

# A LOOK INSIDE NEW YORK HARBOR

## NEW YORK HARBOR IS A LARGE, ICONIC, COMPLEX BODY OF WATER

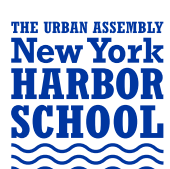
The harbor is an important part of New York City and its millions of residents. Throughout history, New York Harbor has been massively changed and impacted by human activities. These changes have altered the shorelines, water flow, plants, and animals of the harbor. Historically, New York Harbor had marshy shorelines, oyster reefs, sand bars, and rocky reefs which were hazards to ships. The present day harbor created hardened shorelines (seawalls and riprap rocks), dredged channels for shipping, and a few, scattered remaining oysters that are unsafe to eat. However, improvements in water quality, largely by upgrading sewage treatment combined with the natural flushing by tides are helping to restore the harbor. These illustrations of New York Harbor help explain what is happening below the water surface—a look inside.

The New York Harbor region includes the five boroughs of New York City (Manhattan, Bronx, Queens, Brooklyn, Staten Island), Westchester County, New York, Nassau County on Long Island, New York and extensive regions of Northeast New Jersey. The complex waterways include the Hudson River and several New Jersey Rivers (Hackensack, Passaic, Rahway and Raritan Rivers) which all empty into New York Harbor. There are six bays that are contiguous with New York Harbor: Newark, Raritan, Sandy Hook, Lower New York, Upper New York and Jamaica Bays. There are two entrances into New York Harbor; Long Island Sound via the East River, and the Atlantic Ocean via the entrance between Rockaway Point and Sandy Hook.

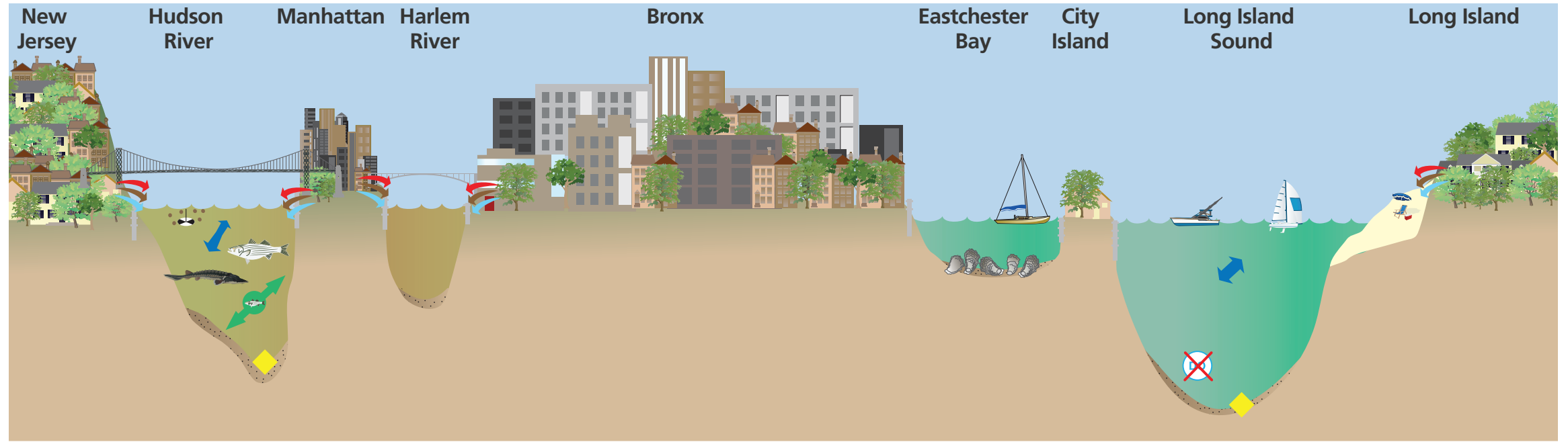


Four parallel east–west transects were established to provide insights into the natural and man-made features of New York Harbor. From north to south, these transects were the following: T1—George Washington Bridge transect, T2—Midtown Manhattan transect, T3—Statue of Liberty transect, and T4—Verrazano Bridge transect.

This poster is a product of the Curriculum and Community Enterprise for Restoration Science (CCERS), a National Science Foundation (NSF) funded project, with a diversity of partner institutions denoted by the logos.



