

Discussion Draft Hudson River Estuary Action Agenda 2010-2014



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

Commissioner Pete Grannis
Governor David Paterson



Discussion Draft
June 2009

Additional information and copies of this report are available from:

**Frances F. Dunwell
Hudson River Estuary Coordinator
NYSDEC – Hudson River Estuary Program
21 South Putt Corners Road
New Paltz, New York 12561
phone: (845) 256-3016
fax: (845) 255-3649
e-mail: hrep@gw.dec.state.ny.us
<http://www.gov/lands/4920.html>**

We welcome your comments:

This document is a discussion draft. Please send us your thoughts by COB, July 31, 2009. Release of the *Action Agenda 2010-2014* is scheduled for January 2010. In the fall of 2009, we will be conducting additional public outreach to further refine this vision for the future.

**E-mail your comments to: hrep@gw.dec.state.ny.us
Please put “Action Agenda Comments” in the subject line**

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Executive Summary

A. How is the Hudson doing? The State of the Hudson 2009

The Hudson River and its watershed form a dynamic ecosystem that supports a variety of human needs and sustains a rich natural environment. It has dramatically changed over time. Studying its past and present condition helps us chart a direction for the future. For over a century, the Hudson has benefited from an active conservation movement that has protected scenic landscapes, historic sites, forests, wildlife and water resources. In many ways the river is much better than it was one hundred years ago. In other ways, things have gotten worse. Some changes are permanent and can never be reversed. Revitalizing and sustaining the river valley for the benefit of all its residents is the task at hand and requires an understanding of both the rhythms of the natural world and the needs of our people. Here's where we stand today:

Water quality:

The Hudson has become cleaner over the last forty years. To continue progress we need to clean up toxic leftovers from the past, upgrade sewage treatment, control polluted runoff, and prevent new contaminants from entering the ecosystem.

River Habitats:

Dredging, filling, and shoreline development caused massive loss and alteration of river habitats into the 1970s. We must protect remaining habitats to nurture the fish and wildlife that depend on them and to sustain benefits they provide to human communities.

River Fish & Wildlife:

Eagles and egrets are up, shad and sturgeon are down, and alien invaders are here to stay. We must protect habitat, adopt stringent fisheries conservation measures, and prevent the establishment of other invasive species.

Tributary Streams that Flow to the Hudson:

Since 1972 we have cleaned up the most degraded tributaries, but now healthy streams are stressed by runoff and the pollutants it carries, while floodplain development and dams compromise stream habitat. Further improvements will depend on decisions made by hundreds of communities and thousands of landowners.

Landscape and Land Use:

One hundred years of conservation have preserved world famous scenic landscapes and significant natural resources such as water supplies. The population and economic growth attracted to this landscape must be guided by the need to conserve these natural assets.

The Living Landscape—Biological Diversity and Ecosystems:

Ongoing threats to the Hudson Valley's biological diversity include climate change and sprawl that fragments habitat, promotes the spread of pests, and disrupts natural processes sustaining people and wildlife. It is crucial that more municipalities and landowners adopt new patterns of development.

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The People of the River Valley:

Growing numbers of citizens, organizations, and institutions are taking action to improve the health of the Hudson. The river shaped our past; we now shape its future. Our power to alter the Hudson must be informed by striving to understand the vital role the river plays in our lives.

B. What needs to be done now? The Hudson River Estuary Action Agenda

In 2005, the state's Hudson River Estuary Action Agenda established 12 long-range goals for revitalizing and sustaining the river valley for the benefit of all its residents and set targets and action steps to achieve them. The Action Agenda is not a state agency "plan" in the formal sense of the word but a statement of where the state and its citizens want to be. The June 2009 *Discussion Draft Hudson River Estuary Action Agenda 2010-2014* identifies the following priority actions for the next four years:

The River

Goals 1, 2, 10 & 11 addresses the need to restore our signature species of fish, conserve the aquatic habitats which sustain them, remove toxic contaminants from the water and sediments, and improve water quality for swimming, fishing, drinking water and other benefits. Needed actions include:

- implement fish recovery plans for shad, herring, sturgeon and striped bass
- address the impacts of water withdrawing facilities, such as power plants
- complete the mapping of key habitats and begin habitat restoration projects
- improve guidance on shoreline erosion control options to make them more ecological
- detect, monitor and where possible control new harmful aquatic invasive species
- prepare for sea level rise and its consequences on human communities and natural systems
- update water and sewer infrastructure and disinfect wastewater where needed
- adopt new "green" approaches to reducing the impacts of run-off
- manage sediments coming into the river from streams
- reduce the inputs of contaminants such as metals, pesticides, PAHs, dioxin and PCBs

The Valley

Goals 3, 4, 5, and 6 address the need to conserve the rich diversity of plants animals and habitats of the valley, restore our streams, protect our famed landscape and scenery and address the changing climate of the valley. Needed actions include:

- Conserve habitat connections that make our ecosystem resilient in the face of change
- Increase groundwater infiltration to protect stream flows and conserve water supplies
- Manage stream corridors and floodplains so that people and ecosystems are safe
- Increase the amount of conserved land for scenic vistas, habitats and recreation
- Help communities become "Climate Smart"
- Improve land use decision-making to reduce the sprawling patterns of development and strengthen our cities, hamlets and community centers

The People

Goals 7, 8, 9 and 12 address the need to provide access to the Hudson for recreational uses enjoyment, enhance public understanding of the river and enjoyment of it, revitalize the waterfront communities of its

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shoreline and celebrate our successes. Needed actions include:

- Complete the Greenway Trail
- Upgrade our deteriorated docks and build new ones
- Provide river access for people whose needs have not been adequately served
- Build connections for richer and more diverse river experiences
- Serve the needs of educators and students by creating curriculum, training programs and facilities
- Continue to revitalize waterfront communities and support enhanced planning
- Track our progress and celebrate our accomplishments

Foreword

In 2009, as we celebrate the Quadricentennial, the time is right to think about the future and the next 100 years. This *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. This *Action Agenda* 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 from 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, in order 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, the state and federal governments 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 on-going 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

The mission of the Hudson River Estuary Program is to: conserve the natural resources for which the Hudson is legendary, promote full public use and enjoyment of the river, and clean up the pollution that affects our ability to use and enjoy it. Our program is founded in science and implemented in ways that support the quality of life of the Hudson Valley's citizens.

Our role is to develop an Action Agenda, which contains goals that broadly apply to the river valley and its ecosystem, to chart a path to meet those goals through interagency action and collaboration with partners, and to establish measurable benchmarks against which progress can be tracked.

Selected Accomplishment Since 1996:

Every four years, the Hudson River Estuary Program updates the Action Agenda creating a blueprint for the program's activities for the next half decade. The Action Agenda outlines the goals, challenges and targeted actions that need to be pursued by the program and its many partners over the coming years. 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 the first Action Plan was adopted in 1996, the Hudson River Estuary Program has dedicated more than a decade to intensive research, adaptive approaches to management, public outreach and the development of partnerships with both 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 many accomplishments, demonstrating how, together the Estuary Program and its many partners have made a difference:

The River:

Fisheries: Striped bass are stable and Atlantic sturgeon are showing signs of recovery. Shad are in crisis and a plan has been adopted. New York has emerged as a strong voice in assessing stock condition, and updating amendments to interstate fishery management plans. Atlantic Sturgeon migration patterns are being revealed for the first time ever through a new study using sonic and satellite tags. Low-tech, affordable "eel ladders" are being successfully piloted by volunteer and school groups to aid migrating eels reach additional habitat areas in tributary streams above man-made barriers.

River Habitats: In the river, key habitats have been mapped, including the estuary's tidal wetlands, submerged aquatic vegetation beds, over 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

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decision makers, community leaders, environmental groups, local land trusts, natural resource managers and regulators.

Water Quality: 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. Fifteen pump-out stations along the river service recreational boaters. The program’s target to achieve swimmable waters by 2009 was significantly advanced through state grants to municipalities for seasonal disinfection and the development and implementation of Long-Term Control Plans to address combined sewer overflows (CSOs), especially in the Capital District area where water quality improvements are most needed to be fully protective of public bathing.

