



Impacted areas are generally characterized by lower species diversity, altered community composition and reduced habitat diversity. The Gowanus Canal has undergone extensive urbanization that has resulted in habitat loss and reduced water quality. As part of the urbanization, a combined sewer system was constructed with several outfalls discharging into the Gowanus. This urbanization has affected the aquatic community in the Canal, especially for organisms that have limited mobility (i.e. benthic invertebrates). Regardless, the Canal is used by multiple trophic levels of organisms that are common in the Harbor.

## Hazardous, Toxic, and Radioactive Waste (HTRW)

The Gowanus Canal was constructed in 1881 to accommodate industrial users and commercial shippers to the Brooklyn waterfront. Major industrial facilities were engaged in refining, manufactured gas distribution and/or bulk-storage of petroleum, coal storage, and chemical manufacturing. Untreated industrial and sanitary wastes were discharged directly into the Gowanus Canal for over a century. Twenty-six major industrial facilities (both operational and abandoned) were identified within the Project Area. Discharges of petroleum and other environmental contaminants have been documented at most of the facilities. As a result, the canal is now characterized by poor water quality, contaminated sediments, deteriorating bulkheads, a poor benthic community structure, extensive filling, hardened shorelines, and unpleasant odors. Despite positive improvements in water quality over the last several decades, there continue to be episodic discharges of untreated sewage associated with periods of heavy precipitation beyond the capacity of the combined storm and sanitary sewer outfalls (CSOs). CSOs convey human pathogens, a variety of industrial wastes, and floatable materials into the waterways. Non-point source pollution from lawns, roads, broken septic tanks, construction sites, and other disturbed areas provide additional sources of contaminants to the Canal, including sediment, fertilizers, pesticides, bacteria, viruses, salt, oils, grease, and heavy metals.

The results of the sampling illustrate the magnitude and extent of contamination, as based on relative "hazard indices", that will facilitate the development of viable, cost effective alternatives for restoration.

## Cultural Resources Documentation

A baseline cultural resources investigation was conducted to ensure that significant historic resources such as structures, viewsheds, landscapes, and archaeological sites were identified and not impacted by proposed project actions. Because of its role in the development of Brooklyn from rural backwater to major city, the Gowanus Canal was recommended as eligible for inclusion in the National Register as an historic district and is subject to review under Section 106 of the National Historic

## Did you know?

This project also is part of a Memorandum of Understanding (MOU) initiated in July 2002 between the USACE-NYD and the EPA. On July 30, 2003, the EPA and USACE announced the acceptance of Gowanus Canal and Bay into the Urban Rivers Restoration Initiative (URRI). Please visit [www.epa.gov/oswer/landrevitalization/urbanrivers/](http://www.epa.gov/oswer/landrevitalization/urbanrivers/) for more information.



*Gowanus Canal circa 1952  
Brooklyn, New York*

Preservation Act (NHPA) of 1966, as amended. In addition to the waterway and the associated pumping station and flushing tunnel, two bridges (Third Avenue Bridge and Carroll Street Bridge) and seven buildings adjacent to the canal contribute to its significance and are considered part of the district, as are the sites of the filled 1st Street and 5th Street basins. Restoration projects, specifically bank softening and habitat creation, have the potential to adversely affect the eligible resource. Mitigation of any adverse project impacts will be coordinated through the New York State Historic Preservation Office.

## Hydraulic and Hydrologic Setting

This work forms part of the physical support structure for ecosystem restoration: water flow, circulation, and hydrological flow patterns. Tasks include assessing the relationships between rainfall, channel flow and water elevations which are critical in evaluating and assessing water quality and sedimentation trends based on flow rates.

The watershed is approximately six (6) square miles, and is served by sewer systems that have replaced the natural overland pathway of runoff. Runoff is conveyed much more quickly and directly to the waterbody without attenuation by surrounding wetlands that have been virtually eliminated. In addition freshwater streams draining the watershed once fed the Gowanus Creek with a constant supply of freshwater that emptied into the tidal marsh and mud flats of Gowanus Bay. The urbanization of the watershed and construction of combined and separated sewers has eliminated these freshwater streams such that the watershed of Gowanus Bay and Canal has no freshwater sources other than CSOs and stormwater discharges. Mathematical models of the Gowanus waterbody and its receiving waters have been used to simulate water quality conditions for the Gowanus Study. Watershed models have simulated hydrologic conditions, sewer system hydraulics, and wet-weather discharges to receiving waters.

