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BAYKEEPER

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The Hudson-Raritan Habitat Initiative: Restoring Critical Habitats Around the Estuary

The Hudson-Raritan Estuary is the system of bays and tidal rivers where fresh water from the Hudson, Hackensack, Passaic, Rahway, Shrewsbury, Navesink and Raritan Rivers meets the ocean.

These waters contain an astonishingly productive ecosystem with hundreds of species of plants, fish and animals. The Estuary also surrounds the islands of New York City and wraps around the long shoreline of Northern New Jersey.

The Estuary is home to an extraordinary aquatic ecosystem. The mix of fresh river water and ocean saltwater creates an exceptionally rich environment brimming with life. Despite its intense commercial and industrial history, the Estuary's natural productivity and diversity rivals that of coral reefs and rain forests.

Rivers feed the Estuary an abundance of life-giving nutrients that support the Estuary's bountiful marine species. When the Hudson-Raritan Estuary was free from pollution, it produced more food per acre (in oysters, clams, scallops, crabs, lobster, sturgeon, shad, and striped bass) than the richest midwestern wheatfield.

The Estuary's physical features include sandy beaches, fresh and salt water marshes, rocky points, broad bays, and narrow straits. Each of these varied environments provides habitat for a great di-

versity of marine creatures. No other estuary on the East Coast possesses a comparable array of near-shore habitats.

Over 200 fish and 300 bird species live in the Estuary. For many migrating birds the Estuary is an essential feeding stop during their long flights. The

Estuary's varied habitats and rich food supply also make it an excellent nursery for juvenile fish; 75% of the commercially and recreationally important fish and shellfish species spend all or part of their lives in estuaries like the Hudson-Raritan.

In short, the Estuary is a natural wonder in the midst of our metropolitan region. Improvements in wastewater treatment and the changing nature of the waterfront have created an historic opportunity for us to restore the health of the Estuary.

However, the Estuary's recovery is by no means certain. Water quality has improved, but vital natural areas — the habitats that support fish, birds, and wildlife — remain threatened.

The recovery of the Estuary will require not only halting habitat loss but also restoring important areas of habitat around the Estuary. This is now possible because Port facilities have become more concentrated, and formerly occupied and inaccessible waterfront areas have become available for habitat restoration and public access. If we do not act quickly, private development will eclipse this opportunity.

Baykeeper has identified several critical habitat types that we are working to protect and restore through the Hudson-Raritan Habitat Initiative. They are: wetlands, stream corridors, benthic habitat, and oyster beds.

The restoration of this natural heritage is the region's great challenge. The following text and accompanying map describe some of the Estuary's critical habitat types and potential restoration sites.

Wetlands

Before the shoreline became developed, the Estuary was ringed by a fringe of green salt marsh. Life in these marshes is governed by the rising and falling tides. The dominant plant species in salt marshes are *Spartina alterniflora*, which grows nearest to open water areas, and *Spartina patens* which grows closer to land. In marshes that have been disturbed by diking and filling, or degraded by pollution, the tall reed *Phragmites* dominates.

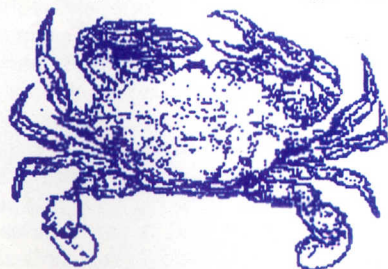
In some areas such as Jamaica Bay and the Hackensack Meadowlands, these wetlands extended for acre after acre; in other areas a thin fringe hugged the shoreline.

Quietly, throughout the year, these green meadows perform astoundingly important jobs for the Estuary. Wetlands convert sunlight and nutrients into tons of food for the Estuary's fish and wildlife. They provide a safe nursery for juvenile crabs, clams, fish, and waterfowl. They are also home to wading birds and muskrat.

Wetlands purify the water by filtering out pollutants that run off the land. And they provide our best protection against floods because they absorb and then slowly release floodwaters.

The wetlands of the Hudson-Raritan Estuary have been decimated. Less than 20% of our original wetlands remain. As we built New York City, Newark, and the suburbs, we filled in the wetlands that support life in the Estuary. The inset maps of wetlands/madlands (see back page) show that most of the filling occurred during the 20th Century. Large sections, including the vast Port Newark facilities, were filled in the last

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thirty years. Jamaica Bay and the Hackensack Meadowlands provide the last large expanses of wetlands in the Estuary.

