

# Hudson River Estuary Program 2012 Annual Report

*Presented to the Hudson River Estuary Management Advisory Committee  
March 6, 2013*

*In accordance with the provisions of the Hudson River Estuary Management Act,  
NYS Environmental Conservation Law Section 11-0306.*



*Clean Water \* Habitat \* River Access \* Climate Change \* Scenery*

Andrew M. Cuomo, Governor  
Joseph Martens, Commissioner

**NYS Department of Environmental Conservation in partnership with:**

NYS Department of State  
NYS Office of Parks, Recreation and Historic Preservation  
NYS Department of Health  
NYS Office of General Services  
Hudson River Valley Greenway  
US Environmental Protection Agency  
National Oceanic and Atmospheric Administration



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## Highlights of 2012

Extreme weather became the defining theme of 2012—Officials in the watershed of the estuary were still dealing with the impacts of 2011’s Tropical Storms Irene and Lee when, a mere 13 months later, Superstorm Sandy roared ashore in October. These storms produced major changes in the river as well as a sea change in public opinion. Residents of the region came to understand the tidal Hudson in a new way: we became aware of its power; we experienced how it could surge over its banks with devastating impact; we saw it flood our parks, waterfronts, homes and businesses. Below the Hudson’s surface, we found that tons of sediment had eroded from flooded farm lands and stream banks to spread a fresh layer of sand and silt on the river bottom. Submerged aquatic vegetation beds—crucial habitats of the estuary ecosystem—virtually vanished. On the shoreline, we came to understand the vulnerability of water and sewer infrastructure and the water quality it protects.



The year 2012 was notable, as well, for our accomplishments in advancing our ability to prepare for extreme weather on the estuary and in its watershed, and for advancing the other goals of the *Estuary Action Agenda*. Here are a few highlights:

- **We are helping estuary communities plan for flood hazards and climate change:** A joint project with the National Oceanic and Atmospheric Administration, (NOAA), to develop detailed shoreline topography and elevation maps utilizing a remote sensing technology known as Light Detection and Ranging (LiDAR), will enable us to better predict the impact area for storm surge and sea level rise. Data collected in 2012 will be available in early 2013. Following Superstorm Sandy, the value of these maps is now widely understood and will help implement climate change programs and policies contained in Governor Andrew M. Cuomo’s State of the State address for 2013, as well as recommendations of his NYS 2100 Commission. Fifty-four municipalities in Hudson Valley counties have now taken the Climate Smart Communities Pledge; 52 have taken action, 19 have developed or are developing climate action plans, and two—Kingston and Albany—are actively planning for coastal flooding. Along the shoreline in 2012, our team and our partners conducted outreach about sea level rise to local officials and community leaders in Columbia, Dutchess, Ulster and Westchester counties.
- **Our program leverages partnerships, volunteers and funding:** Ten state agencies, six federal agencies and 1,700 volunteers collaborated on projects relating to all our *Action Agenda* goals. Investments in our program leveraged \$5.8 million in funding by other partners.

- **We awarded a total of \$145,276 in estuary grants in 2012**, while 18 prior-year estuary grants were completed with a value of \$283,680. Over 1,000 people received conservation training, and 34 communities received conservation technical assistance tailored to their needs. Teachers downloaded our lesson plans from the Web over 19,000 times, and 13 university research projects arose from our work. Governor Cuomo formed an interagency group to manage the Mohawk River—the Hudson’s major tributary—with administrative support from the Estuary Program.
- **We are supporting Economic Development Council strategies and new state sustainability plans for the region:** The Estuary Program continues to improve its alignment with the three Regional Economic Development Council (REDC) plans that include the Hudson estuary. Consistent with these plans, we are conserving economically important water resources, fisheries, natural areas, scenic beauty and related tourism and recreation jobs. In addition, we are cleaning up brownfields, promoting green infrastructure and supporting state sustainability plans in the mid-Hudson and Capital Region. Organized by our sister agency, NYSERDA, these plans address water resource and land-use planning dimensions of sustainability for this executive priority project.
- **State, federal and private partners make big progress on clean water:** Under state and federal supervision, GE made continued progress on Phase 2 of the PCB removal project on the upper Hudson, a long-time priority for the river; 1,269,000 tons of contaminated sediments have been removed to date. To meet our goals for a swimmable river, disinfection of sewage treatment effluent at the Rensselaer Waste Water Treatment Plant (WWTP) will go online in 2013 and at the two Albany WWTPs in 2014. These three projects are expected to reduce the pathogen load in the Albany pool area by 80%. The *Sewage Pollution Right to Know Law* was passed and signed into law. This law gives the public the right to know when raw or partially treated sewage is discharged into New York waters. Public notification via local news outlets and the website of the NY Department of Environmental Conservation (DEC) is required within four hours of a sewage discharge. Remediation work plans were approved for two Westchester County brownfields: Cleanup at the former General Motors Site in Sleepy Hollow removed 4,635 cubic yards of contaminated sediments from the Hudson in 2012. At the Harbor at Hastings (former Anaconda Wire and Cable Co.) in the Village of Hastings on Hudson, the final Record of Decision (ROD) was approved which calls for remediation of 60,000 cubic yards of contaminated soil and 24,000 cubic yards of contaminated sediments (PCBs, metals) from the river, with work expected to begin in 2015. The Hudson River Environmental Conditions Observing System (HRECOS) added a new monitoring station at Marist College capable of collecting and holding a water sample at any given time of day, allowing for contaminants and sediments to be analyzed during storms or other events. The online real time database ([www.hrecos.org](http://www.hrecos.org)) now includes a weather station at Mohawk River Lock 8 and a new weather and hydrology station at Pier 84 in Manhattan’s Hudson River Park.



- **Atlantic sturgeon management programs show signs of success:** The Atlantic sturgeon fishery in the Hudson, closed since 1996, is making an encouraging recovery. Historically, sturgeon was a valuable commercial species providing flesh and caviar from the Hudson River harvest until the population crashed and New York closed the statewide fishery in 1996. Other Atlantic coastal states extended the closure coastwide in 1998; the closure was planned to last 40 years. Monitoring of juvenile abundance in the Hudson River estuary by utility company contractors showed a tripling of abundance of young fish following the closures, a level that has continued through 2011. Review of 2012 data suggests that the population has spiked tenfold over levels observed prior to the closure. Atlantic sturgeon mature and spawn between 12 and 20 years of age. The dramatic increase in juveniles observed in 2012 appears to reflect the return for spawning of fish protected their entire life by the closure. In 2012, the federal government listed Atlantic sturgeon on the endangered species list, lending new importance to our restoration work for this species.



- **River habitats gain new protection:** Using scientific information about river habitats collected by the Estuary Program, HRNERR and other partners over the last 20 years, NYSDOS and NOAA approved updates to the Hudson River Significant Coastal Fish and Wildlife Habitats, including the designation of seven new areas. The Estuary Program also continued to advance its restoration plan for river habitats and engaged in discussion with the Army Corps of Engineers about preparing a federal restoration plan for the estuary. Plans to map the shallow waters of the estuary in New York harbor are under development.
- **Open space conservation progresses and information on scenery will be available to planners and tourists:** DEC, the Greenway, the National Heritage Area and local and county stakeholders worked together to develop a draft of an online database of important scenic vistas. The National Heritage Area art trail gained new sites. The state and partners conserved nearly 3,000 acres in the watershed. DEC completed the first phase, the Essex Chain of Lakes (18,383 acres), of the Finch Pruyn project in the Adirondacks to conserve 69,000 acres.
- **DEC and DOH collaborated for healthy fishing:** To promote awareness of health considerations for eating Hudson River fish, the New York State Department of Health, Hudson River Fish Advisory Outreach Project funded three local groups and worked with many others to reach people fishing on the river at a variety of venues, including riverfront festivals, county fairs and local food pantries. The project collaborates with environmental education and nutrition programs and has begun to partner with Hudson boat club associations.

- **2012 is a big year for young eels:** Five-hundred volunteers participating in the Estuary Program’s citizen science study of juvenile American eel migration into Hudson River tributaries counted nearly 85,000 young eels from March through May, 2012—a figure that exceeded the total catch for the previous four years added together. Working at sites from the Bronx and Staten Island to Albany County, the volunteers—many of them urban high school students—released the tiny “glass” eels above barriers to their upstream journey.



**Lafayette’s return:** According to reports to the Estuary Program’s *Hudson River Almanac*, in summer 2012, the lower Hudson saw a large influx of spot, a small fish of coastal waters that is a sporadic visitor here. Their colloquial name, Lafayette, is said to have originated with the Marquis de Lafayette’s 1824 visit to New York City to be honored for helping the colonies during the American Revolution. His visit coincided with unusually large numbers of these small pan fish in New York harbor and the lower Hudson estuary.

