

The Tidal Exchange



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THIS ISSUE

HARBOR ESTUARY NEWS

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Comprehensive Restoration Plan for the Hudson-Raritan Estuary

Lisa A. Baron

Introduction

The Comprehensive Restoration Plan (CRP) for the Hudson-Raritan Estuary (HRE) is a master plan guiding ecosystem restoration efforts throughout the Estuary. It is intended to be used by all stakeholders (environmental and community groups, government agencies, and others), thus allowing the whole region to work towards a series of common restoration goals providing benefits to the Estuary. The CRP provides the opportunity for the region to coordinate restoration and habitat improvement efforts that address the Estuary's critical needs and draws much needed public attention to the effort.

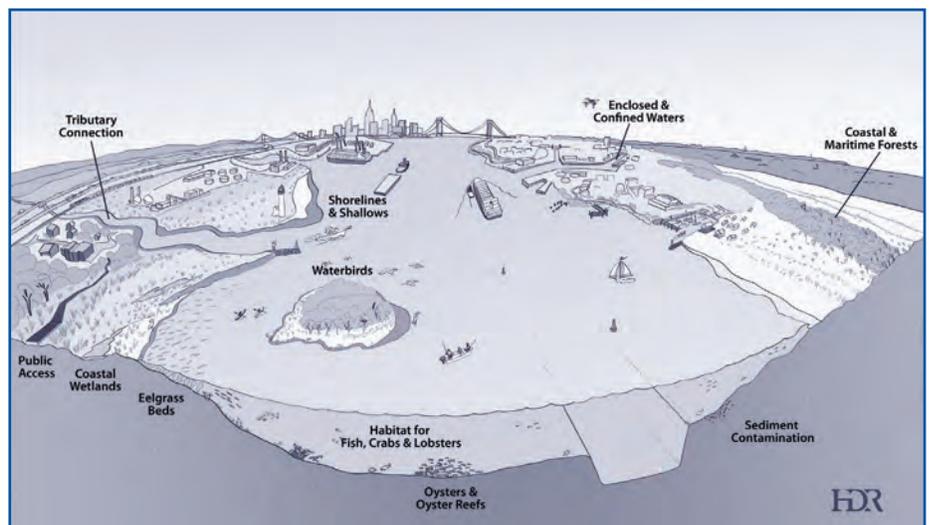
This effort was initiated in 1988, when Congress recognized the New York-New Jersey Harbor as an estuary of national importance and accepted the Harbor into the National Estuary Program (NEP). Following this designation, the Harbor

Estuary Program (HEP) completed a Comprehensive Conservation and Management Plan (CCMP) in March of 1996. Included among its recommendations was the development of a comprehensive strategy for habitat protection and restoration. The U.S. Army Corps of Engineers began the process of developing the strategy in 1999 through initiation of the HRE Ecosystem Restoration Feasibility Study with their non-federal sponsor the Port Authority of New York and New Jersey.

Restoration Goals

To enhance the scientific credibility of the project, the Hudson River Foundation and Cornell University led a series of workshops to craft a strategy to develop a restoration plan for this highly urbanized estuary. From the beginning, the scientists agreed that the restoration program should be focused

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Target ecosystem Characteristics for the Hudson-Raritan Estuary



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The Tidal Exchange – Winter 2009

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The Tidal Exchange is a publication of the New York – New Jersey Harbor Estuary Program (HEP), a partnership of federal, state and local governments, scientists and citizens working together to protect and restore the natural resources of the estuary. The purpose of the newsletter is to promote an informative dialog on issues related to the Harbor Estuary Program.

The HEP is sponsored by the States of New York and New Jersey and the US Environmental Protection Agency. The HEP Management Committee consists of representatives from the US EPA, NJ DEP, NYS DEC, NY and NJ local governments, US ACE, US DOI, NOAA, Port Authority of NY & NJ, Interstate Environmental Commission, NJ Harbor Dischargers Group, NYS DOS, Science & Technical Advisory Committee and Citizens Advisory Committee.

