Detailed Progress Report on Activities in 2010 & 2011 to Achieve the Targets of the 2010-2014 Hudson River Estuary Action Agenda

NYS Department of Environmental Conservation
Hudson River Estuary Program in partnership with

NYS Department of State
NYS Office of Parks and Recreation and Historic Preservation
NY-NJ Harbor Estuary Program
NY Sea Grant
New York City Department of Environmental Protection
NYS Office of General Services

NYS Department of Health
Interstate Environmental Commission
Hudson River Park Trust
Hudson River National Heritage Area
US Army Corps of Engineers
US Environmental Protection Agency
Hudson River Valley Greenway

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How to use this report:

The following pages report on the collective accomplishments of state agencies and our community partners in meeting the 2010-2014 targets of the “Hudson River Estuary Action Agenda.” For each of the twelve goals of the Action Agenda adopted in 2010, we provide an overview of challenges and accomplishments, and we report on the specific actions taken this year to achieve each of the 2010-2014 targets (measurable objectives). A checklist under each target shows if the project is done, underway or not started.
**Accomplishments 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.

**A. Overview of Accomplishments to Date and Challenges for this Goal**

The fisheries of the estuary depend upon a healthy environment as well as effective management strategies to ensure their continued role in a balanced and sustainable ecosystem. Ensuring full enjoyment of the estuary’s fish and crabs, now and into the future, will require management actions to maintain and, in some cases, restore populations, protect habitat and reduce unnecessary mortality. This can only be accomplished through 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, American eel and largemouth bass are currently in decline. River herring current and future status is uncertain. The effects of the decline of shad, sturgeon threaten the long-term viability of commercial fishing, which has existed on the Hudson for hundreds of years.

Our work on signature river species in 2010-2011 is as follows:

- **American shad**: The comprehensive shad recovery plan is now being implemented. It addresses many of the factors that will contribute to the restoration of shad. In 2010, several research studies began: identifying specific adult spawning areas and habitat use and dietary habits of larval American shad in the upper third of the estuary. Additional funding sources were identified to support expansion of the larval fish project to a larger geographic area and to include juvenile fish in the study. This work will be done in partnership with SUNY ESF. Studies of ocean mortality of shad resulting from incidental capture, known as bycatch, in ocean Atlantic herring fisheries have been completed. Results showed that young American shad are indeed being taken by these fisheries. These young fish have not yet had the chance to reproduce before being harvested. Fortunately, shad were not common in the bycatch of the Atlantic herring fisheries. Forty adult shad were tagged in 2010 and 50 fish were tagged in 2011 with sonic (electronic) tags and tracked throughout their spawning season, supplementing data collected in 2009 on identifying specific spawning areas. Results suggest that the geographic extent of spawning activity in the river has shrunk. Shad are now using only the upper third of their historical spawning reach. Analyses to identify specific characteristics of spawning habitat are ongoing. We also have learned that the fish move more throughout the river than previously thought. We used to think that fish once fish reached the spawning area, they remained there until spawning occurred. However, the data from our tagged fish suggest that fish can move up and down the river (sometimes 60 miles in a couple days) after they have reached historic spawning areas. This new finding will impact the form of regulations once the stock is restored and a fishery reopens in the future. The annual monitoring of adult and juvenile shad in the estuary showed no improvement in the severely stressed population.
• **River Herring**: New York participated in the coast-wide Atlantic States Marine Fisheries Commission (ASMFC) stock assessment; it is scheduled for completion in spring of 2012. A New York River Herring Sustainable Fishery Plan was developed in 2011 which proposed regulation changes to create a sustainable fishery for the Hudson stock. The Volunteer River Herring Monitoring Program, a citizen science cooperative data collection program, had 274 participants, including school groups, documenting river herring use of 12 tributaries during the 2011 spawning run. River herring were seen in all but two tributaries, providing information on timing of spawning runs and the relationship of environmental conditions such as tide and water temperature with tributary spawning.

• **Atlantic sturgeon**: Sonic tagged adult Atlantic sturgeon continue to be tracked to evaluate habitat use. We continue to learn about the important areas of the river the fish use and spawning frequency. A new possible spawning area was identified. A report summarizing our findings is being written. Juvenile production of Hudson River Atlantic sturgeon has shown a very slow upward trend since the fishery was closed in 1996. The federal government recently listed the Hudson stock of Atlantic sturgeon as well as other coastal stocks as “endangered.”

• **Striped bass**: In 2010 and 2011, striped bass annual monitoring was completed; the stock is stable. Stock abundance increased in the mid 1990s, and continues to face increasing fishing pressure. Careful management is required to continue to provide a quality and economically viable fishery.

• **American Eel**: A partnership project with the Hudson River Research Reserve engaged citizens and students in monitoring of glass eels—the juvenile life stage of American eel. Young of the Year eel surveys continued in spring 2011 under Atlantic States Marine Fisheries Commission protocols, with fyke nets set up at seven sites from Rockland County (river mile 37) to Greene County (river mile 132). In 2011 a total of 6,964 Young of the Year eels were caught and released for a catch per unit effort of 17, compared to 2010 when 10,564 Young of the Year eels and a catch per unit effort of 23.3 were recorded. A new low-cost design trap-and-pass eel-ladder, installed at a dam on Furnace Brook in Westchester County, caught 1461 eels from late May through late October. Two thirds of those eels caught in the eel ladder measured between 3 and 6 inches. These projects involved approximately 300 volunteers from over 30 organizations. In 2012 we hope to add fyke net sites in Newburgh and Staten Island, and a low-cost eel ladder in Hyde Park.

• **Largemouth and smallmouth bass**: DEC continued to document the use of critical overwintering habitat for largemouth bass. Tournament monitoring has continued. Participation in tournaments on the Hudson appears to have fallen off, although catches in 2009 were up from the previous two years. Tournament participation in 2010 was so low that accurate statistics could not be generated. Tournament participation in 2011 appeared to be better, and catch statistics are currently being summarized. Increased effort to assess the population utilizing overwintering areas will occur in 2012. These data will help with the assessment of whether the 15 inch minimum size limit (implemented in Oct. 2006) has improved the fishery. Both largemouth and smallmouth bass are increasingly popular fisheries, but data gaps leave these species open to risk.

• **Shortnose sturgeon**: No action in 2010 or 2011. This fish is federally listed as “endangered” which dictates that permits for in-river projects receive additional scrutiny during state and federal review. During the past 30 years, the shortnose sturgeon population appears to have increased, yet there is still a need to track future changes. In 2012 we are using some left over funds to tag a small number of shortnose. We will be using this as a pilot for a possible future study.

• **Forage fish**: In 2010, DEC reviewed newly developed GIS maps of early life stage fish distribution within the river. 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. Work on status and abundance is on hold due to competing priorities. No action in 2011.

- **Blue crab:** In 2010 and 2011, blue crab tagging continued. Tag returns indicate widespread movement in the river with some recaptures occurring in a winter fishery in Raritan Bay, NJ.