## GEORGE WASHINGTON BRIDGE TRANSECT



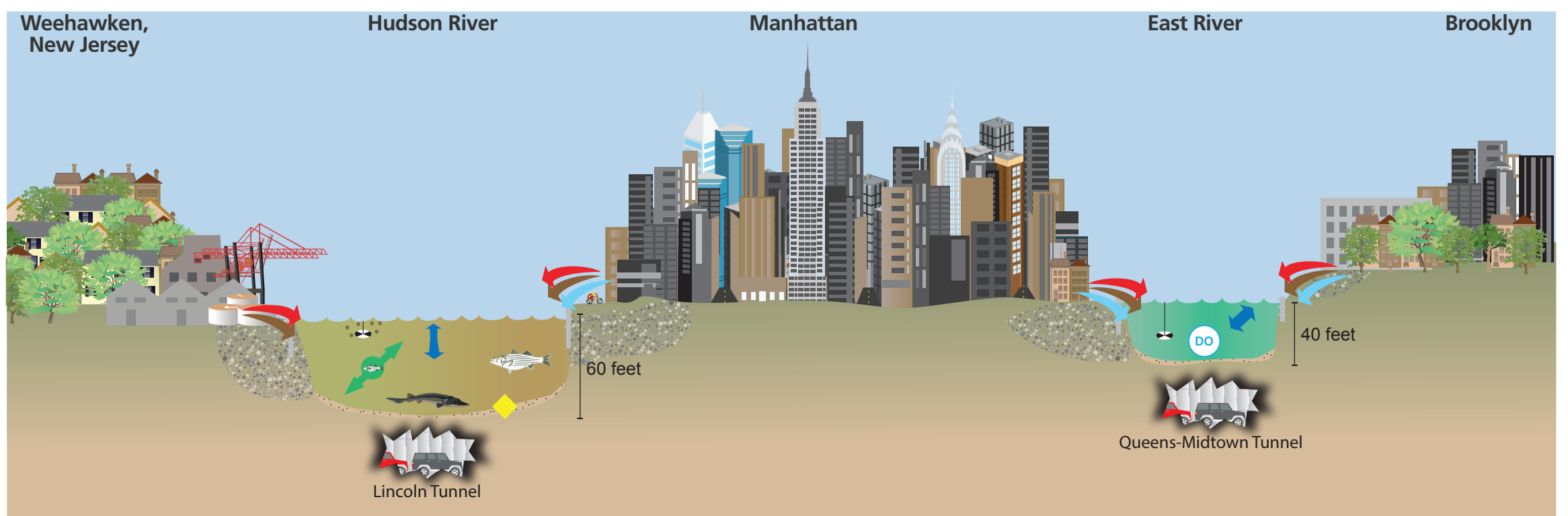
Hudson River is deep and turbid (poor water clarity) with hardened shorelines (riprap and seawalls) and toxic sediments (e.g., PCBs). It is spanned by the George Washington Bridge.

Harlem River is shallow (<16') and turbid.

Eastchester Bay is a shallow embayment (<7') in the Western Narrows of the deeper Long Island Sound (100'+).

The deep bottom waters of Long Island Sound are hypoxic (low oxygen) due to excess nutrients from stormwater runoff, sewage treatment effluent, and contaminated groundwater.

## MIDTOWN MANHATTAN TRANSECT



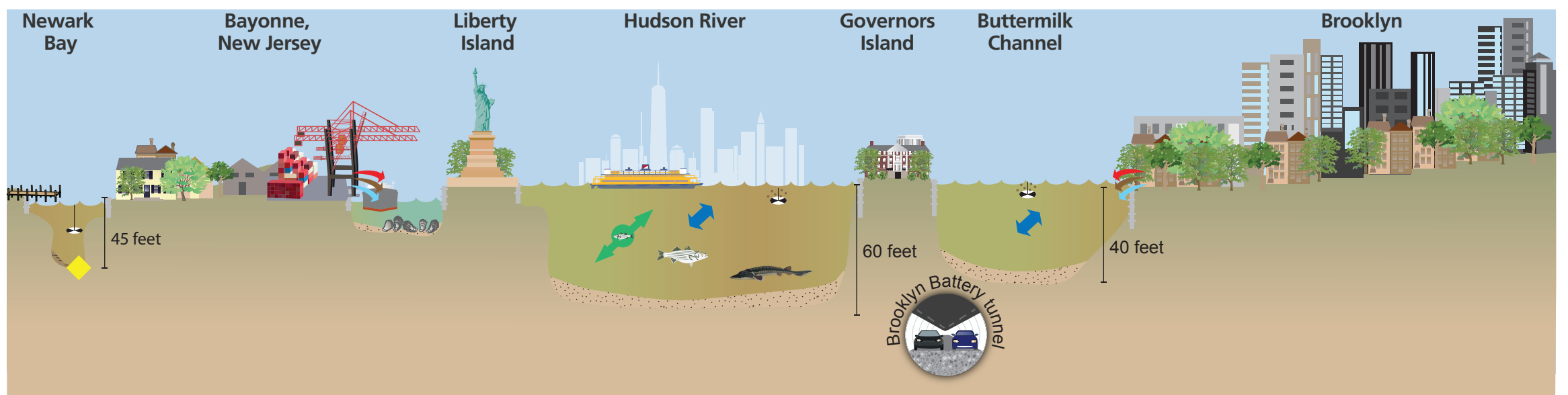
The New Jersey Palisades form a high bluff above a landfill created for port development.