## Did you know?

*The New York City Department of Environmental Protection is developing a Long Term Control Plan to address Systemic Combined Sewer Outfall abatement.*



*Sediment Sampling for the Gowanus Study  
Brooklyn, New York*

## Background

In 1987 the National Estuary Program (NEP) was formed through amendments to the Clean Water Act. Under the NEP, the U.S. Congress mandated the preparation of a Comprehensive Conservation and Management Plan (CCMP) that describes the values and resources of nationally significant estuaries, documents the problems each face, and proposes corrective measures to address those problems in each watershed. The Hudson-Raritan Estuary (HRE), which includes the Gowanus Canal and Bay, is 1 of 28 estuaries recognized as nationally significant. The Gowanus Study provides a vehicle to implement many of the HRE (Harbor Estuary Program) CCMP recommendations.

## Existing Conditions Assessments

In any study, gathering data and preparing existing conditions baseline information is very important, as it directly relates to identifying the water resources problems and formulating possible improvements. Under the Gowanus Study, significant work has been completed to characterize existing conditions in the following areas:

- Geotechnical Characterization - Sediments
- Biological and Water Quality (including Benthic Community Surveys)
- Hazardous, Toxic, and Radioactive Waste (HTRW)
- Cultural Resources Documentation
- Hydraulic and Hydrologic Setting
- Land Use / Bulkhead Inventory
- Bathymetry

Completion of existing conditions now allows for transition to establishing baseline conditions, refining our problem identification, future forecasting in the absence of any improvements, tailoring our restoration goals based on additional information, developing final alternatives to meet goals, and evaluating costs and benefits of potential restoration projects for implementation, along with any monitoring, operation and maintenance, and adaptive management needs.

Results of these initial investigations are summarized in various reports that may be accessed at:

<http://www.nan.usace.army.mil/harbor/gowanus/reports.htm>.

## Geotechnical Characterization - Sediments

The Corps of Engineers, New York District, collected sediment samples from 30 locations beginning at the head of the Gowanus Canal extending into Gowanus Bay. The objective of that investigation was to characterize the physical and engineering properties of the sediments for subsequent analysis of dredging capability and to determine bulkhead stability analysis.

## Baseline Biological and Water Quality Data

A field sampling effort was conducted to obtain baseline biological and water quality data. A variety of sampling techniques were used to determine the presence/absence of species, species composition, and individual size and biomass. Also, to fully characterize various habitats, water quality parameters (temperature, specific conductivity, salinity, dissolved oxygen, pH, redox potential and turbidity) were continually monitored and recorded at various sampling locations by the USACE. Further, floatables were easily recognizable throughout the waterbody with noticeable odors and poor water clarity.

As part of the Gowanus Study, a biological survey was conducted in Gowanus Bay and Canal to inventory the resident and migratory fish and invertebrate communities. Estuaries are typically productive ecological systems that have extensive vegetated shorelines, tidal wetlands and tidal creeks. Physical modifications associated with coastal development and urbanization often result in the loss of marginal wetland and shallow water habitats within estuaries. An informed understanding of existing habitat parameters and physical/chemical support structure will help stakeholders determine the efficacy of potential restoration improvement actions that are sustainable.

### ***Who is involved in the Gowanus Canal and Bay Study?***

*Close coordination with stakeholders is essential for the Gowanus Canal and Bay Study to move forward. The New York City Department of Environmental Protection (NYCDEP) is the non-Federal sponsor sharing the cost of plan development with the Corps of Engineers. In addition, the New York State Department of Environmental Conservation (NYSDEC) and the U.S. Environmental Protection Agency (EPA) are key partners in this effort as water quality improvements and remediation of contaminants require coordination for effective implementation.*

*Additional stakeholders include the Gowanus Canal Community Development Corporation, NYS Department of State, Gowanus Urban Divers, Gowanus Dredgers Canoe Club, Metropolitan Waterfront Alliance, NY/NJ Harbor Estuary Program, NYC Parks & Recreation, U.S. Fish & Wildlife Service, and Hudson River Foundation.*

## Land Use / Bulkhead Inventory

Three (3) principal types of canal bulkheads, in varying conditions have been identified. The principal types of canal bulkheads include: timber cribwork, in many places with upper sections deteriorated, replaced with concrete, and/or covered with rip-rap; concrete bulkheads or relieving platforms, including all five bridge abutments; and sheet piling of timber or steel. Although canal history indicates timber sheet piling was common from the earliest period of construction in the 1850s into the early 20th century, it appears that timber cribwork was the preferred and principal type of Gowanus Canal bulkhead beginning in the mid 1860s, and probably replaced most of the early sheetpile construction. All or virtually all of the present timber sheetpile walls appear to be of 20th-century vintage. In addition, cribwork comprises over 70% of remaining bulkheads, even where modified or not visible at low water. Canal banks may be "softened" in selected areas which would require the removal of bulkheads and limited quantities of fill.

