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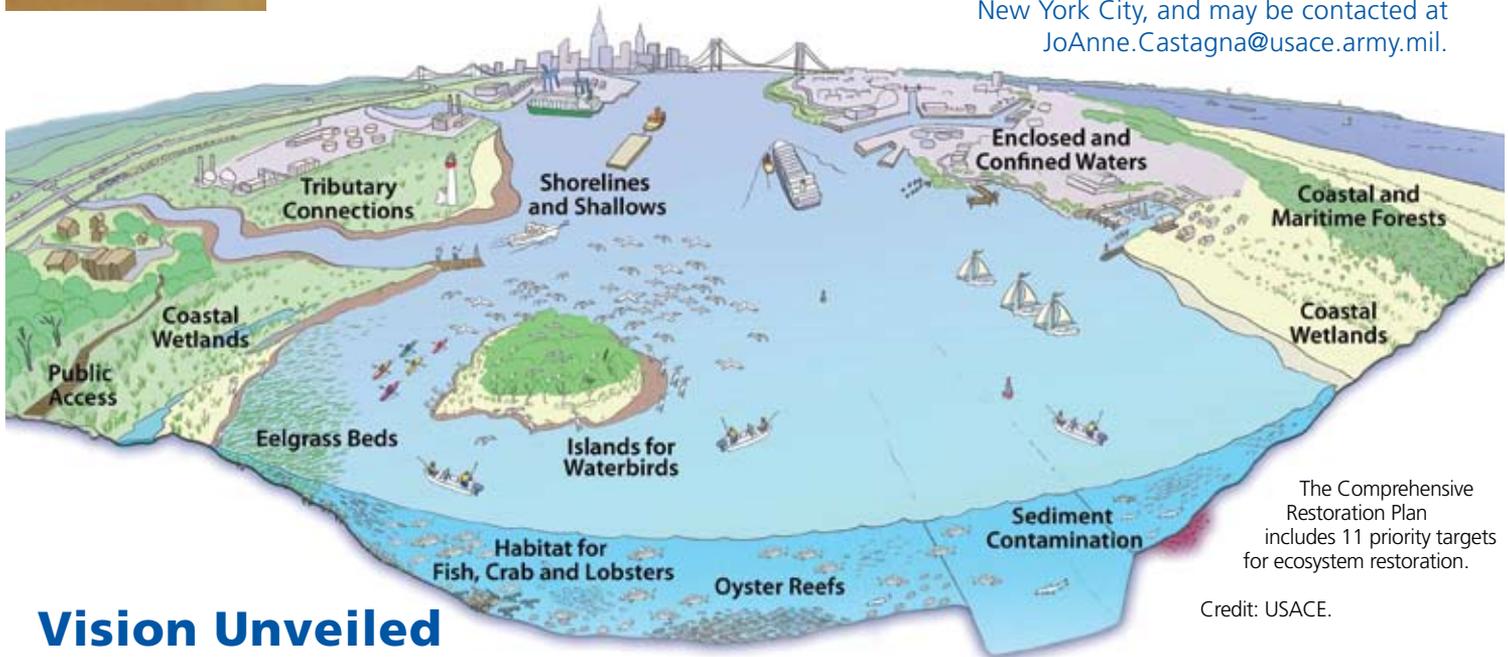


Improving Inferences from Fisheries Capture-Recapture Studies through Remote Detection of PIT Tags

The Challenges of Tracking Habitat Restoration at Various Spatial Scales



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Vision Unveiled for “Mosaic of Habitats” in the New York/New Jersey Estuary

The U.S. Army Corps of Engineers unveiled an innovative, comprehensive, restoration plan that was created in collaboration with the New York-New Jersey Harbor Estuary Program and more than 60 partnering organizations, including federal, state, and local agencies; non-governmental organizations; and regional stakeholders. The plan involves many partners because the New York-New Jersey Harbor Estuary spans 1,600 square miles across New York and New Jersey. Restoring the estuary will not only create a healthier environment for fish and wildlife, but it will also provide the public cleaner waters, healthier fisheries, increased flood protection, recreational oppor-

tunities, and a boost to the region’s economy.

