

HUDSON RIVER ESTUARY: *Report on Ten Years of Progress*



The Hudson River Estuary Program
New York State Department of Environmental Conservation

George E. Pataki, Governor

Denise M. Sheehan, Commissioner



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Governor George E. Pataki

A legacy to remember

Governor George E. Pataki has made conservation of the Hudson River one of the highest priorities of our administration. Beginning with New York State's first *Hudson River Estuary Action Plan*, which he released in 1996, he has kept an unwavering focus on the river for the last 10 years, reflecting his own passion for the place where he grew up as well as his commitment to the principle that a clean environment and a vibrant economy go hand in hand.

This report details the many accomplishments of the New York State Department of Environmental Conservation (DEC) and our partner state agencies implementing the Governor's vision since 1996. It is a sweeping program which embraces science, planning, protection of natural areas and open spaces, and management of the Hudson's unique natural heritage of fish, plants, animals and habitats.

The human side of managing the Hudson River is as important as the ecological side. The Governor's program for the Hudson has embraced river cities and river users, as you will read in the following pages. Through legislative initiatives and administrative actions, the Governor has taken dramatic steps every year to push forward his agenda for the river. He has launched a proposal to create a world-class research institute on the shores of the Hudson, in Beacon. He has proposed making the Hudson swimmable by 2009, the 400th anniversary of Henry Hudson's voyage of discovery and has allocated funds to make it happen. He has committed to provide new or improved access to every Hudson River community by 2009.

Funding is an important element of the revitalization of the Hudson. When the Governor took office, the Estuary Program operated on a shoestring with an annual \$100,000 budget and a small staff. Since then, the program has matured and grown, working with diverse partners who embrace a unified vision for restoring and conserving the Hudson. The 1996 Clean Water/Clean Air Bond Act provided substantial grants to support water quality improvements, brownfield cleanups and open space programs. The state's Environmental Protection Fund (EPF) has been increased from \$25 million to \$225 million annually, and a budget line for the Hudson within the EPF was created. Governor Pataki negotiated an agreement with the Governor of New Jersey to provide funding for trackdown and cleanup of river contaminants through the New York-New Jersey Port Agreement.

Governor Pataki directed all his state agencies to make the Hudson a priority and to work together as a team to deliver results. Achievable objectives and established systems to track progress were created. In the last 10 years, more than \$373.4 million state and federal dollars have been directed to the rebirth of the Hudson. Agencies that have been active partners in this team

The Hudson River rises in the Adirondacks and flows into the sea at lower New York Harbor. About halfway along this 322-mile journey, the river spills over the Troy dam and becomes an estuary, an arm of the sea that ebbs and flows with daily tides.





Governor Pataki kayaks on the Hudson during the Great Hudson River Paddle. As he enjoys the clean river today, he recalls his childhood, when swimming and fishing in the river were unsafe because of poor water quality.



include the Hudson River Valley Greenway, New York State Office of Parks, Recreation and Historic Preservation, New York State Department of State Division of Coastal Resources, The Hudson River Valley National Heritage Area, The Hudson River Park Trust, New York State Office of General Services, and New York State Agriculture and Markets in addition to New York State Department of Environmental Conservation.

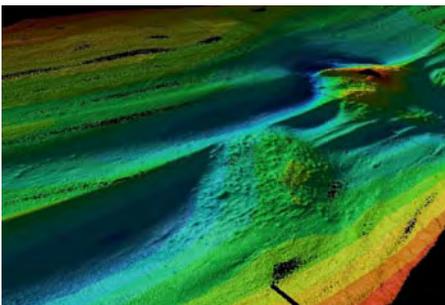
Working effectively with the federal government is also key. The Governor helped secure the support of the United States Environmental Protection Agency (EPA) for cleanup of the Hudson's legacy of PCB pollution and for designating the Hudson as a No Discharge Zone for vessel waste. With his leadership, the Hudson has been crowned an American Heritage River, and the National Heritage Area has become firmly established as a state-federal partnership with the National Park Service.

Last year, the Hudson was a finalist for the Theiss Riverprize, an international award supporting outstanding achievements in river management. Here at home, in the Hudson River Valley, cities and towns have revitalized their waterfronts making the Hudson a miracle of discovery and recovery helped by the new brownfields law advanced by the Governor, and a new water trail. People fish, boat and swim in the river, and school children have learned about its natural cycles. The word estuary was unfamiliar to many valley residents 10 years ago, and now it's part of the common vocabulary.

Governor Pataki's vision of a cleaner river, a healthier ecosystem, and a robust economy throughout the Hudson Valley has been achieved in cooperation with a wide variety of organizations, municipalities, businesses and individuals. As we approach 2009 and the quadricentennial celebration of the early navigators, Henry Hudson, Robert Fulton, and Samuel de Champlain, we also rejoice in a strong Hudson Valley network of people who care passionately about the river today. We celebrate a decade of hard work and creative, productive partnerships. Together, we look forward to a brighter future for future generations of people who love the Hudson River.

A handwritten signature in black ink that reads "Denise M. Sheehan".

Denise Sheehan
Commissioner

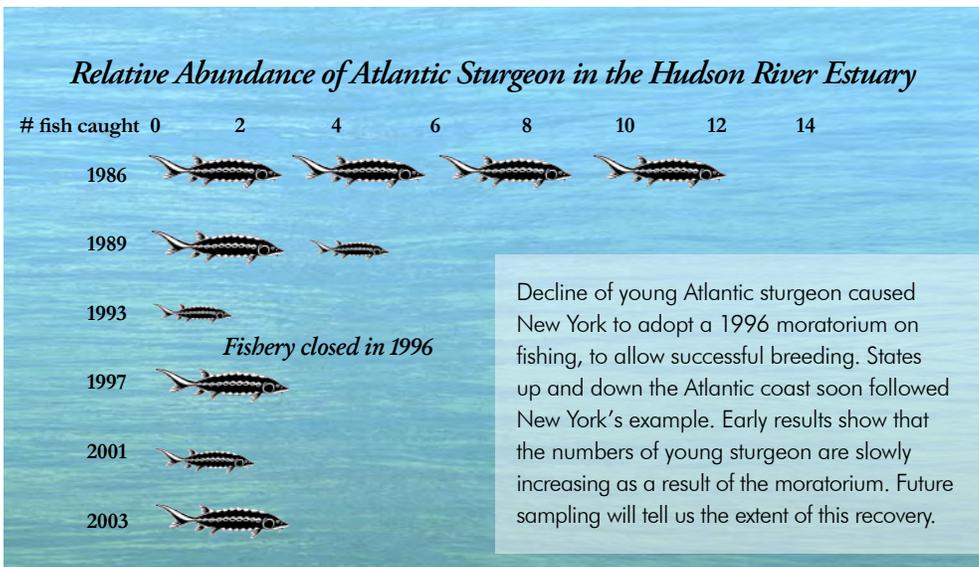
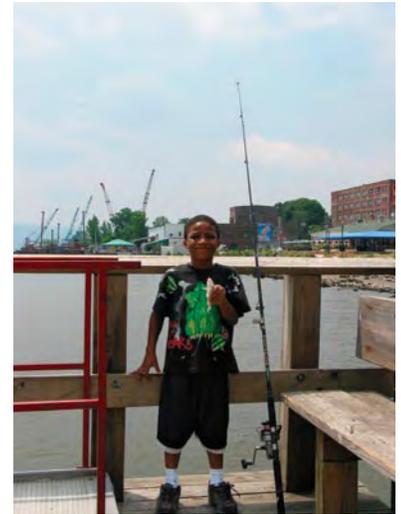