The narrative on the following pages summarizes our progress in achieving each of the goals and associated targets of the *Action Agenda*. For those who want to see our progress at a glance, the following provides a few numbers to illustrate our progress in 2012, with more details contained in the Appendix.

# 2012 Summary by the Numbers

*(See Appendix A for More Details)*

## **Improve Clean Water:**

- WAVE - A pilot citizen scientist water quality monitoring project successfully launched and trained 99 volunteer participants who monitored at 107 sites.
- The Hudson River Environmental Conditions Observing System (HRECOS) website had 5,224 visits this year. Additions to the system funded, completed or underway include: the Poughkeepsie Pump Station, the Mohawk River, Pier 84, and the West Harlem pier in New York City.
- General Electric dredged 93 acres of PCB-contaminated sediments, removing an estimated 619,000 tons of sediment in the upper Hudson in 2012. A total of 1,269,000 tons of contaminated sediment has been dredged from 183 acres of the upper Hudson to date.

## **Manage Fish and Wildlife Habitats:**

- Fifteen juvenile Atlantic sturgeon were tagged with sonic tags to monitor the seasonal movement of this now federally listed “endangered” species (as of 4/6/12). Fifteen shortnose sturgeon, a listed threatened species, were tagged for the first time as a pilot for future study and to monitor seasonal movement.
- Five-hundred volunteer citizens and students from 30 organizations caught and released 84,995 young of the year glass eels under ASMFC protocols. Approx 2,000 people learned about eels in the classroom and other group presentations.
- Updates to the Hudson River Significant Coastal Fish and Wildlife Habitats, including the designation of seven new areas, 15 modified habitats, and narrative changes to 18 habitats were approved by NYSDOS and NOAA. DEC staff and volunteers documented a river-wide decline of more than 90% of SAV coverage, possibly due to the effects of Hurricane Irene and Tropical Storm Lee in 2011. Estuary training programs provided over 4,600 contact hours of science-based training to over 750 managers, regulators, and officials on topics related to climate change, sea level rise and Hudson River shoreline restoration; 23 municipalities received technical assistance and 96 citizens conducted volunteer monitoring of amphibians and birds. Citizens mapped more than 19,500 acres of Hudson Valley habitat.

## **Enhance River Access, Waterfronts and Education:**

- More than 16,500 people (including 10,510 students) participated in the educational programs of the Estuary Program and HRNERR; Hudson River web-based lesson plans were downloaded 19,045 times.
- Four major river-related events reached: 3,765 people at 69 sites through Day in the Life of the River (October); 80 educators through Teaching the Hudson Valley (July); 384 members of the public through Science on the River Day (September); and hundreds of people who attended one of 44 local festivals along the river on River Day (July).



- The 2012 Hudson River Ramble—a joint project of the Greenway and the National Heritage Area, attracted 132,000 participants. More than 1,000 people attended estuary-themed programs.
- Five sites received estuary grants in 2012 to start new access improvements: City of Newburgh, Town of Bethlehem, Village of Sleepy Hollow, Town of Ulster, Village of Nyack.

**Prepare Communities to Adapt to Climate Change and Sea Level Rise:**

- Fifty-four Hudson Valley communities have signed the Climate Smart Pledge. Nineteen Climate Action plans have been started; 14 are complete; 4 are in progress.
- The City of Kingston has formed a waterfront flood task force, and the City of Albany is using a coastal grant to consider the impact of sea level rise.



**Protect Our Renowned Scenic Resources:**

- State and partners conserved 2,960 acres in the watershed below the Troy dam, including 454 acres of shoreline properties along the banks of the estuary.
- In the Adirondacks, DEC completed the first phase of the Finch Pruyn project; an 89,000-acre working forest conservation easement—13% of the upper Hudson watershed—which will keep the majority of the productive timberlands on the property in active forest management.

# 2012 Narrative Reports by Goal

## Fisheries

Two notable developments in 2012 were the federal listing of Atlantic sturgeon as “endangered” and the implementation of new state regulations to begin the restoration of river herring. These actions give added importance to our fisheries restoration work on the Hudson and our current focus on these two species. This year, the status of the Hudson’s more popular fish species remains mixed. American shad, American eel and largemouth bass are in decline; the river herring population is currently at a low level. These stock conditions threaten the long-term viability of the Hudson’s commercial fishing industry, which has existed for hundreds of years, as well as coastal fisheries, which depend on fish born in the Hudson estuary. Within these long-term trends, we can report the following results from our 2012 annual monitoring, similar to results from last year.

### *Status of specific fish stocks of the Hudson*

Atlantic sturgeon: Recent coastal fish-tagging results show more extensive movement of adult sturgeon into Haverstraw Bay and the Tappan Zee than previously understood. In addition, our monitoring programs demonstrate that juvenile Atlantic sturgeon may be showing early signs of recovery.

Striped bass: Young of the year numbers were about average, the stock is stable, and a coastwide stock assessment is underway.



Blue crab: In 2012, we used tags that may possibly stay on the crabs during a molt. The tags we used previously were attached to the shell, and the tag would go with the shell when the crab molted. The new tags will enable us to get more years of data if the crab is recaptured and released back to the river. Crabs remain abundant.

American eel: Eel populations remain a concern coastwide. In 2012, the Estuary Program and its partners installed low-cost trap-and-pass eel ladders at three sites—Furnace Brook in Westchester County, and Crum Elbow Creek and Saw Kill, both in Dutchess County. A total of 447 eels used the ladders and were released upstream of barriers to their migration. These projects involved approximately 500 volunteers from over 30 organizations. Through classroom programs and other group presentations, approximately 2,000 people were educated about eels and their recent population decline.

American shad: Adult and juvenile shad in the estuary showed no improvement in the severely stressed population; cooperative programs with the State of Delaware are now being established. Estuary Program staff tagged 40 American shad this year, enabling us to track their movement and gain new understanding of both shad spawning habitat and shad use of habitats throughout the river across multiple seasons. River herring: A coastwide assessment completed in 2012 showed that river herring have been fished at unsustainable levels, and our data on herring in the Hudson have set the stage for the first phase of protective measures adopted in 2012.

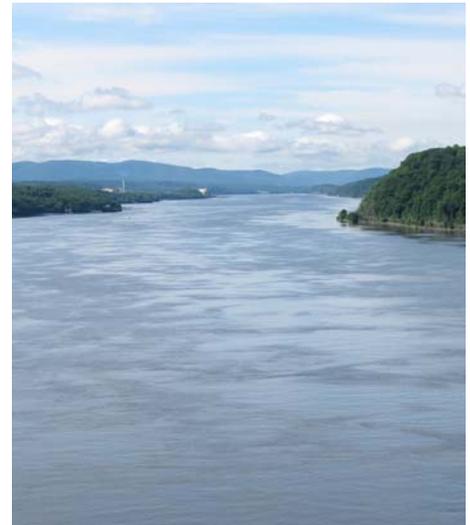
Largemouth and smallmouth bass: DEC continued to document the use of critical overwintering habitat for largemouth bass. In early spring 2012, mark and recapture surveys were conducted in these overwintering areas to estimate population sizes and compare data to previous studies. Data from these surveys are currently being summarized. DEC will continue to monitor the black bass fishery to assess whether the 15-inch minimum size limit has improved the fishery.

Citizen science: Our partnership with the Student Conservation Association (SCA) provided an opportunity for young people to teach their peers how to conduct fisheries field work while also providing useful data for management of fishery resources. In 2012, we engaged 112 volunteers in recording herring presence in eight tributary streams, providing information on timing of spawning runs and the relationship of environmental conditions such as tide and water temperature to tributary spawning. A partnership project with the Hudson River Research Reserve engaged citizens and students in monitoring glass eels—the juvenile life stage of the American eel. Using Atlantic States Marine Fisheries Commission protocols, with fyke nets set up at ten sites from New York City to Greene County, volunteers recorded a total of 84,995 young of the year eels, which were caught and released, compared to 2011, when a total of 6,964 eels were caught.



# Aquatic Habitat

For habitats to be effectively protected in regulatory activities and other conservation decision-making processes, we must understand river habitat trends and threats. Also, an awareness of habitat status and trends, restoration opportunities and best management practices must be developed among key decision-makers, including resource managers, community leaders, shoreline land owners, regulators, contractors and river users and other citizens. To accomplish this, information must be accessible in user-friendly formats, with technical assistance available so that managers can use existing and new conservation mechanisms to safeguard habitats. In 2012, we can report the following progress:



## *Federal-state restoration planning*

Conversations with the U.S. Army Corps of Engineers, facilitated by The Nature Conservancy, have focused on the opportunity to reactivate a long-dormant federal authorization for a restoration plan for the Hudson estuary from Tappan Zee to Troy. NYSDEC and NYSDOS, as partners with the Corps, have signified the intent to work on reactivating this project and possibly expanding the restoration focus to all goals of the Estuary Action Agenda, including habitat restoration and restoration of water quality, fisheries and recreational access.