“The primary goal of the New York-New Jersey Harbor Estuary Comprehensive Restoration Plan is to develop a mosaic of habitats that provides maximum ecological and societal benefits to the region,” said Lisa Baron, project manager and marine biologist with the U.S. Army Corps of Engineers New York District.

Baron, along with a diverse group of technical experts and consultants with the Corps New York District, developed the plan as part of the Hudson Raritan Estuary Ecosystem Restoration Study with the Port Authority of New York and New Jersey, the project’s local

sponsor. The New York-New Jersey Harbor Estuary includes not only the harbor, but also rivers, wetlands, coastlines, and open waters, and is located within a complex ecological system inside a metropolitan region with a population of 20 million people. The plan’s boundary covers a large region of the estuary, which is a 25-mile radius around the Statue of Liberty National Monument.

“To perform restoration work in the estuary, the plan divides the estuary into eight regional areas associated with specific watersheds,” said Peter Weppler, chief of the Army Corps New York District Coastal Ecosystem Section.

The plan includes 11 priority targets for restoration, recognized as Target Ecosystem Characteristics, that include methods to restore and create habitats, ensure these habitats live in harmony and with the surrounding urban infrastructure, and ensure the estuary is safe and accessible to the millions of estuary residents and visitors.

HABITAT RESTORATION

The habitats that are being considered for restoration and creation include coastal wetlands, shellfish reefs,



With the skyline of Manhattan in the background, Col. John R. Boulé II, Commander of the Army Corps' New York District, addresses a group of waterfront leaders aboard the Army Corps' vessel *Hayward* in the harbor. (Photo: Keegan O'Connell-Lilly, USACE).

islands for waterbirds, coastal and maritime forests, and eelgrass beds.

Coastal Wetlands—Coastal wetlands are the regional areas that connect the estuary's open waters to dry land.

"Due to industrialization, nearly 80% of the wetlands have been lost and most of what remains is degraded. Wetlands provide such an incredible benefit to the region, on so many levels. Their vegetation provides a critical habitat for wildlife, fish, and migratory birds. We live in an urban environment where there are lots of hardened surfaces and surface water runoff. Surface water runoff is water, from rain, snow-melt, or other sources that flows from the land surface into water ways, which can bring with it contaminants from the land. Wetlands filter and detoxify our water by catching contaminated sediments in the water," said Baron.

"Wetlands are also nature's sponges and act as shoreline barriers and stabilizers. They diminish wave impact, reduce erosion, and provide

Waterfront leaders and Army Corps personnel assemble on the deck of the Corps vessel *Hayward* for a group photograph near the Statue of Liberty National Monument. (Photo: Christopher Gardner, USACE).



a buffer from flooding for our coastal areas and the communities living there," said Jodi McDonald, chief of the Army Corps New York District Ecosystem Restoration and Flood Risk Management Section. The plan has identified over 26,000 acres of wetlands throughout the estuary that is suitable for coastal wetlands creation and restoration.

Shellfish Reefs—One of the plan's priorities is to restore and create shellfish reefs including oysters, the keystone species for the estuary, mussels, and clams, as well as other shellfish. These reefs are intricate underwater structures made up of live shellfish and layers of empty shells. Oyster reefs have been almost eliminated due to poor water quality conditions, disease, and over-harvesting. In fact, the estuary supported a thriving oyster industry up until the late 1800s, covering approximately 200,000 acres.

These reefs provide nooks and crannies and potential nursery grounds for other species because they provide hiding places, feeding grounds, and egg attachment sites for many species. Shellfish also improve water quality by filtering sediment

from the water and improve water clarity.

Islands for Waterbirds—The plan will restore island habitats for birds whose numbers have declined considerably in the estuary due to hunting, pollution, and habitat loss. The estuary supports 300 species of birds that provide a vital role in the health of the estuary's environment and help regulate the population of other species by consuming them for food.

Coastal and Maritime Forests—Coastal and maritime forests are found on the fringe of seacoast habitats behind the dunes or a wetland and provide critical upland habitat. Maritime forests have trees that are often stunted by salt spray and high winds and they may grow in unusual, gnarled shapes. These hardy forests are needed by many species because they provide a home, food, and a nesting place for migratory birds. They also contribute to shore stabilization and flood control, as well as moderate global climate change.

