area-Western Long Island Sound-1988 to 2001

YEAR	DATE	COUNTY	AREA	WATERWAY	DURATION OF CLOSURE (DAYS)	REASON FOR CLOSURE
<b>1988</b>	July 12, 1988	Queens County	All Beaches-1on Western L.I.S. (Douglaston Manor)	Little Neck Bay	2	Treatment plant bypass
1988 Total Number of Closures	<b>2</b>					
1988 Percentage of Beach Days that are Closed	<b>0.17</b>					
<b>1993</b>	April 18, 1993	Queens County	Douglaston Manor	Little Neck Bay	132	High bacteria densities*
	July 16, 1993	Bronx County	Westchester Country Club	Eastchester Bay	7	High bacteria densities
	July 16, 1993	Bronx County	Golden Beach Club	Eastchester Bay	14	High bacteria densities
	July 16, 1993	Bronx County	White Cross Fishing Club	Eastchester Bay	7	High bacteria densities
	July 16, 1993	Bronx County	American Turners	Eastchester Bay	7	High bacteria densities
	July 16, 1993	Bronx County	Manheim Beach Club	Eastchester Bay	7	High bacteria densities
1993 Total Number of Closures	<b>174</b>					
1993 Percentage of Beach Days that are Closed	<b>14.36</b>					
<b>1994</b>	August 6, 1994	Bronx County	American Turner Club	Eastchester Bay	14	High bacteria densities due to surface runoff
	August 6, 1994	Bronx County	D.A. Beach Club	Eastchester Bay	14	High bacteria densities due to surface runoff
	August 6, 1994	Bronx County	Golden Beach Club	Eastchester Bay	14	High bacteria densities due to surface runoff

**Table 10 Continued: New York City Beach Closures- Outside of Core Harbor Area-Western Long Island Sound-1988 to 2001**

	August 6, 1994	Bronx County	Manheim Beach Club	Eastchester Bay	14	High bacteria densities due to surface runoff
	August 6, 1994	Bronx County	Trinity Danish Beach Club	Eastchester Bay	14	High bacteria densities due to surface runoff
	August 6, 1994	Bronx County	Westchester Country Club	Eastchester Bay	14	High bacteria densities due to surface runoff
	August 6, 1994	Bronx County	White Cross Fishing Club	Eastchester Bay	14	High bacteria densities due to surface runoff
1994 Total Number of Closures	<b>98</b>					
1994 Percentage of Beach Days that are Closed	<b>8.09</b>					
<b>1995</b>						
	July 24, 1995	Bronx County	D.A. Beach Club	Eastchester Bay	8	High bacteria densities due to surface runoff
	July 24, 1995	Bronx County	Golden Beach Club	Eastchester Bay	8	High bacteria densities due to surface runoff
	July 24, 1995	Bronx County	Manheim Beach Club	Eastchester bay	8	High bacteria densities due to surface runoff
	July 24, 1995	Bronx County	Trinity Danish Beach Club	Eastchester Bay	16	High bacteria densities due to surface runoff
	July 24, 1995	Bronx County	Westchester Country Club	Eastchester Bay	16	High bacteria densities due to surface runoff
	July 24, 1995	Bronx County	White Cross Fishing Club	Eastchester Bay	16	High bacteria densities due to surface runoff
1995 Total Number of Closures	<b>48</b>					
1995 Percentage of Beach Days that are Closed	<b>3.96</b>					
<b>1996</b>						
	June 20-30, 1996	Bronx County	Danish American Beach Club	Eastchester Bay	10	Rainfall related elevated bacteria levels
	June 20-30, 1996	Bronx County	Manhem Beach	Eastchester Bay	10	Rainfall related elevated bacteria levels

