

# Hudson River Estuary Action Agenda 2010 - 2014

*"Helping people enjoy, protect and revitalize the Hudson River and its Valley"*



Hudson River Estuary Program  
New York State Department of Environmental Conservation

In partnership with participating federal and state agencies as well as local municipalities, non-profits, universities and businesses.



40 years of stewardship 1970-2010



## **Cover Photo**

*Photo Credit: Chris Bowser*

An annual event, “A Day in the Life of the Hudson River,” involves 3,000 students and teachers as they study the Hudson at more than 60 waterfront sites. Data from this event are compiled and made available online. Throughout the year, teachers participate in trainings and use lesson plans created from the data. The students in this photo attend Public School 51 in Manhattan. Partnered with a Croton school, their class compared data, participated in site visits and benefited from Estuary Program lesson plans. Information on this event is available at:

<http://www.dec.ny.gov/lands/47285.html>

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the Hudson River and its Valley*



Hudson River Estuary Program  
New York State  
Department of Environmental Conservation



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June 2010

## About the Hudson River Estuary Program

The Estuary Program protects and improves the natural and scenic Hudson River watershed for all its residents. The program was created in 1987 and extends from the Troy dam to upper New York Harbor.

Its core mission is to:

- Ensure clean water
- Protect and restore fish, wildlife and their habitats
- Provide water recreation and river access
- Adapt to climate change
- Conserve world-famous scenery

The program is guided by an *Action Agenda*—a forward-looking plan developed through significant community participation up and down the river. It achieves real progress through a collaborative approach that includes:

- Grants and restoration projects
- Education, research and training
- Natural resource conservation and protection
- Community planning assistance

Implementation of the *Action Agenda* relies on partnerships with federal and state agencies, as well as local municipalities, non-profits, academic and scientific institutions, businesses, trade organizations, landowners and dedicated volunteers. The Hudson River Estuary Management Advisory Committee provides guidance to the program, helps the state define goals and evaluate progress, and provides a communication bridge to a wider group of partners and stakeholders. Numerous government partners participate as *ex-officio* members to the committee and help deliver our Action Agenda results. Agency members include:

NYS Department of State	US Army Corps of Engineers
NYS Office of Parks, Recreation and Historic Preservation	US Environmental Protection Agency
Hudson River Park Trust	NY-NJ Harbor Estuary Program
Hudson River Valley Greenway	Interstate Environmental Commission
NY Sea Grant	New York City Department of Environmental Protection
NYS Department of Health	

*The Hudson River Estuary Program: Helping people enjoy, protect and revitalize the Hudson River and its Valley*



New York State  
Department of State



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## ***Foreword***

This *Hudson River Estuary Action Agenda* is the update of our long-range goals and measurable targets for conserving, protecting and revitalizing the Hudson River estuary and its surrounding watershed (the land area that drains to the estuary). It is not a state agency "plan" in the normal sense of the word. Rather, it is a statement of where the state and its citizens want to be. The goals and targets defined here establish a framework for collaboration and recognize the critical roles that local governments, non-profit organizations, federal agencies, citizens groups and a wide range of economic interests need to play to assure they are achieved. Throughout, the process has been informed by participation of the Hudson River Estuary Advisory Committee and its subcommittees, representing scientists, businesses, sports and commercial fishing interests, local and county government officials, environmental conservation groups, academics, educators and others. The challenge inherent in this initiative is to vitalize these interests and the diversity we all represent to achieve common outcomes that will realize long-term benefits for people and nature in the Hudson River Valley. In these uncertain times, our reliance on partners to help deliver these goals and targets is more important than ever. No one organization or agency can fund all the science, all the education, all the conservation initiatives needed to protect and restore the Hudson and its watershed. We hope this updated *Action Agenda* will stimulate the continued emergence of a new, shared vision for the river.

While the focal point of the Hudson River Estuary Program continues to be the tidal portion of the Hudson (from the Troy dam to the Verrazano Narrows), the approach being taken to deliver these diverse ecological and human benefits is watershed-wide in scale and addresses the region's streams and tributaries, scenery, working landscapes and world-renowned natural heritage as well.

Our history gives us confidence that we can achieve this kind of collaboration. There is great progress to report on the Hudson since the program began in 1987. The Hudson is blessed with involved and educated people who care about its future and who bring with them an extraordinary track record of success.

The problems that face us now are unlike the large and definable threats of the past. They are subtle in effect and ubiquitous in origin and include such difficult issues as climate change, loss of biological diversity and the impacts of an emerging suite of new contaminants and invasive species. In a number of key areas of decision-making that affect the conservation of natural resources, New York State and the federal government are not even major players. Like the sources of our remaining problems, the solutions must be found everywhere and must involve everyone.

Setting the goals and targets of the *Action Agenda* is the first step. Once adopted, detailed work plans will be fleshed out, including schedules, budgets and performance-based tracking systems. This process will be an ongoing conversation, updated as we progress, and will continually bring in new partners. As you read this *Action Agenda*, we hope you will consider how your dreams for the Hudson can be woven into a larger strategy for the future of the river. Join with us in bringing about tangible progress for the river valley we all love.

## ***The Hudson River Estuary Program Mission***

### ***Helping people enjoy, protect and revitalize the Hudson River and its Valley***

The mission of the Hudson River Estuary Program is to:

- Ensure clean water
- Protect and restore fish, wildlife and their habitats
- Provide water recreation and river access
- Adapt to climate change
- Conserve world-famous scenery

## ***Selected Accomplishments Since 1996***

Every five years, the Hudson River Estuary Program updates the *Action Agenda* creating a blueprint for the program's activities for the next half decade. Under previous *Action Agenda* goals and commitments, the Estuary Program has made significant inroads in meeting the needs of the river, the valley and the people who benefit from and rely on the health of the river and its watershed for their daily lives and their future.

Since 1996, the Hudson River Estuary Program has dedicated more than two decades to intensive research, adaptive approaches to management, public outreach and the development of partnerships with state and federal agencies, local governments and other involved groups and organizations, all for the betterment of the Hudson River estuary and its surrounding watershed lands. We have much to celebrate!

The following highlights just a few of the program's numerous accomplishments demonstrating how, together, the Estuary Program and its many partners have made a difference for the river and valley we share.

### **Ensuring Clean Water**

- The program's target to achieve swimmable waters was significantly advanced through state grants to municipalities for seasonal disinfection of waste water discharges and the development and implementation of Long-Term Control Plans to address combined sewer overflows (CSOs). The Capital District area, where water quality routinely fails to meet standards for swimming, has been a particular focus, receiving \$2 million in 2008 for planning and engineering studies to address more than 100 CSOs. Updated permits now require municipalities in this area to achieve the goal of swimmable water quality, and grants totaling more than \$15 million have provided funding to help fulfill permit requirements in sections of the river that do not currently meet the swimmable standard. Grants include sewage treatment and effluent disinfection projects in Catskill, Hudson, Rensselaer, the Town of New Baltimore, the Albany County Sewer District, the



Town of East Greenbush, the Village of Castleton-on-Hudson, the Town of Waterford and the City of Glen Falls.

- State grants are assisting many municipalities with the expense of meeting water quality standards on the Hudson in general. To date, \$31.1 million has been spent on priority water quality improvements in the Hudson Valley north of the harbor, leveraging \$28.1 million of matching funds. In the harbor, an additional \$25 million has been spent on water quality improvements, leveraging additional matching funds.
- In 2008, a contaminant reduction model (CARP) was developed in partnership with the NY-NJ Harbor Estuary Program to assess priorities for cleanup, addressing dioxins, heavy metals, DDT and PCBs in water and river sediments. It identified the problems of PCB pollution in the river as the number one chemical contaminant issue to address. In 2009, the General Electric Corporation began a PCB cleanup pilot project which is currently being evaluated. In some cases, during the process of cleanup, dredging operators encountered pure PCB in river sediments some 30 years after the use of these chemicals was banned.
- The entire stretch of the Hudson estuary was designated a “No Discharge Zone” in 2003, prohibiting the discharge of vessel waste from the Troy dam to the Battery in Manhattan. As part of this designation, 15 pump-out stations along the river are now available to recreational boaters.
- The Hudson River Environmental Conditions Observing System (HRECOS) was established in 2008 to gather real-time, internet-accessible monitoring data for the Hudson River. This innovative, state-of-the-art collaboration between DEC, the Hudson River Foundation, the National Estuarine Research Reserve, the U.S. Geological Survey, the Cary Institute of Ecosystem Studies, the Lamont Doherty Earth Observatory and the Stevens Institute of Technology offers, for the first time, a comprehensive look at the river and its responses to changing conditions in a way never before possible.
- The Estuary Program has raised local awareness of how the Hudson Valley’s rivers and streams relate to the Hudson estuary ecosystem and related conservation concerns. As a result, community-based watershed conservation planning and implementation is ongoing in 15 tributary watersheds, supporting the development of a river-stewardship ethic throughout the valley. The Estuary Program has partnered with county and local governments to identify and adopt strategies for protecting water resources, such as the inclusion of better site-design principles in zoning, riparian and wetland buffer protection ordinances and local stormwater laws. Hudson Basin River Watch connects schools and adults to the river through its citizen water-quality monitoring program, and the Hudson River Watershed Alliance (HRWA) has provided a forum for regular public education and outreach programs on a variety of interconnected water resource issues. By 2009, its third year, the Estuary Program’s “Trees for Tribs” initiative protected more than 32,000 feet of stream buffers at more than 70 sites. More than 10,000 native trees, shrubs and grasses had been planted by 1,200 volunteers to protect water quality and stream habitat.

- The Estuary Program has provided extensive assistance to municipalities in the region, helping them understand and implement the new stormwater regulations. The program worked on the new statewide model ordinance and regulations to promote new practices, such as rain gardens, that will recharge groundwater.
- In concert with the Ecosystem Based Management (EBM) principles of the New York Ocean and Great Lakes Ecosystem Conservation Council, which promotes a watershed approach for the entire Hudson River watershed, DEC initiated a Mohawk River Basin Program in 2009. Based on the Estuary *Action Agenda*, an agenda for the Mohawk River, the Hudson's main tributary, was developed. This plan promotes integrated management of the environmental and cultural resources of the Mohawk and its watershed through five key ecosystem goals. It was finalized in 2010 after a period of public involvement and comment.

### **Protecting and Restoring Fish, Wildlife and their Habitats**

- New York State has emerged as a strong voice in assessing stock condition and updating amendments to interstate fishery management plans. The program has enabled DEC to manage fish populations which drive \$7.5 million annually in recreation and tourism expenditures. As a result of these efforts, specifically:
  - The striped bass fishery has increased 10-fold since the mid-80s. With the increase in population comes increased recreational fishing pressure on striped bass and increased pressure on the river herring population for bait.
  - We are beginning to see some recovery in the Atlantic sturgeon population. We monitor the juveniles each year and have noted an increase in the juvenile abundance. We have sonic-tagged 25 adults to learn more about important spawning areas and congregation areas that we can protect. Atlantic sturgeon migration patterns are being revealed through satellite tags.
  - Low-tech, affordable “eel ladders” are being successfully piloted by volunteer and school groups to aid migrating eels in reaching additional habitat areas in tributary streams above human-made barriers.
- Despite extensive measures taken to conserve them, shad populations have dramatically declined; however, DEC adopted a shad recovery plan in 2008 which is now beginning to be implemented.
- In the river, key habitats have been mapped, including the estuary's tidal wetlands, submerged aquatic vegetation beds, more than 2/3 of the estuary's bottom and the shoreline from the Tappan Zee Bridge to Troy. The Estuary Training Program was established and now provides high-quality trainings on habitats, resource management, technical skills and process skills to local decision-makers, community leaders, environmental groups, local land trusts, natural resource managers and regulators.



- In the Hudson Valley, more than 5,000 community leaders have received training to achieve conservation locally. A guide, *Conserving Natural Areas and Wildlife in Your Community*, was published by the program and made available to local leaders. The program provided maps and other biological information to more than 100 municipalities and trained hundreds of community leaders, landowners and managers in how to recognize and conserve biological diversity and significant ecosystems. The first-ever wildlife and habitat monitoring plan for the Hudson Valley was developed to better understand and report the status of important biological resources to state and local leaders. In partnership with the Natural Heritage Program, mapping of the Hudson Valley's biodiversity resources documented for the first time the global, regional and statewide significance of the area's plants and animals. This revealed hundreds of new rare-species occurrences, globally significant turtle habitat and close to three-quarter-million acres of key ecosystems. Habitat staff and many partners joined forces to prevent or control regional invasive species.

### Providing Water Recreation and River Access

- The goal of providing new or improved access in every community has almost been met. Seventy-six estuary grants have been awarded for local trailer and hand launches, fishing piers and shore fishing, trails and shoreline access and swimming and other water-related recreation, as well as additional projects by DOS, OPRHP and the Hudson Valley Greenway. In 1998, the Estuary Program released the *Boating Needs and Opportunities Plan*. As a result, three new launches that accommodate boats with trailers were built to serve areas in need, and renovations were made to four major boat launches. Cooperative state agency action improved fishing access to the river via the railroad tracks at nine Metro-North access points. Examples of projects directly funded by DEC through the Estuary Program include the following:
  - Boat launches and fishing piers at Schodack Island, Verplanck, Peekskill, Haverstraw, Bethlehem, Staatsburgh, Athens and Coxsackie
  - Fishing platforms at the Yonkers Greystone and Riverdale train stations
  - A fishing-access CD released in 2007 that provides information on the location of boat launches, maps and an inventory of facilities available at each site
- The Estuary Program has provided technical assistance and funded nearly 120 projects to develop a network of more than 20 environmental education sites along the Hudson with high-quality exhibits, facilities and programming.
  - The river-wide effort, "A Day in the Life of the Hudson River," has completed six years of sampling and now brings more than 3,000 participants (students, teachers, educators) from more than 60 schools to the river at more than 50 sites, from New York City to Troy, enhancing the quality of teaching about the Hudson and making it easier for partners to share resources and learn from each other.