The US Army Corps regulates the filling of wetlands. Under the Clean Water Act, a wetland can be filled for a project only if the project is "coastal dependent" and if there are no feasible alternatives.

Although the Clean Water Act has slowed the pace of wetland destruction, 20,000 acres are still destroyed each year nationwide. And only 2 % of the applications for permits to fill wetlands are rejected.

It is essential that we save the Estuary's remaining wetlands. Because there are so few remaining wetlands in the Hudson-Raritan, each acre is more important than ever.

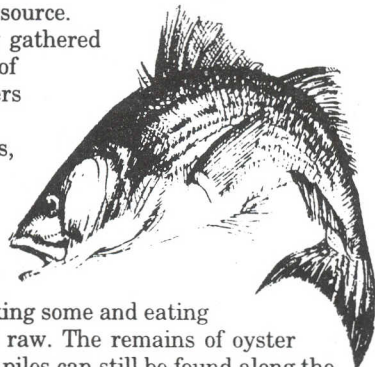
Baykeeper works to achieve permanent protection of these wetlands through conservation easements or purchase by the state or private conservation organizations and by enforcing the Clean Water Act where appropriate.

Fisheries and Shellfish

The Estuary teems with fish and shellfish of all sorts. Oysters and mussels cling to the bottom. Clams burrow in the mud. Young bluefish chase schools of silversides, devouring almost half their own weight each day. And each Spring, as they have for millions of years, sturgeon migrate into the Estuary and up the Hudson River to spawn.

The Lenape Indians, who lived alongside the Estuary when Henry Hudson arrived, made the Estuary their main food source.

They gathered tons of oysters and clams,



smoking some and eating most raw. The remains of oyster shell piles can still be found along the shoreline. The Lenape used seine nets and weirs to catch river herring, shad, and sturgeon.

European settlers also relied on the Estuary. People raked tens of thousands of bushels of oysters out of the Estuary each year. Fishermen also gathered hard and soft clams, blue claw crabs, and lobsters. They hauled in striped bass, fluke, and bluefish. In the Spring, fishermen caught shad and sturgeon as they swam up the Hudson to spawn. Until 1924, they brought sturgeon to a Brooklyn plant where their eggs were removed and processed into caviar.

Around the turn of the century, the

Estuary's fisheries began to decline. As sewage contamination spread, clam and oyster beds were closed. In 1927, even Staten Island's oyster beds were finally condemned. The sturgeon population plummeted. From 1957 to 1987 fish and shellfish landings declined from 317,000 to 72,000 metric tons.

Baykeeper and an ever expanding group of organizations and individuals around the Estuary are committed to reversing this decline. We take heart in the fact that last year, for the first time in over forty years, clam beds in the Navesink River were opened for direct harvest. We are sure that through the joint efforts of the Estuary's many stewards, we can turn the tide.

Anadromous Fish

Anadromous fish are born in streams and lakes but live most of their lives in an estuary or ocean. They swim back upstream in the Spring to spawn (lay eggs).

Alewife, blueback herring, and American shad spawned in great numbers in the rivers and streams of the Hudson-Raritan Estuary. They were an important food source for Native Americans and European settlers, and an important part of the Estuary's ecosystem.

Today, these species are in serious trouble. Passage up almost all the Estuary's tributaries has been blocked by dams and other barriers. Herring, alewife, and shad have been left with few places to spawn and their populations have drastically declined.

In 1991, a Baykeeper report documented the dams, tide gates, and other obstacles to anadromous fish migration. Baykeeper followed this report with guidelines to the restoration of anadromous fish runs in the Estuary's tributaries. By taking out obsolete tide gates and dams and putting in fish ladders on existing dams, we can reopen our streams and help restore these species' remarkable annual migration.