**Table 10 Continued: New York City Beach Closures- Outside of Core Harbor Area-Western Long Island Sound-1988 to 2001**

	June 20-30, 1996	Bronx County	Trinity Danish Beach Club	Eastchester Bay	10	Rainfall related elevated bacteria levels
	June 20-30, 1996	Bronx County	Golden Beach Club	Eastchester Bay	10	Rainfall related elevated bacteria levels
	June 20-30, 1996	Bronx County	White Cross Fishing Club	Eastchester Bay	10	Rainfall related elevated bacteria levels
1996 Total Number of Closures	<b>50</b>					
Percentage of Beach Days that are Closed	<b>4.13</b>					
<b>1997</b>	June 16, 1997	Bronx County	Danish American Beach Club	Eastchester Bay	1	Precautionary due to a 50,000 gal. Untreated discharge from a broken City Island force main.
	June 16, 1997	Bronx County	Manhem Beach	Eastchester Bay	1	Precautionary due to a 50,000 gal. Untreated discharge from a broken City Island force main.
	June 16, 1997	Bronx County	Schuyler Hill Beach Club	Eastchester Bay	1	Precautionary due to a 50,000 gal. Untreated discharge from a broken City Island force main.
	June 16, 28, 29, 1997	Bronx County	Orchard Beach	Eastchester Bay	3	Precautionary due to untreated discharges
1997 Total Number of Closures	<b>6</b>					
Percentage of Beach Days that are Closed	<b>0.50</b>					
<b>1998</b>	July 14-16, 1998	Bronx County	American Turner	Eastchester Bay	3	A
	July 31-Aug 3, 1998	Bronx County	American Turner	Eastchester Bay	4	B
	July 14-16, 1998	Bronx County	Danish American Beach Club	Eastchester Bay	3	A
	July 31-Aug 3, 1998	Bronx County	Danish American Beach Club	Eastchester Bay	4	B

**Table 10 Continued: New York City Beach Closures- Outside of Core Harbor Area-Western Long Island Sound-1988 to 2001**

	July 14-16, 1998	Bronx County	Manhem Beach Club	Eastchester Bay	3	A
	July 31-Aug 3, 1998	Bronx County	Manhem Beach Club	Eastchester Bay	4	B
	July 14-16, 1998	Bronx County	Trinity Danish Beach Club	Eastchester Bay	3	A
	July 31-Aug 3, 1998	Bronx County	Trinity Danish Beach Club	Eastchester Bay	4	B
	July 14-16, 1998	Bronx County	White Cross Fishing Club	Eastchester Bay	3	A
	July 31-Aug 3, 1998	Bronx County	White Cross Fishing Club	Eastchester Bay	4	B
	July 31-Aug 3, 1998	Bronx County	Golden Beach Club	Eastchester Bay	4	B
	July 31-Aug 3, 1998	Bronx County	Locust Point Yacht Club	Eastchester Bay	4	B
	July 31-Aug 3, 1998	Bronx County	Morris Yacht and Beach Club	Eastchester Bay	4	B
	July 31-Aug 1, 1998	Bronx County	Orchard Beach	Eastchester Bay	2	B
	July 31-Aug 3, 1998	Bronx County	Schuyler Hill Beach Club	Eastchester Bay	4	B
	July 31-Aug 3, 1998	Queens County	Douglaston Manor Association	Little Neck Bay	4	B
	Aug 20, 1998 & then not reopened	Queens County	Douglaston Manor Association	Little Neck Bay	19	C
1998 Total Number of Closures	<b>76</b>					
Percentage of Beach Days that are Closed	<b>6.27</b>					

**Table 10 Continued: New York City Beach Closures- Outside of Core Harbor Area-Western Long Island Sound-1988 to 2001**

<b>1999</b>	Sept. 2 to the end of the season (end of Sept.)**	Bronx County	Danish American Beach Club	Eastchester Bay	4	On Aug. 30 and Sept. 1, 1999, sampling detected high presumptive total coliform counts. The Most Probable Number per 100 ml ranged from 3,000 to 30,000 (at Manhem) to 5,000 to 90,000 (at Danish), corresponding to average values exceeding 5,000 MPN. There was no known source of contamination.
	Sept. 2 to the end of the season (end of Sept.)**	Bronx County	Manhem Beach Club	Eastchester Bay	4	On Aug. 30 and Sept. 1, 1999, sampling detected high presumptive total coliform counts. The Most Probable Number per 100 ml ranged from 3,000 to 30,000 (at Manhem) to 5,000 to 90,000 (at Danish), corresponding to average values exceeding 5,000 MPN. There was no known source of contamination.
	July 14 -16, 1999	Queens County	Douglaston Homeowners Association	Little Neck Bay	3	High total coliform counts due to the release of 117,000 gallons of sewage (of unknown treatment status) into the East River and Little Neck Bay between 11:00 pm on July 9 and 12:30 am on July 10.
	July 31-Aug. 3, 1999	Queens County	Douglaston Homeowners Association	Little Neck Bay	4	High total coliform counts due to the release of 117,000 gallons of sewage (of unknown treatment status) into the East River and Little Neck Bay between 11:00 pm on July 9 and 12:30 am on July 10.
1999 Total Number of Closures	<b>15</b>					
1999 Percentage of Beach Days that are Closed	<b>1.24</b>					

