

# New York/New Jersey HARBOR ESTUARY PROGRAM

INCLUDING THE NEW YORK BIGHT RESTORATION PROGRAM



The New York/New Jersey Harbor, along with its con-*tributing* rivers and *tributaries*, is a productive and biologically diverse *estuary*, although it has undergone *significant environmental stress*. The New York/New Jersey Harbor Estuary Program is a partnership of *federal, state, and local* interests working together to *protect* and restore the natural resources of *this* estuary. This cooperative effort is aimed at *promoting environmentally sound management* of the Harbor Estuary.

## FACTSHEET NO. 3

## Combined Sewer Overflows in the New York/New Jersey Harbor Estuary

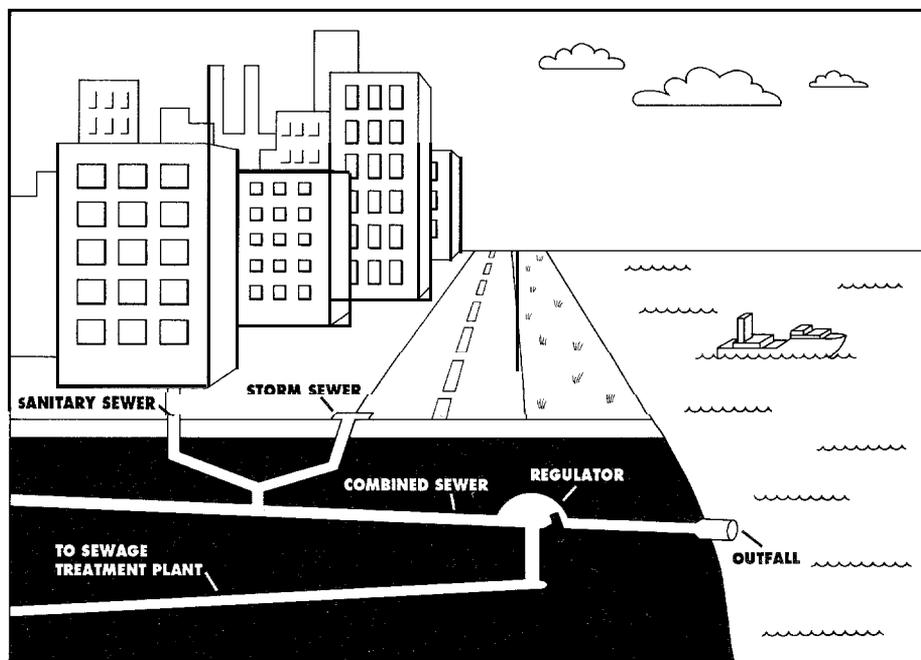
### WHAT IS A COMBINED SEWER OVERFLOW?

**M**ANY OF THE CITIES along the New York/New Jersey Harbor Estuary have combined sewers. These are sewage systems which use a single pipe to transport both stormwater runoff from rainstorms and **sewage\*** from households, businesses and industries to **sewage treatment plants** (STPs).

During dry weather, combined sewers send all **wastewater** to the STPs. During wet weather, rainfall **runoff** enters the sewer system. However, STPs can treat only about twice the normal dry weather flow

in combined sewers. Above that level, regulators shunt all additional flow to a local waterway (creek, river, bay, etc.). This prevents the STPs from flooding and backing up a mix of rainwater and melting snow, urban runoff and raw sewage into streets and homes. During these combined sewer overflows (CSOs), any of the sewage mix which is not treated by an STP or specialized CSO treatment facility is discharged untreated into the waterway, along with debris washed from the streets.

There are over 700 **CSO outfalls** in the New York/New Jersey Harbor Estuary: approximately 450 in New York City, 26 in Yonkers and 250 in New Jersey.



Cross-section of a combined sewer system in an urban area

\*Boldface type indicates words appearing in glossary on pages 2 and 3.