- **Oysters:** In 2010, researchers completed the Hudson River Oyster Restoration Feasibility Study in the Tappan Zee region of the Hudson River Estuary. Work was conducted by SUNY Stony Brook, supported by the State Wildlife Grant (SWG) program. The final report was completed. It contains a model that identifies habitats suitable for oyster restoration from the Tappan Zee region, south to Pier 40 in Manhattan. Under normal weather conditions, the model identified suitable habitats as far north as the Tappan Zee Bridge. However, oysters used in the study suffered near 100% mortality during high discharge events in the Hudson. Therefore, if increased frequency of intense rainfall events projected with climate change is considered, the northern habitats identified in the report may not be suitable for successful restoration. Once sought after as a delicacy, oysters 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 estuary. The Army Corps of Engineers in partnership with the Hudson River Foundation and the New York/New Jersey Baykeeper undertook some pilot restoration projects in New York harbor and lower estuary in 2010. Oyster “spat” on shell was placed on constructed rock reefs. Oysters in the northern study sites in the Tappan Zee region suffered near 100% mortality due to long-term exposure to freshwater resulting from several intense rainfall events.

Public health and Contaminants in fish

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 and control sources of PCBs and 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.

A paper was published in the journal *Environmental Pollution* on the presence of polybrominated diphenyl ethers (PBDEs), polychlorinated and polybrominated dioxins and furans (PBDD/Fs and PCDD/Fs), and polychlorinated biphenyls (PCBs) in smallmouth bass and striped bass. PBDE concentrations were related to human population density upstream from fish collection locations. Dioxin and furan concentrations were low with the exception of a single striped bass bearing the signature of exposure from the Passaic River and Newark Bay. DEC staff continued annual monitoring of PCBs in striped bass, sport fish and forage fish at several locations in the river. Due reductions in staff and funding, no monitoring of cadmium in blue crab has taken place since 2004.

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 EPA throughout 2010 to help plan Phase 2 and was able to bring about important improvements in the standards for Phase 2. Dredging resumed in the spring of 2011; General Electric agreed to perform Phase 2 and dredge over 400 acres.
Power plants and Industrial Water Users

DEC continues to make a concerted effort to reduce fish mortality from impingement and entrainment at Hudson River power plants and other industrial facilities. In 2011, DEC issued a policy which sets performance goals for all industrial facilities (e.g., power plants, manufacturing facilities, and large office complexes) using 20 million gallons a day or more of cooling water. The policy goals are to either install closed-cycle cooling or minimize the impingement and entrainment of fish to levels that would be attained if closed-cycle cooling were used. Lafarge Building Material, Inc. received permits in 2011 to convert to a new cement manufacturing process and will use closed-cycle cooling and narrow-slot width cylindrical wedgewire screens to eliminate impingement and minimize entrainment by greater than 95%. The new facility will also significantly reduce emissions of mercury and other air pollutants. DEC is also seeking the minimization of fish impingement and entrainment at new municipal water supplies including the proposed United Water New York Desalination Plant proposed in the town of Haverstraw, which is currently undergoing environmental review.

Ecosystem Based Management

The Estuary Program continued to improve its ability to meet our goal of ecosystem management, understand the link between fish and their environment. Our fisheries and marine habitat experts are working together to identify the links between fish movement and the characteristics of important fish habitat in the estuary. 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 as well as these are 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. Volunteer herring and eel monitoring programs established in 2008 give local residents a sense of ownership to “watch over their stream,” while also providing valuable scientific information that will help manage these species. Educators use these fish research projects as teaching tools for local high school students. These hands-on experiences will be further developed and continued. Work conducted for goals 2, 4 and 8 will improve our ecosystem-based management of fisheries.

B. Status of progress on the specific 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 for the period 2010-2014 to achieve long-range targets that address the following four themes:

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

Goal 1 Long-Range Target 1 - Effectively Managing Migratory Fish: By 2050, restore or maintain the Hudson’s historic stocks of migratory fishes to levels that will support sustainable, economically viable fisheries through effective participation in coastal management and implementing ecosystem approaches to understand habitat use, increase available habitat, and examine food webs to account for complex species interactions [links to goals 2, 4, 6, 10 and 11].
Planned Action 1. American shad: Implement objectives of the ongoing shad recovery plan adopted by New York State in 2008, including:

- Annually monitor relative abundance and mortality rate, identify sources of mortality and prioritize management actions to reduce mortality and stimulate shad recovery
- Study food web changes in the Hudson ecosystem that may affect shad recovery
- Identify habitat use and habitat restoration opportunities

Progress in 2010 & 2011: The annual monitoring of adult and juvenile shad in the estuary showed no improvement in the severely stressed population. In 2010, several research studies began: identifying specific adult spawning areas and habitat use and dietary habits of larval American shad in the upper third of the estuary. Additional funding sources were identified to support expansion of the larval fish project to a larger geographic area and to include juvenile fish in the study. This work will be done in partnership with SUNY ESF. Studies of ocean mortality of shad resulting from incidental capture, known as bycatch, in ocean Atlantic herring fisheries have been completed. Results showed that young American shad are indeed being taken by these fisheries. These young fish have not yet had the chance to reproduce before being harvested. Fortunately, shad were not common in the bycatch of the Atlantic herring fisheries. Forty adult shad were tagged in 2010 and 50 fish were tagged in 2011 with sonic (electronic) tags and tracked throughout their spawning season, supplementing data collected in 2009 on identifying specific spawning areas. Results suggest that the geographic extent of spawning activity in the river has shrunk. Shad are now using only the upper third of their historical spawning reach. Analyses to identify specific characteristics of spawning habitat are ongoing. We also have learned that the fish move more than previously thought. We used to think that fish once fish reached the spawning area, they remained there until after spawning. However, the data from our tagged fish suggest that fish can move up and down the river (sometimes 60 miles in a couple days) after they have reached historic spawning areas. This new finding will impact the form of regulations once the fishery reopens in the future.

Planned Action 2. River herring: Develop a recovery goal and develop and implement a recovery strategy to meet newly developed interstate management requirements, including:

- Sample stock status annually.
- Implement harvest restrictions to reduce mortality and waste; identify and reduce ocean bycatch losses.
- Characterize habitat, and study food web changes.
- Expand volunteer monitoring to better understand adult spawning runs.

Progress in 2010 & 2011: New York participated in the coast-wide Atlantic States Marine Fisheries Commission (ASMFC) stock assessment which was just completed in early 2012; the report is currently being peer-reviewed. A New York River Herring Sustainable Fishery Plan was developed in 2011 which proposed regulation changes to create a sustainable fishery for the Hudson stock. The plan was approved by the ASMFC Shad and River Herring Management Board in November 2011. The Volunteer River Herring Monitoring Program, a citizen science cooperative data collection program, had over 200 participants, including school groups, documenting river herring use of 12 tributaries during the 2011 spawning run. Data from the first four years of the program have documented presence and absence of river herring in over 15 tributaries and provided insight on the importance of temperature and tide stage to timing of the spawning runs. The program has also introduced over 300 Hudson Valley residents to this enigmatic species and their plight.

Planned Action 3. Atlantic sturgeon: Complete a three-year study of adult Atlantic sturgeon habitat use and migration patterns to identify and characterize critical habitat. Continue to track the progress of recovery efforts achieved under the moratorium.
Progress in 2010 & 2011: Sonic tagged adult Atlantic sturgeon continue to be tracked in 2010 and 2011 to learn about habitat use. We continue to learn about the important areas of the river the fish use and spawning frequency. A new possible spawning area was identified. A report summarizing our findings is being written. Hudson River Atlantic sturgeon have shown a very slow upward trend since the fishery was closed in 1996. In 2012, the federal government recently listed the Hudson stock of Atlantic sturgeon as well as other coastal stocks as “endangered.”