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Mapping Public Access to the Waterfront

Roland Lewis

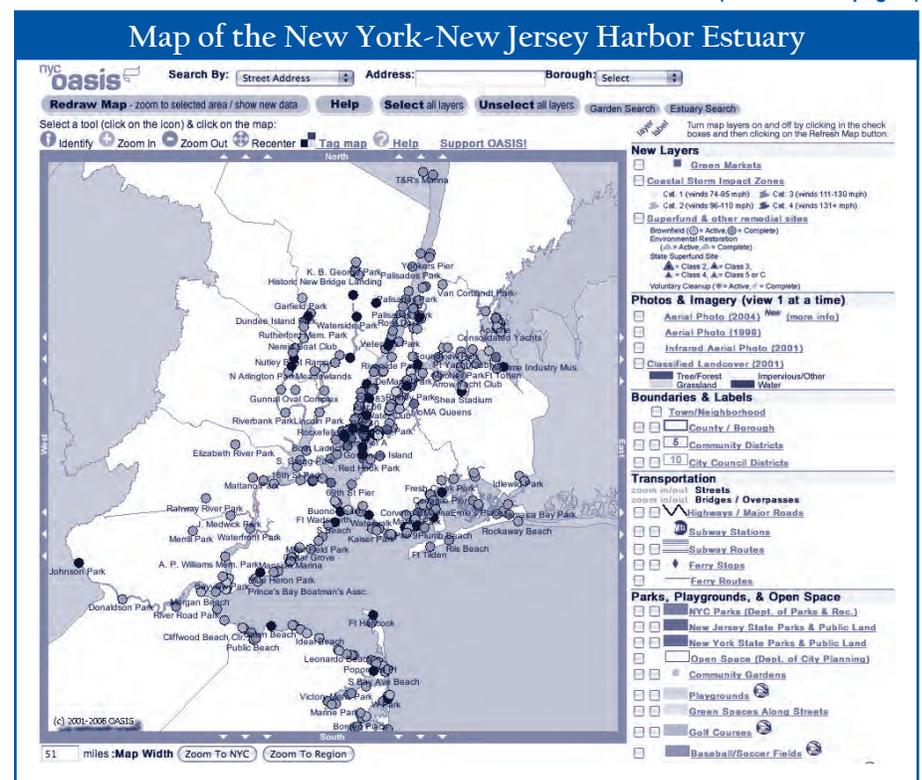
For far too many of us who live in and around the Hudson Estuary, especially those around the New York Harbor, the water that surrounds us is, at best, a pleasant backdrop to our busy urban lives. We acknowledge it is there, but very few of us have any actual connection to it. For generations, our harbor and waterways have been cut off from the general population by industry, commerce, rail, and highways. The Harbor Estuary Program (HEP) and the Metropolitan Waterfront Alliance (MWA) have recognized that this must change. If we are to be better stewards of this incredible natural resource, the public must be able to get to it; for education, for recreation, for relaxation, for employment, and for the improvement of the environment.

HEP has adopted as its goal improving public access to the waterfront for all residents of the core Harbor area. In order to track progress, HEP first had to define a baseline and determine how much waterfront access is there now. For this, HEP turned to the Metropolitan Waterfront Alliance

to help catalog where and how people could currently get to the water. The MWA, at that time a project of the Municipal Art Society, surveyed its Alliance Partners throughout the metropolitan area and cataloged over 400 points of access where New York and New Jersey residents could get to the water. These ranged from fishing piers, to beaches, to kayak launches, to marinas. The initial survey revealed that we did have a number of access points and that number was growing, but large portions of the metropolitan area still had little or no waterfront access. If you were lucky enough to live by the new Hudson River Park on Manhattan's Westside, you did have a few points where you could get to the water. If you lived in Mott Haven in the South Bronx you were out of luck.