## **GLOSSARY:**

**dy weather overflow:** *if a combined sewer regulator malfunctions, or if illegal connections have been made to the combined sewage system, a combined sewer may discharge even when it is not raining or is still affected by the runoff from a previous storm.*

**effluent:** *liquid waste discharged into the environment from a source such as an industry or sewage treatment plant; it can be treated or untreated.*

**floatables:** *solid waste materials and natural debris that float on or just below the water's surface. Floatables include such things as litter and household trash, wood from decaying piers and natural debris such as seaweed. They are aesthetically unpleasing, a threat to boating and sometimes harmful to marine life.*

**nutrients:** *essential chemicals (nitrogen, phosphorus, potassium) needed by plants for growth. Excessive amounts of nutrients in a water body can contribute to massive growth, accumulation and eventual decay of aquatic plants, especially algae. This uses up oxygen, which can degrade water quality.*

**organic matter:** *substances containing carbon compounds that are derived from living organisms—for example, rotting leaves and feces.*

**outfall:** *the pipe or structure where an effluent is discharged into waterways.*

**pathogenic:** *capable of causing disease.*

**runoff:** *water from rain, snow melt, or irrigation that flows over the ground surface and into streams, rivers, etc. Pollutants*

## **WHY ARE CSOs A PROBLEM?**

When CSOs occur, they result in additional amounts of pollutants entering the Harbor Estuary. These include:

- Bacteria
- Floatables
- Organic matter and nutrients
- Toxic substances

**BACTERIA:** Coliform bacteria, found in the intestinal tracts of humans and animals, enter the estuary when untreated human sewage and the animal waste in streets are discharged during rainstorms and snow melt. While not disease-causing, coliform bacteria indicate the presence of other, **pathogenic** bacteria and viruses. The elevated bacteria levels associated with CSOs can sometimes lead to local beach closures. Also, filter-feeding shellfish that live in contaminated waters, such as clams and mussels, can accumulate bacteria in their systems, and are then unsafe for human consumption. In fact, in the Harbor Estuary, all harvesting of clams and other bivalves is restricted because of bacterial contamination.

**FLOATABLES:** CSOs are a major source of small **floatables** in the Harbor Estuary. Floatable debris from CSOs comes from litter washed into the sewers during rainstorms and items flushed down toilets, such as syringes and tampon applicators.

Floatables from CSOs have caused particularly objectionable conditions at some area beaches in recent years. The tides can carry floatables out of the New York Harbor and down the New Jersey shore, depositing the debris on beaches. During the summer, persistent winds from the south and west can transport floatables from the Harbor to the southern shore of Long Island. In the shore environment, floatables (especially plastic) can harm or kill birds and marine animals. Animals can become entangled in or ingest plastic debris.

**ORGANIC MATTER AND NUTRIENTS:** By spewing raw sewage filled with human waste into waterways, CSOs contribute **organic matter** to the marine environment. This organic matter, when it decays, uses up oxygen in the water. Dissolved oxygen (DO) is oxygen that is present (dissolved) in water and which fish and other aquatic animals use to breathe. If the amount of DO in water is too low, bottom-dwelling aquatic animals such as mussels or crabs may die. Human sewage, along with stormwater runoff laden with fertilizers and animal waste, contributes additional amounts of **nutri-**

ents to Harbor waters. This process can promote excessive algae growth, leading to a further DO decline when algae die and decompose.

**TOXIC SUBSTANCES:** **Toxic metals** and other hazardous substances come from runoff, from industrial **effluents** discharged into the sewer system and from households. Households contribute when hazardous products such as paints, oils, solvents and cleaners are poured down the drain or into storm sewers. Pesticides applied to lawns and gardens can also wash into storm sewers after heavy rains. Treatment plants are not specifically designed to remove toxics, but some of the toxic materials adhere to the solid portion of sewage and settle out in the treatment plants as sludge. Therefore, when CSOs occur, those toxics which would have been removed in the treatment process are flushed into the Harbor.

## **WHY WERE COMBINED SEWERS BUILT?**

Although combined sewers are now seen as a problem, they were originally built to alleviate public health concerns. Combined sewers are found throughout New York City and in most older cities located along the New York Harbor and its tributaries (see map). New York City built more than 6,000 miles of sewers starting in the late 1600's and continuing through the early 20th century. In Newark, New Jersey, new underground sewer pipes were installed in the late 1880's.

Combined sewers were built to carry both stormwater from streets and human wastes from homes and industries. They protected people from exposure to disease-causing organisms and ended problems of flooded basements and gutters, while carrying away stormwater, garbage, human waste, animal waste, and other refuse that collected on city streets. Combined sewers made sense at the time—there was no treatment of wastewater, and therefore no reason for sewers separating wastewater from storm water.

By the turn of the century, combined sewers comprised 84% of existing sewers in the New York and northern New Jersey region. Water quality conditions in New York Harbor and its branches were declining because of the volume of untreated sewage. To address this problem, municipalities began constructing plants to treat sewage in the 1920's, and sewer systems were then con-

nected to the STPs.