**Planned Action 4. Striped bass:** Annually monitor abundance and mortality rates of the spawning stock, and monitor recreational harvest to facilitate detection and documentation of change. Re-evaluate the feasibility of a limited, commercial striped bass fishery on any portion of the Hudson River.

*Progress in 2010 & 2011:* In 2010 and 2011, striped bass annual monitoring was completed; the stock is stable. Stock abundance increased in the mid 1990s, and continues to face increasing fishing pressure. Careful management is required to continue to provide a quality and economically viable fishery.

**Planned Action 5. American eel:** Identify threats, establish regular monitoring and expand volunteer participation. Develop projects to lessen existing estuarine and tributary threats to American eels, and develop a recovery plan.

*Progress in 2010 & 2011:* Cooperated with the Hudson River Research Reserve on Citizen Science and Stewardship initiative in 2010 and 2011 to monitor glass eels.

**Overall Status of Goal 1 Target 1:**

- [ ] Done
- [x] Underway
- [ ] Not started

**Goal 1 Long-Range Target 2 - Conserving and Understanding Resident Fish:** By 2014, initiate development of programs to monitor the relative abundance of resident fish species and identify critical habitat used [links to goals 2, 4, 6, 10 and 11].

**Planned Action 1. Shortnose sturgeon:** Continue to support state and federal protection of this species; initiate methodology for tracking shortnose sturgeon seasonal habitat use of the Hudson River Estuary and develop methods to determine that the population remains stable at an optimal level.

*Progress in 2010 & 2011:* Tracking project on hold pending funding. A small pilot project to tag a few shortnose will occur in spring 2012.

**Planned Action 2. Smallmouth and largemouth bass:** Determine whether the smallmouth and largemouth bass recreational fishery can be restored to the nationally renowned levels of the mid-1980s.

- Assess habitat condition and use for both species
- Continue annual tournament monitoring to track changes in fish abundance and size

*Progress in 2010 & 2011:* During the period from 2010-2011, DEC electro-fished Coxsackie Cove, and the tidal portions of Catskill Creek, Rondout Creek, Esopus Creek and Wappingers Creek to continue to document the use of these areas as critical overwintering habitat for largemouth bass. These areas will be sampled again in early spring 2012. Tournament monitoring has continued through requests that bass tournament organizers report their weigh-in results to DEC for tabulation and comparison to previous years. Participation in tournaments on
the Hudson appears to have fallen off, although catches in 2009 were up from the previous two years. Tournament participation in 2010 was so low that accurate statistics could not be generated. Tournament participation in 2011 appeared to be better, and catch statistics are currently being summarized. These data will help with the assessment of whether the 15 inch minimum size limit (implemented in Oct. 2006) has improved the fishery.

Planned Action 3 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.

Progress in 2010 & 2011: DEC is currently reviewing newly developed GIS maps of early life stages showing distribution of forage fish within the river; work on status and abundance is on hold. 82 volunteers reported catch data for 9708 angler hours of fishing.

Overall Status of Goal 1 Target 2:

☐ Done
☒ Underway
☐ Not started

Goal 1 Long-Range Target 3 - Conserving and Enhancing Crustaceans and Shellfish Populations:
Develop restoration goals and necessary monitoring to ensure an optimal fishery for blue crabs, and reestablish small oyster populations in the Hudson for ecosystem benefits [links to goals 2, 4, 6, 10 and 11].

Planned Action 1. Blue crab: Implement studies to identify and characterize critical over-wintering habitat, summer movement and habitat use and factors affecting year class production.

Progress in 2010 & 2011: Blue Crab tagging continued in 2010 and 2011; tag returns indicate widespread movement in the river with a winter fishery in Raritan Bay, NJ capturing Hudson River crabs.

Planned Action 2. Oysters: Conduct pilot projects to establish oyster populations where feasible.

Progress in 2010 & 2011: A study of oyster restoration feasibility in the Tappan Zee region of the Hudson River Estuary was completed in 2010. Work was conducted by SUNY Stony Brook and supported by the State Wildlife Grant (SWG) program. The report identified suitable habitats under normal weather conditions for oyster restoration from the Tappan Zee Bridge to Pier 40 in Manhattan. The ‘Oyster Restoration Research Project’ was implemented by the Hudson River Foundation, NY-NJ Harbor Estuary Program and the USACOE. Six experimental oyster reefs were constructed with three in the Hudson River and NY Harbor at Hastings, Governor’s Island and Bay Ridge Flats. However, intense rainfall events during and after the study resulted in high mortality of transplanted oysters in the northern range of the study area. Similar intense rainfall events associated with climate change are predicted to become more frequent in the region. Therefore oyster restoration efforts located further downriver will have a higher likelihood of long-term success.

Overall Status of Goal 1 Target 3:

☒ Done
☐ Underway
☐ Not started
Goal 1 Long-Range Target 4 - Reducing In-River Impacts to River Biota: By 2020, demonstrate reduced PCBs and mercury in fish and cadmium in blue crabs and reduced fish kills from all types of existing water withdrawals that use once-through cooling systems [links to goals 6 and10].

Planned Action 1. Contaminants in fish: Working through the Pollution Reduction Team, adopt measures that will significantly reduce inputs of PCB, cadmium and mercury to the aquatic environment from local or regional inputs and aerial sources.

- Continue to support federal actions implemented in 2009 to remove PCB-contaminated sediment by dredging.
- Complete assessment of cadmium sources affecting the safe consumption of crabs.
- Evaluate emerging contaminants as potential concern to the Hudson River environment.
- Provide periodic surveillance (e.g., every five years) of PCBs, mercury in fish and cadmium in blue crab.

Progress in 2010 & 2011: 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 EPA throughout 2010 to help plan Phase 2 and was able to bring about important improvements in the standards for Phase 2. DEC was, however, not successful in removing a standard that would allow capping on up to 11% of the area where PCB contaminated sediments are not completely removed. Dredging resumed in the spring of 2011 after General Electric agreed to perform Phase 2 and dredge over 400 acres. GE dredged 75 acres of PCB contaminated sediments, removing about 350,000 tons of sediment in the upper Hudson in 2011, following DEC and EPA guidance. Combined with previous years, a total of 650,000 tons has been dredged from 125 acres of the upper Hudson.

A paper was published by Dr. Larry Skinner in 2011 on the presence of polybrominated diphenyl ethers (PBDEs), polybrominated and polychlorinated dioxins and furans (PBDD/Fs and PCDD/Fs), and polychlorinated biphenyls (PCBs) in smallmouth bass and striped bass. PBDE concentrations were related to human population density upstream from fish collection locations. Dioxin and furan concentrations were low with the exception of a single striped bass bearing the signature of exposure from the Passaic River and Newark Bay. A screening sample of fish was collected in 2003 from several locations on the River including Albany and Troy, Catskill, Poughkeepsie and Haverstraw and analyzed for these contaminants.

DEC staff have continued annual monitoring of PCBs in striped bass, sport fish and forage fish at several locations in the river. Due to lack of staff and funding, no monitoring of cadmium in blue crab has taken place since 2004 and only a small number of fish have been sampled for cadmium since 2004.

Planned Action 2. Water-withdrawing facilities, power-generating plants: These actions will reduce unnecessary mortality by minimizing fish kills at existing and future water intakes.