With the initial survey in place, the larger questions of how we continue the survey's work, spread access and, most importantly, disseminate this information to policy makers and the general public needed to be answered. The answers came by expanding the

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OASIS map showing all surveyed waterfront access points. http://www.oasisnyc.net/OASIS_Waterfront_Access_2006.htm

Mapping Public Access to the Waterfront (from page 2)

MWA/HEP partnership to include a collaboration with Open Accessible Space Information System (OASIS), an innovative computer mapping project, now housed with the CUNY Graduate Center. Through OASIS, the MWA database of access points was not only given new life as clear and understandable maps available online, but also could be integrated with the other OASIS data sets to show how waterfront access related to transportation, wetlands, parks and a host of other information that is kept in the OASIS database. Perhaps the most important piece of visual information created with OASIS was achieved when the MWA Waterfront access database was viewed in juxtaposition with socio-economic factors such as race and income. These filters revealed the remarkable disparity in waterfront access between communities and neighborhoods in the metropolitan area. If you were poor and a minority and you lived on the Passaic in Newark or along the New York Bay in Sunset Park in Brooklyn, your opportunities to get to the water were substantially smaller than if you lived in the more affluent neighborhoods in New York. Further, these neighborhoods where access was slim were also the neighborhoods with the highest number of children; those that could most benefit from the recreation and education that waterfront access brings.

The work done with the Harbor Estuary Program to map access on our waterfront has greatly informed MWA's policy agenda. Like HEP, we have a goal to substantially increase access to our waterfront, primarily through our "Community Dock" proposal that would reconnect from land and water New York and New Jersey neighborhoods that have long lost touch with our Harbor and waterways. A Community Dock is a multipurpose dock facility that would allow boats small and large to moor at various New York City neighborhoods. Historic boats such as Clearwater and John J. Harvey, and recreational boaters would have a place to arrive. School children, paddling enthusiasts,

fishermen, environmentalists and new and old maritime lovers of all stripes would all have a place to connect to the water that surrounds them, right at the water's edge in New York neighborhoods such as Red Hook in Brooklyn and Mott Haven the South Bronx.

The mapping program achieved with HEP and OASIS has not only benefited our organizations, it has proven to be a useful tool for many

Comprehensive Restoration Plan (from page 1)

on creating and restoring a mosaic of habitats within the human-dominated landscape.

To achieve this goal, a team of estuarine scientists identified 11 measurable objectives for restoration, termed Target Ecosystem Characteristics (TECs), each of which defines specific goals for an important ecosystem property or feature that is of ecological and/or societal value. The TECs reflect the broad interest of HRE stakeholders and address habitat and degradation issues. Achieving the objectives in the TECs will increase

the sustainability and resiliency of the HRE. Each Target Ecosystem Characteristic has established short- and long-term objectives for each of 8 Planning Regions within the estuary. For example, the short-term objective for the Coastal Wetlands Target Ecosystem Characteristic is to create or restore 1,200 acres of wetlands by 2015 while the long-term objective is to create or restore a total of 32,000 acres by 2050.

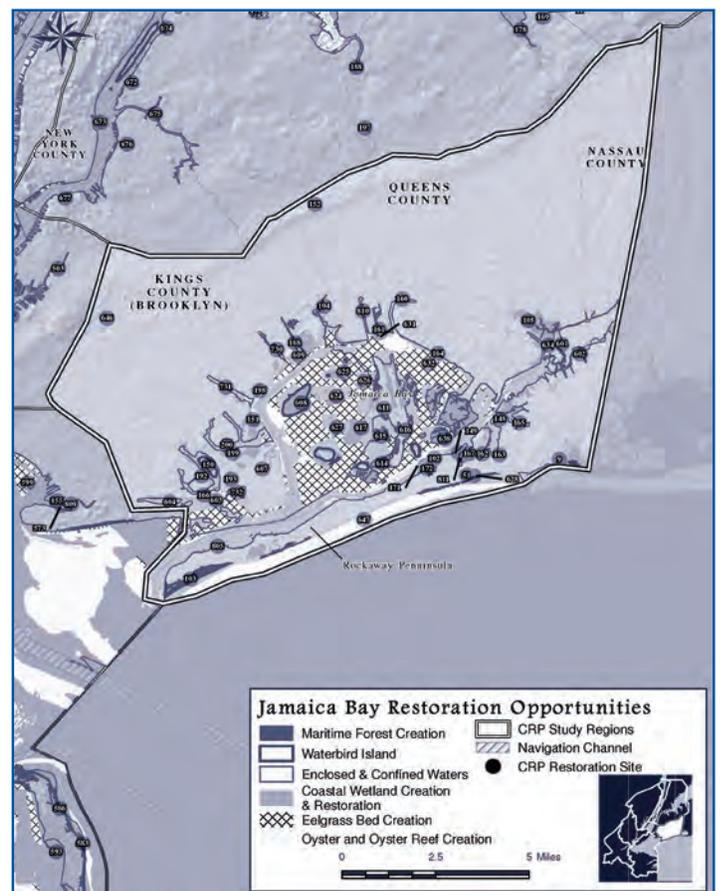
in the general public. A check of the MWA website even in the late fall—not a big waterfront season, revealed close to 1,500 visitors viewing these maps. Apparently HEP and MWA are not the only ones concerned about waterfront access. And, if we all do our jobs right, those numbers will continue to grow and we will all be able to connect to the water that surrounds us. ❖