- New York State standards-based curriculum developed by the Estuary Program is now being used by classroom programs underway in 40 Hudson Valley schools and by the “Teaching Hudson Valley” initiative of the Hudson River Valley National Heritage Area.

## **Adapting to Climate Change**

- The 2006 conference, Climate Change in New York's Hudson Valley, sponsored by the Estuary Program, attracted more than 350 local decision-makers. The Hudson Valley region is now piloting measures to adapt to climate change on a regional scale, with participation from multiple state, local and community agencies.
- 36 municipalities in the Hudson Valley have adopted the ClimateSmart Community Pledge, and a handbook is now being developed to assist them. Regular Hudson Valley Climate Network meetings provide a forum for coordination of climate action in the valley. More than 40 organizations, including local officials, universities, not-for-profits and businesses, participate.
- Scientists at Cornell University have developed a preliminary study to determine the relative impact of rain storms, sea level rise and storm surge on water levels in the estuary. The study predicted that heavy rainfall would primarily affect the northern reaches of the estuary, whereas sea level rise and storm surge would affect the entire estuary up to Troy.
- The Estuary Program is working closely with the Office of Climate Change, DEC regional offices, NYSERDA and the Department of State to develop guidance on how local governments can reduce greenhouse gas emissions and begin to adapt to climate change. Multiple state agencies have participated in the development of climate change scenarios in partnership with The Nature Conservancy's Rising Waters Project and are helping to coordinate the efforts of the state's Sea Level Rise Task Force, which will produce recommendations for the Legislature to respond to sea level rise in New York by the end of 2010.



## **Conserving World-Famous Scenery**

- In the ten Hudson Valley counties that border the estuary from the Troy dam to New York City, state programs have conserved more than 46,133 acres of scenic vistas, habitats and pastoral landscapes since 1996, including more than 3,500 acres of land along or in sight of the Hudson. Nine communities have completed or are developing open space plans through the Estuary Grants Program, and several others have adopted funding mechanisms to conserve local open space. Eight acquisition-easement grant projects have been completed or are underway to help protect valuable local open space resources.



## ***About the Action Agenda 2010-2014***

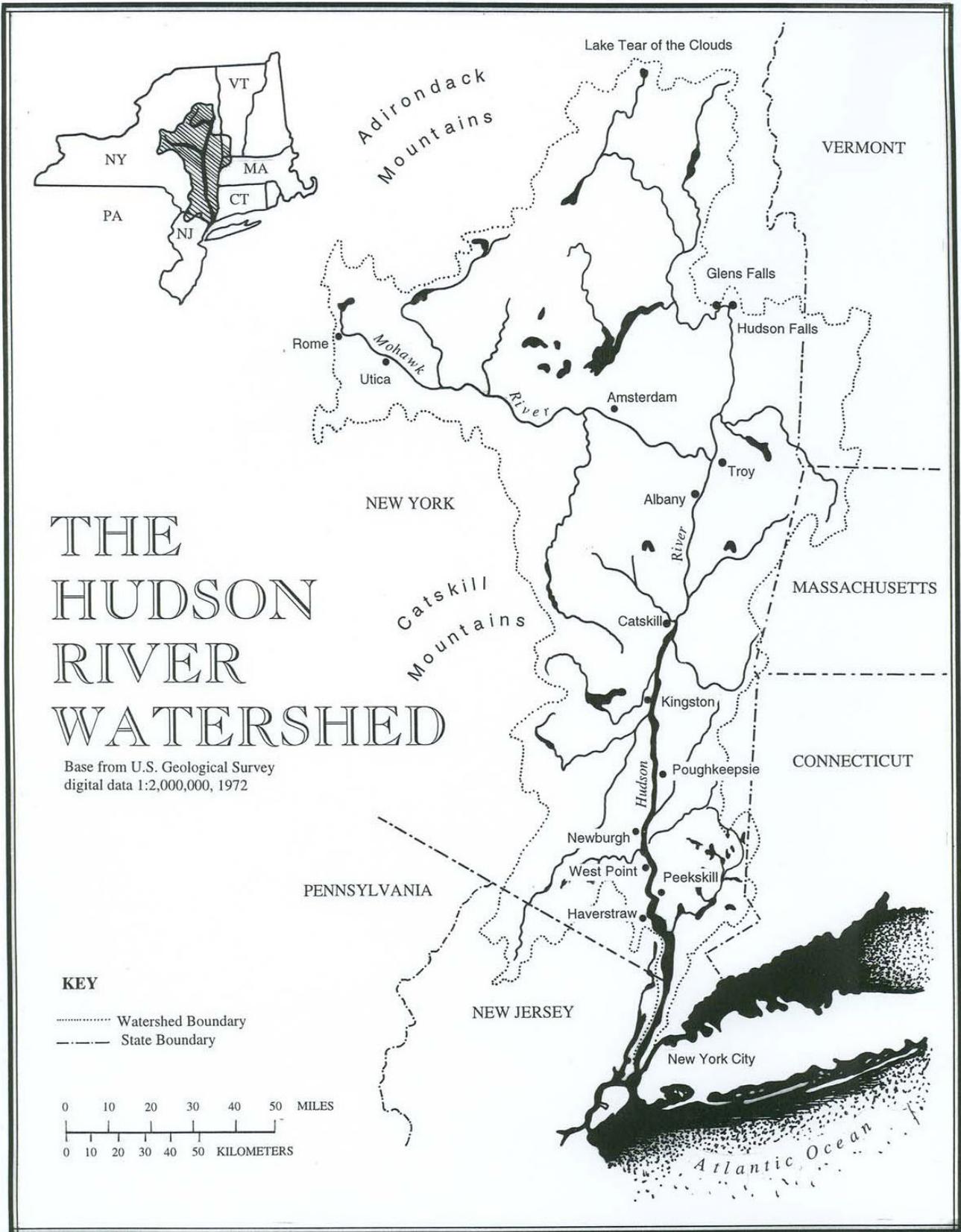
In 1987, the New York State Legislature passed Section 11-0306 of the Environmental Conservation Law. Known as the Hudson River Estuary Management Act, this law directs DEC to develop a management program for the Hudson River Estuarine District and its associated shorelands. Starting in 1996, the Estuary Program developed and has progressively updated an ambitious agenda for the Hudson estuary through a series of multi-year action agendas within the context of the program's mission to:

- Ensure clean water
- Protect and restore fish, wildlife and their habitats
- Provide water recreation and river access
- Adapt to climate change
- Conserve world-famous scenery

The *Action Agenda* contains 12 long-range goals for the conservation and recovery of the Hudson estuary and its watershed. For each goal, actions to be completed by 2014 have been identified, as well as long-range targets that look ahead to the year 2020 and in some cases, beyond. Select goals, such as Goal 1-Signature Fisheries, have an immediate and evident connection to one of the five focus areas of the program's mission, while other goals, such as Goal 8-Education, Goal 9-Waterfront Revitalization and Goal 12-Celebrate Progress and Partnerships, serve multiple aspects of the program's mission. All targets are of equal importance regardless of the order in which they appear.

In implementing the *Action Agenda*, we seek to engage many partners in restoring the Hudson's extraordinary natural heritage and its setting of scenery and mystique. State agency partners in the program include: DEC, as project manager; NYS Office of Parks, Recreation and Historic Preservation (OPRHP); NYS Department of State (DOS); the Hudson River Valley Greenway; NYS Office of General Services (OGS); NYS Department of Transportation (DOT); NYS Office of the Attorney General; Empire State Development Corporation; the Interstate Environmental Commission, and Metro-North Commuter Railroad.

Members of the Hudson River Estuary Advisory Committee listed in Appendix A are some of our many non-governmental partners. Local governments along the estuary, from the Troy dam to the Verrazano Narrows and the State of New Jersey, also take part. Federal agencies, such as the Environmental Protection Agency (EPA), Army Corps of Engineers (ACOE), Department of Commerce—including National Oceanic and Atmospheric Administration (NOAA), and Department of Interior (DOI)—including the US Fish and Wildlife Service (USFWS) and the American Heritage Rivers Program, also have a stake in the plan and participate actively. Cornell University and the New England Interstate Water Pollution Control Commission play a key role in research and coordination of the program.



## ***Geographic Area and Environmental Setting***

The Hudson River estuary, from the Troy dam south to the Verrazano Narrows and the surrounding watershed, also known as the Hudson River Valley, is the focus of this program. This geographic area includes the 153-mile-long, tidal, main stem of the Hudson River, as well as upper New York harbor, the Hudson's tributaries and the upland areas of the Hudson Valley, encompassing 5,200 square miles of the river's overall 13,400-square-mile watershed. The Estuary Program also gives consideration to pertinent issues in the non-tidal Hudson River, including the river and its tributaries above Troy, the Mohawk River, lower New York harbor, the New York/New Jersey Bight and the waters of Long Island Sound as they influence the estuary and its resources.

The Hudson River estuary has long been recognized as a valuable state and local resource, as well as an integral part of the North Atlantic coastal environment. The estuary serves as a spawning and nursery ground for important fish and shellfish species, such as striped bass, American shad, Atlantic and shortnose sturgeon and blue crab. More than 200 species of fish are found in the Hudson and its tributaries. The estuary contains the only significant acreage of tidal freshwater wetlands within the state. These wetlands, along with the river's brackish tidal wetlands and stands of submerged aquatic vegetation, provide essential habitat that supports the Hudson's rich and biologically diverse web of life. More than 16,500 acres of river habitat along the stretch from the Troy dam to the southern Rockland-Westchester County line have been designated "significant coastal fish and wildlife habitat" by DEC and the New York State Department of State. The New York Natural Heritage Program has identified numerous sites where rare plant and animal species and exemplary natural communities occur. The Hudson Valley is particularly important globally for its diverse assemblage of turtles. In addition, 20 pairs of bald eagles are nesting and raising their young along the shores of the river. The estuary also serves as an important resting and feeding area for other migratory birds such as osprey and a variety of songbirds and waterfowl.

The Hudson estuary serves one of the most densely populated areas in the country. Its north end is flanked by the cities of Albany and Troy. Numerous smaller communities are located along both banks of the river to the southern Rockland-Westchester lines. From there south, the greater New York Metropolitan area, with its estimated population of 8 million, dominates the landscape. Nearly one-half of the population of New York State lives within the 15 counties bordering the estuary, the largest proportion being located in the New York City area. Part of New Jersey's major metropolitan area, likewise, borders the estuary.

Human use of the estuary dates back 8,000-10,000 years before European settlement. Today, the estuary is used for commercial navigation, recreation (including boating, fishing, swimming and wildlife observation), commercial fishing, municipal drinking water supplies and as a source of inspiration. Several major power generating facilities, manufacturing plants, petroleum terminals, cement and aggregate plants, resource recovery facilities and various mining operations are located along the banks of the estuary. Railroad tracks hug the shores of the river on the east, from Manhattan to Rensselaer County, and on the west, from Haverstraw State Park in Rockland County to central Ulster County.

## ***Hudson River Estuary Action Agenda Goals 2010-2014***

### ***Helping people enjoy, protect and revitalize the Hudson River and its Valley***

1. Restore the **signature fisheries** of the estuary to their full potential, ensuring future generations the opportunity to make a seasonal living from the Hudson's bounty and to fish for recreation and consume their catch without concern for their health
2. Conserve, protect and enhance **river and shoreline habitats** to assure that life cycles of key species are supported for human enjoyment and to sustain a healthy ecosystem
3. Conserve for future generations the **rich diversity of plants, animals and habitats** that are key to the vitality, natural beauty and environmental quality of the Hudson Valley
4. Protect and restore the **streams**, their corridors and the watersheds that replenish the estuary and nourish its web of life, and sustain water resources that are critical to the health and well-being of Hudson Valley residents and the ecosystem
5. Conserve key elements of the working pastoral **landscapes and world famous river scenery** that define the character of the Hudson River Valley, and provide new and enhanced vistas where residents and visitors can enjoy Hudson River views
6. Address the causes of **climate change** in the Hudson Valley and prepare for projected impacts to safeguard our health and safety and to protect the natural resources and local economies that sustain our communities
7. Develop, maintain and improve a **regional system of access** points for fishing, boating, swimming, hiking, education, river watching and wildlife-related recreation, and build connections that allow residents and visitors to have rich and diverse river experiences
8. Promote **public understanding of the Hudson River**, including the life it supports, its role in the global ecosystem and the challenges the river faces and how they can be met
9. **Revitalize all the waterfronts** of the valley so that the Hudson is once again the "front door" for river communities, where scenery and natural habitats combine with economic and cultural opportunity, public access, working ports and harbors and lively adjacent downtowns, to sustain vital human population centers and a healthy environment
10. Ensure that **Hudson River water quality supports appropriate human benefits**, including drinking water, swimming, fishing, navigation and ecosystem protection
11. Reduce **contaminants** entering the Hudson River, and remove or remediate river sediments contaminated by long-term pollutants so that food webs of the river are supported, people can safely eat Hudson River fish and harbors are free of the contaminants that constrain their operation
12. Track our **progress and celebrate** our successes

## Goal 1: Signature Fisheries

### Goal

Restore the **signature fisheries** of the estuary to their full potential, ensuring future generations the opportunity to make a seasonal living from the Hudson's bounty and to fish for recreation and consume their catch without concern for their health



### Challenge

The fisheries of the estuary depend upon a healthy environment as well as effective management strategies to ensure their continued role in a balanced and sustainable ecosystem. Ensuring full enjoyment of the estuary's fish and crabs, now and into the future, will require management actions to maintain and, in some cases, restore populations, protect habitat and reduce unnecessary mortality. This will require partnerships with federal agencies, Atlantic coastal states, local anglers and others, to ensure that state and federal plans are carried out.