Past and present land use within the Gowanus Study area include paper mills, lumberyards, warehouses, coal storage facilities, grain storehouses, a water softening plant, a power plant, and an oil company.

## Bathymetry

Gowanus Canal is approximately 8,500 feet long, 100 feet wide, with depths ranging from 2 to 12 feet at mean low water (MLW). South of Hamilton Avenue, the Canal transitions into the Federal channel, leading to Gowanus Bay. In this region, the waterbody is approximately 2,900 feet long, 100 to 2,200 feet wide, with depths between 10 and 45 feet MLW. The authorized channel depths are 18 feet and 30 feet MLW for the Gowanus Canal and Bay, respectively. The results of the underwater elevation data provide the foundation to proceed with the analysis of restoration alternatives, taking into account the contaminated sediments and current navigation use of the canal.

## The Path Forward

Currently, USACE is working in collaboration with the Non-Federal sponsor and partners to develop and refine problem identification, final alternative screening and plan development.

Based on the water resources problems, the USACE will evaluate the merits considering the significance of potential improvements versus costs. Upon receipt of future funding, the USACE will prepare another publication summarizing the full alternative formulation results upon completion of a Feasibility Report that will include:

- A navigation assessment of waterborne commerce.
- Formulation of dredging technologies, taking into account the stability of existing bulkheads.
- Finalization of alternatives.
- Development of costs and benefits based on a modified Habitat Evaluation Procedure (HEP).
- Evaluation and comparison of the restoration alternatives.
- Completion of an environmental impact assessment.
- Recommendations to address the water resource problems.

## Plan Improvement Alternatives

*Providing no restorative action for the Gowanus Canal and Bay will allow for continual degradation of the existing habitat, potential threats to human health and loss of ecosystem services. Plan improvement alternatives may include:*

- Complete dredging and capping of the Gowanus Canal Sediments
- Limited dredging and capping of Gowanus Canal segments of "hot spot" sediments
- Dredging and capping to the federal authorized channel depth
- Capping only, with limited dredging
- In-Situ treatment of contaminated sediments
- A combination of the above alternatives

It is likely that work to improve the Gowanus Bay and Canal would involve remediation and restoration measures. As such, a special authority, under Section 312 of the Water Resources Development Act of 1990, as amended, may provide a potential vehicle for implementation. In general, Section 312 ("Environmental Dredging") authorizes the Secretary of the Army to remove contaminated sediments from the navigable water of the United States. Specifically, Section 312(b) provides for removal of contaminated sediments for the purpose of environmental enhancement and water quality improvement if such removal is requested by a Non-Federal sponsor, in accord with a joint plan with the EPA, and the sponsor agrees to pay for 35% of project costs.

## The Partnership for a Better Gowanus

The Gowanus Canal and Bay is an exceptional resource that belongs to the people who live within the boundaries of its watershed. A firm commitment by stakeholders and organizations to collectively support restoration objectives can help move this study forward. The Corps of Engineers is committed to working with its partners and stakeholders to develop a plan of improvement designed to meet the study objectives consistent with the Harbor Estuary Program Comprehensive Conservation and Management Plan and the Hudson Raritan Estuary Study.

## NEPA

This newsletter serves to formally give notice to local, county, state, and Federal agencies as well as identify issues and concerns that may be associated with the Study. In addition, this newsletter provides a description of potential opportunities for ecosystem restoration and serves as a precursor to the preparation of an Environmental Impact Statement as required by the National Environmental Protection Act (NEPA) in accordance with USEPA guidelines (40 Code of Federal Regulations [CFR] 1500-1508) and USACE guidelines (ER 200-2-2).

For more information about the Gowanus Canal Study please contact:

**MARK LULKA**

[Mark.Lulka@usace.army.mil](mailto:Mark.Lulka@usace.army.mil)  
U.S. Army Corps of Engineers

**CHRIS VILLARI:**

[CVillari@dep.nyc.gov](mailto:CVillari@dep.nyc.gov)  
NYC Department of Environmental Protection

**ERIC STERN:**

[stern.eric@epa.gov](mailto:stern.eric@epa.gov)  
U.S. Environmental Protection Agency