Roland Lewis is President and CEO of the Metropolitan Waterfront Alliance.

Restoration Opportunities

Early in the planning process, the HEP Habitat Workgroup's acquisition and restoration site nomination process helped to catalog numerous restoration opportunities. Additional sites were identified during outreach efforts conducted as a part of USACE's Needs and Opportunities evaluation. Collectively, a total of 296 restoration and acquisition sites and 436 public access sites have been cataloged and included in HEP's New York City Open Accessible Space Information System (NYC OASIS, www.oasisnyc.net). While many of these sites have

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Example of Mosaic of Habitat within each Planning Region.

Waterfront Public Access in New York

Nancy Welsh

Overview of the State's Public Access Policy

New York State, through its Coastal Management Program (administered by the Department of State's Division of Coastal Resources), sets goals and standards for waterfront uses and activities, and requires that public agency actions be consistent with the program's coastal policies. The program promotes access at the state level through the following policy: "Protect, maintain, and increase the level and types of access to public water-related recreation resources and facilities." This policy calls for achieving balance among the level of public access, the capacity of a waterfront to sustain access, and the protection of natural resources. The program recognizes that urban areas are often underserved by waterfront access, and prioritizes improvements to the availability of and access to waterfront recreation within heavily-populated, urban coastal areas, and encourages the development of mixed and multiple use areas and facilities.

Public Access in New York City

In New York City, public waterfront access is promoted by the policies of the Local Waterfront Revitalization Program (administered by the Department of City Planning), originally adopted in 1982 and later updated and approved as the "New Waterfront Revitalization Program" (WRP) in 2002. The WRP contains 10 policies that build on and advance the vision developed in the City's Comprehensive Waterfront Plan (1992), and companion Borough Waterfront Plans (1993-1994). As an approved Local Waterfront Revitalization Program, it is the WRP that is used in reviewing activities and projects in New York City for consistency with coastal policies.

The WRP promotes reestablishing

the public connection to the waterfront by creating opportunities for visual, physical and recreational access, and WRP Policy 8 directs decision makers to "provide public access to and along New York City's coastal waters." The city's waterfront zoning regulations, adopted in 1993, implement this policy for actions subject to zoning, and establish public access requirements for most new residential and commercial development. The regulations also provide for adoption of Waterfront Access Plans to tailor the requirements to local conditions.



Ecocruise on the Harlem River: The Catalyst Program creates community involvement by providing previously unavailable water-dependant activities. Image courtesy of Urban Divers Estuary Conservancy/Harlem River Ecology Center.

Public Access Projects

The New York Coastal Management Program, New York City and other local partners are actively working to increase public waterfront access in New York City, especially in underserved neighborhoods. In this complex urban environment, it is often necessary to take advantage of nontraditional access opportunities, such as the creation of linear waterfront access in conjunction with road or highway projects; creation of public access as part of private developments; and creation of point access where linear access is not feasible, such as in industrial areas, at street ends, local parks, and public piers.