The turbid Hudson River is deep (60') and serves as a fish migration corridor (e.g., sturgeon). The Lincoln Tunnel is below the river (100' deep).

Landfill along the hardened Manhattan shoreline has removed salt marshes and created space for roadways and development. Stormwater runoff and sewage treatment effluent lead to excess nutrients, but turbidity prevents algal growth.

The East River is 40' deep and is flushed by tides from Long Island Sound and New York Harbor, with the Queens–Midtown Tunnel (opened in 1940) underneath (100' deep).

## STATUE OF LIBERTY TRANSECT



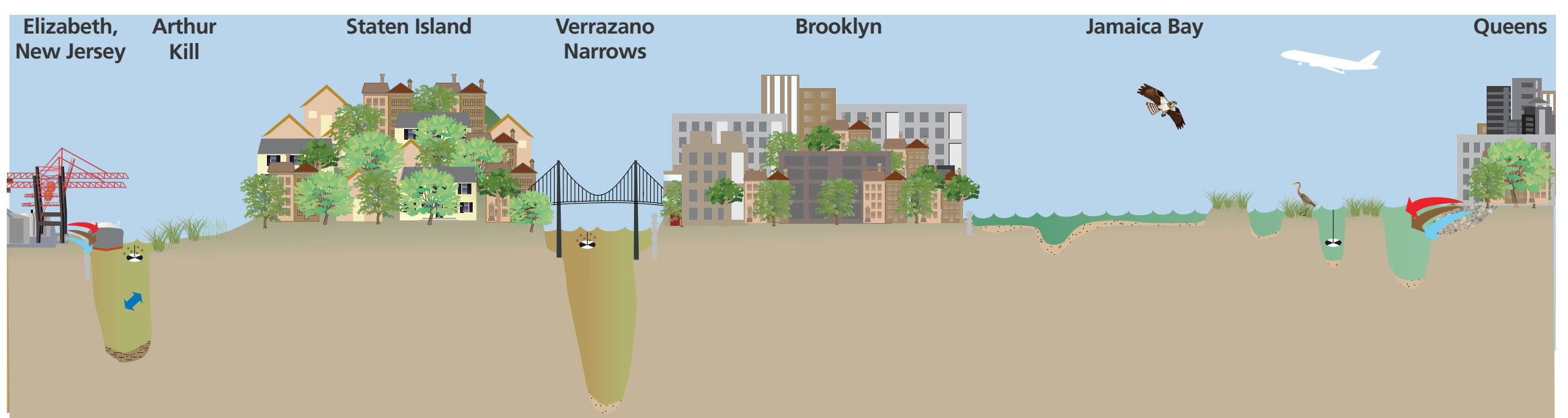
Newark Bay is shallow (<9') apart from a deep shipping channel (45') with muddy sediments containing toxins.

Liberty Bay is a shallow embayment of New York Harbor once filled with oyster reefs. Liberty Island, where the Statue of Liberty stands, is supported by landfill and hardened shorelines to 12' above sea level.

Upper New York Bay at the mouth of the Hudson River has variable depths and is transited by passenger ferries, water taxis, and commercial shipping.

Buttermilk Channel is relatively deep compared with historical accounts of being able to move cattle across at low tide, and separates Governors Island from Brooklyn. The Brooklyn Battery Tunnel runs underneath at a depth of 140'.

## VERRAZANO BRIDGE TRANSECT



Arthur Kill, separating New Jersey from Staten Island, is maintained as a dredged shipping channel (35' deep) with poor flushing.

The Verrazano Narrows is very deep (228') and separates the Upper and Lower New York Harbor with vigorous tidal flushing. It is spanned by the Verrazano Bridge (4,260' long; opened in 1964).

Jamaica Bay is historically very shallow, but dredging has created some deep regions (50'+), especially near JFK International Airport. Jamaica Bay is managed by the National Park Service as part of Gateway National Recreational Area (established in 1972).

Stormwater runoff and sewage treatment effluent from Brooklyn and Queens degrade water quality of Jamaica Bay.

### Habitat characteristics

- Water clarity
- Landfill
- Sandy bottom
- Fish habitat
- Muddy bottom
- Fish migration corridor

### Key Issues

- Nutrients
- Sediment
- Stormwater runoff
- Hardened shoreline
- Toxins

### Physical Processes

- Tidal flushing
- Riverine flow with tidal flushing