Signature Fisheries

The Estuary Program, with support from many partners, has improved management of shad, sturgeon, and striped bass using state-of-the-art technology.

Fish stocks are in decline worldwide as a result of over-fishing, habitat loss, pollution, and water withdrawals by power plants. Hudson River fish stocks mirror these trends, and biologists are finding ways to rapidly respond. Herring and eels appear to be suddenly decreasing. Shad and sturgeon have been in long-term decline.

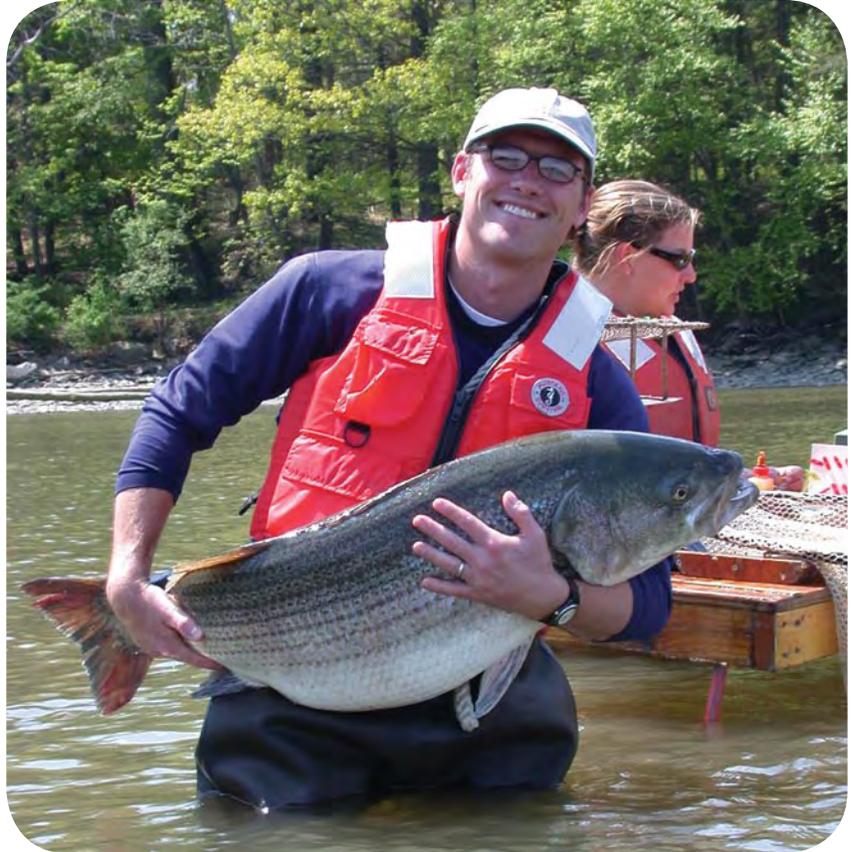
Striped bass, however, are at a hundred-year high due to state and interstate actions to conserve stocks. The Estuary Program and its partners keep a watchful eye on Hudson fish stocks and a “finger on the pulse” of their activity with the goal of conserving the river’s signature species and returning depleted stocks to high levels.



People love to fish the Hudson, as our multi-year survey demonstrated. We counted the people fishing and found out what they catch at different times of the year. The favorites are striped bass and shad, caught only in spring. Blue crab, black bass, yellow perch and white perch are popular in summer and fall. These studies help us understand and manage fishing levels to conserve stocks for future anglers.



More people fish from the shore of the Hudson for blue crabs than for any species except striped bass, yet 10 years ago, we knew very little about them. Since then, we have studied blue crab life cycles and habitat preferences in the Hudson and followed them as they migrate through the Estuary. Results indicate that their population is increasing and that the Hudson may be an important over-wintering area for young crabs.



Ten years ago, the Hudson population of striped bass began its upswing, and the intensity of sport fishing increased as well. To maintain stocks at high levels, DEC increased the minimum size limit for fish that can be kept and provided advice on best catch-and-release fishing methods to keep released fish alive. Today, striped bass are setting size records. The current state record, set in 2003, is a 55-pound Hudson River striped bass, bigger than the one in the photo above.

Ten years ago, the Estuary Program took steps to improve management of signature fish stocks. Biologists in the Hudson River Fisheries Unit of DEC's Division of Fish, Wildlife and Marine Resources studied the natural history and life cycles of Atlantic sturgeon, the fish that symbolizes the Hudson. Using state-of-the-art technology, and supported by many research partners, DEC biologists have found out where the sturgeon go in the Hudson and habitats they prefer. Surveys of shad and striped bass have shown

which factors contribute most to mortality, allowing actions to be taken to manage these fish stocks. DEC also seeks to reduce the number of fish drawn into power plant cooling systems by requiring the best available exclusion technology. Though the New York State Department of Health (DOH) advises caution in eating fish taken from the Hudson, levels of PCBs (polychlorinated biphenyls) in fish are expected to decline as a result of the recently mandated cleanup project on the upper Hudson.



Shad stocks, so abundant in historical records, have diminished in recent years, so the Estuary Program went to work to find out why. Our studies showed that coastal fishing practices reduced the numbers of shad returning to the Hudson to spawn. We pressed for a coast-wide regulation, put into effect in 2005, that outlaws fishing for shad in the ocean.