The Brooklyn Waterfront Greenway creates connectivity between existing public access sites all across the Borough. Image courtesy of Regional Plan Association.

Waterfront Greenway

For example, linear public access along the waterfront is being created across the Borough of Brooklyn through the Brooklyn Greenway Initiative's Waterfront Greenway. Partners working to advance the Greenway have leveraged an initial investment of \$350,000 provided by the Division of Coastal Resources from the Environmental Protection Fund Local Waterfront Revitalization Program (EPF LWRP) into more than \$23 million. The 10 miles of planned Greenway will be built segment by segment as part of multiple capital projects, and has involved securing right-of-way commitments from an array of public and private property owners, including city agencies, the Port Authority, the Brooklyn Navy Yard, and IKEA. Ultimately, the Waterfront Greenway will connect residential neighborhoods and major business and employment centers from Long Island City to Bay Ridge, including the rezoned Greenpoint-Williamsburg neighborhoods, the Navy Yard, the Brooklyn Cruise Terminal and Piers 7-12, the Red Hook industrial area and neighborhood, the Sunset Park container port and new waterfront park, and the Brooklyn Army Terminal.

Designing the Edge

The Division of Coastal Resources, in partnership with the Metropolitan Waterfront Alliance, is also working to advance nontraditional waterfront access through the "Designing the Edge" project. A small seed grant of \$40,000 from the EPF LWRP to conduct community-based

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The Hudson River Waterfront Walkway

Providing Public Access and Recreational Opportunities along a Highly Developed Urban Waterfront

Tali Engoltz

Mention the words ‘coastal recreation and tourism’ and visions come to mind of warm sunny beaches where people wearing stylish summer sportswear are swimming, relaxing, sunbathing, and investigating odd life forms in tidal pools. New Jersey offers residents and visitors many such idyllic locations and experiences, but portions of the state’s waterfront are a highly developed urban landscape. However, this type of coastline also offers extensive and exciting opportunities for recreation and tourism. With more than 1,100 people per square mile, New Jersey is the most densely populated state in the Union. Much of this population resides in the northeast portion of the state where development pressures are intense, especially along the waterfront. Fulfilling the duties as required by the Public Trust Doctrine of preserving and protecting public access in this urban setting can be a significant challenge for the state’s planners. The Hudson River Waterfront Walkway (Walkway), a waterfront corridor spanning nine municipalities and providing recreational opportunities for the public, balances the interests of economic development along a thriving waterfront with the public’s right to recreational opportunities along tidal waters.

The Public Trust Doctrine establishes and protects the rights of the public to enjoy public trust lands, water, and living resources. Historically, the Public Trust Doctrine protected

uses related to navigation, commerce, and fishing. And while these uses are still preserved, the Public Trust Doctrine rights have been broadened to include recreational uses such as swimming, sunbathing, surfing, walking, and other activities that contribute to the public’s complete enjoyment of trust lands.

In part to provide New Jersey residents and visitors to the state access to the Hudson River waterfront, the state’s Coastal Zone Management Rules established criteria for development along the Hudson River Waterfront including the creation of the Hudson River Waterfront Walkway. This Walkway will be a continuous urban waterfront corridor connecting the George Washington Bridge in Fort Lee with the Bayonne Bridge in Bayonne. Nearly completed, (except for sections adjacent to industrial features for which alternatives are being considered), the Walkway offers residents and visitors spectacular views of the Statue of Liberty, the New York City skyline, Ellis Island, and the Hudson River.

Visitors to the Walkway engage in a variety of recreational activities including walking, running, biking, sightseeing, and fishing. During the warmer months, people working at commercial and business offices enjoy leisurely lunches outside on benches placed along the Walkway. Children and adults play volleyball and other games at Frank Sinatra Park and additional green spaces constructed as part of the walkway landscape. Recreational fishermen vie for prime fishing spots at piers and at specific locations along the walkway. Joggers, runners, and cyclists use the Walkway to exercise and even commute, avoiding the traffic congestion often found on the busy streets adjacent to the Walkway. Some small beaches have been created which



Biking along the Walkway. Image courtesy of Metropolitan Waterfront Alliance (MWA).

afford the opportunity for swimming and wading in the river.