- Power-generating plants: Effective immediately, reduce or have schedules to reduce fish kills at the four remaining steam electric power plants that use once-through cooling systems by imposing the “best technology available” standard pursuant to 6 NYCRR§704.5 and §316(b) of the Clean Water Act, which both call for minimizing adverse environmental impacts. Require that future Hudson River power-generating facilities have closed-cycle cooling systems.
- Other industry using cooling systems: Effective immediately, reduce or have schedules to reduce fish kills at all industrial facilities that use once-through cooling systems by imposing the best technology available standard pursuant to 6 NYCRR§704.5 and §316(b) of the Clean Water Act, both of which call for minimizing adverse environmental impact. Require that future Hudson River industrial facilities requiring cooling systems have closed-cycle cooling.
- Reduce fish kills for all types of future water withdrawals compared to the impacts of unmitigated intake structures.
Progress in 2010 & 2011: DEC continues to make a concerted effort to minimize fish mortality from impingement and entrainment at Hudson River power plants and other industrial facilities. Danskammer must reduce impingement and entrainment by 85 and 80 percent respectively by the end of the current permit term. Draft SPDES permits issued for Roseton and Bowline Units 1 and 2 also require technologies and operational measures to minimize impingement and entrainment. Though being challenged by the permittee, DEC is requiring closed-cycle cooling for Indian Point Units 2 and 3 in a draft SPDES permit. In addition, the Best Technology Available (BTA) standard is being imposed at industrial facilities other than steam electric including but not limited to cement and sugar industry facilities and large office building complexes.

In July 2011, DEC adopted a policy establishing performance goals to ensure that industrial facilities meet the Best Technology Available (BTA) requirement to protect aquatic wildlife from injury and mortality caused by cooling water intake structures. A BTA determination is required in each State Pollutant Discharge Elimination System (SPDES) permit for industrial facilities operating a cooling water intake. Throughout New York State, billions of fish are killed each year when they are caught up in the intake of cooling water for industrial processes. Fish of all life stages can be subject to entrainment, passing through a plant’s cooling systems along with the cooling water, or to impingement, where they are pinned against the intake structure screens. Steam electric power plants account for the majority, though not all, of this industrial cooling impact, with some power plants using more than a billion gallons of cooling water every day. Other industries in New York using non-contact cooling water include manufacturing facilities (e.g., cement, salt, and sugar industries) and large office buildings.

The policy identifies closed-cycle cooling or its equivalent as the performance goal for BTA to minimize these impacts. Most existing industrial facilities use once-through cooling where water is drawn into the facility, passed through the cooling system, and then discharged back into the waterbody. Closed-cycle cooling systems, such as cooling towers, recirculate the water they use thereby reducing the volume of cooling water used at an industrial facility by millions of gallons daily. This, in turn, greatly reduces the impingement and entrainment of fish – in many cases by more than 90 percent. However, closed-cycle cooling is not always an available technology for existing facilities as issues of space availability and compatibility of new technology with the facility’s original design frequently make it infeasible to implement. The performance goal of the policy allows facility owners to propose alternative mitigative technologies, or operational measures, such as flow reduction, to achieve reductions in impact equivalent to what could be realized with closed-cycle cooling. All new industrial facilities that require cooling must use a closed-cycle cooling system. The final policy (DEC Commissioner Policy #52) is available on the DEC public website at [http://www.dec.ny.gov/animals/32847.html](http://www.dec.ny.gov/animals/32847.html), along with a Response to Comments and final SEQR Negative Declaration.

In July 2011, Lafarge Building Materials Inc. received the necessary state permits to modernize and expand its existing cement manufacturing facility in Albany County. The new facility will altogether eliminate manufacturing process water discharges and decrease overall water use. The facility will no longer use Hudson River water as a primary water supply, will operate a closed-cycle cooling system, and will install cylindrical wedgewire screening on their water intake to protect aquatic organisms when river water is used as a backup supply during drought periods. Lafarge’s planned new plant will also decrease fuel use, electrical demand and greenhouse gas emissions per ton of clinker produced. As a result of the state-of-the-art emission control technologies to be used, the new plant will also achieve steep reductions in emissions of pollutants associated with acid rain (sulfur dioxide or SOX emissions will drop 95 percent) and ground level ozone, or smog (nitrogen oxides emissions or NOX will drop 60 percent). In addition, emissions of fine particulate matter measuring 2.5 micrometers or less (called PM 2.5) will decrease from 560 tons per year to 351 tons per year. It will also result in a 66 percent reduction in mercury emissions. The company will replace the existing “wet” cement-
making process with a more energy efficient “dry” cement-making process to ensure a continued local supply of a critical building material. Once the planned improvements are made, the facility’s production capacity will increase from about 1.72 million to 2.81 million tons of clinker per year. Clinker is the solid material produced at the plant which is ground and mixed with gypsum to make cement.

Overall Status Goal 1 Target 4:

☐ Done
☒ Underway
☐ Not started
Accomplishments Goal 2:  
River and Shoreline Habitats

Goal

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

A. Overview of Accomplishments to Date and Challenges for this Goal

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

In 2010-2011, progress was made on several habitat restoration projects, including the estuary-wide habitat restoration plan, three Phragmites control projects, oyster restoration feasibility studies, and shoreline restoration project planning. Hudson River Estuary Tidal Wetlands maps and Submerged Aquatic Vegetation maps from 2007 inventories were completed in 2011 and made available to the public. The Estuary Program was also able to acquire the first-ever detailed maps of the estuary shallows-those areas less than four meters deep which are the last unmapped habitats in the estuary. These maps were acquired for a pilot area, from Hudson north to Troy, under a partnership with the NOAA Coastal Services Center. They will be used to define fisheries habitats and to better understand climate change impacts on the estuary. New digital maps were created in 2010 to show the relative abundance of eleven fish species (white perch, striped bass, blueback herring, alewife, eels, killifish, large-mouth bass, American shad, shiners, tomcod, winter flounder) throughout the estuary.

Hudson River estuary habitats are home to a wide variety of plants and animals that are important within New York State and beyond. In 2010 and 2011, the Estuary Program continued its work on the following river habitat conservation priorities:

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

In 2010 and 2011, the Estuary Program and the Hudson River Research Reserve continued to develop an understanding of the interactions of human behavior and habitat. Grants from NOAA secured by the Research Reserve are enabling research on decision-making and cost-effectiveness relating to shoreline habitats and sea level rise. The Hudson’s habitats support extraordinary biological diversity and provide important benefits to humans, yet habitats have been diminished, damaged and disconnected by human patterns of development during the last 150 years. Vast areas of river bottom have been dredged to create and maintain a shipping channel. Tidal wetlands and shallows have been filled, and, in some areas, fill covers a third of the river's original surface area. Nearly half the Hudson’s shoreline has been straightened and hardened by human-made structures. Compounding these losses are impacts from sea-level rise and climate change which threaten shoreline and shore communities where water may rise faster than habitats can build up sediments to keep pace. Also, human responses to sea-level rise and increased flooding may include building dikes which will prevent habitats from migrating landward. Finally, the ongoing accidental and deliberate introduction of invasive plants and animals continues to threaten native species and their habitats.