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, National Estuarine Research Reserve, US Geological Survey, Cary Institute of Ecosystem Studies, Lamont Doherty Earth Observatory and 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 Valley:

Plants and Animals: The program has provided biological information to more than 100 municipalities and trained hundreds of community leaders, landowners, and managers on how to recognize and conserve biological diversity and significant ecosystems. A guide, *Conserving Natural Areas and Wildlife in Your Community*, was published and is being made available to local leaders. The first ever wildlife and landscape monitoring plan for the Hudson Valley was developed to better understand and report the status of important biological resources to state and local leaders. Mapping of the Hudson Valley’s biodiversity resources by the Estuary Program in partnership with the Nature Conservancy and Natural Heritage Program documented for the first time the global, regional and state-wide significance of the area’s plants and animals including 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 are working together to establish two partnerships for Regional Invasive Species Management to prevent or control invasive species.

Watersheds: The Estuary Program has raised awareness of how the Hudson Valley’s rivers and streams relate to the Hudson estuary ecosystem and related conservation concerns. As a result, watershed conservation planning and implementation is ongoing in 13 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 stormwater local 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. The Estuary Program’s “Trees for Tribs” initiative is in its third year and has protected over 32,000 feet of stream buffers at over 70 sites. Over 10,000 native trees, shrubs, and grasses have been planted by 1200 volunteers to protect water quality and stream habitat.

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Open Space and Scenic Vistas: 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.

The People:

Access: The goal to provide new or improved access in every community has been nearly met, with 76 Estuary Grants awarded for local trailered and hand launches, fishing piers and shore fishing, trails and shoreline access, 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 trailered boat launches were built to serve areas in need and renovations were made to four major boat launches. A CD map and inventory of fishing access was released in 2007. Cooperative state agency action led to fishing access enhancements providing access to the river over the railroad tracks at nine MetroNorth access points.

Education: The Estuary Program has provided technical assistance and funded nearly 120 projects to develop a network of over 20 environmental education sites along the Hudson with high quality exhibits, facilities and programming. The river-wide effort, "Day in the Life of the Hudson River estuary" has completed six years of sampling and now brings over 3000 participants (students, teachers, educators) from over 60 schools to the river at over 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. NYS standards-based curriculum developed by the Estuary Program is now being used by classroom programs, underway in 40 Hudson Valley schools and the "Teaching Hudson Valley" initiative of the Hudson River Valley National Heritage Area.

Climate Change: In 2006 the Estuary Program held a conference, *Climate Change in New York's Hudson Valley* attracting over 350 local decision-makers. The Hudson Valley region is now piloting measures to adapt to climate change at a regional scale, with participation from multiple state, local and community agencies. Regular Hudson Valley Climate Network meetings provide a forum for coordination of climate action in the valley. Over 40 organizations including local officials, universities, not-for-profits and businesses participate. 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 NYS Sea Level Rise Task Force, which will produce recommendations to the legislature to respond to sea level rise in New York by the end of 2010.

Estuary Grants: The Hudson River Estuary Grants Program has provided opportunities for local implementation of Action Agenda goals since 1999. Over the past nine years, \$11.5 million has been awarded in 342 grants to local governments and non-for-profit organizations for projects that include

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interpretation and education opportunities, open space planning and protection, community-based habitat conservation and stewardship, watershed planning and Hudson River access. Interagency coordination of grant programs between DEC, DOS, OPRHP and Greenway has supported the revitalization of riverfront communities, while protecting the estuary by guiding new development to population centers.

About the Action Agenda 2010-2014

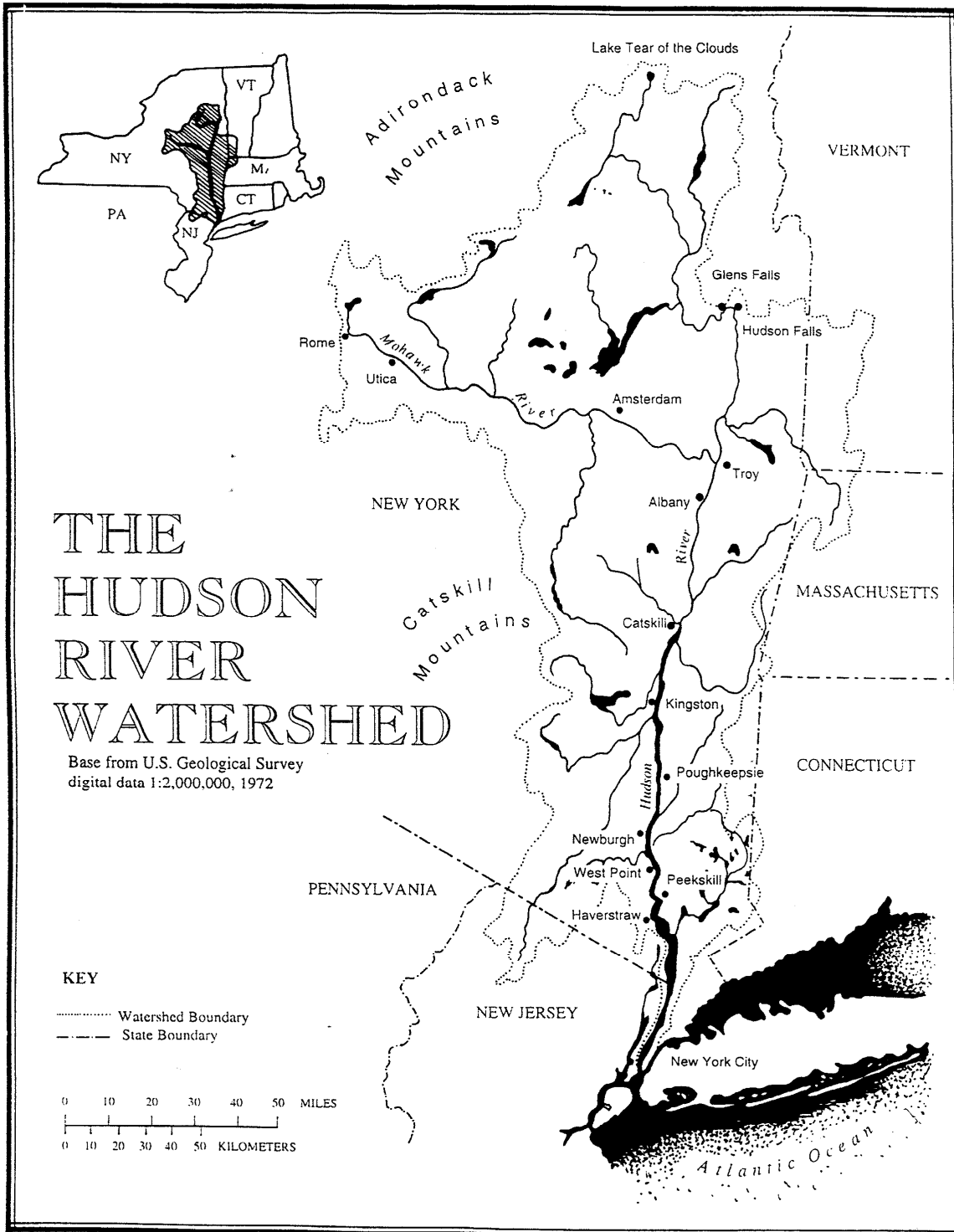
In 1987, the New York State Legislature passed Section 11-0306 of the Environmental Conservation Law. Known as the Hudson River Estuary Management Act, this law directs DEC to develop a management program for the Hudson River Estuarine District and its associated shorelands. Starting in 1996, the Estuary Program developed and has progressively updated an ambitious agenda for the Hudson estuary through a series of multi-year action agendas. This document contains the most recent long-range goals for the conservation and recovery of the Hudson estuary and the lands of its watershed. For each goal, we have identified actions to be completed by 2014, as well as additional longer-range targets that look ahead to the year 2020, and in some cases, beyond.

The goals and targets that follow reflect a progression of steps that will lead to measurable process towards meeting the program's goals. These steps include:

1. Characterizing the resource (to identify what's here and why it's important)
2. Identifying the problems and threats needing to be addressed (to focus our efforts)
3. Implementing targeted actions (to identify what needs to be done and how)
4. Monitoring, measuring and assessing progress (work plans, performance measures, annual reports)
5. Revising steps 1-4 based on assessment results (ecosystem based management approach)

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.

The 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 and its tributaries above Troy, 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, contribute essential habitat that support 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. Recently, bald eagles have successfully nested and raised their young for the first time in over 100 years along the shores of the river. The estuary also serves as an important resting and feeding area for other migratory birds such as osprey, a variety of songbirds and waterfowl.

The Hudson estuary serves one of the most densely populated areas in the country. The estuary's 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 here 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.