People are drawn to the open space, views, and community feel of the walkway area. The municipalities adjacent to the walkway encourage visits to the waterfront by sponsoring festivities throughout the year. Jersey City sponsors the Annual Irish Festival, and Hoboken hosts numerous events including Shakespeare in the Park, the Puerto Rican Cultural Festival, the Italian Festival, and an autumn Harvest Festival. By offering such activities, municipalities gain economic rewards while their residents enjoy recreational opportunities and a sharing of a sense of community, belonging, and ownership of the surrounding water and landscape.

Realizing the importance of a continuous linear path along the waterfront, the Department of Environmental Protection is coordinating with local stakeholders and landowners to identify and complete the gaps, or incomplete sections, of the Walkway. The Department is also working to ensure that features such as trash cans, benches, lighting and signage are provided and maintained. Plans for the future include developing an interactive digital map that will facilitate awareness and use of the Walkway by both residents and visitors to the area.

The development of the Walkway not only fulfills the requirements of the Public Trust Doctrine to preserve

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View of the Walkway at Edgewater, NJ. Image courtesy of MWA.

Comprehensive Restoration Plan (from page 3)

opportunities to conduct restoration activities, additional area is required to achieve the ambitious objectives of the program.

A series of Geographic Information Systems (GIS) analyses were conducted to identify additional restoration opportunities. These estuary-wide analyses helped to guide the planning efforts and to estimate whether the Target Ecosystem Characteristic objectives are achievable. For each Target Ecosystem Characteristic, existing datasets were used to identify habitat suitability (appropriate depth, water quality parameters, etc.) as well as potential constraints to ecological restoration. Preliminary findings indicate that sufficient habitat is available for achieving the Target Ecosystem Characteristic objectives throughout the 8 Planning Regions.

Plan Implementation and Management

It is recognized that implementing restoration projects and their associated monitoring programs is costly. Therefore, achieving the objectives will require a substantial dedication of funds and creative funding strategies. Innovative local financing techniques combined with State and Federal

funding opportunities will generate the support necessary to make these projects a reality. Mitigation and/or Natural Resources Damage Assessment funding should also be considered to support restoration projects. At this early stage of planning, accurately estimating project costs for all of the restoration opportunities would be impossible. However, a rough estimate of the costs to achieve the Coastal Wetlands objectives would be between \$2.6 and \$8.6 billion dollars for the short-term objective and \$7.0 to \$22.8 billion for the long-term objective, based on average costs per acre for this type of project. Considering that these are only the costs associated with one of the eleven Target Ecosystem Characteristics, funding to implement all the TECs will be difficult to secure. The success of the Comprehensive Restoration Plan in improving the estuary's ecosystem is dependent upon successful partnering among stakeholders.

Multi-jurisdictional regulatory boundaries present another challenge to restoration planning within the HRE. Resource management agencies are tasked with balancing multiple, often conflicting goals of resource conservation while providing for compatible uses of the environment. Examples of policy issues that should be addressed include: 1) habitat exchange issues, 2) placement of fill

in water, 3) beneficial use of dredged material for habitat restoration, 4) attractive nuisance issues, and 5) issues affecting management of contaminated sediments.

The Comprehensive Restoration Plan is considered a living document which is meant to be updated as projects are implemented so that lessons learned can be incorporated for the use and understanding of all stakeholders.

Next Steps

The Comprehensive Restoration Plan is expected to be released to the public in February 2009, so get ready to help us review and achieve consensus. Remember, the Comprehensive Restoration Plan is intended to be EVERYONE's plan and the blueprint for restoration within the HRE in the future. We hope the HEP and all the region's stakeholders will eventually call the Comprehensive Restoration Plan their own. ❖

Acknowledgement: *Jennifer Curran (HDR Inc.), Peter Wepler and Jodi McDonald (USACE) also participated in the preparation of this article.*

Lisa Baron is the Project Manager for the Hudson Raritan Estuary and Lower Passaic River Restoration Studies within the Harbor Programs Branch of the US Army Corps of Engineers- New York District.