## *State habitat restoration plan*

A draft state-organized Habitat Restoration Plan is under development and will be released for public comment in 2013.

## *Habitat protection*

In 2012, DEC recommended to the NYS Department of State (DOS) a set of updates to the Hudson River Significant Coastal Fish and Wildlife Habitats, including the designation of seven new areas, boundary and narrative revisions resulting in 15 modified habitats, and narrative changes to 18 habitats. These updates were approved by DOS for state coastal consistency and by NOAA for federal coastal consistency purposes.

## *SAV monitoring*

DEC staff and volunteer monitors organized by the Cary Institute of Ecosystem Studies documented a more than 90% decline of SAV coverage river-wide, possibly due to the effects of Tropical Storms Irene and Lee.

### *Sustainable shorelines*

From 2010 through 2012, the Estuary Program and the Hudson River National Estuarine Research Reserve continued to develop an understanding of the interactions of human behavior and habitat. Grants from NOAA secured by the Research Reserve enabled research on the tradeoffs among management options for controlling shoreline erosion, including relative costs, impacts on habitat functions, and resilience to storms and sea level rise.



### *Understanding fish habitat use*

During this period, the Hudson River Fisheries Unit, Estuary Program, Research Reserve and Marine Habitat staff identified high-use fish habitat areas, drawing on deep water river bottom maps, fish-tracking data, and a compilation of historic early life stage fish-abundance data. This work is being augmented by two shad recovery plan projects which seek to identify preferred habitats for young fish. SUNY Syracuse faculty and students in the College of Environmental Science and Forestry (ESF) provided key research and data collection.

# Valley Habitats and Ecosystems

People in the Hudson Valley depend on the unique habitats of the estuary watershed and the ecological processes they maintain. Managing biological diversity and healthy ecosystems on the landscape is a proven and cost-effective way to sustain the vitality of human communities, especially when faced with environmental change. In 2012, the Estuary Program provided assistance to municipalities and landowners to help build their capacity for conservation and land-use planning; started new projects to address the impacts of extreme weather and climate change on valley habitats; and increased understanding of the status and trends of regional biodiversity.

## *Economic benefits of conservation*

In 2012, the work of the Estuary Program supported goals and strategies of three Regional Economic Development Councils (REDC)—Mid-Hudson, Capitol Region, and New York City. The Mid-Hudson plan includes strategies to “leverage the region’s outstanding natural resources” and “protect clean water and ecological resources” (p. 41). It cites the Estuary Program as a partner. The Capitol Region plan has a goal to “showcase our beauty” and strategies to leverage the beautiful, natural environment (p. 8). The New York City plan emphasizes brownfield cleanups and green zones for stormwater management. Recent studies show that, in addition to providing environmental benefits, healthy natural areas support the local economy and provide jobs. A 2012 study found the Rensselaer Plateau’s forest and protected areas provided \$19 million per year for the local economy and supported 328 local jobs. The U.S. Fish & Wildlife Service reported that in 2011, over five-million people aged 16 years and older participated in wildlife-related recreation in New York and spent billions on related expenses. A study released in 2010 found that several protected areas on the Shawangunk Ridge in Ulster County generated \$12.3 million per year in revenue for the local economy through tourism and supported 358 local jobs.

## *Conserving forests and wetlands for the human benefits they provide*

From 2010-2012, our program has focused on mapping, monitoring, and protecting forests and wetlands in the watershed that recharge ground water, absorb carbon, and protect streams and the estuary. In 2012, we assisted the Towns of Cortlandt, Gardiner, Rosendale, Saugerties, and Ulster with local wetland conservation education; 450 decision-makers and citizens attended these and other presentations we gave on the value and importance of wetlands.

## *Measuring ecosystem health*

We continued to measure sensitive frog, toad, and salamander species found throughout the Hudson Valley that, if lost, would indicate significant declines in ecosystem health. In 2012, we monitored amphibian species at 87 privately and publicly owned wetland sites in Westchester, Dutchess, Putnam, Ulster, Albany, Orange, Columbia, and Greene counties. We also engaged 482 volunteers in two citizen science projects to monitor amphibian



populations and wetland habitats since 2010, saving the costs of data collection and expanding awareness of the importance of local wetlands.

### ***Forest conservation***

This year we advanced work to understand and conserve the region's forests by measuring landscape change in the Hudson Valley by comparing historic aerial photos to present-day photos of Rensselaer County. We found an overall increase in forest cover but a significant decrease in the average size of forest patches, resulting in more edge and lower quality habitat. We also worked with municipalities to plan for growth in ways that avoid fragmenting significant forests, and with landowners to sustainably manage their woodlands. Working with local partners, we supported a regional conservation plan for the Rensselaer Plateau, continued an initiative to preserve the landscape connection between the Catskills and the Shawangunk Mountains, and held three workshops for landowners in these important forested areas.

Forty landowners created Forest Stewardship plans on 5,470 acres, and nine more properties enrolled in the Forest Tax Law Program for another 1,468 acres. Since 2010, Forest Stewardship plans have been created for 11,390 acres, and 4,897 acres have been enrolled in the Forest Tax Law 480a Program in the Hudson River estuary watershed, showing that these tools are a potent force for conservation.

### ***Technical assistance to communities***

The major implementation strategy for this goal continues to be raising the capacity of land-use planners, decision-makers and citizens in the Hudson Valley so they understand how to maintain healthy ecosystems, and to use biological information for decision-making and planning. In 2012, 780 participants attended conservation roundtables, computer-based mapping programs on wetland and forest conservation, and workshops to improve local capacity for conservation-oriented planning. Volunteers mapped nearly 20,000 acres of habitat to inform land-use and conservation planning. From 2010-2012, we trained 2,060 local decision-makers, provided local biological information to 24 communities, helped 10 communities map ecologically significant habitat, and provided land-use planning assistance to 41 communities.

### ***Extreme weather and climate change***

We took additional steps in 2012 to address the growing threat of climate change to the ecosystems that underpin the region's economic and environmental vitality. Monitoring systems are needed to understand and maintain ecosystem services for future generations. In 2012, we established monitoring stations in the estuary watershed to track climate-induced changes in regional habitat and wildlife, and we began work on modeling tidal wetland migration with Scenic Hudson and the Research Reserve. In 2013, we will start work on a Hudson Valley regional connectivity mapping project and partner with local governments and conservation organizations to conserve a priority linkage.



# Streams and Tributaries

In 2012, the Estuary Program developed significant new training, research, and technical assistance programs on water resource issues highly relevant to our economy, our people, our communities and our natural resources in the Hudson River watershed.

## *Water infrastructure*

Research is underway with our partner, Cornell University, to regionally understand the status and locations of our important water supply and wastewater infrastructure. Research on wastewater infrastructure in the Hudson and Mohawk basins is yielding recommendations for better management and funding strategies to include smart growth principles and economic development priorities.

## *Flood damage avoidance on tributaries*

We continue to support outreach, training and community-based efforts on reconnecting streams to flood plains, conserving wetlands, reducing stream constrictions at bridges and culverts, understanding downstream impacts of upstream activities, and avoiding development in floodplains to help reduce future problems. Our partnership with NEIWPC and The Nature Conservancy yielded a draft list of 92 priority barriers on streams that could be removed or resized to mitigate habitat loss for Species of Greatest Conservation Need. These barriers include undersized and perched culverts and dams.



## *Municipal-scale water resource planning and outreach*

In 2012, the Estuary Program and its partner NEIWPC organized a workshop on source water protection focused on Orange County as a pilot region. We also created a water resource summary specific to the Town of Chatham to inform their local zoning and planning decision-making. A template now exists for watershed staff to assist other municipalities on similar water resource needs.

## *Watershed planning*

New projects are underway in 2012 on the Kromma Kill by Siena College, and the Quassaick Creek by the Quassaick Creek Coalition. These projects are funded by DEC and NYSDOS, respectively. In 2012, through the New England Interstate Water Pollution Control Commission (NEIWPC), we collaborated with the Hudson River Watershed Alliance to support a number of watershed outreach priorities, including a workshop on sediment management in the watershed.