Summary: Hudson River Estuary Action Agenda Goals

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, where possible, enhance **critical river and shoreline habitats** to assure that the life cycles of key species are supported for human enjoyment and to sustain a healthy ecosystem.
3. Conserve upland ecosystems that support the estuary and supply clean and abundant water to people by providing habitat for a **rich diversity of plants and animals**.
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 **human, 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 in order 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 or river watching, 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 legacy sources 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. To ensure 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, Atlantic sturgeon, 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 in order 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 if this is possible. Over 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 disrupters, 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

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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 the following long-range targets:

Long-Range Targets

Target 1: Migratory fish:

American Shad and River herring: By 2020, implement on-going recovery plans for shad and river herring, including reductions in mortality, implementing habitat protection measures, and pilot habitat restoration projects so that by 2050, shad and herring populations will be restored to levels that will support sustainable, economically viable fisheries.

Atlantic Sturgeon: By 2036, ensure spawning of the progeny of the first mature and fully protected female year class of Atlantic sturgeon so that by 2050 the Hudson River Atlantic sturgeon population will be positioned to substantially increase. Facilitate stock recovery by maintaining a moratorium on possession, reducing mortality and adopting habitat conservation measures until stock levels that can sustain a fishery have been achieved.

Striped Bass: For all years, maintain a broad age-structure and self-sustaining spawning stock at levels of abundance that provide a quality and economically viable fishery.

American eel: By 2020, maximize production of yellow eels (adult life stage) from the Hudson River watershed ecosystem.

Target 2: Resident fish:

Shortnose sturgeon: For all years, maintain a stable population at an optimal level by continuing to support state and federal protection of this species and protecting habitat, in order to achieve de-listing from the federal and state Endangered Species lists.

Smallmouth and Largemouth Bass: By 2030, if feasible, restore the smallmouth and largemouth bass recreational fishery to the nationally renowned levels of the mid-1980s.

Target 3: Crustacean and shellfish:

Blue crab: By 2030, achieve blue crabs stock levels that can maintain an optimal fishery.

Oysters: By 2025, reestablish small oyster populations in the Hudson for ecosystem benefits and by 2045, determine the feasibility of oyster harvesting in the future.

Target 4: Reducing in-river impacts:

Contaminants in fish: By 2020, demonstrate measurable reduction of PCBs and mercury in fish and cadmium in blue crabs, so that by 2050 fish and blue crabs are safe for human consumption without concern for public health.

Water withdrawing facilities, power generating plants: By 2020, reduce fish kills for all types of existing water withdrawals that utilize once through cooling systems.

Actions Planned for 2010-2014

Target 1: Migratory fish:

- **American shad:** Implement the 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 utilization 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:
 - Annual stock status sampling
 - Implement harvest restrictions to reduce mortality and waste; identify and reduce ocean bycatch losses
 - Characterize habitat, 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.
- **Striped bass:** Annually monitor abundance and mortality rates of the spawning stock and monitor recreational harvest to facilitate detection and documentation of change. Implement protective measures required under interstate fishery management plan. Re-evaluate the feasibility of a limited commercial striped bass fishery on any portion of the Hudson River.
- **American Eel:** Develop projects to lessen existing estuarine and tributary threats to American eels and develop a recovery plan. Identify threats, establish regular monitoring and expand volunteer participation.

Target 2: Resident fish:

- **Shortnose sturgeon:** Explore and initiate methodology for tracking abundance change in the shortnose sturgeon population.
- **Smallmouth and Largemouth Bass:** Determine if 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.

Target 3: Crustacean and shellfish:

- **Blue crab:** Develop restoration goals and necessary monitoring to ensure sustainability. Implement studies to identify and characterize critical over-wintering habitat, summer movement and habitat use, and factors affecting year class production.
- **Oysters:** Complete studies to determine the feasibility of restoring healthy oyster populations to the Hudson River estuary. Conduct pilot projects to establish oyster populations, if feasible.

Target 4: Reducing in-river impacts:

- **Contaminants in fish:** Working through the Pollution Reduction team [Links to Goal 11], 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 PCB, mercury in fish and cadmium in blue crab.
- **Water withdrawing facilities, power generating plants:** Effective immediately, reduce, or have schedules to reduce, fish kills at the four remaining steam electric power plants that utilize 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 impact. Require that future Hudson River power generating facilities have closed cycle cooling systems. 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, where possible, enhance **critical river and shoreline habitats** to assure that the life cycles of key species are supported for human enjoyment and to sustain a healthy ecosystem.

Challenge

The diverse and varied habitats of the estuary have changed dramatically since 1609, when Henry Hudson first sailed up the river to Albany. Vast areas of river bottom have been dredged, tidal wetlands and shallows have been filled, and hundreds of miles of shoreline have been altered, both straightened by the railroad and hardened by timber cribbing, rock rip-rap, concrete revetment and sheet piling. The remaining habitats of the estuary—the wetlands, the aquatic plant beds, the shoreline, and the very bottom of the river itself—are vitally important to the estuarine ecosystem, and provide many human benefits. Submerged beds of native aquatic vegetation enrich the water column with dissolved oxygen, serve as sheltered nurseries, and provide food items, enabling fish and crabs to survive in our waters. Tidal wetlands buffer our shores, export food items to the main river, recycle nutrients, support countless forms of life, and provide important recreational opportunities. Deeper habitats are havens for different forms of life at many life stages.

In order to protect these habitats, we must know what is present along with what has been lost and how it was lost. The habitats must be inventoried, characterized, and, where necessary, conserved or restored. In carrying out an ecosystem management approach, we also need to better understand the contributions of these habitats to the ecosystem, the services they provide, and their capacity to support fish and wildlife. An important new focus in 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 that may affect their ultimate survival. Lastly, in order to adaptively manage the habitats that support these species, we need to understand how they are changing as a result of natural and human-induced factors, including climate change, invasive species and sedimentation.

Past shifts in climate have affected composition, structure and function of the estuary in uplands, the marshes and shallows. Climate change poses a significant threat to river and shoreline habitats in the near term. Sea level in our region has risen more than 15 inches over the last 150 years due to a combination of geological forces, the expansion of ocean water as it warms, and from the melting of glaciers and polar ice sheets. Scientists expect this trend to continue, inundating tidal marshes and sensitive shallow habitats that support many species of fish and wildlife. In the last decade, an alarming disappearance of tidal wetlands in New York City and on Long Island has been linked to accelerated sea level rise as well as dams, land use shifts, nitrogen fertilization and other factors. Although we see no signs yet that upriver Hudson River tidal wetlands and submerged aquatic vegetation beds are disappearing, some data show that these habitats are not accumulating sediments fast enough to outpace projected rates of sea level rise.

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These habitats must build up or migrate landward, or they will disappear.

A related threat to habitats is shoreline hardening. Nearly half of the Hudson River shoreline is hardened by man-made structures. As sea level rises and storms become more frequent and intense, there will be pressure to build dikes and bulkheads to protect low elevation uplands. Shoreline hardening and other attempts to buttress shorelines against flooding will damage critical aquatic habitats and prevent them from migrating inland with rising water levels.

Goal 2: Long Range Targets and Actions Planned for 2010-2014.

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

Long-Range Targets:

Target 1: Habitat Conservation: By 2020, develop a model of how upland, shoreline, inter-tidal and sub-tidal habitats contribute to sustaining the ecosystem, so that by 2030, protection, management and restoration actions will be in place allowing all river and shoreline habitats to increase their support of the ecosystem, estuarine species and human enjoyment of the river. By 2050, retain sufficient distribution, variety, acreage and functioning of river and shoreline habitats to enable comparable or greater ecosystem services in support of estuarine species than those available today, despite sea level rise.

Target 2: River knowledge: By 2020, retain a population of resource managers and constituents who value highly these ecosystem services, and understand how conditions in the river change over time, so that by 2050, we will have in place the science and management tools necessary to maximize resiliency and functioning of all Hudson River habitats

Target 3: Invasive and exotic species: By 2020, implement a process for projecting new arrivals and planning for response to invasions, and implement developed protocols for aquatic invasive species responses. Have in place the regulatory tools to minimize likelihood of new introductions of invasive species, so that by 2050, an early detection system for exotic and invasive aquatic species will be in place along with plans for action upon arrival or evidence of rapid change in distribution.