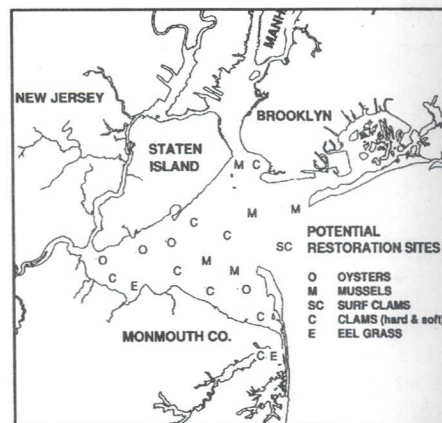
Oysters

Historically, the Estuary had prolific oyster beds. There were beds throughout the Estuary: in Raritan Bay, the Arthur Kill, Newark Bay, the Hudson River, the East River, and Jamaica Bay. Even the Gowanus Canal had oyster beds.

The natural beds were slowly overfished through the 19th Century. Natural production was replaced by an intensive seeding of beds in Raritan Bay.

In the early 20th Century, heavy siltation and sewage pollution ruined the majority of the natural and seeded beds.

Much of the Hudson River Valley was cleared around the turn of the century in a short-lived but intensive agricultural effort. The clearing and farming caused



widespread erosion, increasing the river's sediment load. This sediment ruined oyster habitat by burying many of the beds.

Sewage pollution of the Estuary raised coliform and pathogen levels in the Bay, making the remaining oysters unhealthy for people to eat. In addition, this pollution led to eutrophication and hypoxia (low oxygen) which further hurt the oyster population.

There are just a few oysters left in the Estuary. Water quality has improved to the point that oysters should be able to return. However, oysters need a hard substrate to attach to and most of their historic beds are still buried under silt. Baykeeper is exploring ways to restore these oyster beds.

Eel Grass

Much of the Estuary bottom was covered by a carpet of eel grass when Europeans arrived. Raritan Bay contained broad meadows of these underwater grasses. Eel grass provides a protective home for many kinds of juvenile fish and is critical for bay scallops.

In addition, eel grass binds the sediments of the Bay bottom and prevents resuspension during storm events. Preventing resuspension protects oysters by reducing siltation of oyster beds. It also improves the health of the Bay by increasing water clarity and thus allowing greater primary productivity.

Eel grass depends on good water clarity because it can only grow where sunlight reaches the bottom of the Estuary. Turbidity (cloudiness) and diseases have reduced the amount of eel grass in the Estuary by approximately 90%.

Turbidity increased when pollutants began to cause algae blooms and upland erosion elevated the suspended sediment load in the rivers that feed the Estuary. And, as eel grass began to die off, it no longer functioned to protect against sediment resuspension which led to even greater turbidity.

Baykeeper continues to work to prevent pollution and reduce sediment loads to bring eel grass back. Baykeeper is also researching areas of the Estuary where eel grass restoration is already possible.

Land Development / Habitat Destruction

The health of the Estuary depends on the health of the land in its watersheds. Changes in the land are carried downstream and cause changes in the Estuary. The watersheds of the Hudson-Raritan Estuary have undergone enormous changes during the last thirty years.

Powered by the increased mobility of the automobile, the region's compact cities and towns spread into a formless suburban sprawl. Even suburbanization that occurs far from the Estuary has an impact.

The number of miles driven in the region increased by 60% between 1970 and 1990. Pollutants from cars, such as leaking oil, foul our waterways. Air pollution from cars also impacts the Estuary through atmospheric deposition of nitrates and other pollutants. In addition, the increase in impervious surfaces — such as roads and roofs — significantly impairs groundwater absorption, and speeds rain runoff. The result is an increase in flooding events and damaged stream systems.

Over the last thirty years, the region's population grew by only 13% but developed land grew by 60%. Since 1962 we added a million acres of developments and lost 42% of our farmland.

Open space is being devoured and we are losing the woodlands that encompassed the Estuary. These woods provided clean water, organic material that fed microorganisms in the Estuary, and healthy streams vital to the spawning success of anadromous species.

The shoreline, a zone critical to the health of the Estuary, has been radically altered. Originally land met water in a gentle slope washed daily by the tides.

This salt marsh, sandy shore, or clam-rich mudflat is a vital habitat for many of the estuary's creatures, particularly juvenile fish, crabs, and wading birds.

Today much of our shoreline is abrupt and hard. The important physical connection between water and land has been lost in many places where steel and concrete bulkheads now dive straight into deep water.



More than a third of Newark Bay was destroyed by filling shallow waters and wetlands.