Eelgrass Beds—Eelgrass used to be plentiful. The plant's long shoots provide habitat and food for fish nurseries and estuary wildlife, and improves water quality through the production of oxygen in the water. Eelgrass also reduces shore erosion and improves water clarity and quality by acting as a sediment trap and filtering contaminants from the water.



The eight regional areas encompassed in the Comprehensive Restoration Plan. A star in the Upper Bay regional area denotes the site of The Statue of Liberty National Monument. Credit: USACE.

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CONNECTING HABITATS

The plan not only includes ways to create and restore habitats, but also methods to connect the habitats so that they can benefit from one another. These methods include rebuilding shorelines and creating habitats for fish, crabs, and lobsters.

Over the years, the estuary's 1,000 miles of natural shorelines have been replaced with piers, docks, and bulkheads which have altered the naturally sloped shorelines which transition from shallow to deep water and are needed by fish and sea life to thrive. The plan suggests replacing abandoned piers with naturally sloped shorelines and creating new piers and other shore structures that will be designed in a way to have less of an impact on the natural shoreline and foster habitat complexity. Regional fish, crabs, and lobsters require many different habitats to breed and for their young to develop into full maturity.

HABITAT SUPPORT STRUCTURES

The plan also focuses on the physical landscape, balancing necessary urban infrastructure with environmental restoration to include opening up tributaries that may be obstructed by man-made

barriers and improving the water quality of enclosed waterways. Networks of tributaries connect rivers and streams to the estuary. Each year, migratory fish navigate these connections, swimming many miles upstream to spawn. Man-made barriers such as dams can prevent fish from reaching egg-laying sites, threatening the future of these fish populations.

The plan recommends removing unnecessary barriers and reconstructing others to include fish passage such as fish ladders that can connect upstream habitats with the rest of the estuary. In some areas of the estuary, bodies of water are isolated or enclosed, such as dead-end canals. Often these areas collect pollution discharge and storm-water runoff, resulting in water that is polluted, stagnant, contains sparse vegetation, has low species diversity, and emits noxious odors.

HEALTH AND SOCIETAL VALUE

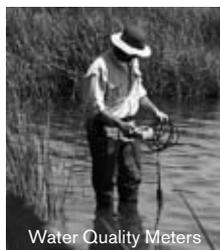
The plan includes ways that millions of people can safely enjoy access to the estuary. For centuries, the estuary has been an area for disposal of chemical and industrial wastes. These contaminated sediments are harmful to the estuary's wildlife, pose a public health risk, and reduce the port's com-

mercial viability. The goal of the plan is to reduce contaminated sediments throughout the estuary by isolating or removing the contamination. Cleanup of contaminated sediments will reduce human health and ecological risks, improve fishery resources, remove fish consumption advisories, and provide the public economic benefits. Increasing and improving public access throughout the estuary is also a goal of the plan, with the hope of enabling everyone in the region to be able to reach the estuary in a 20-minute walk or by public transportation.

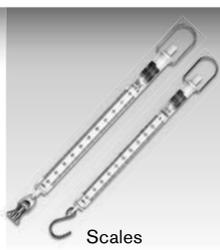
PROJECT GOALS

Just some of the plan's short and long-term goals include creating 1,200 acres of coastal wetlands by the year 2015 and 15,200 by 2050, enhancing four or more islands for waterbirds by 2015 and all islands by 2050, creating or restoring 250 acres of coastal and maritime forest by 2015 and 1,000 by 2050, and creating 500 acres of oyster reefs habitats by 2015 and 5,000 by 2050.

"The team is already achieving the plan's restoration goals," said Wepler. "Salt marshes are being created within some of the estuary's regional areas. This is tangible evidence towards fulfilling our vision of a restored estuary."



Water Quality Meters



Scales



Fish Measuring Boards



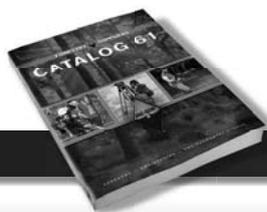
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