Actions Planned for 2010-2014

Target 1: Habitat Conservation

- Continue to identify and map key aquatic habitat types, including submerged aquatic vegetation (SAV), tidal wetlands and inter-tidal areas, shoreline and river bottom to establish trends over time and guide ecosystem-based management, with a focus on the following:
 - Complete mapping of shallow water habitats (0-5m depth) for the entire estuary, the last unmapped area in the estuary.
 - Make river habitat mapping products available in electronic form to the public.
- Enhance our understanding of how and why river habitats and shoreline are changing over time to monitor their ability to provide vital ecosystem services, with a focus on the following:

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- Assess changes in SAV and tidal wetland habitat coverage and composition at approximately five year intervals.
- Advance understanding of patterns of sediment accumulation and transport in marshes and SAV throughout the estuary. This includes an analysis of past variation in sedimentation with climate shifts, such as droughts and wet intervals.
- Monitor marsh elevation throughout the estuary to better define patterns of marsh accretion and/or subsidence.
- Determine what areas are sensitive to increasing salinity due to sea level rise.
- Characterize the functional roles of river and shoreline habitats in the ecosystem.
 - Advance understanding of 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. [Links to Goal 1]
 - Characterize the functional roles of shoreline habitat complexes, including shorelines and the adjacent shallows and shore lands, in order to guide decision-making about human use, erosion mitigation and land use, especially as sea level rises.
- Determine approaches and need for restoration of river and shoreline habitats, including river bottom, oyster reef, shallows, SAV, tidal wetlands, and accessible tributaries to enhance refuge, forage opportunities, and reproductive habitat for estuarine life and to support ecological functions.
 - Complete the Hudson River Restoration Plan, and begin implementation.
 - Identify Target Ecosystem Characteristics (using the techniques developed by the Harbor Estuary Program) for river and shoreline habitats to guide restoration.
 - Develop and disseminate guidance on shoreline erosion control options and their ecological and economic costs.
 - Begin implementation of recommendations of the oyster reef restoration feasibility study, and develop an oyster reef restoration site if determined feasible.
 - Identify sustainable traditional or innovative shoreline management techniques and measures that promote beneficial shoreline ecological services, and develop a process whereby these are routinely recommended for shoreline projects.
- Use existing conservation mechanisms to protect and conserve Hudson River estuarine habitats and the species that rely upon them.
 - Develop guidelines to prioritize conservation of areas of opportunity for Hudson River wetlands to migrate upslope as sea level rises, and implement the recommendations of the NYS Open Space Plan to conserve these.
 - Develop recommendations about species that rely on river habitats for periodic updates to the state's list of Species of Greatest Conservation Need.
 - Complete the update of Significant Coastal Fish and Wildlife Habitat designations for the Hudson River estuary, and disseminate this information to decision-makers.
- Predict and mitigate impacts of accelerated sea level rise on Hudson River habitats.
 - Monitor Hudson River tidal marsh response to sea level rise using geodetic, tidal, and marsh surface elevation data.
 - Assess past rates of sea level rise and consequences for wetland sedimentation.
 - Determine potential areas of tidal wetland migration, and determine approaches for enabling such migration.
 - 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.

Target 2: River knowledge

- Promote conservation of river habitats by providing science-based training to resource managers, shoreline land owners and other river stakeholders, regulators, contractors and other decision-makers.
 - Conduct audience needs assessments to identify key stakeholders and decision-makers, assess their knowledge and attitudes, and design science-based trainings to promote climate change mitigation and adaptation.
 - Annually provide training to key audiences to advance climate change mitigation and adaptation, and understanding of the myriad of estuarine ecosystem services, proactive shoreline management, habitat protection, and sustainable river communities.
 - Continue to link knowledge about habitat extent and change with educational materials [Links to Goal 7] using local maps to enrich curricula.
- Promote the knowledge of the current condition of the Hudson River ecosystem through the Hudson River Environmental Conditions Observing System (HRECOS), including data on water quality, weather conditions and other variables in formats accessible by scientists, managers and recreational users.
 - Provide continuous, real-time information to various stakeholders on multiple variables essential for understanding the environmental response to episodic events in the natural and anthropogenic system, for understanding the controls on this system, and for identifying stressors that might lead to ecosystem deterioration in the future.
 - Improve the capacity of governmental and research entities to understand the ecosystem by providing a backbone of timely monitoring datasets and products necessary for applied research, modeling, decision making, education, and future technological innovation.

Target 3: Invasive and exotic species

- 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.
 - Collaborate with partners to monitor the mitten crab invasion of Hudson River marshes and tributaries, and the impact of this invasion.
 - Develop a process for projecting the arrivals of new invasive species and determining plans of action in advance of the arrival of these species.
 - Improve science-based knowledge of consequences of decisions about whether to attempt eradication and suitable methodologies.
 - Continue to manage and remove invasive colonies of the common reed (*Phragmites australis*) in Hudson River marshes where justified and feasible.

Goal 3: The Living Landscape: Biological Diversity and Ecosystems



Goal

Conserve upland ecosystems that support the estuary and supply clean and abundant water to people by providing habitat for a **rich diversity of plants and animals**.

Challenge

People in the Hudson Valley depend on the unique ecosystems of the estuary watershed and the ecological processes maintained by plants, animals and habitats. Managing biological diversity and ecosystems on the landscape is a proven and cost-effective way to increase the resiliency of human communities, especially when faced with environmental change. Biologically diverse 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 ecosystems 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. Priority habitats for conservation 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.
- Unbroken forests needed by scarlet tanager, warblers, wide-ranging mammals, hawks, owls, box turtles and fringed polygala flower.
- Grasslands and shrublands that shelter northern harrier (marsh hawk), bobolink, eastern meadowlark, golden-winged warbler, short-eared owl and uncommon butterflies.
- Wetlands, including marshes, swamps, wet meadows, 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: Jefferson, marbled, and spotted salamanders, wood frog, spotted turtle, fairy shrimp and others.
- Unique natural areas that support at-risk 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 to survive are declining in the valley. Fragmented landscapes reduce the capacity of ecosystems to provide

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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.

Many land-use decisions that lead to habitat fragmentation are made at the local level by municipal boards and by landowners. Strategies to conserve the region's distinctive biological diversity and associated ecosystem services must target this local level of decision-making. 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 signature fisheries, river and shoreline habitats, tributary streams, water quality and a scenic landscape.

Goal 3: Long Range Objectives and Targets for 2010-2014.

To achieve the goal of maintaining the rich diversity of plants, animals and habitat throughout the watershed we plan to implement specific actions by 2014, within the context of the following long-range targets:

Long-Range Targets:

Target 1: Conserve habitats that support watershed resilience, ecosystem services for people, and at risk plants and animals: By 2020, land trusts will be actively using information provided by the Estuary Program to conserve key habitats and for conservation planning. By 2030, the key habitat types in the watershed including significant forests, grasslands, shrublands, riparian areas and wetlands will be mapped and regular reports on the state of the watershed's biodiversity will assess trends and conservation needs.

Target 2: Raise the capacity of local partners to conserve important habitats and use biological information in decision-making: By 2030 the Estuary Program will have assisted twenty-five municipalities with implementation of plans, local laws and decision-making tools to conserve significant habitat, and 20 regional or inter-municipal partnerships will be underway to develop and implement plans to conserve watersheds, landscape connections and shared biodiversity resources.

Target 3: Address climate change and monitor threats: By 2030, conservation tools will have been developed to help maintain habitat connections and mitigate the impacts of fragmentation and climate change.

Actions Planned for 2010-2014

Target 1: Conserve habitats that support watershed resilience, ecosystem services for people, and at risk plants and animals

- Continue current efforts to identify and map key habitat types in the watershed that support human needs for clean water, clean air, agriculture, recreation, commerce, natural beauty, and

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climate change adaptation and mitigation.

- Identify high priority natural communities that provide critical ecosystem services such as clean drinking water, erosion control, carbon sequestration, and wildlife habitat.
- Assess at risk wildlife populations and identify which habitats in the Hudson Valley are most in need of conservation.
 - Develop and implement consistent monitoring plans for woodland pool wildlife, and marsh, shrubland and forest breeding birds. Continue to monitor watershed wildlife and habitat quality.
 - Identify and track changes in the status and distribution of high priority species, including imperiled turtle, salamander and frog populations, and provide guidelines for reversing their decline.
 - Engage citizen scientists, private landowners, nature centers and local conservation groups in monitoring wildlife populations and habitats. Create online access to monitoring data for citizen scientists.
- 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 identifying their biodiversity resources and developing conservation plans and strategies. Provide all Hudson Valley land trusts with data on biodiversity resources, and encourage use of the information for habitat stewardship on private lands. 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.

Target 2: Raise the capacity of local partners to conserve important habitats and use biological information in decision-making

- Continue to train local leaders to recognize and map ecologically significant habitat and communicate its 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 the Hudson River Estuary Grants program, 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.
- Assist municipalities and other partners with incorporating conservation measures for at-risk species into planning and environmental review.