### ***Sustainability and flood resiliency***

On a regional scale, Estuary Program staff were instrumental in supporting and initiating two projects related to climate change adaptation and flood resiliency. This included co-chairing the water workgroup for the Mid-Hudson Regional Sustainability Plan, where water management strategies were developed as part of the larger plan to reduce greenhouse gasses and help adapt to climate change. Another initiative that got underway in 2012, but will mostly be implemented in 2013, was a regional effort led by the NYS Water Resources Institute to implement research, outreach, and demonstration projects focused on watershed and flood resiliency.

### ***Citizen monitoring***

In 2012, we began the Wadeable Assessments by Volunteer Evaluators (WAVE), pilot program for citizen scientist stream monitoring. We also provided Riverkeeper with an estuary grant to produce a report on its river monitoring results.

### ***Green infrastructure***

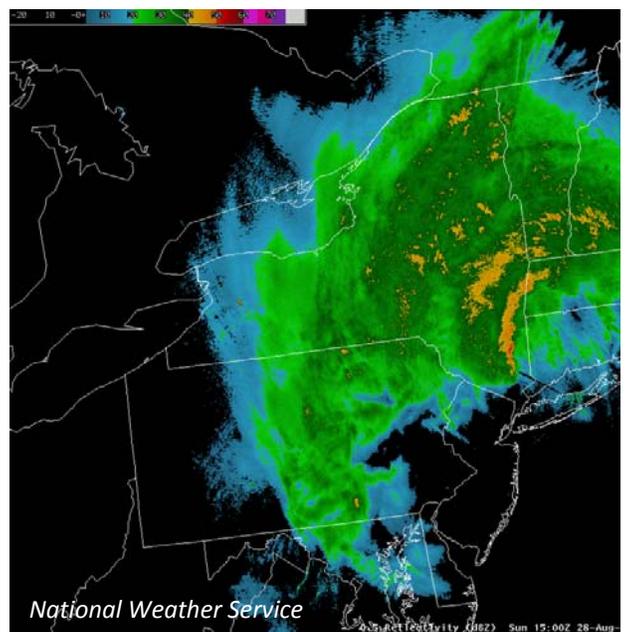
This year, in partnership with NEIWPC, we funded green infrastructure demonstration projects in Poughkeepsie, Kingston and Middletown.

### ***Streamside plantings***

Our successful Trees for Tribes Program in the Hudson Valley has become a statewide model and is now being adapted, with our help, in other watersheds, including the Susquehanna and Lake Champlain watersheds.

### ***Evaluating the impact of Hurricane Irene and Tropical storm Lee***

The passing of Hurricane Irene and Tropical storm Lee through the Hudson Valley in 2011 provided an unprecedented opportunity in 2012 to gather data on the impacts of these storms on our human-made infrastructure, and responses in our streams and rivers. Estuary Program staff gathered, synthesized, and mapped at the watershed scale, information that graphically shows the impacts from these storms to our roads, dams, public water supplies, and wastewater treatment plants. The information is powerful and points the way for actions we can take to improve our management of streams, roads and flood plains to reduce the impacts caused by our decision-making processes.



## River Scenery, Forests, and Farms

In 2012, the Estuary Program continued to promote planning for and conservation of natural areas and world-renowned scenery. The state also continues to work with the Hudson Valley's communities and land trusts to acquire long-standing projects to protect the valley's natural and scenic resources. With grants from the Estuary Program and its partners, a two-phase open space planning inventory was completed for the Town of Poughkeepsie, and, in 2012, a grant was awarded to the Town of Wawarsing for open space planning. Many Hudson River communities now recognize their remaining open spaces and visual resources as unique community assets that bolster the quality of life for residents and contribute to the region's economy. Building on these open space plans, acquisition of shoreline priorities from willing sellers will conserve key scenic vistas and provide new sites for public access to the river.

### *Land conservation*

In 2012, the state and a wide range of partners conserved 2,960 acres in the Hudson River estuary watershed (below the Troy dam). Of this, in 2012, 457 acres are shoreline properties along the banks of the Hudson River estuary. In addition, in 2012, DEC completed the first phase, the Essex Chain of Lakes (18,383 acres), of the Finch Pruyn project in the Adirondacks to conserve 69,000 acres. By conserving natural areas, we help to sustain this unique river landscape and the uses it supports.

### *Scenic resources*

In 2010 and continuing through 2012, the Estuary Program, in partnership with the Hudson River Valley Greenway and the National Heritage Area, embarked on a project to inventory and map significant vistas. For more than a century, New York State has acted to preserve many of the Hudson River Valley's most dramatic natural and scenic features—the Palisades, the Hudson Highlands and views of the distant Catskills, as well as our farms and forests. The state's first designated Scenic Areas of Statewide Significance are all located in the Hudson River Valley. Many vistas made famous by Hudson River painters remain essentially intact today. These vistas are now being documented and added to a geographic information system (GIS) and database through the partnership project. A project to create a searchable database of scenic resources is underway.



Together with an active project advisory council, which includes NYSDOS, county planning officials and others, it has been decided what scenic resource information will be cataloged in the database. Several sets of data have been completely entered, such as state parks, watchable wildlife sites, and scenic byways. In 2012, a draft searchable, online, scenic resource application was completed, which we hope will become public in the coming year.

### *Technical assistance*

The Estuary Program organizes an annual Conservation Roundtable, which in 2012 focused on open space funding mechanisms and plans. With speakers from the Trust for Public Land, local land trusts, and local municipalities dealing with the issue, the Roundtable was a great success and shined some light on the important benefits to open space when a plan is created and funding is secured. More than 40 participants took this joint training.



# Climate Change

During the first three years of this Action Agenda—from 2010-2012—the Estuary Program has assisted with state and local planning efforts to address storm surges, extreme weather and climate change in New York State and in the Hudson Valley. In our region, 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 snowfall amounts, and warmer ocean water temperatures are expected to fuel stronger storms. 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, as we have witnessed in the last two years. Habitats and species diversity will change.

Our future work will be guided by the NYS 2100 Commission, formed by Governor Andrew M. Cuomo in 2012 to provide recommendations for resilient infrastructure in the wakes of Tropical Storms Irene and Lee and Hurricane Sandy. The commission addressed changes in local climate in the Northeast, New York State and the Hudson Valley in a preliminary report released in January 2013. The Governor’s 2013 State of the State report provides policy guidance which interprets the commission’s findings. For 2012, the following summarizes our recent work:

## ***Mapping where storm surge and sea level will go***

Anticipating the need for enhanced information to guide local decision-making, in 2012, the Estuary Program organized the first collection of LiDAR data for the entire tidally influenced coastline of NYS (minus NYC, which has already collected this data) at a resolution sufficient to map storm surge and sea level rise in one-foot increments. Delivery of the processed data is expected to be complete in early 2013. Collection of this data is critical to the development of maps of areas of the Hudson estuary shoreline which are vulnerable to sea level rise and storm surge. We are using this data to inform the development of waterfront flooding task forces in vulnerable communities along the estuary.



## ***Promoting regional sustainability***

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 2012, Governor Cuomo, through NYSERDA, engaged the public in developing sustainability plans for every region of the state to offer such support. The Estuary Program provided input on the water resources and land-use components of these plans in the mid-Hudson and Capital Region. As of December 2012, 49 communities in the Hudson Valley have adopted the Climate Smart

Communities Pledge as a result of our outreach, and many are implementing key climate mitigation projects.

### *Working with other agencies to reduce the risk of flood hazards*

In 2012, Governor Cuomo pledged to help communities respond to increasing vulnerability, especially from extreme events, without increasing overall long-term risks and costs. An interagency effort involving DEC, NYSERDA, DOS, DOT, DOH, PSC, OAG and the State Office of Emergency Management is now working on developing informational tools and guidance for communities to undertake vulnerability assessments and adaptation planning for extreme weather and storm surges. Estuary Program staff provide crucial organizing support for this work group. The guidance will emphasize integration of such planning processes into state hazard mitigation and local waterfront revitalization planning.

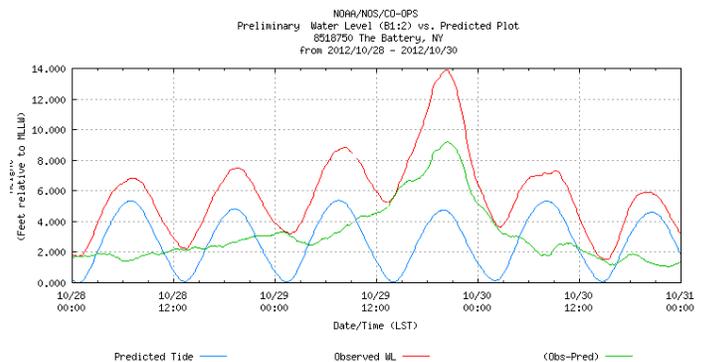
### *Community assistance*

A partnership effort with the Estuary Program, Scenic Hudson and the Hudson River National Estuarine Research Reserve has led to a series of waterfront planning forums that examines the challenges of balancing economic development along our waterfronts with increasing vulnerability from flooding. In 2012, we organized community workshops in Columbia County, Ulster County, Dutchess County and Westchester County. This effort has led to the creation of a waterfront flooding task force now underway in the City of Kingston. With Department of State funding, the City of Albany is planning for climate change adaptation, the first effort of its kind in the Hudson Valley.