The sewage treatment plants were usually designed to handle double the normal sewage flow to account for high flows during a rainstorm. However, the combined flow from a storm has often been more than the treatment plants could handle; so despite improved sewage treatment, CSOs have continued as a major source of pollution.

### WHAT ARE THE CURRENT CSO PLANNING PROGRAMS?

A variety of federal, state and local initiatives have been undertaken to abate CSOs. The U.S. Environmental Protection Agency's *National CSO Strategy* of 1989 requires states to:

- eliminate dry weather overflows;
- meet federal and state water quality standards; and
- minimize impacts on water quality, plant and animal life, and human health.

New York State's CSO control strategy requires municipalities to control CSOs through the discharge permitting system. Municipalities are required to develop a planning schedule for abatement. State funds are provided in the form of

low-interest loans, but municipalities must also finance the projects.

In 1972, New York City opened the first facility in the Harbor Estuary at Spring Creek, Jamaica Bay, to abate the effects of CSOs. This facility stores excess flow from CSOs until after the rainfall ends and then pumps it back to the STP for treatment. By the late 1970's and 80's, following the mandate of the Clean Water Act, New York City began to focus on upgrading existing sewage treatment plants and constructing new ones to eliminate the flow of raw sewage to the Harbor. Now that dry weather sewage treatment is in place for virtually all of the Harbor Estuary, attention has shifted to curtailing the effects of wet weather discharges (CSOs). New York City's current \$1.3 billion *Combined Sewer Overflow Abatement Program* is aimed at evaluating the effects of CSOs on water quality, developing engineering solutions and constructing abatement facilities for New York City tributary areas impaired by CSOs.

By the 1980s, amendments to the federal Clean Water Act provided \$60 million for CSO correction efforts, and New Jersey obtained approval for approx-

*from air, land, streets and gutters can collect and be carried into waterways. Urban runoff is runoff from city streets, usually carrying litter, residues such as dripped motor oil, and other wastes.*

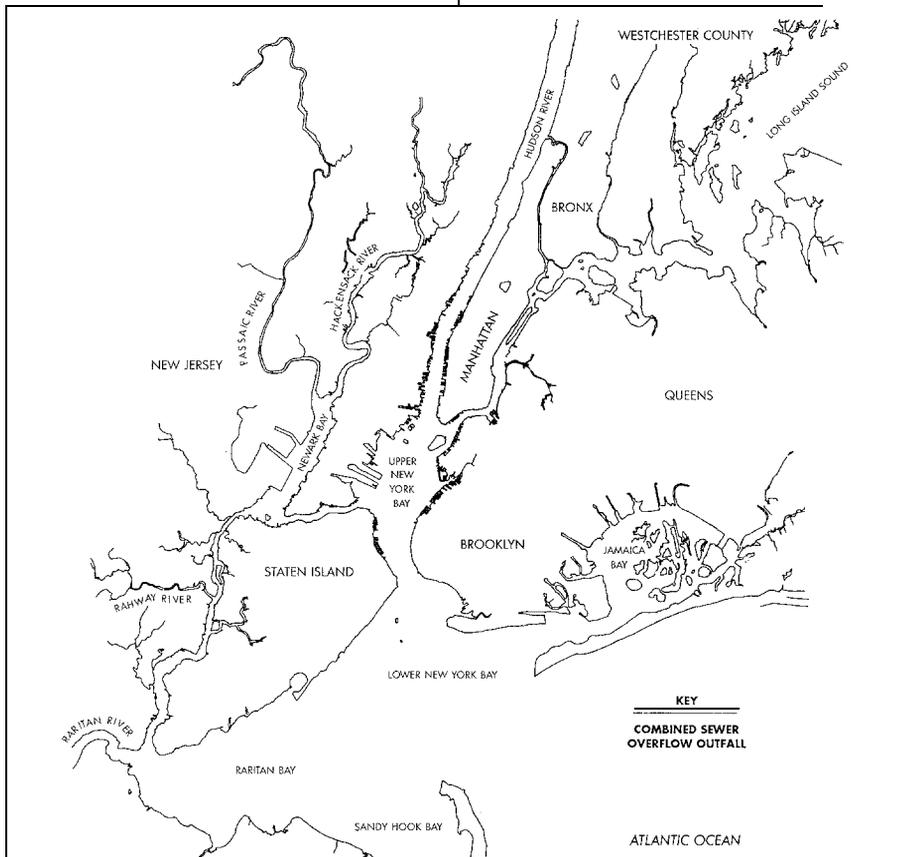
*sewage. wastewater carrying dissolved or suspended solids from homes, farms, businesses, and industries.*