The status of the Hudson's more popular species is mixed. American shad, river herring, American eel and largemouth bass are currently in decline. The effects of the decline of American shad and river herring threaten the long-term viability of commercial fishing, which has existed on the Hudson for hundreds of years. Striped bass, having successfully recovered, face increasing fishing pressure that requires careful management to maintain appropriate levels of abundance to provide a quality and economically viable fishery. In 1980, the state promised the commercial fishing community that the striped bass fishery would reopen once PCB levels declined sufficiently. It is time once again to re-evaluate whether this is possible.

During the past 30 years, the shortnose sturgeon population appears to have increased, yet there is still a need to track future changes. Blue crab and smallmouth bass are increasing popular fisheries, but data gaps leave these species open to risk. Changes in forage fish distribution and abundance need to be investigated, as they are an important food source for popular fishes and are part of a balanced ecosystem. Oysters, once sought after as a delicacy, are now found only occasionally in the estuary and are not edible due to biological contamination. The reason for their disappearance is poorly understood. Improved water quality and growing public interest have stimulated resource managers to consider re-cultivation of oysters within the river's main stem.

Advisories regarding the consumption of Hudson River fish continue. These public health warnings are based on unacceptable levels of toxic chemicals and heavy metals in many fish and crabs and pathogens in oysters. Actions have been taken to reduce cadmium sources and are now underway to reduce PCBs in river sediments and control sources for mercury. The presence of other low-level contaminants in the water which affect the survival of fish during sensitive life stages must be addressed. An emerging suite of contaminants, including pharmaceuticals, endocrine disruptors, certain musks and scents and some disinfectants, have the potential to impact biota. Response to these newly identified threats will require a collaborative approach with other state and federal regulatory agencies.

To meet our goal of ecosystem management, better information is needed to understand the link between fish and their environment. Goals 1 and 2 (river and shoreline habitat) will begin to identify characteristics of important fish habitat. Any changes in habitat, whether it be a change in submerged aquatic vegetation related to water clarity or a rise in sea level related to climate change will affect the fish. Understanding the links that draw fish and habitat together will allow management to be more adaptive to the uncertainties that may lie ahead. More focus will be given to the watershed's streams and tributaries [links to goal 4], important areas for spawning, feeding and over-wintering for many fish species such as river herring, largemouth bass and smallmouth bass. To ensure the long-term protection of river fish and their environment, it is necessary to engage and educate valley residents so they develop a clear understanding of what needs protection and why [links to goal 8]. New volunteer herring and eel monitoring programs established in 2008 give local residents a sense of ownership to "watch over their stream." Educators are using fish research projects as teaching tools for local high school students. These kinds of experiences will be developed and continued.

### **Goal 1: Long-Range Targets and Immediate Actions Planned for 2010-2014**

To achieve the goal of restoring the signature fisheries of the estuary to their full potential, we plan to implement specific actions by 2014 within the context of long-range targets that address the following four themes:

1. Effectively managing migratory fish
2. Conserving and understanding resident fish
3. Conserving and enhancing crustaceans and shellfish populations
4. Reducing in-river impacts to river biota

**Long-Range Target 1 - Effectively Managing Migratory Fish:** By 2050, restore or maintain the Hudson's historic stocks of migratory fishes to levels that will support sustainable, economically viable fisheries through effective participation in coastal management and implementing ecosystem approaches to understand habitat use, increase available habitat, and examine food webs to account for complex species interactions [links to goals 2, 4, 6, 10 and 11]

#### **Target 1: Actions Planned for 2010-2014**

- **American shad:** Implement objectives of the ongoing shad recovery plan adopted by New York State in 2008, including:
  - Annually monitor relative abundance and mortality rate, identify sources of mortality and prioritize management actions to reduce mortality and stimulate shad recovery
  - Study food web changes in the Hudson ecosystem that may affect shad recovery
  - Identify habitat use and habitat restoration opportunities
- **River herring:** Develop a recovery goal and develop and implement a recovery strategy to meet newly developed interstate management requirements, including:
  - Sample stock status annually

- Implement harvest restrictions to reduce mortality and waste; identify and reduce ocean bycatch losses
- Characterize habitat, and study food web changes
- Expand volunteer monitoring to better understand adult spawning runs
- **Atlantic sturgeon:** Complete a three-year study of adult Atlantic sturgeon habitat use and migration patterns to identify and characterize critical habitat. Continue to track the progress of recovery efforts achieved under the moratorium
- **Striped bass:** Annually monitor abundance and mortality rates of the spawning stock, and monitor recreational harvest to facilitate detection and documentation of change. Re-evaluate the feasibility of a limited, commercial striped bass fishery on any portion of the Hudson River
- **American eel:** Identify threats, establish regular monitoring and expand volunteer participation. Develop projects to lessen existing estuarine and tributary threats to American eels, and develop a recovery plan

**Long-Range Target 2 - Conserving and Understanding Resident Fish:** By 2014, initiate development of programs to monitor the relative abundance of resident fish species and identify critical habitat used [links to goals 2, 4, 6, 10 and 11]

#### **Target 2: Actions Planned for 2010-2014**

- **Shortnose sturgeon:** Continue to support state and federal protection of this species; initiate methodology for tracking shortnose sturgeon seasonal habitat use of the Hudson River Estuary and develop methods to determine that the population remains stable at an optimal level
- **Smallmouth and largemouth bass:** Determine whether the smallmouth and largemouth bass recreational fishery can be restored to the nationally renowned levels of the mid-1980s
  - Assess habitat condition and use for both species
  - Continue annual tournament monitoring to track changes in fish abundance and size
- **Forage fish:** Determine status and trends in relative abundance of resident and migratory forage fish species (white perch, Atlantic tomcod, killifish, spottail shiners, silversides and bay anchovies) of the Hudson estuary

#### **Long-Range Target 3 - Conserving and Enhancing Crustaceans and Shellfish**

**Populations:** Develop restoration goals and necessary monitoring to ensure an optimal fishery for blue crabs, and reestablish small oyster populations in the Hudson for ecosystem benefits [links to goals 2, 4, 6, 10 and 11]

### **Target 3: Actions Planned for 2010-2014**

- **Blue crab:** Implement studies to identify and characterize critical over-wintering habitat, summer movement and habitat use and factors affecting year class production
- **Oysters:** Conduct pilot projects to establish oyster populations where feasible

**Long-Range Target 4 - Reducing In-River Impacts to River Biota:** By 2020, demonstrate reduced PCBs and mercury in fish and cadmium in blue crabs and reduced fish kills from all types of existing water withdrawals that use once-through cooling systems [links to goals 6 and 10]

### **Target 4: Actions Planned for 2010-2014**

- **Contaminants in fish:** Working through the Pollution Reduction Team, adopt measures that will significantly reduce inputs of PCB, cadmium and mercury to the aquatic environment from local or regional inputs and aerial sources
  - Continue to support federal actions implemented in 2009 to remove PCB-contaminated sediment by dredging
  - Complete assessment of cadmium sources affecting the safe consumption of crabs
  - Evaluate emerging contaminants as potential concern to the Hudson River environment
  - Provide periodic surveillance (e.g., every five years) of PCBs, mercury in fish and cadmium in blue crab
- **Water-withdrawing facilities, power-generating plants:** These actions will reduce unnecessary mortality by minimizing fish kills at existing and future water intakes.
  - **Power-generating plants:** Effective immediately, reduce or have schedules to reduce fish kills at the four remaining steam electric power plants that use once-through cooling systems by imposing the “best technology available” standard pursuant to 6 NYCRR§704.5 and §316(b) of the Clean Water Act, which both call for minimizing adverse environmental impacts. Require that future Hudson River power-generating facilities have closed-cycle cooling systems
  - **Other industry using cooling systems:** Effective immediately, reduce or have schedules to reduce fish kills at all industrial facilities that use once-through cooling systems by imposing the best technology available standard pursuant to 6 NYCRR§704.5 and §316(b) of the Clean Water Act, both of which call for minimizing adverse environmental impact. Require that future Hudson River industrial facilities requiring cooling systems have closed-cycle cooling
  - Reduce fish kills for all types of future water withdrawals compared to the impacts of unmitigated intake structures

## ***Goal 2: River and Shoreline Habitats***

### **Goal**

Conserve, protect and enhance **river and shoreline habitats** to assure that life cycles of key species are supported for human enjoyment and to sustain a healthy ecosystem



### **Challenge**

The Hudson River estuary's diverse habitats—the wetlands, the aquatic plant beds, the shoreline and the bottom of the river itself—are vitally important to the estuarine ecosystem and provide recreation, improved water quality and scenic amenities to humans. Deep-water habitats are havens for many life stages of fish, shellfish and invertebrates that enrich the food chain and help cycle nutrients and sediments. Submerged beds of native aquatic vegetation in waters less than six-feet deep enrich the water column with dissolved oxygen, serve as sheltered nurseries and provide food for fish and crabs. Tidal wetlands, washed by the steady rhythms of high and low tides, buffer our shores, export food to the main river, recycle nutrients, trap contaminants, support countless forms of life and provide important recreational opportunities. The shoreline is a vital connector, corridor and habitat for life that moves between land and water, navigating the vital edge.

These Hudson River estuary habitats are home to a wide variety of plants and animals that are important within New York State and beyond. Conservation priorities include:

- Globally rare freshwater tidal wetlands that provide essential habitat for river otter, turtles, bald eagles and other raptors, marsh wrens and herons, crayfish and dragonflies and blackbirds
- Brackish tidal wetlands that shelter diamondback terrapins, fiddler crabs, rails and killifish
- Shallows and submerged aquatic plant beds that support blue crabs, bait fish, ducks, osprey, striped bass and American shad
- Natural shorelines that provide a vital transition zone between water and land and foraging grounds for sandpipers, land mammals and a host of fish
- River bottom needed by sturgeons, hogchokers, native mussels and oysters
- Tributary streams accessible to river herring, American eels and other animals that are declining throughout the Northeast

These habitats support extraordinary biological diversity and provide important benefits to humans, yet habitats have been diminished, damaged and disconnected by human patterns of development during the last 150 years. Vast areas of river bottom have been dredged to create and maintain a shipping channel. Tidal wetlands and shallows have been filled, and, in some areas, fill covers a third of the river's original surface area. Nearly half the Hudson's shoreline has been straightened and hardened by human-made structures. Compounding these losses are impacts from sea-level rise and climate change which threaten shoreline and shore communities where water may rise faster than

habitats can build up sediments to keep pace. Also, human responses to sea-level rise and increased flooding may include building dikes which will prevent habitats from migrating landward. Finally, the ongoing accidental and deliberate introduction of invasive plants and animals continues to threaten native species and their habitats.

For habitats to be effectively protected in regulatory activities under articles 15, 24 and 25 and other conservation decision-making processes, we must understand river habitat trends and threats. Also, an awareness of habitat status and trends, restoration opportunities and best management practices must be developed among key decision-makers, including resource managers, community leaders, shoreline land owners, regulators, contractors and river users and other citizens. To accomplish this, information must be accessible in formats that are user friendly, with technical assistance available so that managers can use existing and new conservation mechanisms to safeguard habitats. Protection of habitats also depends on training to enhance capacity to understand the human sides of complex resource issues. Finally, we can create opportunities for leaders and managers to enhance their skills to apply this information effectively.

River habitat conservation in the Hudson estuary achieves multiple *Action Agenda* goals, including those for signature fisheries, living landscape and biological diversity, tributary streams, water quality and scenic landscapes. A new focus of this plan is to outline characteristics of habitats that are important to the fish of the estuary, with complementary strategies under goals 1 and 2. The precarious condition of several key fish populations (notably American shad) argues for an even closer examination of the multitude of factors, including habitat, which may affect their ultimate survival.

## **Goal 2: Long-Range Targets and Immediate Actions Planned for 2010-2014**

To achieve the goal of conserving, protecting and enhancing river and shoreline habitats to their full potential, we plan to implement specific actions by 2014 within the context of long-range targets that address the following four themes:

1. Understanding river habitat trends and threats
2. Conserving and restoring river habitats
3. Training people to manage and protect river habitats
4. Responding to invasive and exotic aquatic species

**Long-Range Target 1 - Understanding River Habitat Trends and Threats:** By 2020, increase understanding of how river and shoreline habitats help sustain the river ecosystem through mapping and assessing habitat change on a river-wide scale, determining important functions and closely monitoring the most vulnerable habitats—tidal wetlands, shallows and shorelines—which are subject to major disruptions from climate change [links to goals 1, 3, 4, 6, 11 and 12]

### **Target 1: Actions Planned for 2010-2014**

- Map shallow-water habitats (0-5m depth) throughout the estuary to complete detailed river-wide mapping, provide a baseline for habitat monitoring and to enable better projections of storm surge and threats to habitats, shorelines and communities

- Map submerged aquatic vegetation (SAV) and tidal wetlands in 2011-2013, and determine trends in habitat coverage and composition
- Make river habitat mapping products available in electronic form to the public
- Study the seasonal use of habitats, such as spawning, nursery, feeding and wintering areas of key species of fish and crabs, through acoustic tracking and observations
- Identify likely impacts of accelerated sea-level rise and climate change on Hudson River habitats
- Establish initial stations to monitor tidal marsh elevation throughout the estuary to better define patterns of marsh accretion and/or subsidence, and work with partners to study sediment accumulation and transport in Hudson River marshes and SAV
- Monitor water quality and explore the potential for climate change-related water quantity changes to affect marshes and SAV; work with partners to assess vulnerability of habitats to changing salinity due to sea-level rise
- Collaborate on flood plain modeling and mapping, including a pilot study of selected Hudson River communities, and evaluate likely human responses to sea-level rise in shoreline management

**Long-Range Target 2 - Conserving and Restoring River Habitats:** By 2020, protect, manage and restore river and shoreline habitats to increase their extent and support of the ecosystem and to sustain them as climate changes [links to goals 1, 3, 4, 5, 6, 9, 11 and 12]