### *Planning for 2013*

With support from the DEC Office of Climate Change, the Estuary Program began to develop new initiatives for the coming year aimed at improving our planning and technical assistance for extreme weather and storm surge. New projects in the coming year will assist shoreline communities on the estuary

with storm surge and sea level rise preparation, provide local training to address flooding along tributaries, and develop maps showing the ecosystem impacts of climate change. The Estuary Action Agenda provides a shared vision which enables state agencies and local governments to pool their resources, learn from one another and make the Hudson Valley a model for collaboration on these issues.



*This graph from NOAA's tide station at the Battery in Manhattan shows Sandy's 14-foot storm tide shortly before 9:00 PM Oct.30, 2012. It flooded the Brooklyn Battery Tunnel, among others.*

# Public Access to Waterways

## *New river access sites*

In 2012, a variety of new or enhanced access opportunities was realized up and down the river:

- The Hudson River Valley Environmental Education Institute in Yonkers is now a site on the Greenway Water Trail.



- Five sites received estuary grants in 2012 to start new access improvements: City of Newburgh, Town of Bethlehem, Village of Sleepy Hollow, Town of Ulster, Village of Nyack.
- Three estuary grant access projects were completed in 2012: Save Esopus Lighthouse floating docks; City of Newburgh fishing and observation pier; *Going Coastal* NYC water trail map and guide.
- Two communities—Cold Spring and Peekskill—advanced their Local Waterfront Revitalization Plans.

# Education

The Estuary Program aims to establish a citizenry knowledgeable about the ecology and natural resources of the Hudson and primed to support well-founded management efforts. All told, Estuary Program and Hudson River Research Reserve education programs directly served 16,539 people, including 10,510 students, in 2012. In all of our education efforts, the Estuary Program draws on the data, knowledge, research 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. Our educators focus mainly on the following priorities:

## *Training teachers and supporting classroom study and field trips*

- In 2012, the Estuary Program offered 26 professional development workshops for 446 classroom and non-formal educators at sites from the Capital Region to New York City. Hudson River lesson plans, including newly posted lessons for grades K-2 available on DEC's website, were downloaded hundreds of times weekly in 2011-2012.
- From 2010-2012, field trips were offered at river access sites in 36 of the 51 districts bordering the Hudson—71% of such districts. A Day in the Life of the Hudson River in October 2012 brought over 3,700 students and teachers to 67 sites on the river, from Canarsie Pier in Jamaica Bay to the mouth of the Mohawk River in Waterford and beyond. Training workshops preceded the event, and follow-up lessons using data collected by students during the day were made available to teachers.
- This year, Estuary Program staff contributed to the text of environmental literacy principles to be included in the Metropolitan Waterfront Alliance's action plan for New York harbor and continued to partner with the National Park Service, Hudson River Valley National Heritage Area, and Marist College in teaching the Hudson Valley's efforts to promote place-based education in the region's schools.



## *Developing resource materials to inform the public about the Hudson*

- Staff continued to review our webpages and communication strategies in 2012, resulting in redesigns of several sections and creation of *RiverNet*, an electronic newsletter about the Hudson River Estuary Program. The first two hits of a Google search for “Hudson estuary” or “Hudson River estuary” continue to be the Hudson River Estuary Program and our webpage describing the estuary. Our gateway page averaged 231 visits per week.

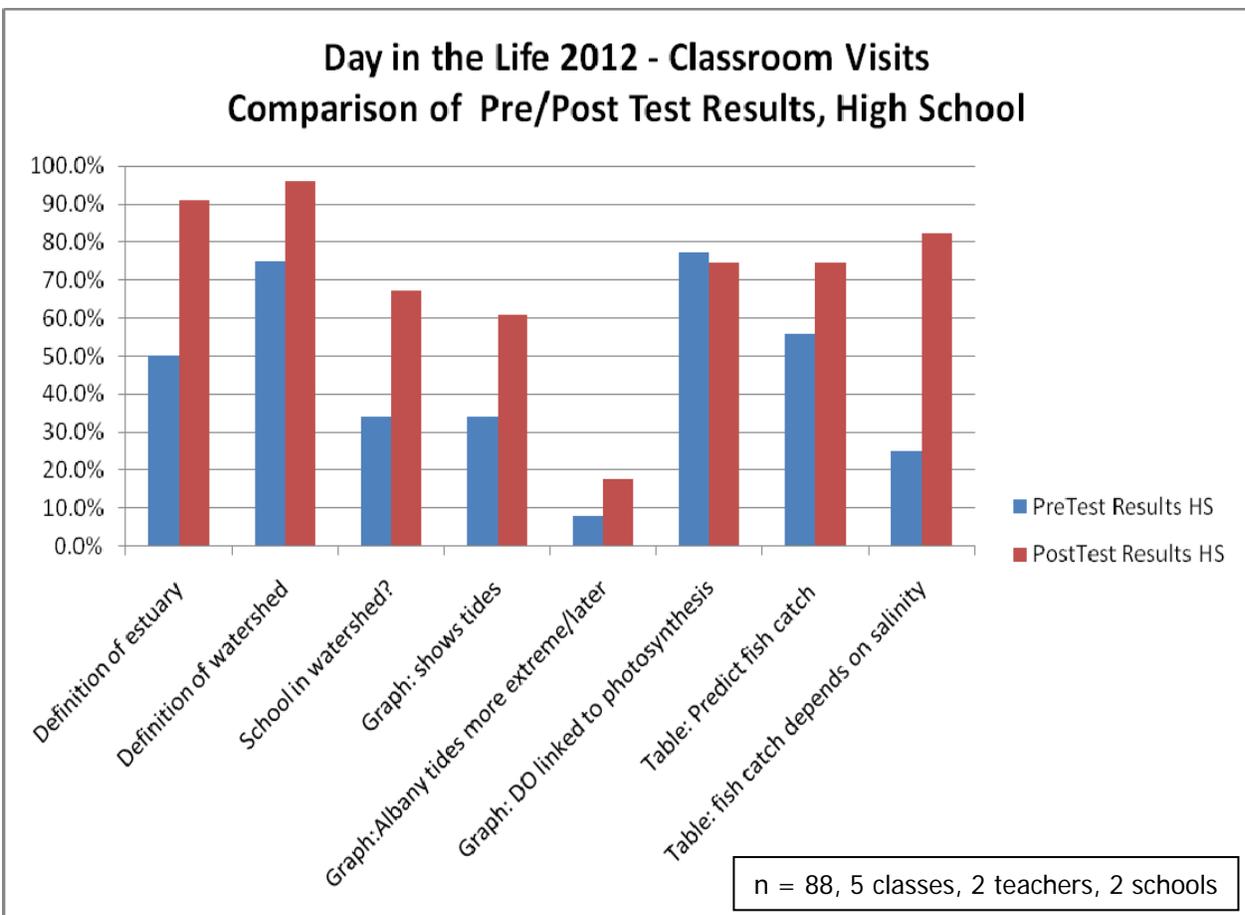
- The *Hudson River Almanac*, a weekly electronic natural history report, had 3,234 subscribers at the end of 2012.

***Promoting stewardship and citizen participation in 2010-2011***

- In 2012, our citizen science glass eel migration study expanded to 12 monitoring sites in nine counties, involving approximately 500 volunteers, to gather data useful in the management of American eel.

***Technical assistance to museums, nature centers and government agencies***

- These efforts ranged from providing text and graphics for interpretive signage to awarding grants for the development of facilities for environmental education on the river. In 2012, eight estuary grants totaling \$61,662 were awarded for projects to build capacity for Hudson River education by non-profit organizations and municipalities.