Target 3: Address climate change and monitor threats

- Identify and prioritize habitat connections including those necessary for plants and animals to move northward and to higher elevations in response to 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, ecosystem services for people, and at risk plants and animals.

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 River as well as its Lower Hudson tributaries and their watersheds (a watershed is the land area that drains to a common water body). 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 freshwater 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 mainstem, important habitat and aquatic vegetation often exists, 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), water withdrawals 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, and productive fish and wildlife habitat. Impacts often make their way downstream, making tributary health not just a local issue, but 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.

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

To achieve the goal of protecting our streams and sustaining water resources we plan to implement specific actions by 2014, within the context of three long-range targets:

Long-Range Targets:

Target 1: Water quality in streams and drinking water: By 2020, maintain water quality in high quality waters to ensure a healthy supply of freshwater and organic carbon to the Hudson estuary and to protect the quality of drinking water supplies, headwater streams and recreational rivers.

Target 2: Water quantity and stream flows: By 2020, maintain resilient watershed hydrology by promoting groundwater infiltration, and improving management of the condition of existing and future water infrastructure, such as water supplies and wastewater facilities.

Target 3: Flooding, flood plains and stream corridors: By 2020, protect, restore and maintain river corridors and floodplains for recreation, fish and wildlife habitat, and to minimize future flooding impacts to property and infrastructure.

Actions Planned for 2010-2014

Target 1: Water quality in streams and drinking water

- Foster active locally-led watershed management and conservation groups on all significant tributaries to the Hudson estuary as critical partners in implementing water resource protection and restoration targets by supporting intermunicipal watershed planning and implementation. [Links to Goal 3]
- Focus land use and water quality outreach programs in a pilot watershed with intermunicipal partners. [Links to Goal 3]
- 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 volunteer and local leader monitoring opportunities that encourage results to be integrated into land-use decision making.
- Track land cover changes in the estuary watershed, such as increases in impervious cover. [Links to Goal 3]
- Assess what motivates the public to protect water resources on private land and through land-use decision making to assist in creating unique watershed protection incentive programs at the local level that reduce impervious cover. [Links to Goals 3 and 8]
- Working closely with the biodiversity program, deliver 15 trainings on land-use impacts to natural resources. [Links to Goal 3]
- Integrate green infrastructure and stormwater retrofits in three Hudson Valley neighborhoods and estuary waterfront communities, including environmental justice communities, to reduce

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pollution impacts from urban stormwater sources on local water resources, implementing at least one pilot project in each community.

Target 2: Water quantity and flows

- Continue to characterize estuary watershed hydrology and sediment loading through such mechanisms as installing and operating stream gages on major streams and rivers, and through other mechanisms, such as investigating water conservation trends and projected supply needs throughout the estuary watershed.
- Assist communities in including aquifer characteristics and groundwater protection in watershed planning efforts, with an emphasis in recognizing the role groundwater plays in stream baseflow. [Links to Goal 3]
- Investigate and spatially illustrate the impact on streams resulting from hydrologic modifications and out-of-basin transfers induced by large-scale water supply and wastewater infrastructure in the watershed.
- Investigate the feasibility of sustainable wastewater options, such as decentralized approaches that promote groundwater recharge.
- Assist communities in changing their codes to be more environmentally sustainable, and implement better site design practices to promote infiltration at new developments. Implement these practices in at least four communities as pilot projects. [Links to Goal 3]

Target 3: Flooding, floodplains and streamside ecosystems

- Minimize future flooding impacts and protect stream habitat and water quality by developing and delivering local government guidance that protects stream buffers and floodplain corridors. Work with municipalities to adjust local codes to protect 400 miles of riparian corridors. [Links to Goal 3]
- Assist communities and landowners to identify opportunities for streamside assessment, outreach and restoration through “Trees for Tribes,” and other riparian restoration programs. Re-vegetate 15 miles of stream with native vegetation or plant 30,000 native trees and shrubs within riparian buffers. [Links to Goals 1, 2, and 3]
- Restore stream habitat by implementing barrier mitigation and dam removal in at least three rivers to benefit water quality and aquatic connectivity. [Links to Goals 1 and 2]

Goal 5: The Working Landscape, Open Space, and River Scenery



Goal

Conserve key elements of the **human, 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, forestry and the presence of “wild” open space have long been recognized as important components of the region’s sense of place. The Hudson itself, has been a working river from its earliest settlement leading to the development of commercial and recreational waterfronts, as well as its many historic community centers. To this day, these historic and natural features maintain the rural character of the region so loved by Hudson Valley residents and visitors.

For over 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, the views of the distant Catskills, as well as our more human, working and pastoral landscapes. 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.

However, the economics of maintaining traditional land uses and preserving views from publicly accessible natural and historic sites is under increasing pressure from both shoreline development and developmental sprawl threading its way across the region. As the water quality of the Hudson mainstem has improved, property values have likewise increased. As the valley continues to grow, the need to conserve the area’s remaining open space has become critical, especially along inland rivers and streams and along the Hudson’s shores where these lands serve a wide variety of services from providing recreational opportunities to mitigating the impacts of flooding on communities and local infrastructure. We now know that in the not-so-distant future, these lands will prove to be vital in buffering the effects of climate change in our region by providing wildlife corridors for a variety of migrating species, both from south to north as well as from current tidal areas to more inland areas of future inundation.

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 tourist economy. Protection of river scenery will assist in achieving other *Action Agenda* goals, including those for waterfront revitalization, river and shoreline habitats, watershed conservation, plants and animals and public access. We are moving aggressively 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 Actions Planned for 2010-2014

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

Long-Range Targets:

Target 1: Open Space Planning: 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 and 4]

Target 2: Open Space Conservation: By 2020, working with land trusts and local governments and using a combination of fee, easement and other conservation mechanisms, protect 200,000 acres in the greater Hudson Valley for wildlife-related recreation and for conservation of biodiversity, scenery and landscape character, and working farms, of which at least 10,000 acres should be along or in sight of the Hudson River. Prioritize conservation of parcels that provide connectivity between larger habitat areas, as well as parcels which protect riparian areas. [Links to Goals 2, 3 and 4]

Target 3: Conservation of Community Vistas: By 2020, implement the program to designate and conserve 400 scenic viewpoints of the Hudson Valley, and identify an additional 600 scenic viewpoints for potential designation. [Links to Goals 7, 8 and 9]

Target 4: Conservation of World Renowned Scenery: By 2020, conserve the key viewsheds from publicly accessible parks and historic sites, and their cultural landscapes and set a long term target of permanently conserving 25 vistas painted by the Hudson River School of Painters. [Links to Goals 7, 8 and 9]

Actions Planned for 2010-2014

Target 1: Open Space Planning

- Encourage three communities to adopt Community Preservation Acts.
- Twenty percent of Hudson River Valley communities will have developed and implemented local open-space protection programs consistent with the state Open Space Conservation Plan.
- Continue the state grants program to support local acquisition and open space planning by municipalities and conservation groups and for development of local open-space plans, site stewardship management plans, and local codes and ordinances that will allow the landscape objectives to be achieved and seek federal matching support.
- Prioritize conservation of parcels that help provide connectivity between larger habitat areas, protect riparian areas, provide north-south connectivity between larger habitat areas or conserve natural shoreline.

Target 2: Open Space Conservation

- Assure that the conserved lands database is available for public use and kept current. This dataset identifies lands permanently secured against conversion to development held by state, federal, county, municipal governments and land trusts in the Hudson River Valley. Adjust priorities for land protection and acreage goals based on changes recorded in this database.

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- Conserve 75,000 forested acres by working with private land owners to retain the characteristic woodland landscape. Use existing regional, state and federal forestry programs to encourage private forest landowners to: a) practice sustainable forestry, or "forest stewardship" on 45,000 additional privately owned acres over and above the 2005 baseline; b) commit 30,000 new acres to forest management through the forest tax law and other programs; and c) provide access to hunting, bird-watching and other pursuits.
- Work to secure federal funding for Forest Stewardship Management Planning for private forestlands.
- Retain the traditional agricultural landscape through the efforts of the State Department of Agriculture and Markets in supporting the viability of agriculture with regional, state and federal agriculture programs, including farmland preservation and stewardship programs.
- Develop new tax incentives to encourage sustainable conservation management to enhance the environmental benefits of private lands, and encourage landowners to more fully utilize existing incentive programs. Implement stewardship management practices to conserve and enhance forest resources, water quality, wildlife habitats, biodiversity, and aesthetic qualities.
- Protect 5,000 acres along or in sight of the Hudson River.
- In partnership with local government, land trusts and others, permanently protect 40,000 acres of open space for wildlife-related recreation and for conservation of biodiversity, scenery and landscape character in the greater Hudson Valley, in addition to those protected from 1996-2009.