#### **Target 2: Actions Planned for 2010-2014**

- Complete the Hudson River Habitat Restoration Plan
- Complete studies to determine the feasibility of restoring oyster populations to the Hudson River estuary for the habitat benefits that oyster reefs provide. Conduct pilot projects to establish oyster populations if feasible
- Conserve and restore habitat for migratory fish in tributary streams
- Conserve and restore vegetated shallows, tidal wetlands and shoreline habitats, including restoration of secondary channels in the upper Hudson River estuary
- Identify management techniques and measures that promote sustainable shorelines, and develop and disseminate guidance on shoreline erosion control options to respond to accelerated sea level rise
- Identify low-lying areas where tidal wetlands may occur as sea level rises, and seek to conserve these properties

- Support completion of updates of Significant Coastal Fish and Wildlife Habitat designations for the Hudson River estuary, and disseminate this information to decision-makers

**Long-Range Target 3 - Raising the Capacity of People to Conserve River Habitats:** By 2020, train or inform 2,000 people whose actions most directly affect river habitats to promote adoption of best management practices [links to goals 3, 4, 5, 6, 8, 9 and 12]

**Target 3: Actions Planned for 2010-2014**

- Provide current scientific information and technical assistance about Hudson River habitats to local partners and key stakeholders to reduce the threat of estuarine habitat loss and adapt to climate change
- Provide 2,500 contact hours of science-based training per year to resource managers, regulators, shoreline land owners and other decision-makers to improve knowledge and conservation of river habitats and promote use of sustainable shoreline practices
- Evaluate changes in knowledge and behavior of these stakeholders

**Long-Range Target 4 - Responding to Invasive and Exotic Aquatic Species:** By 2020, implement a process for projecting new arrivals and planning responses to invasions, and implement developed protocols for aquatic invasive species responses [links to goals 1, 3, 4, 5, 6, 10 and 12]

**Target 4: Actions Planned for 2010-2014**

- Cooperate with Capital District and Lower Hudson Partnerships for Regional Invasive Species Management (PRISMs) to prevent, detect, monitor and, where possible, control harmful aquatic invasive species. Work with the Invasive Species Office to develop a process for projecting the arrivals of new invasive species and determining plans of action in advance of their arrival
- Collaborate with partners to monitor the mitten crab invasion of Hudson River marshes and tributaries
- Manage and remove invasive colonies of the non-native form of common reed (*Phragmites australis*) in Hudson River marshes where justified and feasible

## ***Goal 3: Valley Habitats and Ecosystems***

### **Goal**

Conserve for future generations the **rich diversity of plants, animals and habitats** that are key to the vitality, natural beauty and environmental quality of the Hudson Valley.



### **Challenge**

People in the Hudson Valley depend on the unique habitats of the estuary watershed and the ecological processes they maintain. Managing biological diversity and healthy ecosystems on the landscape is a proven and cost-effective way to sustain the vitality of human communities, especially when faced with environmental change. Biologically diverse habitats and ecosystems prevent the spread of diseases and pests and provide pollinators and rich soils for growing food. Wetlands absorb floodwaters, and forests allow water to filter through soils and recharge our water supplies. Grasslands and forests stabilize soils that might otherwise erode during storm events. Municipalities like New York City and many smaller communities are reducing the costs of clean drinking water by protecting the watershed's wetlands, forests and streams.

The Hudson River Valley hosts an unusual variety of plants, animals and habitats that are important within New York State. Our region is important globally for the conservation of turtles and tidal wetlands and statewide for a variety of plants and animals, including several endangered species. Actions identified in this plan help to meet conservation goals identified in the State Wildlife Action Plan for these species of greatest conservation need. Priority ecosystems for conservation in the Hudson Valley include:

- Shoreline corridors that provide essential habitat along the Hudson River and its tributary streams for river otter, wood turtle, cerulean warbler, wading birds, trout, stream salamanders and Hudson River water nymph, and important connections for plant and animal migration due to climate change
- Unbroken forests needed by scarlet tanager, warblers, wide-ranging mammals, hawks, owls, box turtles and fringed polygala flower
- Grasslands and shrublands that can sustain northern harrier (marsh hawk), bobolink, eastern meadowlark, golden-winged warbler, short-eared owl and uncommon butterflies
- Wetlands, including marshes, swamps, wet meadows and fens, bogs and surrounding lands that support American bittern, marsh wren, Blanding's turtle, northern leopard frog and pitcher plant
- Seasonal woodland pools for animals that are declining throughout the Northeast, such as Jefferson, marbled and spotted salamanders, wood frog, spotted turtle, fairy shrimp and others
- Unique natural areas that support at-risk and recovering populations of plants and animals, such as smooth cliff brake fern, grass pink orchid, bog turtle, peregrine falcon and bald eagle

This extraordinary biological diversity and the benefits we receive are challenged by today's pattern of sprawling development, which fragments ecosystems, interrupts pathways for movement and disrupts the natural processes that sustain life. As a result, many wildlife species that require a complex of habitats for survival are declining in the valley. Fragmented landscapes reduce the capacity of ecosystems to provide clean water and threaten the region's distinctive character by promoting the spread of invasive and overabundant plants and animals. The effects of this fragmentation on wildlife are made worse by climate change. As temperatures rise, some plants and animals will need to move to cooler areas in the north or to higher elevations. To meet this challenge, we must maintain habitat connections across the landscape.

Strategies to conserve the region's distinctive biological diversity and associated ecosystem services require partnerships among a variety of stakeholders and decision-makers, including local government, landowners, non-profit organizations and state agencies. DEC uses many tools to protect the region's biodiversity resources, including open space conservation and programs that protect wetlands, streams, and endangered species and their habitats. Goal 3 complements the regulatory and conservation work of DEC by focusing on the capacity of local governments and private landowners to reduce habitat fragmentation and protect important ecosystems. This work helps to implement the state Wildlife Action Plan and fulfills DEC's goals of safeguarding New York's unique natural assets and fostering green and healthy communities. We can continue to protect quality of life for people in the Hudson Valley by working together to preserve abundant life on the land and in the river.

Biodiversity conservation in the Hudson Valley achieves multiple *Action Agenda* goals, including those for Goal 1. Signature Fisheries; Goal 2. River and Shoreline Habitats; Goal 4. Tributary Streams; Goal 10. Water Quality, and Goal 5. Landscape and Scenery.

### **Goal 3: Long-Range Targets and Immediate Actions Planned for 2010-2014**

To achieve the goal of conserving biological diversity and ecosystems, we plan to implement specific actions by 2014 within the context of long-range targets that address the following three themes:

1. Understanding the status and trends of regional biodiversity
2. Raising the capacity of local partners to conserve important habitats
3. Addressing climate change and monitoring threats

#### **Long-Range Target 1 - Understanding the Status and Trends of Regional Biodiversity:**

By 2020, develop a clear understanding of the status of plants and animals throughout the Hudson Valley, with a focus on at-risk birds, frogs, turtles and salamanders, and identify the places most important for their long-term survival. Track changes in forests, wetlands, streams, grasslands and other priority ecosystems that maintain regional biodiversity and ecosystem services so we can continue to inform state and local conservation programs with science and place-based recommendations [links to goals 4, 5 and 6]

### **Target 1: Actions Planned for 2010-2014**

- Identify and map priority habitats, ecosystems and landscape connections that support biological diversity. Update and add new locations to databases of rare species and significant ecosystems to fill the “gaps” in conservation maps
- Conduct regular land-cover analyses and field surveys to document changes in the size, location, quality and landscape connections of priority woodland pools and forests and all major habitat types in the watershed
- Develop and implement consistent plans to monitor the status and distribution of high-priority species, including marsh, shrubland and forest birds and turtle, salamander and frog populations
- Develop a conservation plan for the Hudson Valley region that maps and identifies significant landscape features and the connections between them, with a focus on reversing the decline of imperiled species and maintaining ecosystem services
- Engage citizen scientists, private landowners, nature centers and local conservation groups in monitoring diverse bird, turtle, salamander and frog populations and their habitats. Create online access to monitoring data for citizen scientists

**Long-Range Target 2 - Raising the Capacity of Local Partners to Conserve Important Habitats:** By 2020, create “biodiversity literacy” among land-use planners, decision-makers and citizens in the Hudson Valley so they understand the role of biodiversity in maintaining healthy ecosystems, and use biological information for decision-making and planning. Twenty-five municipalities will adopt or update local policies, plans or procedures that contribute to biodiversity conservation [links to goals 4, 5, 6, 8 and 9]

### **Target 2: Actions Planned for 2010-2014**

- Convey biological information and technical assistance to local partners to reduce the threat of habitat loss and fragmentation and adapt to climate change
- Assist 50 local municipalities with recognizing their biodiversity resources and developing conservation plans and strategies
- Create a centralized online resource that makes current information on the location and status of estuary watershed ecosystems, wildlife habitat and threats to biodiversity widely available to citizens of the Hudson Valley
- Continue to train local leaders to recognize and map ecologically significant habitats and communicate their importance to the community

- Provide science-based trainings, roundtables and other educational and networking opportunities to 500 key decision-makers, including local leaders, land-use planners, landowners and managers
- Through state grant programs, continue to raise the capacity of municipalities, land trusts and non-profits to identify and assess watershed biodiversity, promote stewardship and conservation of vital habitats and create local conservation programs that maintain the valuable services provided by the Hudson River estuary watershed
- Work with partners to improve public understanding of the actions needed to stop the spread of harmful invasive species in our region

**Long-Range Target 3 - Addressing Climate Change and Monitoring Threats:** By 2020, land-use decision-makers and land managers will use tools and strategies for conservation and land-use planning in the highest priority locations to maintain landscape connections, address climate change and reduce fragmentation [links to goal 6].

**Target 3: Actions Planned for 2010-2014**

- Identify and prioritize landscape connections, including those necessary for plants and animals to move northward and to higher elevations in response to climate change
- Develop conservation tools and strategies that assist land-use decision-makers and land managers with maintaining priority landscape connections and mitigating impacts of fragmentation and climate change
- Track the key threats of habitat loss, fragmentation and climate change, and use monitoring data to determine their impact on wildlife populations
- Understand past trends for landscape change, and predict future implications for watershed resilience and ecosystem services for people and at-risk plants and animals
- Conduct a vulnerability analysis to determine which plants, animals and ecosystems are most vulnerable to climate change

## ***Goal 4: Streams and Tributaries of the Hudson River Estuary Watershed***

### **Goal**

Protect and restore the **streams**, their corridors and the watersheds that replenish the estuary and nourish its web of life, and sustain water resources that are critical to the health and well-being of Hudson Valley residents and the ecosystem



### **Challenge**

The health and condition of the Hudson River estuary is directly affected by what it receives from the upper Hudson and Mohawk rivers, as well as the lower Hudson tributaries and their watersheds. Approximately 65 tributaries enter the estuary south of the Troy dam. From the surrounding hills, the Hudson River is fed by thousands of miles of headwater streams and rivers that drain an ever-changing landscape. These streams provide essential fish and wildlife habitat, as well as recreational opportunities and drinking water for millions of people.

Tributaries contribute vital fresh water and nutrients to the Hudson River estuary. The watershed, via the tributaries, is the single largest source of organic carbon for the Hudson River, forming the foundation of the estuary's food chains. Where these tributaries meet the Hudson River main stem, important habitat and aquatic vegetation often exist, which are critical for a variety of fish and wildlife, such as great blue herons, osprey, blue crabs and herring.

Hudson Valley streams are affected by a wide range of stresses, such as increases in impervious surfaces, loss of vegetative cover, agricultural and lawn runoff, failing wastewater treatment and septic systems, fish barriers (e.g., dams) and atmospheric deposition of pollutants. These stresses can cause erosion and siltation, polluted stormwater runoff, flooding, loss of groundwater recharge and unnaturally low stream flows. Water withdrawals and large-scale sewer infrastructure may also be imposing impacts on stream flow. Streams and rivers become degraded from this myriad of stresses, no longer providing healthy drinking water, outdoor recreation or productive fish and wildlife habitat. Impacts often travel downstream, making tributary health both a local issue and a regional issue, which often crosses municipal boundaries and affects the Hudson estuary as well.

A healthy estuary requires a healthy watershed containing intact riparian corridors, floodplains, wetland complexes, limited impervious surfaces and minimal dams and barriers. Practicing good watershed protection principles serves to advance other natural resource conservation goals, such as protecting wildlife habitat and adapting to climate change, as well as protecting human health and well being. For example, intact riparian areas along streams are transition areas between water and land, supporting a wide variety of plants and animals, such as cottonwood trees, wood turtles, stream salamanders, river otter and a variety of birds. Rainfall that recharges groundwater also feeds

wetlands in the watershed and regulates the flow of streams. When water does not reach underground aquifers due to impervious cover and runoff, habitats of the watershed suffer, and less groundwater is available for drinking water supplies.

The Hudson River Estuary Program's watershed initiative focuses on protecting healthy streams before they become degraded, while striving to restore damaged stream corridors to improve river health. To accomplish this, the Estuary Program promotes a locally led holistic and comprehensive watershed planning and conservation approach that accomplishes a number of important goals, including:

- Documenting and inventorying watershed natural resources
- Identifying stresses to those resources
- Setting priorities for their protection and restoration

Watershed planning engages local stakeholders, scientists, advocacy and civic groups, landowners, municipal officials and land-use decision-makers. This process provides vital education, communication and partnerships between local stakeholders to accomplish necessary watershed projects. Estuary Program staff and partners also deliver watershed protection and restoration outreach tools to encourage implementation of water resource protection strategies, striving to create a synergy among the tools to make them collectively stronger. This assistance includes: Trees for Tribes (streamside re-vegetation), municipal stormwater and floodplain outreach, mapping, dam removal guidance, water-quality monitoring, land-use training and grants to assist partners in meeting the following targets.