In 2010 and 2011, the Hudson River Estuary Training Program trained 1050 decision makers from government, business, community, and nonprofit organizations, and provided over 4000 contact hours of training to support habitat conservation. For habitats to be effectively protected in regulatory activities under articles 15, 24 and 25 and other conservation decision-making processes, we must understand river habitat trends and threats. Also, an awareness of habitat status and trends, restoration opportunities and best management practices must be developed among key decision-makers, including resource managers, community leaders, shoreline land owners, regulators, contractors and river users and other citizens. To accomplish this, information must be accessible in formats that are user friendly, with technical assistance available so that managers can use existing and new conservation mechanisms to safeguard habitats. Protection of habitats also depends on training to enhance capacity to understand the human sides of complex resource issues. Finally, we can create opportunities for leaders and managers to enhance their skills to apply this information effectively.

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

In 2010-2011, Hudson River Fisheries Unit, Estuary Program, and Marine Habitat staff identified high use fish habitat areas, drawing on the 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.

B. Status of progress on the specific actions planned for 2010-2014

To achieve the goal of conserving, protecting and enhancing river and shoreline habitats to their full potential, we plan to implement specific actions for the period 2010-2014 to achieve long-range targets that address the following four themes:
1. Understanding river habitat trends and threats
2. Conserving and restoring river habitats
3. Training people to manage and protect river habitats
4. Responding to invasive and exotic aquatic species
Goal 2 Long-Range Target 1 - Understanding River Habitat Trends and Threats: By 2020, increase understanding of how river and shoreline habitats help sustain the river ecosystem through mapping and assessing habitat change on a river-wide scale, determining important functions and closely monitoring the most vulnerable habitats—tidal wetlands, shallows and shorelines—which are subject to major disruptions from climate change [links to goals 1, 3, 4, 6, 11 and 12].

 Planned Action 1. River bottom mapping: Map shallow-water habitats (0-5m depth) throughout the estuary to complete detailed river-wide mapping, provide a baseline for habitat monitoring and to enable better projections of storm surge and threats to habitats, shorelines and communities.

 Progress in 2010 & 2011: In 2010, completed mapping of shallow water from Saugerties north to Troy, covering an area of 11 square kilometers (about 2750 acres). In 2011 we began creating a digital archive of this data and earlier bottom mapping data in disc space provided by NYSDEC DIS and placed the contoured bathymetry on the NYSDEC Data Selector. In 2011 we also drafted a statement of work for shallow water mapping in the harbor.

 Planned Action 2. Tidal wetland and SAV mapping: Map submerged aquatic vegetation (SAV) and tidal wetlands in 2011-2013, and determine trends in habitat coverage and composition.

 Progress in 2010 & 2011: In 2010, initiated a pilot digital inventory of SAV and tidal wetlands to evaluate how best to transition from film to digital inventories. We acquired digital imagery in 2010 from Esopus Meadows to Imbocht Bay. Cornell University staff are evaluating the new digital method to compare its automated classification and georeferencing capabilities with the former manual film interpretation technique. Supported the 8th and 9th years of volunteer monitoring of SAV coverage.


 Progress in 2010 & 2011: Created digital maps of wetlands, and shore type for municipalities whose representatives attended a 2010 Pace University Land Use Leadership Alliance training program. Provided sediment environment maps and other graphic material to a variety of users, including researchers, consultants, municipalities and agency staff. These products have been used for: evaluation of plans for a new Tappan Zee bridge; study of shad habitat; City of Kingston waterfront development planning; a U.S. Department of Defense project in the estuary; and sediment management in Haverstraw Bay. Provided the eel project with land cover maps for each of the 11 watersheds where eel sampling is occurring in 2010. Provided geographic information to the NYS GIS Clearinghouse for access by the general public, including data derived from various sonar survey techniques including sidescan images and subbottom profiles, data derived from sediment cores and grabs including sediment contaminant data and sediment age data and interpretive maps including river bottom sediment types and river bottom sediment environment and shoreline types. In 2011 submerged aquatic vegetation (SAV), tidal wetlands maps and new bathymetric contour maps were posted on the internal NYSDEC GIS Data Selector and the public NYS GIS Clearinghouse. We provided a customized FOIL-exempt dataset of all 1-meter resolution sun-illuminated bathymetry and all digital field recordings of sidescan data for the entire estuary to the Lake Champlain Maritime Museum for use in evaluating historic treasures in the estuary as part of planning for an electric cable that might run down the estuary from Troy to New York City. River bottom sediment types (grab samples and core sample), shoreline types, tidal wetlands, submerged aquatic vegetation, and HRNERR vegetation maps. We submitted vegetation maps for the four HRNERR sites to the GIS unit of the NYSDEC DIS for posting on the internal NYSDEC GIS Data Selector and the public NYS GIS Clearinghouse. In 2011 the sediment environment maps were used extensively in negotiations re
the proposed placement of the Champlain Express electric cable. We created a customized dataset of environmental data for the City of Kingston for use in their water front development planning.

Planned Action 4. Fisheries habitat use: Study the seasonal use of habitats, such as spawning, nursery, feeding and wintering areas of key species of fish and crabs, through acoustic tracking and observations.

**Progress in 2010 & 2011:** Created digital maps in 2010 showing high relative abundance of 11 fish species throughout the estuary. In 2011, in preparation for new river herring recreational fishing regulations, we worked with the NYSDEC Hudson River Fisheries unit to develop a database of the extent of Hudson River Estuary tributaries that are accessible to anadromous fish.


**Progress in 2010 & 2011:** In 2010 built capacity and partnerships for assessing vulnerability of river habitats to accelerated sea-level rise and climate change. A presentation titled "Adapting Toward the Best of Both Worlds: Natural Resource and Infrastructure Vulnerability Assessment of the Hudson River Estuary" was presented, on behalf of staff by project partner Scenic Hudson, to the Society for Conservation Biology, International Congress for Conservation, December 5-9, 2011. The presentation described a vulnerability analysis that provides stake holders with a high-resolution understanding of sea-level rise impacts on the estuary's natural habitats and built infrastructure.

Planned Action 6. Marsh elevation monitoring: Establish initial stations to monitor tidal marsh elevation throughout the estuary to better define patterns of marsh accretion and/or subsidence, and work with partners to study sediment accumulation and transport in Hudson River marshes and SAV.

**Progress in 2010 & 2011:** Four study segments were established within the Tivoli Bays to monitor marsh sediment elevation changes in response to climate change stressors. The segments include 1) an emergent marsh reference site with stable vegetation communities across an elevation gradient; 2) an emergent marsh site adjacent to a wooded swamp to analyze the potential for upland marsh migration; 3) a mud flat site that is heavily impacted by the invasive Trapa natans; and 4) a submerged aquatic vegetation site that is minimally impacted by the invasive Trapa natans. In 2011, a total of 84 vegetation plots were sampled, 9 tide gauges were deployed, 6 surface elevation tables were installed, and one study site was surveyed for transect elevations. This work provides the foundation for long-term marsh monitoring that will guide marsh management under conditions of accelerated sea level rise, which threatens the Hudson’s 7000 acres of tidal wetlands.

Planned Action 7. Wetland water quality monitoring: Monitor water quality and explore the potential for climate change-related water quantity changes to affect marshes and SAV; work with partners to assess vulnerability of habitats to changing salinity due to sea-level rise.