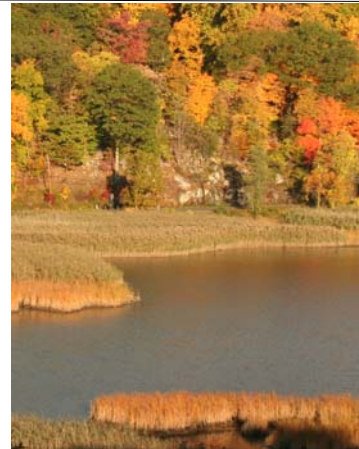
Target 3: Conservation of Community Vistas

- Conduct a scenic study, including baseline assessment of identified scenic viewpoints, of the Hudson Valley to identify criteria for designating scenic viewpoints.
- Protect key scenic properties. Develop a program to designate and conserve 400 scenic viewpoints of the Hudson Valley.
- Encourage 15 municipalities to develop programs to inventory and protect important local river vistas.
- Provide training and technical assistance for local government in the use of tools for scenic conservation.

Target 4: Conservation of World Renowned Scenery

- Through partnership with the Hudson River Valley National Heritage Area, develop an inventory of the key vistas painted by the Hudson River School of Painters and viewsheds associated with public recreational and historic sites, and develop a program for their conservation.
- Continue Estuary Grants Program support for local projects that protect or enhance scenic river vistas and promote the conservation of the scenic quality of the river.
- Secure the conservation of one or more key scenic vistas, and showcase the community river vistas that have been protected.

Goal 6: Climate Change



Goal

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

Challenge

More than 3700 scientific experts from 130 countries (including the US) 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 the 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 to continue over the 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 how communities respond to increasing vulnerability, especially from extreme events, does not increase the overall long-term risks and costs to valley communities as a whole. Organizing at the regional level 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 Actions Planned for 2010-2014

To achieve the goal of addressing the causes of **climate change** in the Hudson Valley, we plan to implement specific actions by 2014, within the context of the following long-range targets:

Long-Range Targets:

Target 1: Riverfront communities and sea level rise in the estuary: By 2020, working with DEC Office of Climate Change, state agencies and local governments to implement key adaptation strategies outlined by the Sea Level Rise Task Force, NYSERDA Climate Impacts Assessment, NYC Climate Adaptation Task Force and Rising Waters project, all riverfront 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.

Target 2: Climate Smart Hudson Valley communities: By 2020, fifty percent of Hudson Valley communities will adopt and begin to implement the New York State “ClimateSmart Communities Pledge” which outlines the most important energy conservation and climate adaptation strategies that should be undertaken by municipalities, so that by 2030, 75 percent of Hudson Valley communities will have adopted and begun to implement the pledge.

Target 3: Research and Data Collection: By 2020, research and agency partners will be able to measure and model regional impacts of climate change in the Hudson Valley including changes in air and water temperature, migration of plants and animals, sea level rise, and extreme weather events, and will be able to provide information to help communities take effective action. Potential funding mechanisms will have been identified to update FEMA floodplain maps in at-risk communities, natural shoreline areas will have been identified and prioritized as to their capacity to aid in climate adaptation.

Actions Planned for 2010-2014

Target 1: Riverfront communities and sea level rise in the estuary:

- Riverfront communities will have preliminary information on projected impact areas for local flooding associated with sea level rise and stronger storms, will know what action is needed to prepare, and will be aware of resources available to craft solutions.
- Seek the support of Hudson Valley partners and federal agencies to help collect shoreline elevation data using LIDAR (Light Detection and Ranging) technology to map potential areas of shoreline inundation due to sea level rise and stronger storms. Provide communities with maps and information on impact areas for climate change.
- Identify and map vulnerable natural systems and human infrastructure (water and sewer intakes/outfalls, rail lines, roads, transportation, utilities, etc.) along the Hudson River estuary shoreline and outline potential impacts to each sector.
- Develop guidance for all riverfront 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 or siting new critical infrastructure
 - Determining which shoreline areas are suitable for shoreline protection and which areas may be more suitable for 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

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Target 2: Climate Smart Hudson Valley communities

- 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.
- Partner with DOS, the Federal Emergency Management Agency (FEMA) and State Emergency Management Office (SEMO), the Hudson River Valley Greenway and ICLEI-Local Governments for Sustainability to develop guidance for communities in the estuary watershed to become climate resilient including undertaking a step-by-step climate vulnerability analysis and developing a local action plan.
- Work with SEMO and Hudson Valley partners to develop guidance to help municipalities incorporate climate change information and natural resource-based climate adaptation strategies into county, village, or town hazard mitigation plans.
- Facilitate the formation of 2 county-wide task forces or shared (county or intermunicipal) sustainability coordinators to develop and disseminate regional mitigation and adaptation strategies in Hudson Valley communities.
- Continue to raise awareness of climate change causes, projections, and evolving responses through public presentations and outreach materials. Develop and implement, with the DEC Climate Change Office, outreach strategies targeted toward local government officials and other key audiences in the Hudson Valley. Promote awareness of climate change in the Hudson Valley through conferences, training, public presentations, and outreach materials.
- Annually, continue to work with the DEC Climate Change Policy Office and key stakeholders in the Hudson Valley to coordinate efforts of the members 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.

Target 3: Research and Data Collection

- Preliminary modeling to understand how sea level rise and strong storms will impact the estuary will be completed and areas of greatest vulnerability to human and ecosystem health will be identified.
- Develop basic models to understand how sea level rise and shoreline inundation from strong storms (tributary inputs, storm surge) will affect different regions of the Hudson River estuary.
- Identify brownfields and other high vulnerability areas along the Hudson River shoreline at risk of coastal inundation due to sea level rise and strong storms.
- Regularly evaluate emerging scientific information and use it to update guidance to local governments.

Goal 7: Public Access

Goal

Develop, maintain and improve a **regional system of access points** for fishing, boating, swimming, hiking, education or river watching, 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 possible 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 Plans, 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.

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 fishing and swimming. This goal will be undertaken cooperatively by the NYS Office of Parks, Recreation and Historic Preservation (OPRHP), the NYS Department of State (DOS), including 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 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 the following long-range targets:

Long-Range Targets:

Target 1: Community Docks: By 2020, achieve substantial renovation of river docks and piers that support multiple uses including fishing, tourism, transportation, educational and research purposes

Target 2: Facilities for underserved communities: By 2020, establish river-wide access for people with disabilities and in environmental justice neighborhoods

Target 3: 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 5 communities

Target 4: Fishing Access: By 2020, establish one fishing access site per community where feasible

Target 5: Swimming: by 2020, establish increased opportunities for the public to safely swim in the Hudson

Target 6: Education and River-watching: By 2020, survey river cities to assess whether an education site linked with river access exists, initiate new projects where needed, working towards the creation of a network of education sites linked with river access in each river city.

Target 7: The Hudson River Valley Greenway Land Trail and Water Trail: By 2020, the Hudson River Greenway Watertrail will have established a series of campsites (or other overnight accommodations) every 15 miles or less that will promote multi-day excursions on the river for canoeists and kayakers; the Greenway land trail will be located primarily on an off-road non-motorized riverfront path with either physical or visual access to the Hudson River, and by 2020, the Greenway, working with local partners, will designate a continuous “riverside” Greenway Trail consisting of off road and interim on-road segments.

Target 8: All access sites and facilities—Building connections for richer and more diverse experiences: By 2020, develop trails and parks to establish and build connections between river education centers, cultural sites, scenic vistas, habitats and restoration sites so that residents and visitors can have richer and more diverse river experiences; and coordinate stewardship among agencies for access sites along the entire estuary. Work with state agencies to coordinate management objectives of all state-owned property on or in sight of the Hudson so that habitat and recreational needs are met. Create connections between river education centers, cultural sites, scenic vistas, habitats and restoration sites in five additional demonstration areas.

Actions Planned for 2010-2014

Target 1: Community Docks

- Establish one town dock per borough in New York City and upgrade 10 docks and piers north of Manhattan
- Establish a grant program to support the renovation of docks and piers, with priority given to use of “green” and recycled materials wherever feasible.
- Build on the “Blue Links” study which identifies sites in need of repair and develop a plan for renovating and improving these docks.
- Work with the NYS Department of Transportation (DOT) to develop access opportunities at commuter ferry docks

Target 2: Facilities for underserved communities

- Conduct a user survey to assess use and identify locations where additional access is needed to meet the needs of persons with disabilities. Develop a plan.
- Identify underserved environmental justice neighborhoods and identify access needs and opportunities, and develop a plan. Consider adopting standards or guidelines for amount of public waterfront open space per person.
- Thorough state and federal grant programs, fund access improvements to meet these needs.