#### **Goal 4: Long-Range Targets and Immediate Actions Planned for 2010-2014**

To achieve the goal of protecting our water resources and streams using a comprehensive and sustainable watershed approach, we plan to implement specific actions by 2014 taking a regional watershed approach, as well as targeting at least one pilot watershed, to more meaningfully engage municipalities with watershed protection. These actions will be taken within the context of long-range targets that address the following three themes:

1. Protecting water quality in streams and drinking water sources
2. Maintaining water availability and stream flows
3. Minimizing flooding impacts and conserving flood plains and stream corridors

##### **Long-Range Target 1 - Protecting Water Quality in Streams and Drinking Water**

**Sources:** By 2020, maintain water quality and stream biological integrity in at least one pilot watershed by applying and evaluating a suite of best management practices aimed at reducing water pollution. Ensure that municipalities throughout the estuary watershed are aware of, and will apply where feasible, the available tools and strategies to protect water quality [links to goals 3, 8, 10 and 11]

**Target 1: Actions Planned for 2010-2014**

- Assess biological and chemical stream quality through stream biomonitoring methods (e.g., tiered aquatic life uses) to identify threatened high-quality streams and maintain their biological integrity, while providing monitoring opportunities for volunteer and local leaders to encourage results to be integrated into land-use decision-making
- Assess what motivates the public to assist in protecting water resources on private land and through land-use decision-making to help create unique watershed protection incentive programs at the local level that reduce impervious cover and promote river stewardship
- Track land-cover changes in the estuary watershed, such as increases in impervious cover
- Provide technical assistance and resources to active, locally led watershed groups on all significant tributaries to the Hudson estuary to support critical partners in implementing water resource protection and restoration targets through inter-municipal watershed planning and implementation
- Conduct land-use, water quality and stream habitat outreach programs in a pilot watershed with inter-municipal partners
- Working closely with the biodiversity program, deliver 15 trainings on land-use impacts to natural resources so that municipal leaders have the tools to protect water resources
- Integrate green infrastructure and stormwater retrofits in code revisions/updates in three estuary watershed communities to reduce pollution impacts from urban stormwater sources on local water resources, implementing at least one pilot project in each community. Provide tools and technical assistance to additional watershed communities to change their codes to be more environmentally sustainable, while promoting implementation of green infrastructure practices at new developments to enhance groundwater recharge

**Long-Range Target 2 - Maintaining Water Availability and Stream Flows:** By 2020, conserve stream flows and groundwater recharge in at least one pilot watershed through implementation and evaluation of water resource management tools. Ensure that all municipalities throughout the estuary watershed are aware of available water resource protection and restoration strategies. Through these methods, demonstrate progress in sustaining a healthy supply of freshwater in ways that provide for both human needs and natural resources [links to goals 3, 10 and 11]

**Target 2: Actions Planned for 2010-2014**

- Characterize estuary watershed hydrology and sediment loading through such mechanisms as installing and operating stream gauges on major streams and rivers or through other mechanisms, such as investigating water use, future needs and conservation trends throughout the estuary watershed

- Map the impact on streams resulting from hydrologic modifications and out-of-watershed transfers induced by large-scale water supply and wastewater infrastructure in the watershed and, where possible, from cumulative impacts from land development activities
- Investigate the feasibility of alternative wastewater options, such as decentralized approaches that promote groundwater recharge and water reuse
- Assist communities in including aquifer characteristics and groundwater protection in watershed planning efforts, with an emphasis in recognizing the role groundwater and land use plays in stream base flow

**Long-Range Target 3 - Minimizing Flood Impacts and Conserving Flood Plains and Stream Corridors:** By 2020, work with watershed groups and municipalities to implement at least one new floodplain ordinance and one stream corridor conservation practice on each major tributary to help protect fish and wildlife habitat, recreational use, property, infrastructure and human life [links to goals 1, 2, 3, 10 and 11]

**Target 3: Actions Planned for 2010-2014**

- Develop and deliver local government guidance that protects stream buffers and floodplain corridors to minimize future flooding impacts and protect stream habitat and water quality, and work with pilot watershed communities to implement protection ordinances
- Re-vegetate 15 miles of stream with native vegetation, or plant 30,000 native trees and shrubs within riparian buffers while engaging volunteers. Assist communities and landowners in identifying opportunities for streamside assessment, outreach and restoration through “Trees for Tribs” and other riparian restoration programs
- Working with partners, provide assistance, guidance and technical support to municipalities, landowners and other watershed partners for the restoration of free-flowing rivers, including removal of dams and other stream barriers to benefit water quality, stream habitat and aquatic connectivity

## ***Goal 5: River Scenery, Forests, Farms and Open Space***

### **Goal**

Conserve key elements of the working, **pastoral landscapes and world famous river scenery** that define the character of the Hudson River Valley, and provide new and enhanced vistas where residents and visitors can enjoy Hudson River views

### **Challenge**

Working landscapes, agriculture and forestry, and the presence of “wild” open space have long been recognized as important aspects of the region’s sense of place and its world-renowned scenery. The Hudson itself always has been a working river leading to the development of commercial and recreational waterfronts, as well as its many historic community centers. To this day, these features maintain the character of the region so loved by Hudson Valley residents and visitors.

For more than a century, New York State has acted to preserve many of the Hudson River Valley’s most dramatic natural and scenic features—the Palisades, the Hudson Highlands and views of the distant Catskills, as well as our farms and forests. The state’s first designated Scenic Areas of Statewide Significance are all located in the Hudson River Valley. Many vistas made famous by Hudson River painters remain essentially intact today.

Natural areas serve a wide variety of public benefits, from providing recreational opportunities, protecting water supplies and sustaining local tourism and agricultural economies, to mitigating the impacts of flooding on communities and local infrastructure. The valley’s farms and forests provide employment, food and forest products critical to its diversified economy. We now know that in the near future, these open spaces will prove to be vital in buffering the effects of climate change in our region by providing corridors for a variety of plant and animal species, to move from south to north. Conserved river shorelines protect tidal habitats from the effects of sea level rise. A March 2010 report from the state comptroller on the economic benefits of open space found that conservation of natural areas supported industries that generate billions of dollars annually, reduced the cost to local governments of providing services and infrastructure and supports regional economic growth.

However, the economics of maintaining traditional land uses and preserving views is under increasing pressure from both shoreline development and patterns of sprawl. As the water quality of the Hudson main stem has improved, property values have likewise increased making conservation more difficult. The need to conserve the area’s remaining natural areas has become critical. Supporting the viability of agriculture is key and requires robust federal agricultural programs, as well as substantive continuing investment in local, regional, state and federal agricultural economic development initiatives. Support for forestry programs is also crucial. Acquisition of shoreline priorities from willing sellers will conserve key scenic vistas and provide new sites for public access to the river.



Many Hudson River communities now recognize their remaining open spaces and visual resources as unique community assets that bolster the quality of life for residents and contribute to the region's economy. A new partnership among local, regional and statewide lands trusts and conservation organizations in the Hudson Valley, "Saving the Land that Matters Most," is advancing the goals of the Hudson River Estuary Plan by collaborating to conserve 65,000 acres of scenic, ecologically significant and viable agricultural lands in the Hudson River corridor. Policies and programs are being developed to help municipalities conserve priority local natural areas.

Protection of open space and river scenery will assist in achieving all *Action Agenda* goals, including Goal 9, Waterfront Revitalization; Goal 2, River and Shoreline Habitats; Goal 4, Watershed Conservation; Goal 3, Plants and Animals, Goal 6, Climate Change, and Goal 7, Public Access. We must move quickly to conserve the waterfront and adjacent upland areas of the Hudson as the renaissance of the Hudson River Valley continues.

## **Goal 5: Long-Range Targets and Immediate Actions Planned for 2010-2014**

To achieve the goal of conserving the key elements of human, pastoral landscapes and river scenery, we plan to implement specific actions by 2014 within the context of the long-range targets that address the following three themes:

1. Planning for open space
2. Conserving open space
3. Conserving world-renowned scenery
4. Coordinating land stewardship

**Long-Range Target 1 - Planning for Open Space:** Ensure that by 2020, at least 30 percent of Hudson River Valley communities develop and implement local open space protection programs consistent with the state Open Space Conservation Plan [links to goals 2, 3, 4 and 6]

### **Target 1: Actions Planned for 2010-2014**

- Assess the extent of communities with existing open space protection programs, including those specifically for working landscapes, and the progress being made to implement those programs
- Provide technical and financial assistance, including continuation of state grants programs to assist Hudson River Valley communities and conservation groups so that 20 percent will have developed and implemented local open space protection programs consistent with the state Open Space Conservation Plan to identify priorities for conservation of farmland, forests, aquifer, habitat and scenery, to prepare site stewardship management plans and local codes and ordinances, and to address predicted effects of climate change
- Develop additional technical and financial resources for community open space planning, including resources for local governments

- Encourage three communities to adopt local open space funding mechanisms to empower those communities to conserve lands of local, regional and statewide importance

**Long-Range Target 2 - Conserving Open Space:** By 2020, conserve 65,000 acres in the greater Hudson Valley, including at least 25,000 acres along or in sight of the Hudson River, working with land trusts and local governments to use a combination of fee, easement and other conservation mechanisms [links to goals 2, 3 and 4]

### **Target 2: Actions Planned for 2010-2014**

- Working collaboratively in partnership with local government, land trusts and others conserve 30,000 new acres, including 12,500 acres along or in sight of the Hudson River, to provide connectivity between larger habitat areas, and protect river and stream corridors, intact forests, Hudson Valley farmland, aquifer recharge areas or natural Hudson River shoreline as follows:
  - Retain the traditional agricultural landscape on 25,000 acres of viable agricultural land through preservation and stewardship programs, working with the State Department of Agriculture and Markets, local governments, individual farmers and land trusts
  - Assist in permanently protecting 40,000 acres of ecologically important open space for wildlife-related recreation and for conservation of biodiversity using a combination of fee, easement and other conservation mechanisms
- Use existing regional, state and federal forestry programs to encourage willing private forest landowners to: a) practice sustainable forestry or "forest stewardship" on 15,000 additional privately owned acres above the 2005 baseline; b) commit 10,000 new acres to forest management through the state forest tax law, forest certification and other programs, and c) provide access to hunting, birdwatching and other pursuits through voluntary agreements with private land owners
- Encourage local governments to take steps within their land-use authority to conserve floodplains, wetlands, stream and river corridors that absorb storm and flood waters and provide protection to community and private property against the effects of climate change. Support programs to establish community protection funds
- Develop new tax incentives to encourage sustainable conservation management to enhance the environmental benefits of private lands, and encourage willing landowners to more fully use existing incentive programs
- Implement stewardship management practices to conserve and enhance forest resources, water quality, wildlife habitats, agriculture biodiversity and aesthetic qualities
- Work to secure federal and other funding for management and acquisition programs that support ecosystem health and resiliency, including mitigation and natural resource adaptation to climate change and stewardship of public and private lands

- Continue state grant programs to provide funding for open space conservation, farmland protection and local government implementation of open space and scenic preservation
- Assure that the conserved-lands database, a dataset that identifies lands permanently secured against conversion to development held by state, federal, county, municipal governments and land trusts in the Hudson River Valley, is available for public use and is kept current. Identify and map parcels that provide connectivity between larger habitat areas, protect river and stream corridors, intact forests, Hudson Valley farmland, aquifer recharge areas and natural Hudson River shoreline. Adjust priorities for land protection and acreage goals based on changes recorded in this database

**Long-Range Target 3 - Conserving World-Renowned Scenery:** By 2020, designate, conserve and interpret: 1) the key viewsheds from publicly accessible parks and historic sites; 2) 25 Hudson Valley vistas painted by Hudson River School painters, and 3) 30 locally significant vistas [links to goals 7, 8 and 9]

#### **Target 3: Actions Planned for 2010-2014**

- Through partnership with the Hudson River Valley National Heritage Area, develop an inventory of the key Hudson Valley vistas painted by Hudson River School painters and viewsheds associated with public recreational and historic sites, and develop a program for their conservation
- Encourage and assist local government to review designated Scenic Areas of Statewide Significance (SASS) within their communities to better inform local land-use decision-making, and encourage the passage of local laws which protect the resources highlighted in the SASS
- Provide state technical, financial and training assistance to 15 municipalities to inventory, designate and protect important local river vistas and showcase this accomplishment

**Long-Range Target 4 - Coordinating Land Stewardship:** By 2020, work with landowning state agencies to coordinate stewardship objectives of all state-owned property on or in sight of the Hudson so that habitat and recreational needs are met. Invite other interested land-holding entities such as non-profits, municipalities and industries to voluntarily participate in coordinated land stewardship of their properties [links to goals 2, 3, 4, 6, 7 and 9]

#### **Target 4: Actions Planned for 2010-2014**

- Pilot a coordinated land-management effort in the upper reaches of the tidal Hudson by creating an estuary preserve where coordinated land management can be demonstrated

## Goal 6: Climate Change

### Goal

Address the causes of **climate change** in the Hudson Valley and prepare for projected impacts to safeguard our health and safety and to protect the natural resources and local economies that sustain our communities

### Challenge



More than 3,700 scientific experts from 130 countries (including the U.S.) participated in the 2007 Intergovernmental Panel on Climate Change (IPCC) Report, which synthesized international research on global climate change. They found that the earth has warmed during the last century, that warming is changing the planet's climate and that much of the warming is caused by human activities.

As Earth's temperature rises, it affects weather patterns and changes our climate. Scientists have already documented changes in local climate in the Northeast, New York and the Hudson Valley that they expect will continue in coming decades. Heavy precipitation events are expected to increase, leading to more frequent local flooding. Summer days are expected to become hotter, increasing evaporation of soil moisture and leading to drier periods between rain events. Warmer winters are projected to reduce winter snowfall amounts, and warmer ocean water temperatures are expected to fuel stronger storms. With rising temperatures, some species may move out of our area, and new species are expected to move in. Other impacts, such as sea-level rise and storm surges generated by extreme weather are expected to affect infrastructure and natural systems along our coastline.