Websites for more information:

Status of specific Hudson River fish stocks:
 NYSDEC Hudson River Fisheries Unit
www.dec.state.ny.us/website/dfwmr/marine/hudson/index.html

Health Advisories; NYS Department of Health; Chemicals in Sportfish & Game
www.nyhealth.gov/nysdoh/fish/fish.htm

Coast-wide regulations governing migratory fishes;
 Atlantic States Marine Fisheries Commission
www.asmf.org

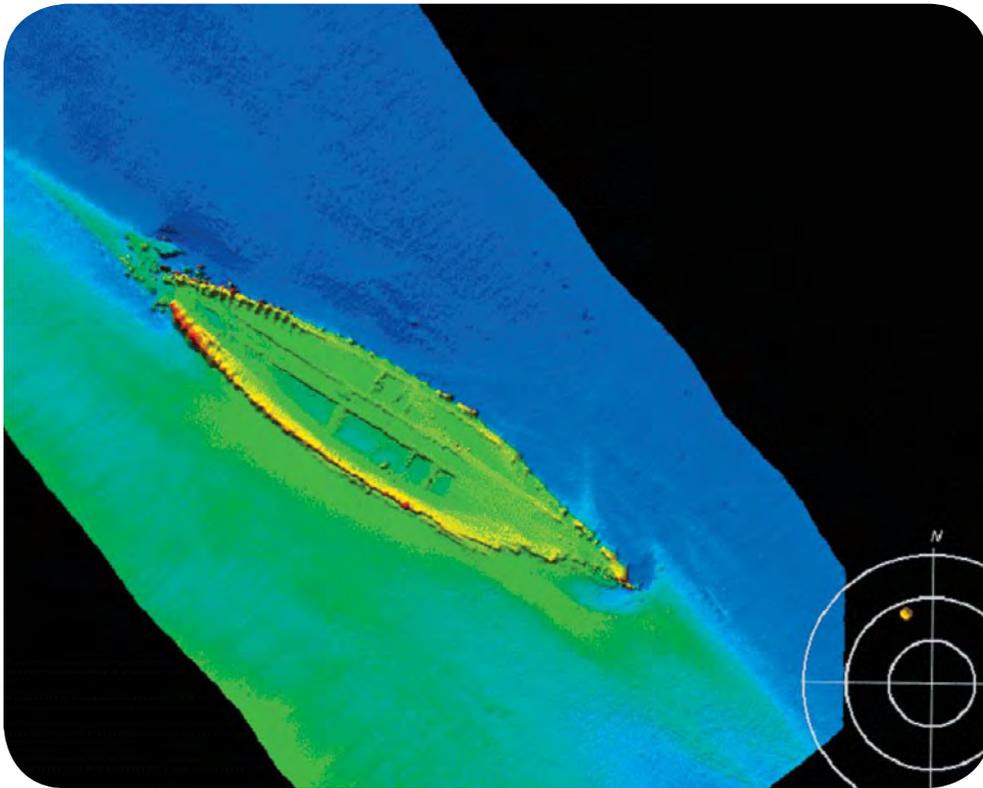
Federal programs: US Fish and Wildlife Service;
 National Marine Fisheries Service
www.fws.gov or www.nmfs.noaa.gov

River and Shoreline Habitats

The Hudson River Estuary Program is currently taking steps to conserve our remaining native species by protecting the habitats on which they depend.

Key habitats of the Hudson ecosystem—wetlands, underwater plant beds, shoreline, and river bottom—have been drastically altered by human actions over the last 400 years. Dredging, filling, rip-rapping and bulk-heading have changed the physical characteristics of river habitats. In addition,

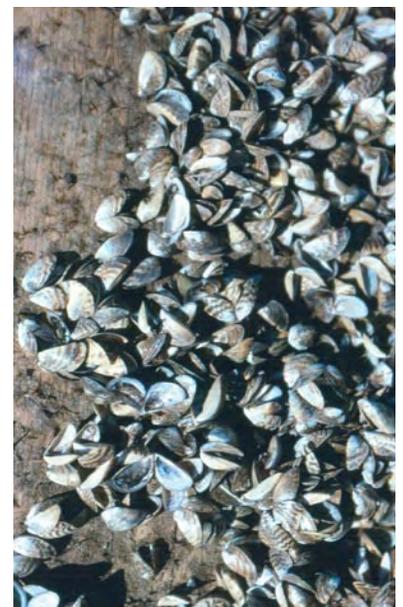
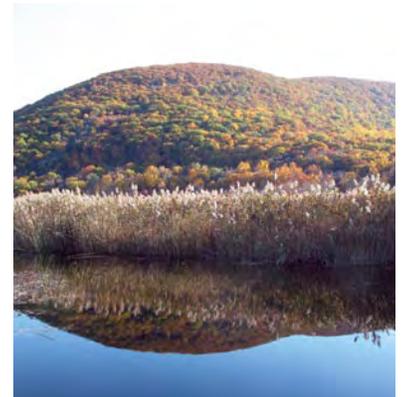
the arrival of new plant and animal species from places as far away as Asia can alter food webs and habitats and their ability to support living creatures. Today, maintaining the quality and quantity of remaining river habitats is crucial to the fish and wildlife of the Hudson.



Amazing new images of the river bottom developed by the Estuary Program are changing the way people look at the river. As a result, we are able to answer key questions about how the river serves as fish habitat, how the bottom changes over time and how contaminants move. This work has also helped historians. This image shows a nineteenth-century schooner. Studies by marine archaeologists suggest that this vessel may have been deliberately scuttled.



Non-native species such as the above water chestnut as well as zebra mussels and phragmites below have profoundly changed Hudson River habitats. Studies by the Estuary Program and its partners show how these species affect the ecosystem, often negatively.



Zebra mussels have caused profound changes in food webs by filtering out most phytoplankton (microscopic plants) and depriving fish of this important food source.



Volunteer kayakers help measure the size and location of aquatic vegetation beds.

Ten years ago, Hudson River habitats had not been comprehensively mapped, making it virtually impossible to protect and manage them. To correct this, we launched an effort to measure the size and location of key habitat types and study how each contributes to the river's life. Working with many partners, biologists in DEC's Division of Fish, Wildlife, and Marine Resources (DFWMR) have mapped 85 percent of the habitat on the Hudson, creating baseline measurements of deep river bottom, submerged aquatic vegetation (SAV), shoreline structure, and tidal wetlands. We have gained a

much better understanding of how and why these habitats are important to the Hudson ecosystem. With this information, we can measure change over time, guide development to less sensitive areas, and assess the potential for restoration and enhancement of certain habitats. We are now informing river users about these habitats so they can become good stewards of these vital resources. Ecosystem research and education is delivered through the Hudson River National Estuarine Research Reserve to promote the use of scientific information by coastal communities.



Submerged Aquatic Vegetation (SAV) provides shelter for blue crabs.