*This chart confirms that students participating in the Estuary Program’s Day in the Life of the Hudson and associated classroom presentations improved their understanding of the Hudson ecosystem.*

# Waterfront Revitalization

In 2010-2012, NYSDOS waterfront and downtown planning efforts continued to be advanced by the Local Waterfront Revitalization Program (LWRP). Design and construction of parks and downtown amenities has begun in many communities. As part of Governor Cuomo's Regional Economic Development Council initiative and Consolidated Funding Application process, the Department of State's Environmental Protection Fund Local Waterfront Revitalization Program grants were announced. Highlights of 2012 include the following:

- Waterfront and downtown planning efforts continued to advance through completion of a waterfront strategy in the Village of Cold Spring, which is now being used as the basis for an LWRP. The Village of Peekskill completed designs for Peekskill Landing and its southern waterfront.
- The City of Albany held meetings to get their climate action and adaptation plan started and ultimately prepared a draft of the plan.
- Public access improvements to Long Dock Beacon were completed. A kayak launch was installed at Scenic Hudson Park in the Village of Irvington, and a segment of the Westchester County RiverWalk was completed at the Crawbuckie Nature Area in the Village of Ossining.
- Activity on two brownfield sites was announced: the former General Motors Site, Sleepy Hollow, Westchester County; and DEC's dredging of .8 of an acre of contaminated sediments—approximately 4,400 cubic yards—from the Hudson River in 2012-2013.
- Harbor at Hastings (formerly Anaconda Wire and Cable Co.), Village of Hastings on Hudson, Westchester County—A final Record of Decision (ROD) was announced in May 2012 calling for the remediation of 60,000 cubic yards of contaminated soil and 24,000 cubic yards of contaminated sediments (PCBs, metals) from the Hudson River.



*For more detailed information on brownfield sites and remediation activities, see the following DEC databases:*

*Environmental Site Database: [www.dec.ny.gov/chemical/8437.html](http://www.dec.ny.gov/chemical/8437.html)*

*Environmental Remediation Project Information: [www.dec.ny.gov/chemical/3755.2html](http://www.dec.ny.gov/chemical/3755.2html)  
(<http://www.dec.ny.gov/chemical/brownfields.html>)*

# Water Quality and Contaminant Reduction

- 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 implement specific actions to achieve long-range targets that address the following three themes:
  - Achieving swimmable water quality
  - Providing water and sewer infrastructure for community growth and revitalization
  - Managing water quality for human benefits and for the watershed's ecosystem



## In 2012, we can report the following progress:

- **Pathogens:** Disinfection of sewage treatment effluent for the Rensselaer Wastewater Treatment Plant is set to go online in 2013, and the two Albany WWTPs in 2014. These three projects are expected to reduce the pathogen load in the Albany pool area by 80%.
- The *Sewage Pollution Right to Know Law* was passed and signed into law. The law goes into effect May 2013, and gives the public the right to know when raw or partially treated sewage is discharged into New York waters. Public notification via local news outlets and the website of the NY Department of Environmental Conservation (DEC) is required within four hours of a sewage discharge. In addition, DEC is directed to produce a statewide Sewage Discharge Report each year that will report annual discharges and remedial responses taken.
- **Infrastructure needs assessment:** Hudson basin needs are identified in the USEPA Clean Watersheds Needs Survey (CWNS) and Report to Congress (RTC) maintained by NYSEFC and updated every four years. The process for developing the USEPA 2012 CWNS and RTC will run throughout the 2012 calendar year, with states entering information for USEPA review.
- **Stream condition:** Biological sampling is a key component of the NYSDEC statewide monitoring and assessment program. The Rotating Intensive Basin Studies (RIBS) Program returned to the lower Hudson basin in 2012.

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

Dredging regulations make disposal of chemically contaminated sediments very expensive for the maintenance of navigational channels, turnaround basins, commercial ports and recreational

harbors. This is especially true in the New York harbor area, where the volume of sediment to be dredged is great and the availability of disposal options is limited.

Achievement of a “green port” free from toxic substances and unencumbered by excessive sediments will require prolonged effort to reduce contaminant hotspots and deal wisely with the land. Chemicals which are toxicologically significant at exceedingly low concentrations are globally distributed. Because they are virtually indestructible and move very slowly in the environment, they will be with us for a long time. Landscape modifications for dwellings, industry, commerce, transportation and agriculture are unavoidable. Nevertheless, progress is being made. If anticipated reductions of PCBs in the upper Hudson and lower Passaic River remediation projects are realized, most New York harbor sediments will be suitable for ocean disposal within 30 years. Even without remediation, dioxin levels in surface sediments should be suitable for ocean disposal within 30 years. Reduction of excessive sediment loadings is possible with improved design and practices. In 2012, the most significant progress is attributable to the GE PCB cleanup.

- **PCBs: *Progress in 2010 - 2012:*** The DEC Division of Water Sediment Assessment Unit and Hudson River Estuary Program coordinate with DEC’s Division of Environmental Remediation and USEPA regarding comments and input related to the dredging project. Phase 1 of the Hudson River PCB remediation was completed in 2009, with 48 of the 88 planned acres dredged. Less area was dredged than planned because of greater than expected PCB contamination and difficulty in estimating the depth of contaminated sediments. DEC worked with USEPA throughout 2010 to help plan Phase 2 and was able to bring about important improvements in the standards for it. General Electric agreed to perform Phase 2 and dredge over 400 acres.

For the first year of Phase 2 dredging, less woody debris was encountered, resulting in good bucket closure. Better bucket closure and the elimination of bucket dewatering helped to reduce the in-water PCB concentration for Phase 2, both in the near field and far field. Better characterization of the depth of contamination also contributed to low in-water concentrations of PCBs by reducing the number of times a certification unit (CU) was dredged. Most CUs were dredged in two passes and not many nodes had to be capped due to residual PCB concentration. Of the nodes that were capped, most were located in glacial clay. In-water PCB concentration remained low, and the dredging project remained on target to achieve dredge volume goals and to stay below the capping rate limit. GE dredged 75 acres of PCB-contaminated sediments, removing about 350,000 tons of sediment in the upper Hudson in 2011, following DEC and USEPA guidance. Combined with previous years, a total of 650,000 tons has been dredged from 125 acres of the upper Hudson.

In 2012, total acres to date include about 90 acres in Phase I and 193 acres in Phase 2 (75 acres in 2011; the rest, about 118, in 2012). In 2011, 350,000 cubic yards of material were removed from the river, and 2012 is expected to be about 619,000 cubic yards. Estimates of amounts of PCB removed were not available at the time of this printing.



## Progress and Partnerships

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, enabling the public to monitor progress, evaluate the program's effectiveness and participate in future decision-making exercises to help guide the program. Celebrations such as National Estuaries Day, the Hudson River Valley Ramble and River 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.



### ***HRECOS***

In 2010-2012, we expanded our capacity to measure changes in basic water quality in real time through build-out of the Hudson River Environmental Conditions Observing System (HRECOS). We also expanded our environmental baseline in the Hudson Valley to understand changes in land use, and we improved our baseline understanding of fish habitat and sediment transport from the tributaries. A HRECOS Governance Structure was drafted in 2010 and approved and signed in 2011 to ensure smooth collaboration among our many partner organizations. This was essential for working with our partners and for adding new partners to the system. In 2010, Marist College, Clearwater, and the Harbor Estuary Program joined the HRECOS partnership. In 2011, the Schenectady County Office of Emergency Management, and the Mohawk River Research Center joined the HRECOS partnership. Discussions with the Beacon Institute and the NY City Department of Environmental Protection began in 2011, offering promising opportunities for collaboration in 2012. HRECOS completed its second year of collecting data according to the new quality assurance plan in 2012. The majority of the partners adhered to these requirements, resulting in high-quality data outputs. Unfortunately, the George Washington Bridge and Castle Point stations were removed in October 2012 due to quality concerns. HRECOS expansion in 2012 included the following:

- The Poughkeepsie Pump Station was completed in July 2012. This resource is now available for regulatory and research purposes. Water quality parameters are collected in near-real time, and grab samples may be collected remotely using an internet protocol or in response to a jump in a real-time water quality parameter.
- A new water quality station was funded for the Mohawk River at Utica. Construction will begin in March 2013.
- The two NY Harbor stations, George Washington Bridge and Castle Point, were removed from the network due to quality concerns.

- Two new HRECOS stations were added to the NY harbor. The HRECOS station at Pier 84 was constructed in December 2012. The HRECOS station at the West Harlem pier will be completed in early 2013. Both stations will monitor the full suite of weather and water quality parameters.
- Sediment monitoring: The HRECOS sediment monitoring network completed its first year of data collection in 2011. Preliminary data was available in 2012. This data, in combination with data collected in 2012, will be used to identify which are the high sediment-yielding tributaries to the upper estuary.

The HRECOS sediment-monitoring network captured the impacts of Tropical Storms Irene and Lee in August/September 2011. A total of 2.745 million tons was discharged to the estuary. Of this total, 1.745 million tons were trapped in the estuary between Troy and Poughkeepsie. Sediment monitoring will continue through 2013. Due to the abnormal weather in 2011, estimates of tributary contributions will be delayed until 2013.