Waterfront Public Access in NY (from page 4)

planning and research on alternative shoreline treatments, such as bio-walls, has blossomed into an implementation pilot at Harlem River Park, currently in construction between 139th Street and 142nd Street in Manhattan. "Designing the Edge" provides a model of alternative techniques to creatively reinvent waterfront infrastructure in urban areas, increasing the usability of the water/land interface by boats, people, and aquatic biota without sacrificing shoreline stabilization. Future "Designing the Edge" projects are being planned to take advantage of anticipated capital reconstruction along the waterfront throughout the five boroughs.

Waterfront Catalyst Program

Underutilized, local waterfront parks are the focus of Partnership for Parks' Waterfront Catalyst Program, which is undertaking community visioning and capacity-building in three groups of city parks: Highbridge Parks in both Manhattan and the Bronx; Astoria and Long Island City Waterfront Parks in Queens; and Red Hook, Coffey and Valentino Parks in Brooklyn. These three very distinct areas envision a relationship to their waterfront differently, but in each case tangible public access and park improvements are being made: restoration and reopening of the High Bridge over the Harlem River has been fully funded; Green Shores NYC has been formed out of the Astoria/LIC Catalyst membership and is undertaking clean-ups and kayaking

events along the Queens waterfront; and Valentino Park and Pier has been rebuilt and serves as a key access point and program venue in this industrial area. Building on \$515,000 in funding provided under the EPF LWRP to build and sustain the Waterfront Catalyst Program, Partnership for Parks has helped leverage and direct more than \$41 million for capital improvements to Catalyst parks since its launch in 2003. ❖

Nancy Welsh is a Coastal Resources Specialist in New York State Department of State's Division of Coastal Resources. As part of her work supervising the Division's New York City Unit, Nancy assists city agencies and their community partners to develop and implement waterfront revitalization projects under the EPF LWRP.

Bird's Eye View Workshops Support NYC Teachers and Educators



Exploring changes to the Estuary.

This past summer, about 65 teachers and educators had fun exploring changes to the NY-NJ Harbor Estuary environment from a bird's eye view. HEP, NY Sea Grant Extension, and Cornell University Institute for Resource Information Sciences co-sponsored two teacher professional development workshops on how to use a variety of geospatial data to track changes to landscapes, shores, and other features within HEP's core area. Project partners in these events included The American Museum of Natural History and the Wildlife Conservation Society New York Aquarium, who hosted the workshops in May and September and generously provided support and other resources.

During the workshops and

Hudson River Waterfront Walkway (from page 5)

access to trust lands but has also created a place that is attractive, suitable for many uses, pedestrian and bicycle friendly, and lively and enticing to visitors. It has improved the quality of life for residents and visitors by encouraging economic and community well being, connecting people to their local land and water environment, and promoting the character, history, and culture of the area. This part of New Jersey is highly urbanized and developed, but the Walkway ensures a connection to the local environment and the community

with contagious enthusiasm, instructors Susan Hoskins and Nordica Holochuck familiarized educators with topographic maps, aerial photographs, satellite images and other geospatial tools. These materials can provide a new way for educators to engage learners in habitat stewardship issues. One of the goals of the workshop was to

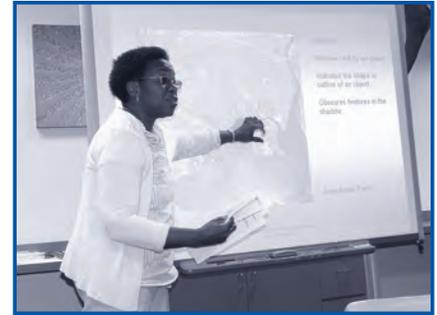
help build "powers of observation" to mine and interpret the vast amount of information (both explicit and implicit) these materials contain. With a little training and comparing present with past images and maps, workshop participants were able to discover changes throughout the Estuary. For example, observing historical and current topographic maps can reveal a story of marshes being filled, beaches eroded or nourished, new roads and buildings being built, and habitat restoration. The day's agenda focused on HEP restoration sites posted on NYC Open Accessible Space Information System (OASIS).