Over the past 10 years, Estuary Program studies have revealed the vital role of aquatic plants in supporting the Hudson's fish populations. Vegetation is an essential part of the Hudson ecosystem, providing oxygen needed by wildlife, sheltering small fish and offering habitat for aquatic insects and other small creatures that form the building blocks of the food web.



Water celery, a valuable native aquatic plant is also shown above right.

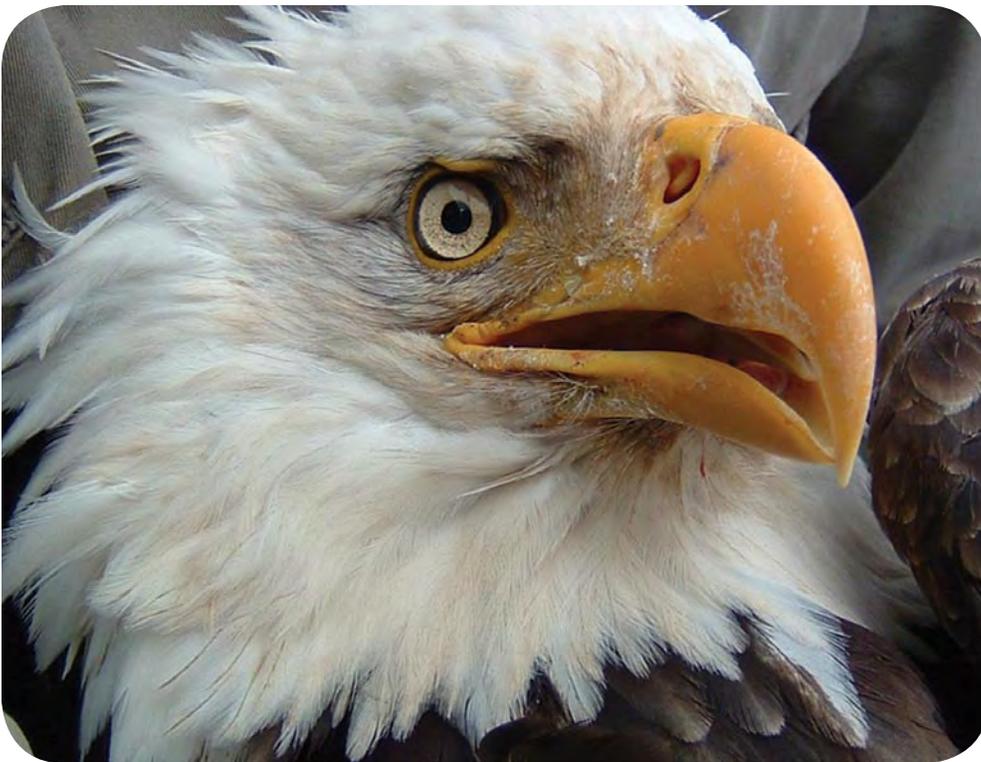
Websites for more information:

River bottom maps: www.benthic.info
Hudson River National Estuarine Research Reserve:
NYSDEC DFWMR Bureau of Marine Resources
www.dec.state.ny.us/website/dfwmr/marine/index.html
NYSDEC Bureau of Habitat
www.dec.state.ny.us/website/dfwmr/habitat/index.htm

To order the tidal wetland interactive map email
HREP@gw.dec.state.ny.us
DOS Division of Coastal Resources
Significant Coastal Fish and Wildlife Habitats
www.nyswaterfronts.com/waterfront_natural_resources.asp

Plants and Animals of the Hudson River Valley

The Hudson River Estuary Program is taking steps to conserve native species of the valley and the habitats on which they depend.



For more than 100 years, no bald eagles nested in the Hudson Valley. In 1997, eagles returned to the shores of the Hudson to breed and successfully fledge their young. The Estuary Program helped track the migratory patterns of Hudson River eagles and study levels of PCBs in this fish-eating bird. We have also purchased shoreline properties that protect their habitat.

The Hudson Valley is a place of great natural beauty, defined not only by its scenery but also by the fall colors of maples, dogwoods and oaks, the songs of red-winged blackbirds, warblers and wrens, and the fleeting movement of wild animals. It is also a station in the great migration pathways of birds, fish and other creatures. However, our extraordinary natural heritage is challenged by changes to the landscape that are happening at a much

faster pace than human population growth, causing habitats to be lost and wildlife variety to decline or disappear from the Hudson Valley forever. This affects the health and survival of people as well. Robust natural areas reduce the spread of disease, reduce the costs of clean drinking water, and provide checks and balances that prevent some wildlife species from becoming pests.



J. Avery/WCS/MCA

Box turtles, barred owls, bears and bobcats have one thing in common. They need large expanses of forest to survive. As woodlands become fragmented, these species decline. The Estuary Program has encouraged villages and towns to adopt local laws that conserve habitat for these species through inter-municipal approaches that help keep forest tracts intact and direct development to the most suitable sites.



Amphibians (frogs, toads, salamanders) are particularly sensitive to pollution and to habitat loss.

Agricultural landscapes like the one below support northern harrisers, bobolink, eastern meadowlark, golden-winged warbler, short-eared owl and several uncommon butterflies. NYS Department of Agriculture and Markets has purchased easements on many Hudson Valley farms to help them remain in agriculture as the region rapidly develops. The Estuary Program has also established demonstration projects for wildlife conservation on farms.



Michael Kemens/LLC

Spotted salamanders, wood frogs, spotted turtles and other species breed in vernal pools—habitats that are generally not protected under state law. Through partnerships, the Estuary Program trained hundreds of citizens to identify these habitats and conserve them locally.

How can we, the earth's human population, conserve the rich natural heritage of plants and animals in the Hudson Valley in ways that support our mutual needs? Ten years ago, the Estuary Program set out to answer that question working through DEC's Division of Fish, Wildlife and Marine Resources. The first step was to determine what is most worthy of conservation and what is most likely to be lost if no action is taken. Using the latest satellite photography and information technologies, DEC and our partners undertook the most extensive biological surveys and habitat mapping of any region of New York State. Wildlife biologists have completed inventories of

reptiles, amphibians, mammals, breeding birds, rare plants, rare animals and exemplary habitats. The second step was to reach out to people who make the decisions about how land is used. Since much of this happens at the local level, we worked with many partners to provide training and outreach to community leaders, builders and landowners to help them better assess and conserve habitats as part of their decision-making process. Protecting habitats will allow a diversity of species to survive and flourish and will support the vitality, natural beauty and environmental quality of the Hudson River Valley.