**Progress in 2010 & 2011:** Monitored water quality for the 20th year at the four Hudson River Research Reserve sites to track changes and monitor stressors.

Planned Action 8. Community response to sea-level rise: Collaborate on flood plain modeling and mapping, including a pilot study of selected Hudson River communities, and evaluate likely human responses to sea-level rise in shoreline management.
Progress in 2010 & 2011: Provided technical support to LiDAR mapping planning. In order to more fully understand how shoreline decisions are made along the Hudson, conducted case studies of shoreline management planning in five communities, including Peekskill’s Southern Waterfront Park and Trail, Tarrytown’s Pierson Park and River Walk, Four Mile Point in Greene County, The Harbors at Haverstraw, and Foundry Dock Park in Cold Spring. Held a workshop which included an exercise where participants mapped vulnerable built and natural features and discussed plausible actions.

Overall Status of Goal 2 Target 1:
☐ Done
☒ Underway
☐ Not started

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

Planned Action 1. Habitat restoration plan: Complete the Hudson River Habitat Restoration Plan.

Progress in 2010 & 2011: A draft restoration plan was completed in 2010. Staff reached out to State and Federal partners and non-governmental organizations to raise awareness and build support for the plan, and obtain comments on the plan’s scope and content prior to its public release following a technical review. In the spring of 2011, the draft restoration plan was reviewed by the Hudson River Estuary Program’s Habitat Sub-Committee along with other experts from federal and state agencies. Several revisions were made and a ‘Discussion Draft’ was completed.

Planned Action 2. Oyster restoration: Complete studies to determine the feasibility of restoring oyster populations to the Hudson River estuary for the habitat benefits that oyster reefs provide. Conduct pilot projects to establish oyster populations if feasible.

Progress in 2010 & 2011: In 2010, researchers completed the Hudson River Oyster Restoration Feasibility Study in the Tappan Zee region of the Hudson River Estuary. Work was conducted by SUNY Stony Brook, supported by the State Wildlife Grant (SWG) program. The final report identifies suitable habitats, under normal weather conditions, for oyster restoration in the Tappan Zee region, south to Pier 40 in Manhattan. Once sought as a delicacy, Hudson River oysters 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 estuary. The Army Corps of Engineers in partnership with the Hudson River Foundation and the New York/New Jersey Baykeeper undertook some pilot restoration projects in New York harbor and lower estuary in 2010. Oyster “spat” on shell was placed on constructed rock reefs. Oysters in the northern study sites in the Tappan Zee region from both the Hudson River Oyster Restoration Feasibility Study and the ACOE pilot projects suffered near 100% mortality due to long-term exposure to freshwater resulting from several intense rainfall events.


Progress in 2010 & 2011: In cooperation with Bard College students and faculty, operated and maintained an eel trap and pass system at the Saw Kill, in Red Hook, until the ladder was
dislodged and destroyed during high flows associated with Tropical Storm Irene in 2011. A newly designed, low cost eel passage device was installed in Furnace Brook in Putnam County in 2011. The device successfully trapped nearly 1500 eels until it was removed in the fall. A new ladder has been constructed and will be installed in the spring of 2012 at a Dutchess County location, still to be determined.

**Planned Action 4. Restoration of tidal habitats:** Conserve and restore vegetated shallows, tidal wetlands and shoreline habitats, including restoration of secondary channels in the upper Hudson River estuary.

**Progress in 2010 & 2011:** Continued to explore feasibility of secondary channel restoration, in part through two graduate student projects studying migratory fish utilization of secondary channels.

**Planned Action 5. Sustainable shorelines:** Identify management techniques and measures that promote sustainable shorelines, and develop and disseminate guidance on shoreline erosion control options to respond to accelerated sea level rise.

**Progress in 2010 & 2011:** Advanced several elements of the Hudson River Sustainable Shorelines Project, including engineering assessments of different management techniques, analyses of legal opportunities for changing policy and practice, case studies of community decision-making, assessments of key stakeholder information needs, and ecological assessments of different shorelines types. Successfully raised an additional three years of funding to support more detailed ecological studies, a characterization of projected physical conditions in the estuary, a decision support tool, and a demonstration site. Convened four meetings of the project advisory group. Staff provided project design, management and technical advice to OPRHP staff during the design of an ‘ecologically enhanced’ engineered shoreline project to be installed on the Hudson River at Coxsackie, Greene County, NY. The project received a permit in late 2011. Construction will be completed during the spring of 2012. Staff also reviewed several other shoreline locations for potential use as ‘ecologically enhanced’ engineered shoreline demonstration sites, and provided technical assistance to two communities on shoreline management.

**Planned Action 6. Wetland adaptation to sea level rise:** Identify low-lying areas where tidal wetlands may occur as sea level rises, and seek to conserve these properties.

**Progress in 2010 & 2011:** Worked with Scenic Hudson and the Nature Conservancy to develop an approach for identifying low-lying areas where tidal wetlands may occur as sea level rises. Convened a panel on this topic at a National Estuarine Research Reserve System annual meeting to identify strategies being used by other states and federal agencies to promote wetland adaptation. Co-wrote a successful Coastal and Estuarine Land Conservation Program funding proposal that will underwrite the acquisition of a property at Nutten Hook in Columbia County, an important parcel for wetlands migration.

**Planned Action 7. Significant coastal fish and wildlife habitat updates:** Support completion of updates of Significant Coastal Fish and Wildlife Habitat designations for the Hudson River estuary, and disseminate this information to decision-makers.

**Progress in 2010 & 2011:** Created digital maps showing high relative abundance of 11 fish species throughout the estuary, which will be used to refine boundaries of and actions within the proposed Significant Coastal Fish and Wildlife Habitat updates. Developed the specifications for mapping the fine-scale (meter-scale) movement of fishes using arrays of fixed acoustic receivers. This may lead to a project that will evaluate sturgeon movements in their spawning habitat.
between Crum Elbow and Norrie Point. Proposed updates to existing habitats and new habitat
designations were completed. Draft updates were released to the public by the Department of
State, public information meetings as well as a public hearing were held.

**Overall Status of Goal 2 Target 2:**
- [ ] Done
- [x] Underway
- [ ] Not started

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

**Planned Action 1. Technical assistance:** Provide current scientific information and technical
assistance about Hudson River habitats to local partners and key stakeholders to reduce the threat
of estuarine habitat loss and adapt to climate change.

**Progress in 2010 & 2011:** Provided current scientific information and technical assistance about
Hudson River habitats to a wide variety of local partners, stakeholders, businesses, and
professional resource managers. This effort included an extensive review of technical documents
related to compliance studies and mitigation studies associated with a proposal to install an
electric power cable along the axis of the estuary from Cementon to Manhattan. Attended several
meetings with proposal proponents and agency staff to discuss these documents.

**Planned Action 2. Estuary Program Training:** Provide 2,500 contact hours of science-based
training per year to resource managers, regulators, shoreline land owners and other decision-
makers to improve knowledge and conservation of river habitats and promote use of sustainable
shoreline practices

**Progress in 2010 & 2011:** Provided over 4,000 contact hours of science-based training to
resource managers, regulators, shoreline land owners and municipal officials. Workshops
including Assessing Vulnerability to Climate Change for Wildlife Managers, Sustainable
Shorelines, Invasive Species, Psychology of Climate Change, Stormwater Management, New York
State Climate Change Initiatives, Water Words that Work, Climate Justice, Hudson River
Habitats and Revitalizing Hudson Riverfronts. Reached 1152 decision-makers from local, state,
and federal government agencies, universities, community groups, and non-profit organizations.