As with suburbanization, developing the Estuary's edge increases pollution. A naturally vegetated shoreline buffer can absorb 90% of the pollutants from runoff. Similarly, wetlands filter pollutants from the land and, as water flushes through wetlands, cleans the water itself.

If we are to achieve a clean and healthy Estuary, we must concentrate future development in existing urban areas. Directing growth to urban centers will avoid the pollutants associated with suburban development and preserve the region's remaining woodlands and wetlands.

Restoration Efforts

Citizens, nonprofit organizations, and some government agencies have been working to restore the health of the Hudson-Raritan Estuary for many years. Sewage treatment plants have improved water quality; coastal zone management acts have slowed the destruction of aquatic habitat. Now people are adding a third critical component: pro-active habitat restoration.

The Estuary's ecosystem is crippled by the loss of habitat. You cannot have scallops without eel grass, herring without healthy streams, or diamond backed, terrapin turtles, mussels, or muskrats without wetlands. In addition to eliminating pollution and halting habitat loss, it is imperative that we start to restore habitat areas in the Estuary.

Habitat restoration takes many forms. The New York City Parks Department's Natural Resources Group has been replanting salt marshes along the Arthur Kill — an area that was devastated by oil spills in 1990. The restored areas now support wading birds, crabs and fish.

In another effort, Baykeeper, working with AmeriCorps members and community volunteers, is restoring the Second River in Newark and other towns in Essex County, New Jersey by stabilizing and replanting eroding stream banks, removing aggressive non-native plants,

and, eventually, building fish ladders for herring to migrate to their historic spawning grounds.

Baykeeper recently launched a campaign to develop a coordinated habitat preservation and restoration program in the Hudson-Raritan Estuary. Baykeeper's Hudson-Raritan Habitat Initiative (HRHI) is working to coordinate and instigate habitat restoration around the Estuary. HRHI focuses on the key habitat's described in this document: wetlands, oysters beds, eel grass, and stream corridors.

Baykeeper's HRHI will promote habitat preservation and restoration through a public outreach campaign, a report on current habitat efforts and a catalog of potential restoration sites.

Baykeeper hopes to bridge the gap between the public sector, where much research and planning have already occurred, and the grassroots, where much of the hands-on work will be done.

Hudson-Raritan Habitat Initiative Goals

1. By 2006, increase the diversity of benthic habitat in the Estuary; and protect benthic habitat throughout the Estuary from ecologically adverse alteration and degradation.
2. By 2006, prevent further loss of wetlands acreage in the Estuary, and improve net gain in wetlands functions.
3. By 2006, restore or enhance 50 miles of riparian corridor along the Estuary's tributaries.
4. By 2006, expand the spawning range for anadromous fish, and enhance habitat for native fish species, in at least four of the Estuary's tributaries.