Scientists conclude that we can head off the worst effects of climate change in our area by improving the way we produce and use energy. Some communities are already implementing strategies to reduce greenhouse gas emissions, saving energy and money. Others need help getting started. All communities will need information to plan now for long-term adaptation to changing environmental conditions to protect natural resources, health and safety. In addition, at the state level, we must insure that communities respond to increasing vulnerability, especially from extreme events, without increasing the overall long-term risks and costs to valley communities as a whole. Working with the Governor's Climate Action Council, DEC Office of Climate Change, state agencies and local governments to implement key adaptation strategies outlined by the Sea Level Rise Task Force, as well as NYSERDA Climate Impacts Assessment, NYC Climate Adaptation Task Force and the Rising Waters project, we can pool our resources, learn from one another and make the Hudson Valley a model for responding to climate change in the state and in the nation.

## **Goal 6: Long-Range Targets and Immediate Actions Planned for 2010-2014**

To achieve the goal of addressing the causes of climate change and to help prepare for projected impacts throughout in the Hudson Valley, we plan to implement specific actions by 2014 within the context of long-range targets that address the following two themes:

1. Helping waterfront communities prepare for flooding from sea-level rise and stronger storms
2. Adopting and implementing the ClimateSmart Communities Pledge in Hudson Valley communities

**Long-Range Target 1 - Helping Waterfront Communities Prepare for Flooding from Sea-Level Rise and Strong Storms:** By 2020, all waterfront communities will be aware of projected impact areas for local flooding associated with sea-level rise and stronger storms, and 75 percent will be taking steps to prepare [links to goals 3, 4, 5 and 9]

### **Target 1: Actions Planned for 2010-2014**

- Map estuary shoreline elevation using LIDAR (light detection and ranging) technology, model projected sea-level rise and storm surge in the estuary, and provide communities with maps and information on areas of greatest risk of shoreline inundation due to climate change
- Identify and map vulnerable natural systems and infrastructure (water and sewer intakes/outfalls, rail lines, roads, transportation, utilities, brownfields) along the Hudson River estuary shoreline and its tributaries, and outline potential impacts to each sector
- Develop guidance for local governments on shoreline adaptation strategies to respond to sea-level rise and shoreline inundation in the Hudson estuary and its tributaries. Outline a process to assist shoreline communities making critical decisions in shoreline areas, including:
  - Upgrading existing or siting new critical infrastructure
  - Determining which shoreline areas are suitable for shoreline protection and which areas may require a planned retreat
  - Formulating adaptive management strategies that consider the design life of infrastructure projects and allow project design and management to be flexible over time to respond to changing conditions

**Long-Range Target 2 - Adopting and Implementing the ClimateSmart Communities Pledge:** By 2020, 50 percent of Hudson Valley communities will have adopted and begun implementing the New York State “ClimateSmart Communities Pledge,” which outlines the most important energy conservation and climate adaptation strategies to be undertaken by municipalities. By 2030, 75 percent of Hudson Valley communities will have adopted and begun implementing the pledge [links to goals 3, 4, 5 and 9].

**Target 2: Actions Planned for 2010-2014**

- Ten pilot communities in the Hudson Valley will adopt and begin to implement the New York State “ClimateSmart Communities Pledge”
- Annually, through technical assistance and state grants programs, support local efforts to reduce greenhouse gas emissions and develop and implement local adaptation strategies
- Develop guidance for communities in the estuary watershed to undertake a vulnerability analysis and develop a local adaptation plan
- Align state agency policies to support inclusion of climate information and low-impact and natural resource-based climate adaptation strategies into county, village or town hazard mitigation plans
- Through public presentations and outreach materials, continue to raise awareness of the most current information on the causes and impacts of climate change, actions needed to adapt and resources available
- Annually, coordinate efforts of the Hudson Valley Climate Change Network to address the impacts of climate change at the regional level and facilitate communication between climate research and outreach partners

## Goal 7: Public Access

### Goal

Develop, maintain and improve a **regional system of access** points for fishing, boating, swimming, hiking, education, river watching and wildlife-related recreation, and build connections that allow residents and visitors to have rich and diverse river experiences

### Challenge

The main stem of the Hudson River and its shores offer exceptional opportunities for a variety of outdoor recreation, including swimming, fishing, boating, hiking, education and river-watching. Water quality has improved markedly in the last 40 years, and the demand for river access by residents and visitors has grown accordingly. Simultaneously, the pace of riverfront development has increased. Preserving and expanding public access for suitable uses where possible, including access for persons with disabilities and for disadvantaged populations, is an important need to consider as the riverfront develops.

Our ability to get people to the river is limited by shoreline topography, railroad rights-of-way, land ownership patterns and local water conditions. Even so, much has been achieved since 1996, and now, most communities have new or improved access facilities. The challenge now is to build connections both figuratively and literally so that residents and visitors can have richer and more diverse experiences. By developing trails and parks to connect with cultural sites, scenic vistas, habitats, restoration sites and river education centers, we can do just that. We must also do our best to enable people to achieve the health benefits of river recreation and provide access for people who still have limited ways of enjoying the river. Access projects can provide alternative routes that connect people to work and play. We can create connections for people in the city to get to the countryside and vice versa.

In addition, we need to complete the tasks we set out to accomplish in 2005. There are still boat launches, docks and piers that require renovation. Creating a network of new or improved docks that serve the needs of tourists, researchers, educators, anglers and community members will be a focus for the coming years. Where appropriate, these docks will use recycled materials, such as plastic lumber for decking. Many new and improved boat launches have been constructed in recent years. Where communities have indicated a need and opportunity for boat launches in their Local Waterfront Revitalization Programs, these will be supported through state grant programs. Design standards for access facilities must ensure that habitat is not degraded and consider the effects of a changing climate, including a projected increase in local shoreline flooding and a rise in sea level.

Private and public marinas and boat clubs also serve as important access points for many residents and visitors. The Clean Marina Program, coordinated by the Environmental Facilities Corporation, encourages environmentally responsible operation of facilities and provides funding for pumpout facilities through the Clean Vessel Act Pumpout Program. Revisions in state and federal regulations will require improvements in stormwater and wastewater management at these facilities.



Achieving the targets of this goal requires close coordination with other goals of the plan: education centers, waterfront revitalization, open space and scenery and aquatic habitat. In addition, our water quality management targets will improve conditions for boating, fishing and swimming. This goal will be undertaken cooperatively by the state Office of Parks, Recreation and Historic Preservation (OPRHP) Department of State (DOS), the Hudson River Valley Greenway, and DEC, as well as through partnerships with local municipalities, non-profits and heritage sites.

## **Goal 7: Long-Range Targets and Immediate Actions Planned for 2010-2014**

To achieve the goal of developing and maintaining a regional system of access sites along the estuary, we plan to implement specific actions by 2014 within the context of long-range targets that address the following eight themes:

1. Building and renovating community docks
2. Providing facilities for underserved communities
3. Preserving and enhancing recreational boating access
4. Providing increased fishing access
5. Creating safe places for swimming
6. Creating a network of education sites linked with river access and waterfront destinations
7. Completing the Hudson River Valley Greenway Land Trail and Water Trail
8. All access sites and facilities—building connections for richer and more diverse experiences

Such projects will be pursued where local, state and federal permit standards are met and will be subject to full environmental review.

**Long-Range Target 1 - Building and Renovating Community Docks:** By 2020, renovate and build river docks and piers that support multiple uses, including fishing, tourism, transportation, educational and research purposes as identified in approved state and local plans [links to goal 9]

### **Target 1: Actions Planned for 2010-2014**

- Work with the state Department of Transportation (DOT) to develop access opportunities at commuter ferry docks
- Support renovation of 10 docks or piers for public access, as well as transportation uses along the Hudson River, East River, Harlem River and Kill Van Kull

**Long-Range Target 2 - Providing Facilities for Underserved Communities:** By 2020, improve river access for people with disabilities and for people living in environmental justice neighborhoods in each of the river cities and villages, including the five boroughs of New York [links to goal 9]

**Target 2: Actions Planned for 2010-2014**

- Conduct a user survey to assess use, identify locations where additional access is needed for persons with disabilities and develop a plan to meet these needs. Through state and federal grant programs, fund access improvements to meet these needs
- Develop an Americans with Disabilities Act (ADA) handbook for river access design, and conduct outreach and training on how to address these needs
- Identify underserved environmental justice (EJ) neighborhoods that lack access opportunities, and develop a plan to improve river access. Through state and federal grant programs, fund access improvements to meet these needs
- Encourage incorporation of ADA and EJ goals in LWRPs, comprehensive plans, project site plans and designs for waterfront structures and parks

**Long-Range Target 3 - Preserving and Enhancing Recreational Boating Access:** By 2020, build or upgrade boating access sites on the Hudson identified in approved state and local plans, completing new access sites in five or more communities. Insure continued access through existing boat launch sites, yacht clubs and marinas by working to address siltation and dredging issues [links to goal 9]

**Target 3: Actions Planned for 2010-2014**

- Pursuant to approved Local Waterfront Revitalization Programs and approval of all necessary permits, construct or renovate four boat launches on the Hudson
- Support community boating needs for non-motorized craft, such as floating docks in New York City and rowing facilities for crew, using grants and municipal agreements. Enhance and construct eco-dock infrastructure for non-motorized boats
- Revise the 1998 Boating Access Plan to reflect new information and understandings
- Promote and support the Clean Marina Program, which encourages environmentally responsible boating facility operations. Identify marinas and boat clubs that do not currently provide pumpout facilities, and encourage them to seek grants from the Clean Vessel Act Pumpout Program to provide such facilities
- Encourage marinas and boat clubs to pursue beneficial-use opportunities for dredged materials to facilitate continued operations

**Long-Range Target 4 - Providing Increased Fishing Access:** By 2020, establish at least one public fishing access site per river community where feasible [links to goals 1, 2, 5 and 9]

**Target 4: Actions Planned for 2010-2014**

- Identify opportunities to expand public fishing access and support local projects through grant programs. Provide updated access information on DEC's website
- Continue to educate the public about safe fishing practices, including fish consumption health advisories

**Long-Range Target 5 - Creating Safe Places for Swimming:** By 2020, establish increased opportunities for the public to safely swim in the Hudson [links to goal 10]

**Target 5: Actions Planned for 2010-2014**

- Improve existing swim-beach facilities, and support the development of new swimming beaches, floating pools and bath houses where practical by providing assistance through grants to interested parties
- Continue to improve water quality in impaired areas

**Long-Range Target 6 - Creating a Network of Education Sites Linked with River Access and Waterfront Destinations:** By 2020, create a network of education facilities linked with river access and waterfront destinations in each river city [links to goal 8]

**Target 6: Actions Planned for 2010-2014**

- Through state grant programs, provide assistance to partners to create new linked opportunities for education and river access along the shoreline

**Long-Range Target 7 - Completing the Hudson River Valley Greenway Land Trail and Water Trail:** By 2020, the Hudson River Greenway Water Trail will have established a series of campsites (or other overnight accommodations) located every 15 miles or less, to promote multi-day excursions on the river for canoeists and kayakers. These sites will be located primarily on non-motorized riverfront trails. The Greenway, working with local partners, will designate a continuous "riverside" Greenway Trail consisting of off-road and interim on-road segments [links to goals 3, 5 and 9]

**Target 7: Actions Planned for 2010-2014**

- The Hudson River Greenway Water Trail will include at least one access point (launches and take-outs) every 10 miles or less along both shores of the river.
- The Greenway will create a feasibility study to transition all on-road segments of the riverfront Greenway Trail to off road.

**Long-Range Target 8 - All Access Sites and Facilities—Building Connections for Richer and More Diverse Experiences:** By 2020, develop connections among river parks, education centers, cultural sites, scenic vistas, unique habitats and restoration sites to provide residents and visitors with richer and more diverse river experiences. Post information about access points on DEC's website [links to goals 5, 8 and 9]

**Target 8: Actions Planned for 2010-2014**

- Survey and map current public-access points along the river and tidal portions of the tributaries. Make this information available to the public on DEC's website, and update it on a regular basis
- Fund five demonstration projects that create connections to link diverse river experiences

## Goal 8: Education

### Goal

Promote **public understanding of the Hudson River**, including the life it supports, its role in the global ecosystem and the challenges the river faces and how they can be met

### Challenge

Since its inception, the Estuary Program has made great strides in better understanding many aspects of the estuary and its surroundings, including its fish, wetlands, the river bottom and the rich biodiversity of the landscape.

For this information to be effectively applied in future management decisions, the participation of citizens, river users, businesses, scientists and community leaders must be engaged. To accomplish this, information gathered by the Estuary Program must be readily accessible to the public and local community leaders in formats that are user friendly. Technical assistance must be made available to land managers, municipalities and others to develop creative solutions to complex issues at the local level. Through outreach to local decision-makers, much is being accomplished to achieve targets for other *Action Agenda* goals, such as Goal 2's training programs, Goal 3's initiatives to conserve the rich diversity of plants, animals and habitats of the Hudson Valley and Goal 4's efforts to protect and restore the rivers and streams of the watershed.

Goal 8 aims to support these initiatives by establishing a citizenry knowledgeable about the ecology and natural resources of the Hudson and primed to support decisions that further wise management of the estuary. The audiences for Goal 8 include students and teachers in formal education settings, members of the public who take advantage of non-formal education opportunities offered by institutions such as nature centers and museums and the broader public reached by the internet and other mass media outlets.

In all these efforts, Estuary Program education staff draws on the data, knowledge and skills of other DEC staff directly involved with research into and management of the Hudson estuary's natural resources. For example, lesson plans intended to teach mathematics skills incorporate data from anadromous fish tagged by the Hudson River Fisheries Unit, while lessons on river tides and salinity use data from HRECOS sensors in the Hudson. Where appropriate, agency resource managers are invited to speak directly to educators at training workshops organized by the Estuary Program.