**Planned Action 3. Training evaluation:** Evaluate changes in knowledge and behavior of these
stakeholders.

**Progress in 2010 & 2011:** Evaluated changes in knowledge and behavior of workshop
participants through post workshop summative evaluations; also collected anecdotal
information.

**Overall Status of Goal 2 Target 3:**
- [ ] Done
- [x] Underway
- [ ] Not started
Goal 2 Long-Range Target 4 - Responding to Invasive and Exotic Aquatic Species: By 2020, implement a process for projecting new arrivals and planning responses to invasions, and implement developed protocols for aquatic invasive species responses [links to goals 1, 3, 4, 5, 6, 10 and 12].

Planned Action 1. Aquatic invasive species management: Cooperate with Capital District and Lower Hudson Partnerships for Regional Invasive Species Management (PRISMs) to prevent, detect, monitor and, where possible, control harmful aquatic invasive species. Work with the Invasive Species Office to develop a process for projecting the arrivals of new invasive species and determining plans of action in advance of their arrival.

Progress in 2010 & 2011: Attended Lower Hudson PRISM meetings. No progress was made on work with the New York State Invasive Species Office to develop a process for projecting the arrivals of new invasive species and determining plans of action in advance of their arrival. However progress was made on specific species (see below).

Planned Action 2. Mitten crab monitoring: Collaborate with partners to monitor the mitten crab invasion of Hudson River marshes and tributaries.

Progress in 2010 & 2011: In 2010, Compiled data on mitten crab finds throughout the Hudson River Estuary and submitted it to the Smithsonian Mitten Crab Watch. Continued collaboration with partners at US Fish and Wildlife and researchers at California State University, Fresno despite having no Hudson River mitten crab sightings in 2011.

Planned Action 3. Phragmites control: Manage and remove invasive colonies of the non-native form of common reed (Phragmites australis) in Hudson River marshes where justified and feasible.

Progress in 2010 & 2011: Continued partnership with The Nature Conservancy (TNC) to continue common reed (Phragmites australis) control efforts in Tivoli North Bay with treatment of 7 locations with the herbicide Rodeo® and monitoring of vegetation response. Partnered with OPRHP staff at the Palisades Interstate Park Commission to monitor a 10-acre control area at Iona Island, and to supervise a citizen stewardship/science volunteer Phragmites control project at Piermont Marsh carried out by The Young Women’s Leadership School of East Harlem and Lamont-Doherty Earth Observatory. This work generated information that will help guide plans to manage invasive species at Piermont Marsh, the Hudson's largest salt marsh.

Overall Status of Goal 2 Target 4:

- [ ] Done
- [X] Underway
- [ ] Not started
Accomplishments Goal 3: Valley Habitats and Ecosystems

Goal

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

A. Overview of Accomplishments to Date and Challenges for this Goal

In 2011, the Estuary Program took action to understand the status and trends of regional biodiversity; provided assistance to municipalities and landowners to help build their capacity for conservation of important valley habitats; and began to address the impacts of climate change on valley habitats.

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 addition to providing environmental benefits, healthy natural areas support the local economy and provide jobs. 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 support 358 local jobs.

The Hudson Valley’s natural areas perform beneficial services that are costly to replace with treatment plants and other infrastructure, particularly in a time when local and state government budgets are strained. Biologically diverse habitats and ecosystems prevent the spread of diseases and pests and provide pollinators and rich soils for growing food locally. 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. Infrastructure costs can be reduced by conserving existing significant natural areas through proactive planning. 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.

In 2011, we advanced our work to map, monitor, and protect small wetlands that are critical for storing flood waters, filtering runoff, recharging groundwater and for maintaining populations of declining amphibians. Sensitive frog, toad, and salamander species found throughout the Hudson Valley are an important part of the food chain and if lost would indicate significant declines in wetland and watershed health. This year, we filled holes in existing wetlands maps by identifying and ground-truthing an additional 752 small woodland wetlands. We monitored amphibian species at 53 privately and publicly owned wetland sites in Westchester, Dutchess, Putnam, Orange, Columbia, and Greene counties. We assisted the Towns of Rosendale (Ulster County) and Montgomery and Wallkill (Orange County) with completing natural resource inventories that mapped small wetlands. We gave presentations on the value and importance of wetlands to over 344 decision-makers and citizens. And, we engaged a total of 281 volunteers in two citizen science projects to monitor amphibian populations and wetland habitats in 2010 and 2011, saving in labor costs and expanding recognition of local wetlands and their importance.

At the same time, we continued work to conserve the region’s forests, in particular working with municipalities to plan for growth in ways that avoid fragmenting significant forests, and with landowners
to implement wildlife friendly forest management practices. Working with local partners, we completed maps and biological descriptions of remnant floodplain forests in Dutchess and Columbia Counties and began a study of the effects of Emerald ash borer (EAB) invasion on habitats near rivers and streams within the Valley.

Forests and wetlands in the watershed recharge ground water, absorb carbon, and protect streams and the estuary. Healthy plant and animal populations are necessary for forests and wetlands to continue providing water purification and flood mitigation, among other benefits to our communities. Forest and wetland habitats were mapped at the 156-acre Esopus Bend Nature Preserve (Ulster County) and the Westchester Land Trust helped to conserve 978 acres of land in the Croton to Highlands Biodiversity Corridor (Westchester County). In 2011, 738 participants attended conservation roundtables, GIS training, programs on wetland and forest conservation, and workshops to improve local capacity for conservation-oriented planning.

The major implementation strategy for Goal 3 continues to be raising the capacity of land-use planners, decision-makers and citizens in the Hudson Valley so they understand the role of biodiversity in maintaining healthy ecosystems, and use biological information for decision-making and planning. Over 2010 and 2011, we provided training and education for 1,181 local decision-makers on biodiversity and land-use planning topics. Municipal-specific biological information was shared with 14 communities in 2010 and 7 in 2011, including digital data, written summaries with maps, and digitized habitat maps created by volunteers. In 2010 and 2011, a total of 49 communities received technical assistance from the Estuary Program and its outreach partners, including comments on draft comprehensive plans, support of Conservation Advisory Council initiatives, and guidance on biodiversity assessment procedures for planning board reviews.

Finally, we took additional steps in 2011 to address the growing threat of climate change to the ecosystems that underpin the region’s economic and environmental vitality. As adaptation strategies progress, managers are realizing the need for monitoring systems that will inform the intensive management efforts that will be needed to maintain biodiversity and ecosystem services for future generations. In 2011, we began coordinating with our partners to develop a draft regional habitat connectivity plan accounting for the expected impacts of climate change on wildlife migration. The plan will help to prioritize natural resource conservation. In 2012, we will establish terrestrial monitoring stations in the estuary watershed in order to track climate-induced changes in regional habitat and wildlife.

The Hudson River Valley hosts an unusual variety of plants, animals and habitats that are important within New York State. Priority ecosystems for conservation in the Hudson Valley include:

- Shoreline corridors that provide essential habitat along the Hudson River and its tributary streams;
- Unbroken forests;
- Grasslands and shrublands;
- Wetlands, including marshes, swamps, wet meadows and fens, bogs and surrounding lands;
- Seasonal woodland pools for animals that are declining throughout the Northeast; and
- Unique natural areas that support at-risk and recovering populations of plants and animals.