Websites for more information:

NYS DEC DFWMR
www.dec.state.ny.us/website/dfwmr/index.html

Conservation Guides for sensitive species & habitats:
www.acris.nynhp.org/

DOS Division of Coastal Resources
 Significant Coastal Fish and Wildlife Habitats
www.nyswaterfronts.com/waterfront_natural_resources.asp

NYS Breeding Bird Atlas:
www.dec.state.ny.us/website/dfwmr/wildlife/bba/

NYS Amphibian and Reptile Atlas:
www.dec.state.ny.us/website/dfwmr/wildlife/herp/

NY Natural Heritage Program:
www.nynhp.org

Streams and Tributaries of the Hudson River Estuary Watershed

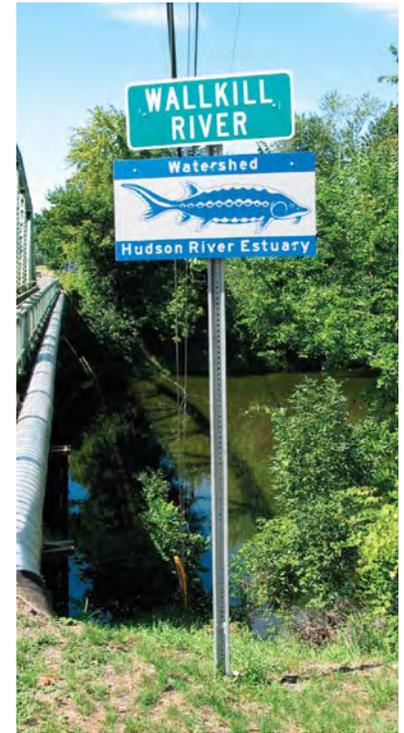
The health of the river is closely linked to the quality of the tributary streams that feed it. The Estuary Program fosters development of local watershed management groups and provides technical assistance.



A stream surrounded by a healthy buffer of trees supports many kinds of fish, birds, salamanders, turtles, crayfish and sometimes river otters. One goal of our stream conservation plans is to maintain or restore forested edges along streams.

Much of the pollution that enters the Hudson today stems from human actions on land, often from far away, that reaches the river through streams. For example, oil and grease from parking lots, fertilizers and pesticides from lawns and fields, and chemicals from landfills all make their way into the Hudson. Pollution isn't the only problem. Paved surfaces keep snow and rain from recharging groundwater. Also, when

it rains, stormwater surges into tributaries, destroying stream banks and habitats. People are affected as well. A heavy rain can destroy houses in flood-prone areas or overwhelm a sewage treatment plant, sending raw waste into a stream or the Hudson. Tax increases for water management improvements and property damage are a frequent result of improper management of water.



Appearing where highways cross tributaries, the likeness of the Hudson River's sturgeon has become the emblem of our conservation efforts. The signs, developed in 1998, remind drivers that protecting water quality in these tributaries is key to preserving the Hudson, its habitats, and its unique fish and wildlife species.



Flooding caused by too much pavement and improper stormwater management can be dangerous and costly to municipalities. These factors also prevent rain from recharging groundwater, affecting drinking water supplies, trees, wetlands and streams. We work with builders, engineers, and municipalities to improve management of stormwater runoff and to adopt local laws that promote conservation.

Five years ago, the Estuary Program created a new watershed outreach initiative working through DEC's Division of Water. The aim has been to promote conservation of streams and tributaries and to reduce the impacts of land use on our water resources. County agencies, universities and local community groups joined in this effort. Now, many municipalities are working with their neighbors in the Hudson Valley to develop watershed management and

stream conservation plans, using strategies to protect and restore water resources. Several towns and cities are also reviewing local laws to better align them with water resource management needs and reduce the effects of stormwater. As public awareness and understanding of the challenges facing our water resources grows, so does the interest and will of citizens, government, non-profits, and academia to preserve those resources.



For seven years, the Estuary Program has partnered with schools and citizens' groups to measure the water quality and biological health of their streams — and to note signs of change.

Websites for more information:

DEC Stormwater Information site:
www.dec.state.ny.us/website/dow/mainpage.htm
 NYS Water Resources Institute
www.wri.eas.cornell.edu
 DEC's Watershed Stewardship site
www.dec.state.ny.us/website/dow/stewop.html

EPA's Menu of Best Management Practices for Stormwater Phase II www.cfpub.epa.gov/npdes/stormwater/menu-ofbmps/menu.cfm
 EPA's Watershed Website
www.epa.gov/owow/watershed
 DOS Division of Coastal Resources
www.nyswaterfronts.com/waterfront_natural_water-quality.asp

Landscape and Scenery

The scenery brings visitors from around the world and serves as an anchor to the region's economic vitality. The State helps local organizations protect this legacy.



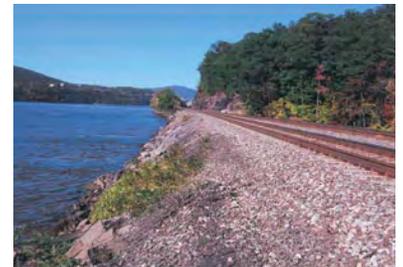
Working together, landowners, municipalities, not-for-profits, and state agencies have conserved magnificent views such as this one, were painted by Frederick Church from his home and studio, Olana. At the same time, they have preserved working orchards and key river habitats. This is a featured site of the Hudson River Valley National Heritage Area.

The people of the Hudson Valley care deeply about the landscape and wish to maintain its working farms, forested hills and valleys, distant views of river and mountain scenery, and vibrant historic villages, towns and cities. The scenery brings visitors from around the world, serving as an anchor to the region's economic vitality. River scenery is varied and ever-changing—from New York Harbor to the cliffs of the Palisades, across the broad expanse of the Tappan Zee and Haverstraw Bay, embracing the drama of the Highlands Gorge, sweeping past the

monasteries and estates of the mid-Hudson to the sand beach islands and gateway cities of the state's Capital District. Authors Washington Irving and James Fenimore Cooper celebrated the Hudson Valley in their works of literature, while painters of the Hudson River School made it a symbol of spiritual mystery. The rapid change and increase of sprawl that erases sense of place is of great concern, even as more people seek to live and work in the Hudson Valley, and the cost of housing increases.