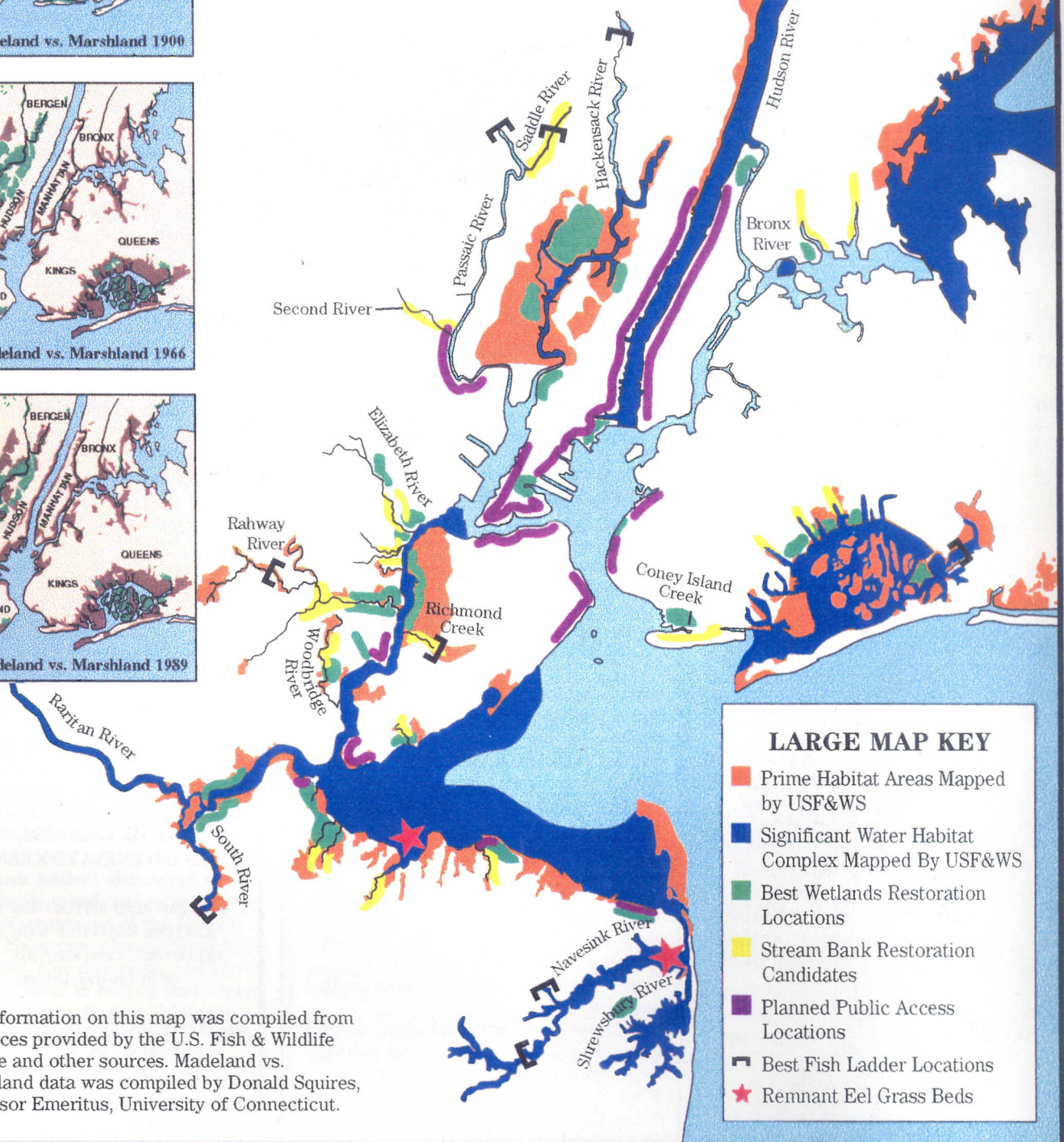
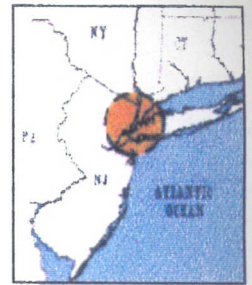
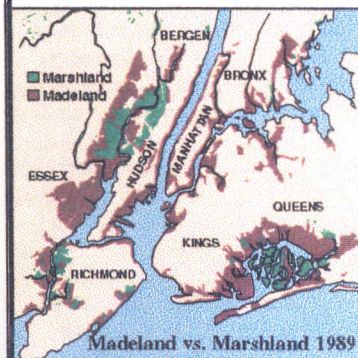
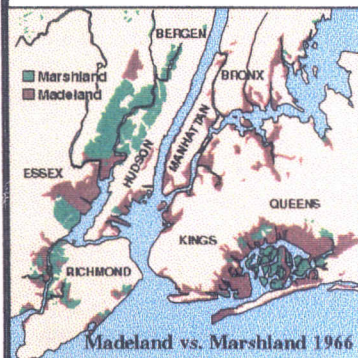
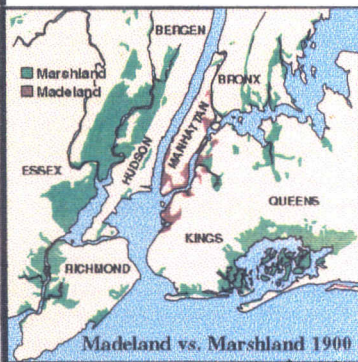
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A MAP OF SENSITIVE HABITAT AND HABITAT LOSS IN THE HUDSON-RARITAN ESTUARY



The information on this map was compiled from resources provided by the U.S. Fish & Wildlife Service and other sources. Madeland vs. Marshland data was compiled by Donald Squires, Professor Emeritus, University of Connecticut.