### ***Expanding partnerships to achieve Action Agenda goals***

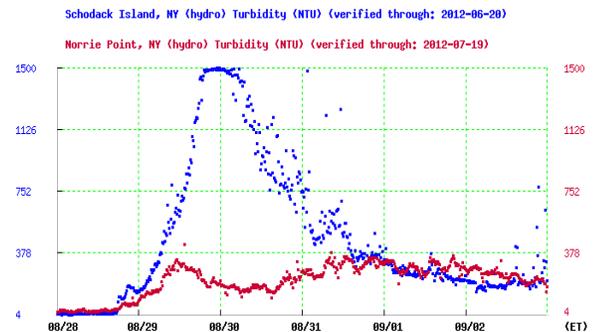
Over 500 partners are now participating in the implementation of some aspect of the Estuary Action Agenda, including researchers, school districts, municipal boards, land trust businesses and conservation groups.

### ***Aligning state and federal agencies around common goals***

In 2011, we had ten state agencies working together to achieve our goals for climate readiness, waterfront revitalization, habitat protection, education, water resource management and river access. They include the NYS Departments/Offices of: Health; State; General Services; Transportation; Emergency Management; Cyber Security; Greenway; Parks, Recreation and Historic Preservation; and Energy Research and Development. Six federal agencies actively participated in achieving our goals, including USEPA, the U.S. Department of Commerce, NOAA, the U.S. Department of Interior's Fish & Wildlife Service, and National Park Service, the U.S. Forest Service and the U.S. Department of Agriculture.

Governor Andrew Cuomo's initiative to create Regional Economic Development Councils (REDC) provided an opportunity to integrate with strategic plans for the Hudson and Mohawk valleys.

In addition, NYSDEC and NYSDOS both launched programs to address conservation needs in the Mohawk Valley within the greater Hudson watershed. A coalition of Soil and Water Conservation Districts is working with NYSDOS and the US Army Corps of Engineers (ACOE) on a watershed plan and natural resources inventory. DEC is working with an interagency steering committee to implement a plan first drafted in 2009.



*HRECOS data shows that much of the sediment washed into the river by Irene settled out between Schodack Island just south of Albany and Norrie Point in the Mid-Hudson region.*

## Appendix - Details for Numerical Statistics

### **Funds leveraged: \$5,779,576 total, including:**

- Hudson River Estuary Grants, \$292,025
- Ocean Great Lakes Conservation Council for river herring, \$200,000
- National Estuarine Research Reserve System (NERRS) Science Collaborative, \$267,925; DEC Operations, \$531,090 federal, \$227,610 match: Greenway Monitoring, \$56,100 federal, \$24,043 match
- The Nature Conservancy, invasive species control: \$5,000 Stockport Flats, \$5,000 Tivoli Bays
- USFWS/NYSDEC State Wildlife Grant T13 Project, \$24,000
- Wildlife Conservation Society Grant: Sea Level Rise Affecting Marshes Modeling of the Upper Hudson River Estuary, \$20,038
- NYSERDA funding hydrodynamic modeling forum, \$24,625
- Scenic Hudson and the Consensus Building Institute for the Kingston Waterfront Flooding Task Force, \$30,000
- NY/NJ HEP, \$69,170
- USGS: matching funds to HEP - \$12,000, to DEC/DOW- \$75,450
- Environmental Benefit Funds: Buckeye Partners-\$30,000; Department of Energy \$15,000 NYCDEP Esopus Creek settlement between DEC and NYC, \$530,000
- Consent order with Beacon for I&I remediation, \$3,000,000
- Quassaick Creek, DOS-\$43,500, local-\$22,000, OCWA-\$15,000
- EPA grant, Fall Kill Creek, \$60,000

### **State agencies coordinating to achieve estuary Action Agenda goals: 10**

#### NYS Departments/Offices of:

- State - waterfront revitalization, significant habitat protection, sustainable shorelines project
- Hudson River Valley Greenway - scenic vista project, river access and trails
- General Services - conservation land transfers
- Parks, Recreation and Historic Preservation - river access improvements, land conservation, invasive species control interpretive signage
- Health - angler education
- Transportation - climate adaptation work group
- Emergency Management - climate adaptation work group
- Cyber Security - LiDAR mapping for sea level rise predictions
- Energy Research and Development - climate adaptation work group SUNY Stony Brook, fisheries management
- Regional Economic Development Councils - multiple Consolidated Funding Application (CFA) grants for river, conservation and natural resource-based tourism projects

**Federal Agencies/Services helping to achieve estuary Action Agenda goals: 6**

- U.S. Department of Commerce, NOAA – Research Reserve, shorelines and habitat conservation
- U.S. Department of Agriculture – farmland protection
- USEPA – HRECOS and NY-NJ HEP
- U.S. Fish & Wildlife Service – fisheries and habitat
- National Marine Fisheries Service – fisheries
- U.S. Forest Service – forest conservation

**Community leaders who received training (teachers, decision-makers, etc.): 1,198 people**

- Valley habitats and biodiversity: 268 local land-use decision-makers received over 175 hours of training to support habitat conservation.
- Aquatic habitat: 772 decision-makers from government, business, community, and nonprofit organizations received over 4,630 contact hours of training to support habitat conservation, with a 78% positive feedback indicating trainees plan to use the knowledge gained in their work.
- Environmental education: 446 attended education training workshops.

**Volunteers conducting stewardship: 1,763 people**

- Herring monitoring: 112 volunteers (including school groups) completed 51 hours of stream monitoring, documenting river herring use of eight tributaries during the 2012 spawning run.
- Frog and salamander monitoring: 139 people volunteered at least 850 hours of time in the field at more than 300 sites.
- Songbird nest monitoring: 15 volunteers monitored songbird nesting success on their property (TBD).
- Recreational fishing data: 157 volunteers reported catch data through the Cooperative Angler Program.
- Trees for Tribs: 840 volunteers completed 2,260 hours of volunteer work planting 6,290 trees and shrubs on 10,600 feet of stream at 47 sites.
- SAV Monitoring: 18 volunteers visited a total of 20 sites, putting in a total of 240 volunteer hours on the water.
- Eel project: 500 volunteers spent 2,500 volunteer hours and counted 84,995 eels at 12 sites; 447 eels used fish ladders and were released upstream of barriers.
- WAVE: 99 participants volunteered 428 hours at 107 sites and attended 396 contact hours of training.

**Communities receiving conservation technical assistance tailored to their needs:**

- City of Albany
- City of Hudson
- City of Kingston
- Greater Stockport Watershed: Water Resource Summary
- Lower Esopus Watershed Partnership: grant for sub-basin mapping
- Town of Ancram
- Town of Bedford

- Town of Catskill
- Town of Chatham
- Town of East Fishkill
- Town of Hunter
- Town of Hurley
- Town of Kingston
- Town of Marlbetown
- Town of New Baltimore
- Town of New Lebanon
- Town of New Scotland, Columbia County
- Town of Olive
- Town of Pleasant Valley
- Town of Rhinebeck
- Town of Rosendale
- Town of Saugerties
- Town of Somers
- Town of Stuyvesant
- Town of Taghkanic
- Town of Ulster
- Town of Wawarsing
- Town of Woodstock
- Ulster County
- Warwick – Upper Wawayanda Creek watershed – NEI grant for education, data gathering and community organizing

**Communities which adopted new conservation measures or master plans:**

- City of Albany adopted a comprehensive plan
- Town of Chatham created Conservation Advisory Councils
- Town of Taghkanic

**New information posted to the Web and GIS in 2012:**

- Posted HRNERR vegetation maps to the NYSGIS Clearinghouse and the NYSDEC Data Selector with separate maps for each of the 4 HRNERR sites.
- 2011 emergent marsh vegetation metadata submitted to NERRS CDMO website.
- 2011 SAV data and metadata to the NERRS CDMO website.
- Quarterly (Oct - Dec 2011) water quality and meteorological data to the NERRS CDMO website.
- 2011 water quality QA/QC data and metadata to the NERRS CDMO website.
- 2011 water quality QA/QC data and metadata to the HRECOS website.
- 2011 meteorological QA/QC data and metadata to the NERRS CDMO website.
- Quarterly (Jan - Mar 2012) data submission of water quality and meteorological data to the NERRS CDMO website.
- 2011 nutrient QA/QC data and metadata to the NERRS CDMO website.
- 2012 vegetation data and metadata to the NERRS CDMO website.