## **Goal 8: Long-Range Targets and Immediate Actions Planned for 2010-2014**

To achieve the goal of promoting public understanding of the Hudson River, we plan to implement specific actions by 2014 within the context of four long-range targets that address the following themes:

1. Creating a network of places to go to learn about the river
2. Providing enhanced access to river information for the public
3. Enhancing school programs for place-based river learning
4. Improving the effectiveness of programs serving educators and citizens concerned about the river

### **Long-Range Target 1 - Creating a Network of Places to Go to Learn about the River:**

By 2020, establish and publicize a coordinated network of gateway sites for education and information about the Hudson River, its natural and human history and its future needs. Ensure that there is at least one gateway facility in each county along the estuary [links to goals 9 and 12]

#### **Target 1: Actions Planned for 2010-2014**

- Through the Estuary Grants Program, improve sites and facilities for riverfront field education, and promote their use to the point that Hudson River field trips have been offered in 60 percent of the school districts bordering the Hudson River

### **Long-Range Target 2 - Providing Enhanced Access to River Information for the Public:**

By 2020, expand public recognition and reliance on the Hudson River Estuary Program and the Hudson River Research Reserve as key sources of accurate and current information about the river's resources and opportunities for stewardship [links to goal 12]

#### **Target 2: Actions Planned for 2010-2014**

- Make creative use of the Estuary Program web pages to attract visitors and disseminate information about the river, doubling visits to these pages
- Update the *2009 State of the Hudson Report*
- Conduct a public survey to measure baseline recognition of HREP and HRRR as key sources of information about the river

### **Long-Range Target 3 - Enhancing School Programs for Place-Based River Learning:**

By 2020, expand study of the estuary in Hudson Valley school districts as teachers incorporate lesson plans and field experiences produced by the Hudson River Estuary Program and its partners into classroom curricula [links to goal 12]

**Target 3: Actions Planned for 2010-2014**

- Work with education partners to make available more field-tested, interdisciplinary standards-based and place-based Hudson River curriculum materials for all grade levels. These materials will be used in 60 percent of Hudson Valley school districts
- Work with education partners to provide teacher training opportunities that reach classroom teachers from 75 percent of school districts in the Hudson Valley

**Long-Range Target 4 - Improving the Effectiveness of Programs Serving Educators and Citizens Concerned about the River:** By 2020, working with education partners, expand the overall quality and quantity of river education programs, creating models for interdisciplinary environmental education that can be adopted nationally and internationally [links to goal 12]

**Target 4: Actions Planned for 2010-2014**

- Enhance annual programs, such as the *Hudson River Almanac*, HRECOS stories (see Goal 12) and the “Day in the Life of the Hudson River” sampling event to increase public understanding of and involvement in the natural environment of the river. Double *Hudson River Almanac* circulation to 4,000
- On an ongoing basis, provide technical assistance to enhance school and public programming offered by individuals and organizations that teach about the Hudson. Identify ways that the Estuary Program, the Hudson River Research Reserve and DEC’s Division of Public Affairs and Education can add value to the efforts of their Hudson River education partners and implement as many of them as possible

## ***Goal 9: Waterfront Revitalization***

### **Goal**

Revitalize all the waterfronts of the valley so that the Hudson is once again the “front door” for river communities, where scenery and natural habitats combine with economic and cultural opportunity, public access, working ports and harbors and lively adjacent downtowns to sustain vital human population centers and a healthy environment



### **Challenge**

The Hudson Valley economy is diversifying, and a key element of the region's economic strategy is to strengthen and revitalize riverfront communities and waterfront areas as destinations for tourists and boaters, as well as vibrant places to live and work. In the valley's urban areas, this includes returning long-dormant waterfronts, created by the loss, relocation and retreat of waterfront industry, back to productive water-dependent uses with new businesses, a cleaner environment, new and restored piers and docking facilities, as well as new recreational opportunities. Many of the Hudson Valley's smaller villages and communities are revitalizing their downtown and waterfront areas. At the same time, the region is facing large-scale residential development pressure, particularly along the immediate shoreline of the Hudson River. These proposals, if not planned and implemented according to smart-growth principles, may cut off public access to the waterfront, impact water quality, impair habitats, affect scenic resources and impose a burden on public infrastructure.

As municipalities adjust to new economic opportunities, many riverfront communities are finding that environmental conservation plays a key role in their smart-growth strategies. Smart growth is sensible, planned, efficient growth that integrates economic development and job creation with community quality of life by preserving and enhancing the built and natural environments. It encourages growth in developed areas with existing infrastructure to sustain it, particularly municipal centers, downtown (“main streets”), urban cores, hamlets, historic districts and older first-tier suburbs. Directing new growth to urban and community centers will make cities and villages more vital and will help to protect open space and the Hudson River watershed and prevent habitat fragmentation.

Emerging problems now confronting river communities require attention and financial commitment to resolve. The region’s water and sewer infrastructure is outdated and requires costly upgrades (See Goal 10). Changes induced by climate change will require a new look at waterfront planning, conservation of tributary floodplains and the availability and adequacy of drinking water supplies (See Goal 6). As the use of shipping and rail increases in the face of diminishing oil supplies and related fuel prices, riverfront communities will need to plan for and provide on-shore port facilities for handling, warehousing and redistributing goods arriving by barge and by rail. State agency action on these issues could benefit from improved coordination.

Thousands of New York State residents and visitors enjoy boating on the river and rely on public and private marinas and boat club facilities for access both to and from the river. Providing environmentally sound locations for these uses and maintaining them where they exist is a priority. In addition, working with communities to incorporate the most current information on local strategies to conserve critical shoreline habitats and adapt to a changing climate will further strengthen the waterfronts of the valley and help them adapt to changing conditions over time.

## **Goal 9: Long-Range Targets and Immediate Actions Planned for 2010-2014**

To achieve the goal of revitalizing all the waterfronts of the valley to their full potential, we plan to implement specific actions by 2014 within the context of the long-range targets that address the following three themes:

1. Revitalizing local waterfronts
2. Cleaning up brownfields
3. Improving urban environmental conditions

**Long-Range Target 1 - Revitalizing Local Waterfronts:** By 2020, advance and foster the preparation and implementation of Local Waterfront Revitalization Programs (LWRP) and other pertinent waterfront and downtown planning documents in all riverfront communities [links to goals 2, 3, 4, 5, 6, 7 and 11]

### **Target 1: Actions Planned for 2010-2014**

The state Department of State (DOS) will continue to work in partnership with local governments to prepare Local Waterfront Revitalization Programs and other planning documents that define a local vision for the waterfront and downtown areas. The LWRP is a voluntary partnership that establishes a vision and consensus between a community and the state on actions needed to revitalize and protect natural and economic resources. Through its LWRP Environmental Protection Fund grant program, DOS provides funding for both planning and implementation efforts. Specific 2014 actions are as follows:

- Complete the waterfront and downtown planning efforts, including LWRPs and LWRP amendments, in the cities of Albany, Beacon, Hudson, Kingston, Newburgh, Peekskill, Poughkeepsie, Rensselaer, Troy and Watervliet; the villages of Briarcliff Manor, Cold Spring, Dobbs Ferry, Hastings-on-Hudson, Ossining, Tarrytown, Tivoli and Wappingers Falls and the towns of Bethlehem, Coeymans, Cortlandt and Lloyd, and Ulster County
- Complete a climate action and adaptation plan for the City of Albany
- Construct new public park or downtown amenities in the cities of Albany, Beacon, Hudson, Irvington, Kingston, Peekskill, Rensselaer and Troy; in the villages of Athens, Catskill, Dobbs Ferry, Haverstraw, Nyack, Ossining, Piermont and Tarrytown, and in the towns of Lloyd and Poughkeepsie
- Promote, in partnership with Scenic Hudson and the City of Kingston, the recently completed guide to standards for sound waterfront development for the Hudson Valley

**Long-Range Target 2 - Cleaning up Brownfields:** By 2020, plan for and promote cleanup and reuse of brownfield sites, including contaminated, former industrial areas in riverfront communities [links to goal 11]

**Target 2: Actions Planned for 2010-2014**

- Promote cleanup and reuse of six or more additional brownfield sites affecting the Hudson estuary
- Continue to encourage participation of municipalities in the voluntary cleanup and restoration of contaminated urban waterfront sites
- Provide technical and financial support to preliminary investigations and cleanups
- Through the Brownfield Opportunity Areas Program, develop plans for the redevelopment of former industrial and commercial waterfronts in 11 communities

**Long-Range Target 3 - Improving Urban Environmental Conditions:** By 2020, adopt urban-greening and smart-growth programs that improve both the environmental quality and infrastructure of river cities and environmental conditions for disadvantaged populations, maritime industries and urban neighborhoods, focusing on projects that address water quantity, water quality, maritime needs and sea level rise [links to goals 4, 6, 10 and 11]

**Target 3: Actions Planned for 2010-2014**

- Implement urban-greening pilot projects in two river cities
- Develop a plan to address needs in all river cities and villages
- Encourage green building and adaptive reuse of historic structures, both commercial and residential, along waterfronts
- Connect neighborhoods to the water
- Identify maritime needs

## Goal 10: Water Quality

### Goal

Ensure that **Hudson River water quality supports human benefits**, including drinking water, swimming, fishing, navigation and ecosystem protection

### Challenge

Clean water benefits swimmers, anglers and kayakers, municipalities which draw their drinking water from the Hudson, riverfront parks, restaurants, marinas and residential development. It also sustains the ecosystem of the river. The improvement in water quality that the Hudson has experienced since the 1960s and 1970s has led to significantly increased opportunities for all these uses, and, in most cases, the water quality of the river is now suitable to sustain these uses.

Challenges remain, however. Among the biggest of these facing us today are water and sewer infrastructure needs stemming from both aging systems and growing demand. In some communities, sewer and stormwater overflows occur when it rains, impacting the river, tributary streams and even local streets and homes. Many of the sewage treatment plants built in the 1970s are nearing the end of their design life and must be upgraded or replaced. Revitalization of river cities and villages cannot occur without addressing the problems of antiquated infrastructure, inadequate back-up alarm systems, rainwater infiltration through damaged sewer pipes and the need to redesign stormwater systems to allow rainwater to replenish groundwater rather than flood streets and cause local streams to swell.

One of the few river uses which still challenges us in parts of the river is swimming. The dramatic improvement in water quality has created a demand for river swimming and for sports such as kayaking, where close contact with the water is the norm. While the goal of fishable, swimmable waters, as established in the federal Clean Water Act of 1972, has nearly been met, there are still spots in the river where pathogen and bacteria levels make swimming unsafe on most summer days, and there are other places where swimming is unsafe after it rains. Since 2001, we have focused our attention on the areas where water quality for swimming can be improved. This goal is now within our reach except in urban areas following a storm.

To make the river suitable for swimming will benefit eager bathers on hot summer days and will also promote other recreational and economic activities associated with a healthy water resource. The Estuary Program, through DEC's Division of Water, is focusing on four primary strategies: 1) seasonal disinfection of municipal wastewater discharges; 2) reduction of combined sewer overflow (CSO) impacts; 3) local implementation and compliance with the Phase II Stormwater Permit Program to reduce runoff impacts, and 4) continued support for vessel waste pump-out facilities to maintain the No Discharge Zone status of the Hudson. While these strategies will be applied to the entire length of the river and its tributaries, initial efforts will focus on the Capital District area. Wastewater, stormwater and combined sewer overflows from a number of



municipalities along both sides of the river continue to discharge elevated levels of pollutants into the stretch known as the “Albany pool,” making those waters unsuitable for swimming despite the growing popularity of the area for spontaneous swimming from rocky shores or from boats.

In addition to these actions to reduce impacts in the main stem of the river, a wide range of other measures implemented throughout the Hudson watershed—such as protecting stream buffers, wetland restoration and green infrastructure projects—also contribute to water quality improvements. Recent scientific work of DEC staff and our research partners has given us a much greater understanding of water quality issues affecting food webs, habitat and nutrient cycles in the watershed. This watershed approach improves water quality and also provides critical protection to high-quality water resources that have not experienced impacts. Such a focus on pollution prevention and protection is more efficient, economical and sustainable than having to restore resources after they have experienced impacts. Protecting forests, wetlands and streams in the watershed will provide long-term benefits to the entire river ecosystem and save taxpayer dollars that might otherwise be spent to undertake costly fixes.

The focus of the Estuary Program will remain on the tidal waters of the Hudson from the Troy dam to the Verrazano Narrows. Within this framework, we seek to refine our ability to better integrate water quality programs with the other goals of the *Action Agenda*. The targets outlined below are closely related to and supported by those in Goal 1, Fisheries; Goal 2, Aquatic Habitat; Goal 3, The Living Landscape; Goal 4, Watersheds; Goal 6, Climate Change; Goal 8, Waterfront Revitalization, and Goal 11, Pollution Reduction. Programs to protect the Mohawk River and the upper Hudson are now being established and will coordinate with the Estuary Program to meet common objectives. These programs and linkages can be expected to grow in time.