The workshops were very well received and teachers and educators were excited to learn about new tools that they could then bring back to the

through the availability of access and recreational opportunities along the river landscape.

For more information, please contact the author at (609)633-2201 or Tali.Engoltz@dep.state.nj.us ❖

Tali Engoltz works at the New Jersey Coastal Management Office at the NJ Department of Environmental Protection. She works with state and local government and interested stakeholders to facilitate completion of the Hudson River Waterfront Walkway. She also coordinates the NJ Clean Marina Program and two recycling programs for boat shrink wrap and monofilament fishing line.



Sharing observations during the workshop. classrooms, and information to bolster local habitat restoration-related field studies. Most of the resources used during the workshop are publicly available and many are free of charge. A list of some of these resources is provided at www.harborestuary.org/TEwinter09.htm. In addition, kits that include printed examples of US Geological Survey (USGS) and NYS Department of Transportation maps, as well as USGS airphotos and OASIS data used in the workshop are available at a nominal charge from Susan Hoskins (sbh1@cornell.edu or 607-255-4864) or Nordica Holochuck (New York Sea Grant, nch8@cornell.edu or 845-340-3983).

The team plans four additional workshops to take place in 2009 with the New York Biology Teachers Association, Westcher Community College, Westchester Boces, and at a location to be defined in New Jersey. Please stay tuned for date and location announcements to be posted at www.harborestuary.org/communityevents.htm. ❖

Calendar of Community Events

Please check out our new webpage at <http://www.harboestuary.org/communityevents.htm> for a list of NY-NJ Harbor Estuary-related events.

Do you have an event or activity you would like to post? Please fill out the form and we will add it to the list!

Green Darner

Anax junius

This article is part of a series of species profiles commissioned by HEP and compiled by Claire Antonucci, Rosemary Higgins and Peter Rowe (New Jersey Marine Sciences Consortium/New Jersey Sea Grant)

Green darners are an important member of the Estuary's food chain providing food for fish, turtles, frogs and birds and consuming insects, most notably the mosquito. They make their one way migration into the Estuary at the same time that the region's migrating bird populations do and are an important source of food for these birds during a critical time. They also eat copious amounts of mosquitoes, making them natural controllers of this seasonal pest. This quality has earned the green darner the alternate name of "mosquito hawk."

The green darner or common green darner is the largest, most abundant, and widespread of the 200 dragonfly and damselfly species documented in the area of the NY-NJ Harbor Estuary. World-wide, about 6,500 dragonfly and damselfly species are known to exist. Fully grown, the green darner measures about 3 inches long with a 4½ inch wingspan. They are best known for their iridescent green head and thorax. The abdomen is yellow and brown on the female and long, slender, and bluish on the male. Both have clear wings with a yellowish tint towards the back. The wings are strongly veined in a net-like pattern. They have strong jaws, spiny legs, and large compound eyes which give them a nearly 360° range of vision. Most of the green darner's brain is dedicated to processing and responding to what they see.

Green darners can spend several years in the larval form and live only about four to seven weeks as winged adults. As larvae they eat fish eggs, tadpoles and other small aquatic animals. As adults they eat wasps, butterflies and flying insects including mosquitoes and other dragonflies. During their larval stage they are called nymphs. This stage can last for 2 to 3 years. During that time, the nymph will go through 11 to 12 larval stages before metamorphosing into a dragonfly. Once they emerge from the water they are adults and able to reproduce. The females will lay one egg at a time in little slits in submerged aquatic plants.

In the Harbor Estuary, they are most likely to be seen, depending on the weather, from April to early December with a preference for the Estuary's wetland, salt marsh and coastal dune areas.

The Estuary's green darner population is fairly abundant and they seem to face only one threat, the loss of the freshwater habitats in which they breed. ❖



Photo courtesy of Chris Merkord

Would you like to change your address or add someone to our mailing list?

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