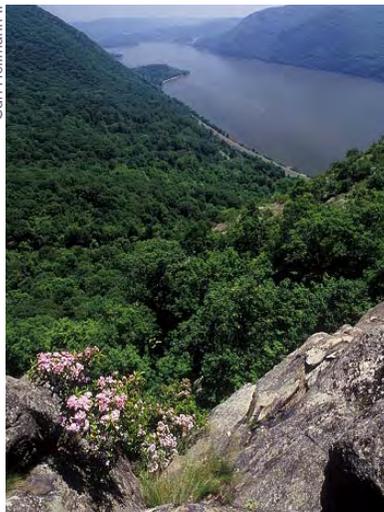
Metro-North Railroad



The Estuary Program teamed with the Metropolitan Transportation Authority's Metro-North Railroad to remove hundreds of derelict utility poles along the commuter railroad right-of-way from Peekskill to Poughkeepsie. The view from the railroad between Albany and New York City is a spectacular panorama of the Hudson. The train passes through towns, cities and villages, farms, forests and fields and past tidal wetlands along the river's banks—against a background of the Helderberg, Catskill and Highland mountains and the Palisades.



Quiet Cove Riverfront Park a 27-acre parcel that was once part of the Hudson River Psychiatric Center in Poughkeepsie is now managed by Dutchess County as parkland



Carl Heilmann II

The purchase of Sterling Forest and other large parcels has helped create a forested green belt in the Hudson Highlands 50 miles from Manhattan, stretching from the New Jersey border to the Connecticut state line.

Protecting the landscape and scenery of the Hudson Valley, while providing for growth, is an important component of the state's program for the Hudson and engages many partners. Since 1996, state agencies have conserved more than 46,000 acres of parkland, wild forest, mountain ranges, working farms and watershed recharge areas throughout the Hudson Valley. The Department of State provides protection to six areas of the valley that have been designated as scenic areas of statewide significance. New York State has helped preserve scenic vistas from historic sites

such as Wilderstein, a landscape designed by renowned nineteenth century architect, Calvert Vaux, one of the creators of Central Park in New York City, and Olana, home of the eminent Hudson Valley painter, Frederick Church. Agency partners include Hudson River Valley Greenway, DEC's Division of Lands and Forests, Quality Communities and the Local Waterfront Revitalization Program of the Department of State, NYS Office of Parks, Recreation and Historic Preservation, NYS Agriculture and Markets, NYS Office of General Services.



Chris Ailing/Scenic Hudson

Waterfront parcels, such as this one at Brandow Point in Greene County, provide habitat for eagles and protect the scenic beauty of the region. New York State has conserved about 4,000 acres of river shoreline since 1996 and an additional 1,400 acres of state lands have been transferred to other agencies for new public uses and conservation, including the Quiet Cove property pictured on the top left and 401 acres on Manhattan's west side, part of the Hudson River Park.

Websites for more information:

NYSOPRHP:
nysparks.state.ny.us/

Hudson River Valley National Heritage Area:
www.hudsonrivervalley.com/

Hudson River Valley Greenway:
www.hudsongreenway.state.ny.us/

Quality Communities:
www.qualitycommunities.org/

DOS Division of Coastal Resources:
www.nyswaterfronts.com

Public Access

Increased interest in river recreation has resulted in new boat launches, trails, fishing piers, and parks, as well as upgrades to older sites.



On the west shore of Manhattan, Hudson River Park stretches five miles from Battery Place to West 59th Street. State investments of more than \$119 million since 1996 create opportunities for jogging, kayaking and river study.

With improvements in water quality, people have rediscovered the river for fishing, swimming, hiking, boating, bird watching or just quietly taking in the magic of an evening sunset or morning fog. Even so, decades of neglect had left many state recreation facilities in disrepair, making it difficult for the public to fully enjoy these activities. In addition, the river can be hard to reach. Along the 153-mile stretch of the estuary, from the Battery in Manhattan to

the head of tide in Troy. Railroad tracks and highways limit access to much of the shoreline, and abandoned industrial sites occupy many sites where access could be possible. It is important to ensure that the public can enjoy river recreation, the reward for investments made in a clean environment, while also conserving sensitive habitats. Improving public access to the river is also an important element of the state's economic strategy for the region.



Haverstraw County Park in Rockland County. The Estuary Program has supported eight new or refurbished boat launches, 14 small craft launches and floating docks, and two fishing piers.



Swindler Cove boathouse built on the Harlem River with state and private grants by the New York Restoration Project.



Above: DEC and the Office of Parks, Recreation and Historic Preservation jointly released a feasibility study about swimming in the Hudson. The study identified improvements needed at existing beaches and listed other places along the river where swimming could potentially take place in the future. Estuary grants have funded improvements to water quality for swimming beaches.



© Ken Allen

The Hudson River Valley Greenway organized a Hudson River Water Trail for canoes and kayaks, with more than 64 day use sites, 58 designated access points and 13 campsites along the river. In 2000, it launched an annual event, The Great Hudson River Paddle, a challenging journey that celebrates the Hudson's designation as an American Heritage River and a National Heritage Area. The Greenway is also establishing a continuous land trail along both shores of the river through voluntary agreements. To date, 190 miles of trail have been designated.



Major support from the Estuary Program made it possible to open Schodack Island State Park and build a modern, new boat launch. A new wetland there is a favorite haunt of eagles and herons.

Since 1996, New York State has redoubled its efforts to establish new or improved river access, including boat launches, docks, piers, and railroad crossings. It has assisted the development of new local parks and waterfront walks. Through state agency programs, almost every river community has received funding or assistance to improve access, and many more facilities are currently being developed. The Office of Parks, Recreation and Historic Preservation

(OPRHP), Hudson River Valley Greenway, Department of State, Hudson River Park Trust and Metro-North Railroad have been agency leaders in this effort, along with DEC. Working closely with local government officials, they have created new opportunities for hiking, picnicking, swimming, fishing, boating, and viewing river scenery. These latest access sites serve as great places for public education programs.

Websites for more information:

NYSOPRHP: nysparks.state.ny.us/

Hudson River Valley National Heritage Area: www.hudsonrivervalley.com/

Hudson River Valley Greenway: www.hudsongreenway.state.ny.us/

Quality Communities: www.qualitycommunities.org/

DOS Division of Coastal Resources: www.nyswaterfronts.com

NYS boat launching sites: www.dec.state.ny.us/website/dfwmr/fish/foe4cbl1.html

Hudson River Valley Greenway Water Trail: www.hudsongreenway.state.ny.us/conserv/watertr.htm

HRPTrust: www.hudsonriverpark.org/

Education

Educating the next generation of New Yorkers is essential to protect and conserve the environment. The Estuary Program supports a network of 25 sites offering river education.

The Hudson River's remarkable recovery since the 1960s, when pollution created dead zones in summer, is largely due to the organized efforts of our informed and concerned

citizens. A continued emphasis on education about the river is essential to our future conservation efforts in New York State.