Target 3: Boating Access

- Revise the 1998 Boating Access Plan to reflect new information and understandings.
- Support the development of new or improved boating access facilities in Troy, Catskill, and other locations based on needs to be determined, provided that permit conditions can be met.
- Complete the Greenway Water Trail for small non-motorized water craft, with one launch site at least every 10 miles on each shore and one camping /overnight accommodation site every 15 miles.
- Support community boating needs, such as floating docks in New York City and rowing facilities for crew using grants and municipal agreements.

Target 4: Fishing Access

- Develop a plan for a system of fishing access sites.
- Continue to educate the public about safe fishing practices including health advisories. Through grant programs, support local projects.

Target 5: Swimming

- Provide assistance through grants to interested parties to develop new or improved facilities.
- Where feasible, develop new swimming beaches, improve existing facilities, including bath houses, and support floating pools.
- Continue to improve water quality in impaired areas. [Links to Goal 10]

Target 6: Education and River-watching

- Through state grant programs, provide assistance to partners to create new linked opportunities for education and river access along the shoreline. [Links to Goal 8]

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Target 7: The Hudson River Valley Greenway Land Trail and Water Trail

- The Hudson River Greenway Watertrail 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.

Target 8: All access sites and facilities—Building connections for richer and more diverse experiences

- Survey and map current public access points along the river and tidal portions of the tributaries. Make this information available to the public and update on a regular basis.
- Create connections between access projects in three demonstration areas that will showcase municipal partnerships between neighboring or cross-river communities. Establish demonstration areas to tie into transit oriented locations (ferries) and DOS smart growth initiatives.
- Work with state agencies to coordinate management objectives of all state-owned property on or in sight of the Hudson within a demonstration area so that habitat and recreational needs are met.
- Develop standards for improvements at access points to insure that new facilities and/or upgrades to facilities are designed to withstand projected increases in shoreline flooding events and sea level rise due to climate change.

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, its wetlands, the river bottom, and the rich biodiversity of the landscape.

In order for this information to be effectively applied in future management decisions, the active 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 the following long-range targets:

Long-Range Targets:

Target 1: Places to go to learn about the river: By 2020, establish and publicize a coordinated



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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.

Target 2: 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, up-to-date information about the river's resources and opportunities for stewardship. By 2014, conduct a public survey to measure baseline recognition; repeat in 2019 to measure change.

Target 3: School programs: By 2020, 75 percent of Hudson Valley school districts will incorporate place-based education about the Hudson in their curricula.

Target 4: Improve the effectiveness of programs led by Hudson River Estuary Program staff to create a network of educators and citizens concerned about the river: By 2020, working with education partners, continue to establish the Hudson as a national and international model for interdisciplinary environmental education.

Actions Planned for 2010-2014

Target 1: Places to go to learn about the river

- 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.

Target 2: Information for the public

- 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.

Target 3: School programs

- Work with education partners to make available more field-tested, interdisciplinary, standards 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.

Target 4: Improve the effectiveness of programs led by Hudson River Estuary Program staff to create a network of educators and citizens concerned about the river

- Enhance annual programs such as the Hudson River Almanac 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 (2,000 subscribers early in 2009).
- 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 its 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 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 use with new businesses, a cleaner environment, and 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 correctly, may cut off public access to the waterfront, impact water quality, impair habitats, impact scenic resources and impose a burden on public infrastructure.

Furthermore, 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. 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. 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 redistribution of goods arriving by barge and by rail. State agency action on these issues could benefit from improved coordination.

As municipalities adjust to new economic opportunities, many riverfront communities are finding that environmental conservation plays a key role. Directing new growth to urban and community centers will make cities and village more vital and will help to protect open space and prevent habitat fragmentation. 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.

The lighthouses on the Hudson provide an opportunity to link waterfront revitalization with education and tourism. 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 following long-range targets:

Long-Range Targets:

Target 1: Local Waterfront Revitalization: By 2020, advance and foster the preparation and implementation of Local Waterfront Revitalization Programs and other pertinent waterfront planning documents in all riverfront communities.

Target 2: River Access: By 2020, complete the access projects identified in 2014 plans. [Links to Goal 7]

Target 3: Brownfield Clean-up: By 2020, promote cleanup and reuse of contaminated, riverfront brownfield sites affecting the Hudson estuary.

Target 4: 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, focusing on projects that address water quantity, water quality and sea level rise.

Actions Planned for 2010-2014

Target 1: Local Waterfront Revitalization

The NYS Department of State (DOS) will continue to work in partnership with local governments to prepare Local Waterfront Revitalization Programs (LWRP) and other waterfront planning documents that define a local vision for the waterfront. 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 waterfront resources. Through its LWRP Environmental Protection Fund grant program, DOS provides funding for both waterfront planning and implementation efforts. Specific targets are as follows:

- Complete the waterfront planning efforts, including LWRPs and LWRP amendments, in the cities of Albany, Hudson, Newburgh, Rensselaer and Yonkers; the villages of Briarcliff Manor, Cold Spring, Hastings-on-Hudson and Wappingers Falls; the towns of Cortlandt, Bethlehem, Wappinger and Coeymans.
- Complete a Climate Action and Adaptation Plan for the City of Albany.
- Complete a regional waterfront revitalization plan for Ulster County.
- Complete a Main Street Revitalization Plan for the City of Poughkeepsie.
- Construct new public park or downtown amenities in the Cities of Kingston, Peekskill, Rensselaer and Troy; in the Villages of Athens, Haverstraw, Nyack, Ossining, Piermont and Tarrytown; and 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.

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Target 2: River Access

Develop plans to address new shoreline facility needs, advance waterfront revitalization, and complete the following projects identified in existing Local Waterfront Revitalization Programs and other plans to date [Links to Goal 7]

- Develop designs for the Dayliner ferry dock in the City of Kingston.
- Construct a new boat launch in the City of Troy, Village of Tarrytown and the Town of Lloyd.
- Construct or rehabilitate a pier in the City of Beacon, Newburgh and Peekskill; and the villages of Nyack and Tarrytown.
- Restore Andre Brook, a tributary of the Hudson River using habitat and shoreline techniques in Goals 2, 3 and 4.
- Work with riverfront municipalities to develop quality public access to the Hudson River through programs such as the Greenway Water Trail and riverside Greenway Trail, acknowledges river access as a central component to a waterfront revitalization strategy. [Links to Goal 7]

Target 3: Brownfield Clean-up

Promote cleanup and reuse of six or more additional contaminated, brownfield sites affecting the Hudson estuary.

- Continue to encourage the participation of municipalities in the voluntary cleanup and restoration of contaminated urban waterfront sites.
- Provide technical and financial support to preliminary investigations and cleanups.

Target 4: Urban environmental conditions

Implement urban greening pilot projects in two river cities. Develop a plan to address needs in all river cities and villages.

Goal 10: Water Quality

Goal

Ensure that **Hudson River water quality supports appropriate 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 1970's 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 storm water systems to allow rain water 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 not only benefit eager bathers on a hot summer's day, but 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. Waste water, 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 over 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 the following long-range targets:

Long-Range Targets:

Target 1: 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 a routine and popular summertime activity, with new beaches and floating swimming pools drawing more and more New Yorkers to the waterfront each year.

Target 2: Water and Sewer Infrastructure for Community Growth and Revitalization: By 2020, have funding and contracts in place to support needed construction of water and sewer facilities, including upgrades to river city and village facilities, where needed, to assure that these population centers are quality places to live and revitalization efforts are supported. The Mohawk River Program will address key local problems on this major tributary through the Mohawk River Action Agenda.

Target 3: Water quality and the Watershed's Ecosystem, By 2020, characterize how the Hudson estuary's watershed functions as an ecosystem that supports clean water for drinking, swimming and recreation as well as natural resource protection and adopt conservation measures to achieve water quality goals, including conserving additional forests, wetlands and tributary shorelines (to be coordinated with Goals 3, 4 and 5). In concert with Goal 11, set sediment goals for the Hudson to

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assure that impacts on navigation, benefits to wetlands and concerns about sea level rise and erosion are understood and properly addressed.