## **Goal 10: Long-Range Targets and Immediate Actions Planned for 2010-2014**

To achieve the goal of insuring that Hudson River water quality supports appropriate human benefits, including drinking water, swimming, fishing, navigation and ecosystem protection for its entire length, we plan to implement specific actions by 2014 within the context of long-range targets that address the following three themes:

1. Achieving swimmable water quality
2. Providing water and sewer infrastructure for community growth and revitalization
3. Managing water quality for human benefits and for the watershed’s ecosystem

**Long-Range Target 1 - Achieving Swimmable Water Quality:** By 2020, achieve swimmable water quality along the entire main stem of the river, except following storms. All forms of outdoor recreation on the estuary, including swimming, will be considered routine and popular summertime activities, with new beaches and floating swimming pools drawing more and more New Yorkers to the waterfront each year [links to goals 1, 4, 6, 7 and 11]

**Target 1: Actions Planned for 2010-2014**

- Have contracts and funding in place to disinfect municipal discharges where needed to achieve swimmable water quality on the Hudson estuary and tidal tributaries from the Troy dam to New York City, as well as in the upper Hudson above Troy
- Address impacts from combined sewer overflows (CSOs) through implementation of Long-Term Control Plans and best management practices adopted for Hudson River municipalities
- Fully implement and ensure continued compliance with Phase II stormwater permits for Hudson River municipalities
- Promote green infrastructure techniques, such as rain gardens, green streets and other low-cost approaches throughout the Hudson River watershed to help support efforts to control CSOs and stormwater runoff and promote groundwater recharge
- Continue to promote compliance with the vessel waste No Discharge Zone designation in the Hudson River estuary by supporting the establishment of additional pump-out facilities

**Long-Range Target 2 - Providing Water and Sewer Infrastructure for Community**

**Growth and Revitalization:** By 2020, have funding and contracts in place to support construction of water and sewer facilities in river communities to assure that these are quality places to live, work and play [links to goal 9]

**Target 2: Actions Planned for 2010-2014**

- Develop and maintain programs and plans to meet the 2020 target
- Complete a needs assessment for Hudson River shoreline communities, including cost estimates for long-term infrastructure needed to revitalize these population centers
- Undertake pilot projects in areas of highest need
- Improve infrastructure in disadvantaged neighborhoods as part of a revitalization strategy
- Secure federal funding partnerships to address the cost of infrastructure upgrades
- Identify likely climate-change and sea-level rise impacts to infrastructure

**Long-Range Target 3 - Managing Water Quality for Human Benefits and for the Watershed's Ecosystem:** By 2020, have policies in place to protect those natural systems that provide clean and abundant water [links to goals 3, 4 and 5]

**Target 3: Actions Planned for 2010-2014**

- Map municipal reservoir watersheds and aquifer recharge areas that provide clean and abundant water
- Identify and assist communities willing to pilot conservation measures to protect forests, wetlands and tributary shorelines to protect water resources in the Hudson Valley
- Develop state and local policies for watershed and aquifer protection
- Where feasible, implement watershed and aquifer protection plans to protect drinking water sources
- Improve methods of assessing and monitoring the biological condition of streams

## Goal 11: Contaminant Reduction

### Goal

Reduce **contaminants** entering the Hudson River, and remove or remediate river sediments contaminated by long-term pollutants so that food webs of the river are supported, people can safely eat Hudson River fish and harbors are free of the contaminants that constrain their operation.

### Challenge

Contaminants entering the Hudson estuary are taken up by fish and other aquatic organisms, affecting the entire food chain, including consumption of fish by humans. Toxic chemicals reduce the abundance and diversity of the aquatic plant and animal communities.

Dredging regulations make disposal of chemically contaminated sediments very expensive for the maintenance of navigational channels, turn-around basins, commercial ports and recreational harbors. This is especially true in the New York harbor area, where the volume of sediment to be dredged is great and the availability of disposal options is limited.

Plain sediment can also be a contaminant. Sediments are necessary to replenish wetland soils and to maintain a level of turbidity in the river that avoids algae blooms from excess nitrogen found in the river's water. However, disturbances to the landscape from agriculture, development, certain industries and construction can result in excessive sediment. This sediment comes off the land as loss of topsoil and from within streams. High levels of development can reduce the ability of land to absorb water and increase the rate at which water runs into streams. Abnormally increased flows in streams cause local floods, damage to public infrastructure and private property, ecological disturbances and erosion of stream banks. Oyster reefs can be smothered by too much sediment. Even relatively uncontaminated sediments impact recreational uses as many smaller marinas and boat clubs that serve state residents and visitors lose dockage areas, and navigable channels are restricted because of sediment deposition. This deposition also has the potential to adversely affect aquatic habitat and alter the ecosystem of the estuary.

Achievement of a "green port" free from toxic substances and unencumbered by excessive sediments will require prolonged effort reducing contaminant hotspots and dealing wisely with the land. Chemicals which are toxicologically significant at exceedingly low concentrations are globally distributed. Because they are virtually indestructible and move very slowly in the environment, they will be with us for a long time. Landscape modifications for dwelling, industry, commerce, transportation and agriculture are unavoidable. Nevertheless, progress is being made. If the reductions in PCBs anticipated in the upper Hudson and lower Passaic River remediation projects are realized, most New York harbor sediments will be suitable for ocean disposal within 30 years. Even without remediation, dioxin levels in surficial sediments should be suitable for ocean disposal within 30 years. Reduction of excessive sediment loadings is possible with improved design and practices.

The actions outlined in this goal are closely related to and supported by those in Goal 4, Watersheds.



## **Goal 11: Long-Range Targets and Immediate Actions Planned for 2010-2014**

To achieve the goal of reducing contaminants and removing or remediating river sediments, we plan to implement specific actions by 2014 within the context of long-range targets that address the following two themes:

1. Managing contaminants through continued monitoring, modeling and tracking down hotspots
2. Managing sediment with improved design and practices

**Long-Range Target 1 - Reducing Contaminant Concentrations:** By 2020, projects to reduce dioxins and legacy PCBs will be completed, and new contaminant sources will be targeted for reduction [links to goals 4 and 10]

### **Target 1: Actions Planned for 2010-2014**

- Identify contaminant sources that may be affected by increases in sea level and storm events
- Use the 2007 Contaminant Assessment and Reduction Project (CARP) model to identify practical targets for contaminant reduction in the estuary. Refresh the CARP model with periodic monitoring to check for progress. Conduct recommended scientific investigations to strengthen the model. Define a work plan to attain appropriate contaminant concentrations by 2020, and set targets for reducing contaminant levels in sediment sources
- Continue to track down sources of contaminants in the Hudson River estuary, and monitor the response to pollution reduction activities. Identify, quantify and remediate sources of contaminants of concern such as dioxin, PCBs, PAHs, metals and pesticides
- Review other chemicals that may become targets for future resolution
- Work with the EPA as it implements the PCB dredging project in the upper Hudson

**Long-Range Target 2 - Managing Sediment:** By 2020, the quantity of sediments entering the estuary system will be managed to support both the navigational activities and the ecological health of the estuary, including shallow water habitats such as oyster reefs [links to goals 2, 5 and 9]

### **Target 2: Actions Planned for 2010-2014**

- In cooperation with the NY-NJ Harbor Estuary Program, complete a sediment management plan that addresses both navigational and ecological concerns. Maintain a monitoring program to characterize sediment sources to the estuary and sediment movement
- Develop regional sediment management tools, and implement programs needed to promote soil and water management practices throughout the estuary

- Reuse dredged sediments where such use is determined to be protective of the public health and the environment
- Establish the research capacity to inform a sediment management plan to be implemented through Goal 11 targets. In concert with Goal 2, set sediment objectives for the Hudson to assure that impacts on navigation, benefits to wetlands, concerns about sea-level rise and impacts from storm events associated with climate change and erosion are understood and properly addressed

## ***Goal 12: Celebrate Progress and Partnerships***

### **Goal**

Track our **progress, and celebrate** our successes!

### **Challenge**



The Hudson River ecosystem is going through a period of profound change. Zebra mussels have altered the food web, impacting aquatic animal populations. The composition of terrestrial species is shifting as well, with consequences that are not entirely known. In the watershed, patterns of development are changing, with the potential to affect water quality and habitats. Changes in our climate will impact aquatic and terrestrial habitats, species distributions and shoreline and coastal infrastructure. The challenge is to be sure that we observe and record these changes to better understand and predict how they will affect the river and to engage our partners in effective action to insure that development and growth are implemented in ways that minimize environmental impacts.

Today, we are in a better position to track these changes than ever before. In the last several years, we have established working partnerships with local governments, business leaders, schools and grassroots non-profit organizations. These partnerships can usher in a new era of cooperation if we nurture them. In partnership with regional academic and research institutions, DEC is poised to strengthen the scientific foundation of the Hudson River Estuary Program. The challenge is to make the Hudson a model for scientific management through productive partnerships.

With ambitious goals for the future, we also need to continue to communicate to the public and our partners how well we are doing. We will improve our ability to efficiently and meaningfully track program effectiveness in meeting the *Action Agenda* goals, and we will need to establish broad understanding of what needs to be done to continue our progress.

Finally, it is beneficial to reflect upon and celebrate our successes, evaluating what has been accomplished and looking toward future achievements.

The *Hudson River Estuary Action Agenda 2010-2014* offers a combination of ways that the program's successful achievements can be viewed and celebrated. Some of these ways include development of an improved monitoring program that will focus on developing indicators, or "vital signs," to measure the health of human communities and natural systems within the watershed. Scientific information that has been gathered by the program's many studies will be interpreted into an understandable format, allowing the public to monitor progress, evaluate effectiveness of the program and participate in future decision-making exercises to help guide the program. Celebrations such as National Estuaries Day continue to bring heightened attention to the Hudson River and its many values, and programs focused around other Hudson River-related events will be planned.

## **Goal 12: Long-Range Targets and Immediate Actions Planned for 2010-2014**

To achieve the goal of tracking our progress and celebrating our successes, we plan to implement specific actions by 2014 within the context of long-range targets that address the following four themes:

1. Monitoring ecosystem condition and tracking program performance
2. Building partnerships
3. Building accessible databases
4. Celebrating progress

### **Long-Range Target 1 - Monitoring Ecosystem Condition and Tracking Program**

**Performance:** By 2020, monitoring programs will be in place for key environmental indicators, and performance reports will document a record of achievement since 2009 [links to all goals]

#### **Target 1: Actions Planned for 2010-2014**

- Document and consolidate data on baseline ecological conditions, and, where lacking, collect needed baseline information
- Select a set of key environmental indicators for the watershed ecosystem that will monitor environmental conditions as well as the outcomes of our efforts
- Enhance existing monitoring programs, and streamline performance reporting to improve our tracking against baselines
- Promote knowledge of the current condition of the Hudson River ecosystem through the Hudson River Environmental Conditions Observing System (HRECOS)
  - Provide high-frequency, real-time data of defined quality in formats accessible by scientists, managers and recreational users on water quality, weather conditions and other variables, describing environmental responses to cyclic and episodic events
  - Improve the capacity of governmental and research entities to understand the ecosystem by providing timely monitoring data sets and products applicable for research, modeling, decision-making, education and future technological innovation
  - Complete the implementation of HRECOS by extending the network into the Mohawk River, upper Hudson and elsewhere in the state by installing webcams and by installing pumping stations that will allow investigators to obtain water samples at any time
- Gather and analyze information on baselines and indicators of change with time in the Hudson River watershed, and use the information to update the *State of the Hudson 2009* report. Additional economic and social indicators related to the use of natural resources by people and communities will be developed and measured

- Report on 15 years of progress since the first Estuary Action Plan was adopted in 1996
- Efficiently track progress on all goals, and allow the public to follow our efforts

**Long-Range Target 2 - Building Partnerships:** By 2020, enlist 1,000 partners (municipalities, businesses, non-profits) in implementing this *Action Agenda* [links to all goals]

**Target 2: Actions Planned for 2010-2014**

- Enlist 500 partners (municipalities, businesses, non-profits) in implementing this *Action Agenda*

**Long-Range Target 3 - Building Accessible Databases:** By 2020, ensure that Hudson River watershed databases, maps and reports are available to partners and the public through web-based interactive applications [links to goals 2, 3, 4, 5 and 6]

**Target 3: Actions Planned for 2010-2014**

- Ensure that key databases, maps and reports generated by Estuary Program projects since 1996 are readily available to our partners and the public
- Continue to provide maps, training, documents and resources to support all goals of the *Action Agenda*

**Long-Range Target 4 - Celebrating Progress:** By 2020, progress on the estuary will be recognized through regional celebrations and events [links to goal 8]

**Target 4: Actions Planned for 2010-2014**

- Annually celebrate National Estuaries Day (the fourth Saturday in September)
- Publish stories about what we have learned, and make them accessible to the public on the web and through other media. See Goal 8, Target 4
- Encourage artists and writers to include river issues in their work

**Appendix A:  
Hudson River Estuary Management Advisory Committee  
Members and *Ex-officios*  
June 2010**

**HREMAC Members:**

Dennis Suszkowski, Committee Chairman  
Hudson River Foundation

Judy Anderson  
Community Consultants

Allan Beers  
Rockland County

Andrew Bicking  
Scenic Hudson, Inc.

Bill Conners  
Federation of Dutchess County Fish and Game Clubs

Gina D'Agrosa  
Westchester County

Katie Dolan  
Auburn Theological Seminary

John Dorritie  
Penny Bridge Marina  
Hudson Valley Marine Trades Association

Bill Emslie  
Coastal Conservation Association

Stuart Findlay  
Cary Institute of Ecosystem Studies

Sara Griffen  
OLANA Partnership

Tom Lake  
Commercial Fisherman/Educator

Chris Letts  
Hudson River Foundation Educator

Roland Lewis  
Metropolitan Waterfront Alliance

Eric Lind  
Audubon Constitution Marsh Sanctuary

Bernard Molloy  
Historic Hudson River Towns

Alex Matthiessen  
Riverkeeper, Inc.

John Mylod  
MT Nets

Jon Powell  
Columbia Greene Community College

Jeff Rumpf  
Hudson River Sloop Clearwater

Karl Schoeberl  
Central Hudson Gas & Electric Corp.

Rene VanSchaack  
Greene County IDA

John Waldman  
CUNY Queens College

**HREMAC *Ex-officios*:**

Tom Baudanza  
NYC Department of Environmental  
Protection

Mark Castiglione  
Hudson River Valley Greenway

Mario Del Vicario  
USEPA  
Marine and Wetlands Protection Branch

Noreen Doyle  
Hudson River Park Trust

Nordica Holochuck  
NY Sea Grant

Len Houston  
US Army Corps of Engineers

Regina Keenan  
NYS Department of Health

Jane McLaughlin  
NYS Office of Parks, Recreation  
And Historic Preservation

Bob Nyman  
USEPA - NY-NJ Harbor Estuary Program

Brian Mitchell  
Interstate Environmental Commission

Bonnie Devine - Division of Coastal Resource  
NYS Department of State