DEC photo

Estuary Program staff organize the annual Day in the Life of the Hudson event, connecting environmental education centers with schools to compare river data they collect at dozens of sites along the estuary one day in October. Results are posted on: www.ldeo.columbia.edu/edu/k12/snapshotday/



New, eye-catching interpretive signs help visitors learn about the river's history and ecology. This sign in Troy's Waterfront Park describes the annual striped bass journey from the ocean, up the Hudson Estuary, to the Troy dam.

Facilities at the Beacon Institute for Rivers and Estuaries (below) will support teacher training and scientific research. To learn more visit: www.thebeaconinstitute.org/support/



Provided by Beacon Institute for Rivers and Estuaries



Grants to the Hudson River sloop, Clearwater have helped offer educational programs for school children from all backgrounds.

Ten years ago, the Estuary Program launched a program to strengthen education about the Hudson. Through DEC's Division of Public Affairs, we provided technical assistance on exhibits, equipment, and the scientific content of programming at 25 existing educational sites on the Hudson River and in the Hudson Valley. DEC and partner agencies have funded the development of many new facilities and exhibits. Today, a network of local museums, floating classrooms, field stations, and other environmental education facilities provide hands-on river programs with ever-improving teaching tools. In addition, classroom teachers in the Hudson Valley now increasingly include more estuarine ecology in their curriculum. They recognize the potential value of the Hudson River as a focus of study that can help their students meet state learning standards with

engaging programs. Since few teachers and school districts have the expertise, funding, and time to develop effective curricula that take advantage of this potential, the Estuary Program has undertaken an initiative to develop a full range of K-12 Hudson curricula by 2009. Since few teachers and school districts have the expertise, funding, and time to take advantage of this potential, the Estuary Program has offered workshops for educators and developed curriculum materials linked to state learning standards. We create opportunities for thousands of kids to "get wet," experiencing the river environment outdoors. The Hudson River Research Reserve has brought science into the classroom, using data from Reserve sites. The "Teaching Hudson Valley" project of the Hudson River valley National Heritage Area provided training for educators.

Right: Swindler Cove, operated by the New York Restoration Project on the Harlem River, provides a site for river access as well as education programs. Children from the South Bronx and northern Manhattan learn boat building skills, river ecology and gardening. It is one of 25 interpretive centers from Manhattan to Troy that has been enhanced through grants and technical assistance from the Estuary Program.



Websites for more information:

DEC public affairs
www.dec.state.ny.us/website/dpae/index.html

Teaching the Hudson Valley
www.nps.gov/hofr/curriculumdevelopmentgrants/

The Estuary Program web site
www.dec.state.ny.us/website/hoodson/hrep.html

Hudson Basin River Watch
www.hudsonbasin.org/

Hudson River National Estuarine Research Reserve
www.nerrs.noaa.gov/HudsonRiver/

Waterfront Revitalization

The waterfront of the Hudson is being reinvented as a destination for tourism and commerce and as a great place to live, dine and enjoy river scenery.



The NYS Department of State (DOS) Division of Coastal Resources helps riverfront communities develop and implement Local Waterfront Revitalization Programs. DOS has funded 148 Hudson River projects, totaling more than \$23.9 million, since the first Estuary Action Plan was adopted in 1996. In the City of Hudson, a former oil tank farm is being transformed into a beautiful park, shown here in the City's concept drawing. DEC helped with brownfield cleanup programs designed to deal with contamination of old industrial sites and water and sewer lines for the park.

For 150 years, the Hudson was one of the leading industrial rivers in America. The establishment of the interstate highway system, along with shifting national and global economic trends, resulted in the slow abandonment of many river manufacturing sites and led to the decline of river cities. This left contaminated properties and tattered downtowns. Recently, the Hudson Valley economy began to diversify, and

now, a key element of the region's economic strategy is to strengthen and revitalize riverfront communities and waterfront areas as destinations for tourists and as vibrant places to live and work. In the valley's urban areas, this includes returning dormant waterfronts left vacant by the loss and relocation of heavy industry back to productive use with new businesses, a cleaner environment, and recreational opportunities.



Chris Bowser

Investments by several state agencies have brought new vitality to Kingston's Strand district on Rondout Creek, a tidal tributary of the Hudson. Improved water quality, restored bulkheads, refurbished buildings and lighthouses, and new museum exhibits all contribute to the revival of this part of the city.



Michael Nelson/Scenic Hudson

Public and private investments turned the run-down waterfront in Yonkers into a booming destination. Commuter ferries, new waterfront trails, and mixed commercial and residential development made the river the new "front door" of the community.

Michael Nelson/Scenic Hudson



Michael Nelson/Scenic Hudson



Michael Nelson/Scenic Hudson



Through the 1996 Clean Water/Clean Air Bond Act, the state has provided \$15 million for cleanup and reuse of old industrial sites. Investigation or remediation of 32 contaminated sites is under way. This park in Irvington is one of the first successful brownfield redevelopment projects funded by the Bond Act, replacing a lumber yard with recreation facilities. The state's Brownfields Opportunities Areas program provides Hudson River communities with additional funds to help plan redevelopment of former commercial and industrial waterfronts.



©Ken Allen

Riverfront communities have realized new interest in their waterfront parks as destinations for tourists and as a haven for local residents. Above, a family of kayakers relax on the shore in Cold Spring. Storm King Mountain is seen in the distance.

Ten years ago, New York State stepped up efforts to assist local governments, regional organizations, businesses, community organizations, and citizens with improving their river waterfronts in ways that advance economic development opportunities, and protect natural and historic resources. Today, increasing numbers of Hudson River communities have fixed up their waterfronts and returned abandoned industrial sites to

life as parks, trails and new business and home sites. As municipalities adjust to new economic opportunities, many riverfront communities find that environmental conservation plays a key role in successful redevelopment. DEC works with communities to identify sensitive natural resources before development plans are finalized so that adverse impacts can be avoided or minimized.

Websites for more information:

DOS Division of Coastal Resources
www.nyswaterfronts.com

NYSDEC brownfield cleanup program
www.dec.state.ny.us/website/der/bfield/index.html

NYSDOS Brownfields opportunity areas grants www.nyswaterfronts.com/grantopps_BOA.asp

Local Waterfront Revitalization Grants
www.nyswaterfronts.com/grantopps.asp

Hudson River Valley Greenway funding
www.hudsongreenway.state.ny.us/funding/funding.htm

Water Quality

Maintaining high water quality by reducing pollution and eliminating contamination has been one of the Estuary Program's biggest challenges and greatest accomplishments.