*sewage treatment plant: a facility where wastewater from homes and commercial establishments is treated before being released into local waterways. Primary, secondary and tertiary treatment steps take out many, although not all, toxic, pathogenic and unaesthetic substances, enabling most facilities to meet state and federal water quality standards.*

*sewer: a channel or pipe that carries wastewater and/or stormwater runoff from the source to a treatment plant or receiving stream. Sanitary sewers carry household and commercial waste. Storm sewers carry runoff from rain or snow to a place where it can soak back into the groundwater or flow into surface waters. Combined sewers are used for both wastewater and stormwater.*

*toxic metals: metallic elements such as mercury, chromium, cadmium, arsenic and lead that can be toxic to living things and can accumulate in the food chain.*

*wastewater: effluent that comes from homes, farms, businesses, and industries and carries wastes such as fecal matter, chemicals, detergents, food wastes, etc.*



Locations of combined sewer outfalls in the New York/New Jersey Harbor Estuary. Map courtesy of HydroQual, Inc.



## NEW YORK/NEW JERSEY HARBOR ESTUARY PROGRAM

### CONTACTS FOR FURTHER INFORMATION

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imately \$15 million in CSO construction projects. In 1988, New Jersey passed the *Sewage Infrastructure Improvement Act*, establishing a grants fund for planning and design efforts to eliminate dry weather overflows and control floatables materials in CSO discharges. New Jersey's 1989 *Stormwater Management and CSO Abatement Bond Act* authorized the creation of a \$50 million fund to provide financial assistance to local governments for construction of CSO and stormwater abatement facilities.

### WHAT METHODS CAN BE USED TO CONTROL CSOs?

When choosing which method to use in CSO abatement, states and municipalities have to consider engineering feasibility, environmental benefits, land availability and cost. There are various abatement techniques which can be used to diminish the harmful effects of CSOs. These include separating sewers, in-stream storage (flow balancing), off-line storage (holding tanks), screening for floatables or a combination of technologies. For the largest CSOs, New York City is developing plans for storage near the discharge point, followed by treatment at nearby STPs. For storm flows which exceed the capacity of the storage facilities, the facilities themselves will remove solids and floatables, and disinfect when necessary. For the smaller CSOs, floatables removal will be necessary at most locations, with disinfection added for discharges affecting bathing or shell-fishing waters. The abatement of smaller CSOs presents the greatest design and regulatory challenge, as the construction and operation of scores of smaller facilities results in higher unit costs and diminished benefits.

In coming years, CSO abatement will require the continued search for new and better technologies, as New York City and other older municipalities seek answers to a problem that began as a solution to threats to human health.

### HOW CAN CITIZENS HELP?

The actions of people in their everyday lives, at home or at work, affect the Harbor Estuary. These steps can help reduce some of the harmful impacts of CSOs:

Conserve water by using low-flow shower heads and toilet "dams". Don't run faucets when brushing teeth or shaving.

Don't throw litter outside which can be washed into local waterways during rainstorms.

Pick up after your pet. "Pooper-scooper" laws prevent pathogens in dog feces from washing into waterways.

Don't flush syringes, plastic tampon applicators, condoms, or other trash down the toilet.

Don't pour household chemicals down the drain or in storm sewers. Dispose of them at a local household hazardous waste disposal day or by other means available in your community. Use alternatives to toxic household products.

Repair automotive leaks. Fluids leaking on streets and driveways are washed into sewers with the rainfall.

Never pour used motor oil or other auto fluids into a waterway, down a storm drain or dump into the trash. Recycle the used oil by bringing it to a car repair facility that accepts used oil.

In addition to the measures above, public support for cost-effective measures to control CSOs is necessary for their implementation. New York City has a Citizens Advisory Committee and holds public meetings specifically on CSOs. Information on the meetings can be obtained from the New York City Department of Environmental Protection, Public Participation, 59-17 Junction Blvd., Elmhurst, New York, 11373-5107, 718-595-3496. For information on CSO planning in Yonkers, contact Westchester County Department of Environmental Facilities, **Rm 400**, M.O.B., 148 Martine Ave., White Plains, NY 10601, 914-285-2480, and for New Jersey, contact New Jersey Department of Environmental Protection and Energy, Municipal Discharge Permits, 401 E. State St., 4th Floor, Trenton, NJ 08625, 609-633-3869.

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