**Table 10 Continued: New York City Beach Closures- Outside of Core Harbor Area-Western Long Island Sound-1988 to 2001**

<b>2000</b>	Aug 23-31, 2000	Bronx County	Danish American Beach Club	Eastchester Bay	8	High levels of total coliform bacteria.
	Aug 23-31, 2000	Bronx County	Manhem Beach Club	Eastchester Bay	8	High levels of total coliform bacteria.
2000 Total Number of Closures	<b>16</b>					
2000 Percentage of Beach Days that are Closed	<b>1.32</b>					
<b>2001</b>	Sept. 2 to the end of the season (end of Sept.)**	Bronx County	American Turner	Eastchester Bay	2	High levels of total coliform bacteria.
	Sept. 2 to the end of the season (end of Sept.)**	Bronx County	Golden Beach Club	Eastchester Bay	2	High levels of total coliform bacteria.
	Sept. 2 to the end of the season (end of Sept.)**	Bronx County	Manhem Beach Club	Eastchester Bay	2	High levels of total coliform bacteria.
	Sept. 2 to the end of the season (end of Sept.)**	Bronx County	Trinity Danish	Eastchester Bay	2	High levels of total coliform bacteria.
	Sept. 2 to the end of the season (end of Sept.)**	Bronx County	White Cross Fishing Club	Eastchester Bay	2	High levels of total coliform bacteria.
	July 14-16, 2001	Queens County	Douglaston Homeowners Association	Little Neck Bay	3	High levels of total coliform bacteria.

**Table 10 Continued: New York City Beach Closures- Outside of Core Harbor Area-Western Long Island Sound-1988 to 2001**

	July 31-Aug. 3, 2001	Queens County	Douglaston Homeowners Association	Little Neck Bay	4
2001 Total Number of Closures	<b>17</b>				
2001 Percentage of Beach Days that are Closed	<b>1.40</b>				
<p>All data was supplied by the Interstate Environmental Commission.                      The number of beach days is based on the official beach season of Memorial Day to Labor Day (101-days).</p> <p>*NYCDOH, Environmental Health Services. Closure was based on previous season sampling results, which showed consistent high coliform bacteria densities during dry and wet weather conditions.                      **Closures were to the end of September (28 days), but the total of beach days that were closed were calculated only to Labor Day for the purpose of this paper.</p> <p>A=On July 14, 1998, sampling detected presumptive total coliform counts (3,000 to &gt;160,000 per ml). This may have resulted from work by NYCDEP on a subaqueous force main from City Island under Eastchester Bay.                      B=Westchester County Health Department notified NYCDOH that a sewage spill at the Edison Ave Extension was emptying into the Hutchinson River. A total of 2.8 MG of chlorinated but untreated sewage was released.                      C=High fecal coliform counts were reflective of septic tank failures near the beach area. The beach remained closed for the remainder of the season.</p>					

## **Conclusions**

The beach closures are an indicator for pathogen levels in the NY/NJ Harbor Estuary. The low numbers of beach closures in NY and NJ in recent years indicate that the water quality is sufficient for bathing at the designated beaches. According to the 2000 New York Water Quality Regional Summary (2001), the water quality of the harbor is the cleanest it has been since the early 1900s. The reduction in raw sewage and floatables in the Harbor and environmental awareness through the passing of the various acts and regulations have contributed to the improvement of the water quality. Consent Order's and court cases on behalf of the ISC have been instrumental also. The potential for new swimming areas are dependent upon more water quality testing. According to the NJDEP, there are currently 17 new potential swimming areas from the Palisades Interstate Park to the Atlantic Highlands in NJ. In NY, the Hudson River Park Trust is proposing the establishment of two non-swimming beaches on the Hudson River. These two beaches would be located in Manhattan one at Gansevoort and the other at 34<sup>th</sup> Street immediately south of Pier 76 (HydroQual 2002; HRPT et al. 2001).

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