Actions Planned for 2010-2014

Target 1: Swimmable Water Quality

- 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 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 (MS4 and construction) for Hudson River municipalities.
- Promote the use of green infrastructure techniques such that the use of rain gardens, green streets and other low-cost approaches to storm water source control and groundwater recharge so they become a routine component of development in the Hudson River estuary.
- Continue to promote compliance with the No Discharge Zone designation in the Hudson River estuary by supporting the establishment of additional pump-out facilities.

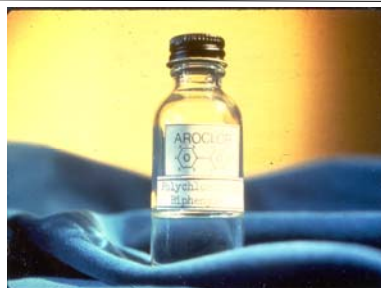
Target 2: Water and Sewer Infrastructure for Community Growth and Revitalization

- Have programs and plans in place to meet the 2020 target
- Complete a needs assessment and develop cost estimates for construction needs
- Undertake pilot projects in areas of highest need
- Improve water quality conditions in disadvantaged neighborhoods as part of a revitalization strategy
- Secure federal funding partnerships to address the cost of infrastructure upgrades.
- Address climate change and sea level rise impacts to infrastructure

Target 3: Water Quality and Ecosystem function

- Coordinate with Goals 3, 4, and 5 to understand how the Hudson estuary's watershed functions as an ecosystem that supplies clean water for drinking, swimming and recreation as well as providing for the area's natural resources. Support conservation measures to achieve water quality goals, including conserving additional forests, wetlands and tributary shorelines to protect water quality throughout the watershed to support these human needs as well as natural resource protection.
- Establish the research capacity to inform a sediment management plan to be implemented through Goal 11 targets [Links to Goals 2 and 11].

Goal 11: Contaminant Reduction



Goal

Reduce **contaminants** entering the Hudson River and remove or remediate river sediments contaminated by legacy sources 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

Many contaminants that make their way into the Hudson estuary have numerous impacts. Many contaminants are toxic to aquatic life and reduce the abundance and diversity of the plant and animal communities. Other contaminants in water and sediment are taken up by fish and other aquatic organisms, resulting in impacts that affect the entire food chain including consumption of fish by humans.

Many contaminants that enter the estuary also settle in river sediments. This results in economic impacts related to the maintenance of commercial ports and recreational harbors on the Hudson which requires periodic dredging of the main channel as well as docking berths and turn-around basins. High levels of contaminants in these sediments make it difficult and costly to dispose of dredged materials. 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.

Sediment has both negative and beneficial effects on the Hudson. Too much sediment in harbors causes dredging problems and, when combined with PCBs, mercury and other pollutants, causes significant disposal expense to the state economy and limits the navigational benefits of the river. However, sediment is also needed 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. Conversely, 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.

Clearly port/harbor planning and operations must meld economic interests with environmental concerns. This balance is critical to the development and implementation of strategies for the management of dredged material currently causing problems in some areas. To achieve a truly "green port" will require taking advantage of opportunities to beneficially use dredged material in a number of ways, including habitat improvement and brownfield cleanups. In the longer term, contaminant loadings must be halted at their source and upstream sediment loadings appropriately reduced. This will provide the greatest benefit to both the economic and ecological interests and make the balance between these interests easier to achieve.

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 the following long-range targets:

Long-Range Targets:

Target 1: Reducing contaminant concentrations: By 2020, contaminated sediment hot spots, and point and non-point sources of contaminants entering the estuary will be reduced, so that levels of toxics in newly-deposited sediments will meet 2014 work plan target levels and will not inhibit a healthy thriving ecosystem. Dredging and beneficial reuse of sediments will require little or no treatment. Contaminant movement that may be affected by projected increases in sea level and storm events associated with climate change will be identified and addressed.

Target 2: Sediment Management: By 2020, the quantity of sediments entering the estuary system will support the ecological health of the estuary, including protection of shallow water habitats, such as oyster reefs, without impairing navigational activities.

Actions Planned for 2010-2014

Target 1: Reducing contaminant concentrations

- Use the 2008 contaminant assessment and reduction model to evaluate our capability of meeting contaminant reduction targets for the river. 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 EPA as it implements the PCB dredging project in the upper Hudson.

Target 2: Sediment Management

- In cooperation with the NY-NJ Harbor Estuary program, complete a characterization of sediment loading to the estuary and develop regional sediment management tools.
- Begin to investigate how sediment movement may be affected by projected increases in sea level and storm events associated with climate change.
- Develop the programs needed to promote soil and water management practices throughout the estuary to achieve the targets to be established by 2010. Work with three or more county soil and water agencies to reduce sediment transport in the estuary and implement sediment reduction projects and programs, especially in priority areas.
- Dredged sediments will be beneficially reused where such use is determined to be protective of the public health and the environment.
- Using the model developed in 2008, evaluate opportunities and develop a plan to reduce sediment contamination at the source, facilitate future navigational dredging of New York Harbor and other estuary ports and minimizing the uptake of these chemicals into the food chain.

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, the patterns of development are changing, with the potential to affect water quality and habitats. Changes in our climate have the potential to 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 in order to 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 grass-roots 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 with 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 the following long-range targets:

Long-Range Targets:

Target 1: Monitoring ecosystem progress and tracking program performance: By 2020, monitoring programs will be in place for all program indicators and performance reports will document a record of achievement since 2009. Additional economic and social indicators related to people and communities will be developed and measured. Baseline ecological conditions for the watershed will be established.

Target 2: Partnerships: By 2020, enlist 1,000 partners (municipalities, businesses, non-profits) in implementing this Action Agenda.

Target 3: Cross-cutting services: By 2020, continue to ensure that Estuary Program databases, maps and reports are available to partners and the public.

Target 4: Celebrate progress: By 2020, National Estuaries Day will be a recognized regional event

Actions Planned for 2010-2014

Target 1: Monitoring ecosystem progress and tracking program performance

- Select a set of key environmental indicators for the watershed ecosystem that will monitor environmental conditions as well as the outcomes of our efforts.
- Existing monitoring programs will be enhanced, and performance reporting will be streamlined.
- Complete the implementation of HRECOS by extending the network into the Mohawk River and Upper Hudson, by installing webcams, and by installing pumped water ports that will allow investigators to obtain water samples at any time.
- Gather and analyze information on baselines and indicators of change over time in the Hudson River watershed and use the information to update the *State of the Hudson 2009 report*.
- 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.

Target 2: Partnerships

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

Target 3: Cross-cutting services

- Ensure that all 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

Target 4: Celebrate progress

- Annually celebrate National Estuaries Day (the 4th Saturday in September)

Discussion Draft

Appendix A:
Hudson River Estuary Management Advisory Committee
Members and Ex-officio
June, 2009

Dennis Suszkowski, Committee Chairman
Hudson River Foundation

Eric Lind
Audubon Constitution Marsh Sanctuary

Judy Anderson
Community Consultants

Bernard Molloy
Historic Hudson River Towns

Allan Beers
Rockland County

Alex Matthiessen
Riverkeeper, Inc.

Andrew Bicking
Scenic Hudson, Inc.

John Mylod
MT Nets

Bill Conners
Federation of Dutchess County Fish and Game
Clubs

Jon Powell
Columbia Greene Community College

Gina D'Agrosa
Westchester County

Jeff Rumpf
Hudson River Sloop Clearwater

Katie Dolan
TNC Eastern NY Chapter

Karl Schoeberl
Central Hudson Gas & Electric Corp.

John Dorritie
Penny Bridge Marina
Hudson Valley Marine Trades Assoc.

Rene VanSchaack
Greene County IDA

HREMAC Ex-officios:

Bill Emslie
Coastal Conservation Association

Tom Baudanza
NYC Department of Environmental
Protection

Stuart Findlay
Cary Institute of Ecosystem Studies

Mark Castiglione
Hudson River Valley Greenway

Sara Griffen
OLANA Partnership

Mario Del Vicario
U.S. EPA

Tom Lake
Commercial Fisherman/Educator

Marine and Wetlands Protection Branch

Chris Letts
Hudson River Foundation Educator

Discussion Draft

Noreen Doyle
Hudson River Park Trust

Bob Elliot – Division of Local
Government
NYS Department of State

Nordica Holochuck
NYS Sea Grant

Len Houston
US. Army Corps of
Engineers

Jane McLaughlin
NYS Office of Parks, Recreation
And Historic Preservation

Bob Nyman
US EPA- NY-NJ Harbor Estuary Program

Boris Rucovets
Interstate Environmental Commission

Bonnie Devine –Division of Coastal Resources
NYS Department of State