- Quarterly (April - June 2012) data submission of water quality and meteorological data to the NERRS CDMO website.
- Quarterly (July - September 2012) data submission of water quality and meteorological data to the NERRS CDMO website.
- GIS coverage of thickness of 20th-century sediment to NYS GIS Clearinghouse and NYSDEC Data Selector.
- New website for Hudson River Sustainable Shorelines, publications, demonstration site.
- New website for HRNERR, explanations of sectors, archived workshop content.
- DOS added the updated, approved 2012 SCFWH narratives and maps to its website at: <http://www.dos.ny.gov/communitieswaterfronts/consistency/scfwhabitats.html#hudson>
- Training program agendas, resource lists, and PowerPoint presentations.
- Posted zero Chinese mitten crab finds since summer 2011 to Smithsonian Environmental Research Center Mitten Crab Watch website.
- Significant Biodiversity Areas Layer available on NYS GIS clearinghouse. New amphibian identification guide posted to DEC website at: <http://www.dec.ny.gov/lands/82722.html>
- Dam Removal and Barrier Mitigation in New York State; Barriers to Green Infrastructure in the Hudson Valley survey; four new examples of green infrastructure added; maps of watershed plans and inter-municipal councils or agreements.
- New LiDAR will be posted to the NYS GIS Clearinghouse and the NOAA Digital Coast website.
- Results of the hydrodynamic modeling forum and the climate network meeting were posted to: [www.hrnerr.org](http://www.hrnerr.org)
- Added two lesson plans and “trading card” images of Hudson estuary flora and fauna; made many revisions to existing pages.

#### **Communities undertaking climate action plans:**

- 54 communities have taken the Climate Smart Pledge and have taken action on the pledge in Hudson Valley counties; one of which, the Village of Irvington, is new. 52 have taken action on the pledge.
- 19 communities have taken action on developing Climate Action Plans; 14 are complete, four are in progress.

#### **Green infrastructure projects:**

Green infrastructure examples on Hudson Valley webpage: 66 examples, with at least 4,754 page visits.

- Three new projects announced in 2012 will implement green infrastructure practices as a watershed management tool: Orange County SWCD in the Wallkill watershed; Ulster County Dept. of Environment–Leading Green: a green infrastructure hub at the Ulster County office campus; eDesign Dynamics–Poughkeepsie Underwear Factory/Fall Kill GI Project.

#### **Lands acquired by New York State or with state support:**

2,960 acres were conserved in the watershed by the state and partners, including 457 acres of

shoreline property along the banks of the estuary. DEC completed the first phase, the Essex Chain of Lakes (18,383 acres), of the Finch Pruyn project in the Adirondacks to conserve 69,000 acres.

The following acquisitions were funded or completed in the valley:

- 148 acres acquired by Scenic Hudson (6/12/12) in Greenport, Columbia County, to protect the Olana viewshed.
- DEC conserved a total of 148 acres at Vosburgh Swamp, Coxsackie, Greene Co. and Bonck Island, New Baltimore, Albany County.
- OPRHP conserved 101 acres through four projects in Columbia and Ulster counties.
- Scenic Hudson closed on a total of 767 acres of fee and conservation easements, including lands adjacent to Vosburgh Swamp, Fort Montgomery Marina, Orange County, and a 76-acre farm on the river in New Baltimore, Greene County.
- 435 acres were secured in Orange County by the Orange County Land Trust , OSI and the NY/NJ Trail Conference, protecting a critical connection between the Shawangunk Mountains and the New Jersey Highlands.
- The Dutchess Land Conservancy conserved 160 acres of farmland in Dutchess County.
- The Columbia Land Conservancy acquired three scenic/agricultural easements in Ancram, Ghent, and Taghkanic, totaling 881 conserved acres.

The Conservation Partnership Program funded five acquisition projects conserving 400 acres:

- Columbia Land Conservancy – Stuyvesant Farms, 166 acres
- Hudson Highlands Land Trust – Jaycox Park-to-Park Connection Project, 50 acres
- Rensselaer Land Trust – Staalensen Preserve, 24 acres
- Wallkill Valley Land Trust – Joppenbergh Mountain Management Plan, 118 acres
- Westchester Land Trust – Maryknoll Sisters, 42 acres

**Watershed committees/councils (WCs) receiving assistance:**

- Thirteen towns in 11 tributary watersheds received technical assistance and water resource management assessments:
  - Kromma Kill: NEIWPCC grant for watershed assessment
  - Moodna Creek: NEIWPCC grant for flood forum, technical assistance/advice
  - Catskill Creek: NEIWPCC grant for watershed awareness project
  - Lower Esopus Creek: NEIWPCC grant for online watershed mapping tool, NEIWPCC green infrastructure retrofit grant
  - Wawayanda Creek: NEIWPCC grant for watershed awareness project, NEIWPCC green infrastructure retrofit grant
  - Quassaick Creek: technical assistance/advice on management plan, workshop on source water protection with Washington Lake case study
  - Fall Kill Creek: HREP 2008 grant, NEIWPCC green infrastructure retrofit grant, technical assistance/advice on green infrastructure plan
  - Monhagen Brook: NEIWPCC green infrastructure retrofit grant
  - Rondout Creek: technical assistance/advice
  - Sparkill Creek: technical assistance/advice;
  - Casperkill Creek: technical assistance/advice;

- Stockport Creek: technical assistance/advice
- Saw Mill River: assistance on green infrastructure planning and flooding resiliency

### **Reports and Publications:**

- Strayer, D.L., S.E.G. Findlay, D. Miller, H.M. Malcolm, D.T. Fischer, and T. Coote, 2012. Biodiversity in Hudson River Shore Zones: Influence of Shoreline Type and Physical Structure. *Aquatic Sciences* 74: 1-14
- Harris, C., D.L. Strayer, and S. Findlay. 2012. The Ecology of Freshwater Wrack along Natural and Engineered Hudson River Shorelines. *Aquatic Sciences*. In review
- “Hudson River National Estuarine Research Reserve Sentinel Site Plan” – Sarah Fernald, grey literature
- “Upper Hudson River Estuary (USA) Floodplain Change Over the 20th Century” by Michael Collins (NOAA) and Daniel Miller (HREP). Published in *River Research and Applications*
- Hauser, E., 2012. Terminology for the Hudson River Sustainable Shorelines Project
- Land Use Law Center at Pace Law School, 2011. Hudson River Sustainable Shorelines Project: Legal Framework Analysis
- Rella, A. and Miller, J. 2012a. Engineered Approaches for Limiting Erosion along Sheltered Shorelines
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### **Research Projects:**

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- Assessment of fish community use of six types of engineered shoreline on the Hudson River estuary (part of the Sustainable Shorelines Projects).
- Social science research on shoreline use and perception, S. Dalton, Thrive Consulting
- Hudson River Estuary Biodiversity Outreach Evaluation, Brossard and Stedman, Cornell University;
- Vernal Pool Mapping and Assessment in Yorktown, Cortlandt, Philipstown, and Putnam Valley, Mike Rubbo, Teatown Lake Reservation;
- A Multi-species Wildlife Inventory Approach in the Upper and Lower Hudson River Basin, Ted Kerpez and Suzanne Beyeler, USFWS/NYSDEC;
- Sea-Level Rise Affecting Marshes Modeling of the Upper Hudson River Estuary, Sacha Spector and Suzanne Beyeler, Scenic Hudson and Cornell Department of Natural Resources; Rensselaer County Forest Cover Change Assessment, Cornell IRIS Lab, Cornell Department of Natural Resources
- Wetland mitigation of infill development: An evaluation of green infrastructure effectiveness in a near-urban setting. Mary Ann Cunningham, Vassar College

- Digitizing a 70-year record of land use change in New York State watersheds to examine the effectiveness of non-structural landscape modification on flood control. Steven Shaw, SUNY-ESF
- Land use leadership alliance training program: Integrating watershed protection into land use decisions. Tiffany Zezula, Pace University
- Geospatial analysis as a tool for identifying critical land use and infrastructure impacts on regional environmental water quality. Peter Woodbury, Cornell University
- Green infrastructure, water quality, and GHG emissions. Todd Walter, Cornell University
- New life for New York's marine highways and inland ports: A case study of the Port of Albany. Susan Christopherson, Cornell University
- Innovative approaches to making a business case for water resource management. Mark Milstein, Cornell University
- Hudson water and sewer smart growth infrastructure. David Kay, Cornell University
- LIDAR data collection, NOAA Coastal Services Center
- Framework for a Certification process for Climate Smart Communities, Vannesse, Hangen and Brustlin
- Characterization of attitudes among Hudson River Estuary watershed municipal officials, Shorma Broussard and Allison Chatrychan, Cornell University
- Effects of land use on runoff volume in small Hudson Valley watersheds under a changing climate, Art DeGaetano, Cornell University

*For additional details on our specific projects and progress on each goal and target, go to <http://www.dec.ny.gov/lands/4920.html>.*