Ten years ago, the states of New York and New Jersey agreed to a \$12.4 million river-wide track-down of chemical contaminants, with a goal of reducing sources of pollution that make it difficult and costly to dredge port facilities in the harbor. Since many of these contaminants travel down river in waterborne sediment, it is necessary to learn more about where they come from, and how they move through the river and into the harbor. Phase 1 of this project, now nearing completion, has identified previously unknown sources of toxins, and will soon produce a scientific model that will help predict which sources of contaminants could be cleaned up with the greatest immediate impact.

Until 1965, the Hudson was an open sewer and the symbol of a polluted river. In summer, there were dead zones where state biologists found no living fish. That year, state voters passed the Pure Waters Bond Act, the first step in a stunning 40-year cleanup of the Hudson River. Today, recreational boating and fishing are enjoyed by thousands. Yet trouble spots still remain, especially in the urban areas of the Capital District and New

York City. Sewage treatment infrastructure is failing in some places and inadequate in others. Chemicals, such as PCBs, continue to be detected in Hudson River fish, though the levels are declining. Lead, mercury and DDT in localized areas also affect river life. The disposal of dredged material, needed to keep the New York-New Jersey Port viable, is costly and difficult due to the high level of contaminants in river sediment.



Above: At the urging of New York State, the federal Environmental Protection Agency signed an historic agreement with General Electric Corporation to clean up PCB hot spots in the upper Hudson. This will permanently remove dredged PCBs from the ecosystem of the Hudson, preventing their movement downstream into the Estuary, where they become part of the food chain of important migratory fishes.



DEC works with communities on the Hudson to provide disinfection of sewage waste and halt sewer overflows. More than \$50 million has been spent from New York Harbor to Troy making the river cleaner for fishing, swimming and boating.



Improvements in water quality have led to a resurgence of real estate values as more and more people seek to live, work and play on the river's shores.

Over the last 10 years, state programs have targeted pollution trouble spots. More than \$50 million from the Clean Air/Clean Water Bond Act has been spent on water quality improvements. The first-ever comprehensive track-down of chemical contaminants is under way. Working with the federal government, DEC supports the cleanup of the Hudson's PCB pollution hot spots.

Websites for more information:

PCB project
www.epa.gov/hudson/

DEC, Division of Water
web page www.dec.state.ny.us/website/dow/

NY/NJ Harbor Estuary Program
www.hudsonriver.org/hep/about.htm

DOS Division of Coastal Resources
www.nyswaterfronts.com/waterfront_natural_water-quality.asp

Celebrate Progress and Partnerships

After more than a decade of hard work, New York State residents can celebrate a meaningful legacy for future generations.

So much has changed since 1996! At that time, the word *estuary* was unfamiliar to most valley residents. The program operated on a modest budget of \$100,000 per year.

Many plans for restoring the river had been developed, but not implemented. Agency programs were not coordinated, and no long-range goals had been adopted for the river.



The Hudson River Valley Ramble celebrates National Estuary Day through guided walks, hikes, paddles, pedals, river explorations, and cultural events from New York City to the Capital Region. It also honors the scenic, natural, and historic riches that earned the region its National Heritage Area designation. The Ramble is held during two consecutive weekends in September and draws thousands every year.



The Estuary Grant Program, started in 1999, provides assistance to municipalities and non-profits to implement the goals and objectives of the Estuary Action Agenda. More than \$8.3 million has been awarded to 267 grant recipients for projects throughout the region such as this new dock in Rensselaer.





The Estuary program undertakes many programs to track progress in meeting our goals. With help from the Estuary Program, the United States Geological Survey has established a monitoring station to track the movement of sediment in the river and some of its tributaries. The Hudson River National Estuarine Research Reserve monitors conditions at four stations on the Hudson and surrounding watersheds.



Grants to Bezak Center in Yonkers and partnerships with the county and Scenic Hudson allowed this education center to move to new facilities from a run-down structure next door. A new educational wetland, exhibits and aquariums serve the population of Westchester County.



Boscobel in Cold Spring, is part of the Hudson River Valley National Heritage Area (HRVNHA) designated by Congress in 1996 to recognize, preserve and interpret the historical, cultural and national resources of the Hudson River Valley. The area includes 250 communities in 10 counties bordering the Hudson River, from the confluence of the Mohawk and Hudson rivers to the northern border of New York City. The HRVNHA offers many events and programs that highlight the rich history, culture and landscapes of the valley.

Over the last 10 years, the Estuary Program has built a team for the Hudson River. We have developed a shared vision for its future among local, state and federal agencies, regional planners, private businesses, not-for-profits, and sportsmen. Many partners have adopted the goals of the Hudson River Estuary Action Agenda for 2005-2009 as their own, and we have planned, developed, and implemented hundreds of cooperative projects to achieve these goals. Sustained funding has made it possible to take full advantage of technological advances in mapping techniques and software.

Geographic information systems, radio tracking, side-scan sonar, internet capability and other state-of-the-art techniques have promoted scientific approaches that didn't exist a decade ago. As we move forward, measuring progress in meeting our goals and reporting that progress to the public is an important component of the Estuary Program. We are now developing a performance plan to ensure we will continue to achieve great things for the river and its watershed. The 2009 quadricentennial celebration will be an opportunity to celebrate more than ten years of success and our invaluable partnerships.

Websites for more information:

Hudson River Estuary Program Grants
www.dec.state.ny.us/website/udson/hrep/grants

Hudson River National Estuarine Research Reserve
www.dec.state.ny.us/website/udson/hrnerr.html

RiverScope:
<http://xtide.ldeo.columbia.edu/udson>

Health of NY Harbor:
www.hudsonriver.org/docs/harborhealth.pdf

US Geological Survey:
www.usgs.gov

Beacon Institute for Rivers and Estuaries:
www.thebeaconinstitute.org

DOS Division of Coastal Resources
www.nyswaterfronts.com

Hudson-Fulton-Champlain Quadracentennial
www.ExploreNY400.com

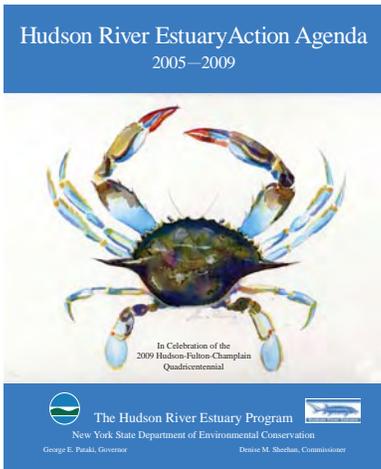
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All photographs are provided by DEC and our partners, except where noted.