**B. Status of progress on the specific actions planned for 2010-2014**

To achieve the goal of conserving biological diversity and ecosystems, we plan to implement specific actions for the period 2010-2014 to achieve long-range targets that address the following three themes:

1. Understanding the status and trends of regional biodiversity
2. Raising the capacity of local partners to conserve important habitats
3. Addressing climate change and monitoring threats
Goal 3 Long-Range Target 1 - Understanding the Status and Trends of Regional Biodiversity: By 2020, develop a clear understanding of the status of plants and animals throughout the Hudson Valley, with a focus on at-risk birds, frogs, turtles and salamanders, and identify the places most important for their long-term survival. Track changes in forests, wetlands, streams, grasslands and other priority ecosystems that maintain regional biodiversity and ecosystem services so we can continue to inform state and local conservation programs with science and place-based recommendations [links to goals 4, 5 and 6].

Planned Action 1. Mapping priority habitats: Identify and map priority habitats, ecosystems and landscape connections that support biological diversity. Update and add new locations to databases of rare species and significant ecosystems to fill the “gaps” in conservation maps.

Progress in 2010 & 2011: In 2011, we advanced a forest integrity map of regional forest habitat quality relative to threats to forest structure and composition. Two key components of the forest integrity map - forest fragmentation and edge habitat, were completed in 2011. The fragmentation layer identifies core forests less than 250 acres, between 250-500 acres, and more than 500 acres in size throughout the Valley. The edge layer shows edge habitat within forest patches typically associated with lower forest integrity. The forest fragmentation and forest edge layers will assist outreach partners with recognizing and valuing forest ecosystem services and with planning to protect significant forests into the future. The maps will also be used for monitoring of forest habitats. Work continues to develop a final forest integrity layer.

This year, we filled holes in existing wetlands maps by identifying and ground-truthing an additional 752 small woodland wetlands. We also conducted a survey of ongoing regional woodland pool monitoring and mapping activities. A regional woodland pool monitoring workshop is planned for 2012 with the goal of facilitating a discussion on ways to share resources for biological monitoring and small wetland mapping.

We continued work with the New York Natural Heritage Program to develop models for accurately mapping small, forested wetlands and to improve our understanding of the role of these wetlands in maintaining the presence of rare amphibians within the estuary watershed. In 2011, we monitored rare amphibian species in 53 privately and publicly owned wetlands and surrounding areas in Westchester, Dutchess, Putnam, Orange, Columbia, and Greene counties. Data from wetland and amphibian monitoring will be used to identify regionally important wetlands and to predict small wetland locations in areas of the Valley that are difficult to survey.

Working with Hudsonia, Ltd., work was completed in 2010 to map habitats at 55 sites located on or adjacent to the Hudson River estuary between Dutchess and Ulster counties and Rensselaer and Albany counties. The maps are being used to develop site management plans and to identify opportunities for coordinated management that protects biodiversity, recreational, and scenic values at the sites.

This year we began work with Hudsonia, Ltd. and the Catskill Creek Watershed Advisory Committee to pilot methods for mapping and prioritizing habitats of stream corridors within tributary watersheds. The outcomes will be used for biodiversity outreach and riparian buffer plantings under Goal 4.
Planned Action 2. Documenting landscape habitat changes: Conduct regular land-cover analyses and field surveys to document changes in the size, location, quality and landscape connections of priority woodland pools and forests and all major habitat types in the watershed.

**Progress in 2010 & 2011:** Land cover maps from previous years were analyzed and revealed shifting landscape patterns where agricultural fields began reverting to forests, while in other places forests were cleared for agriculture or residential development. While the overall amount of forest land remained unchanged, we observed an increasing amount of forest fragmentation that was linked to a decline in forest-breeding songbirds. Additional study of land cover change will be completed using 2010 satellite images when they become available. The results will be reported to regional planners through our outreach programs.

Planned Action 3. Monitoring priority species: Develop and implement consistent plans to monitor the status and distribution of high-priority species, including marsh, shrubland and forest birds and turtle, salamander and frog populations.

**Progress in 2010 & 2011:** In 2011, we continued coordination with regional and federal partners in the areas of amphibian monitoring, marsh bird monitoring and large scale connectivity planning. This work involves a partnership between the Estuary Program and the United States Geological Survey’s (USGS) North American Amphibian Monitoring Program and the United States Fish and Wildlife Service’s (USFWS) National Marsh Bird Monitoring Program. With federal funds leveraged by the Estuary Program, we carried out field survey of key woodland pool and marsh wetland habitats and associated wildlife. Biologists conducted surveys of vernal pool amphibians (salamanders and frogs) and tested survey techniques for box turtles and marsh birds. These animals are indicators of forest and wetland integrity and require additional conservation, as most populations appear to be in significant decline. Cornell researchers will analyze the data and develop recommendations to inform the state’s conservation and monitoring programs after field surveys are completed. To date, sampling of 53 vernal pools and landscapes surrounding pools have been completed, and marsh sampling has expanded from four to seven Hudson Valley zones working with the DEC Region 3 Bureau of Wildlife.

As part of collaborative efforts with the NYSDEC’s Northern Cricket Frog Research Project, we studied the factors influencing how and where cricket frogs move through their upland habitats. Northern Cricket Frogs are found only in scattered populations in the mid-Hudson Valley within New York State. Their populations have declined as wetland habitats were lost or altered.

In 2011, the monitoring program studied the effects of Emerald ash borer (EAB) invasion on habitats near rivers and streams within the Valley. We partnered with researchers from Cornell University to complete a baseline survey of biodiversity and water quality in 16 ash tree stands adjacent to rivers or stream in Ulster and Greene Counties. These sites will be revisited over time to monitor the effect of ash tree loss due to EAB on both water quality and habitat.

Planned Action 4. Conserving landscape connections: Develop a conservation plan for the Hudson Valley region that maps and identifies significant landscape features and the connections between them, with a focus on reversing the decline of imperiled species and maintaining ecosystem services.

**Progress in 2010 & 2011:** Preparation has begun for a major project to map landscape integrity over the next several years. A series of priority natural resource layers will be developed for use in conservation planning. They will be used to prioritize regional conservation actions. The forest integrity map previously described is the first map layer being developed for this project.

Progress in 2010 & 2011: A total of 281 volunteers participated in two citizen science projects to monitor amphibian populations and wetland habitats in 2010 and 2011, saving in labor costs and expanding recognition of local wetlands and their importance. In 2011, 64 citizen scientists collected data on calling frogs and toads between March and July. The data collected feed into a national database tracking the status of frog and toad populations. Citizen scientists were also recruited to contribute to our understanding of spring amphibian migrations. In 2011, 94 volunteers surveyed roads to locate amphibian crossings; collect data on migrations; and assist frogs, toads, and salamanders safely across roads. To date, 153 volunteers have documented 4,376 live and 1,930 dead amphibians during spring migrations in eight counties. Both projects have been running since 2009.

Overall Status of Goal 3 Target 1:

☐ Done
☒ Underway
☐ Not started

Goal 3 Long-Range Target 2 - Raising the Capacity of Local Partners to Conserve Important Habitats: By 2020, create “biodiversity literacy” among land-use planners, decision-makers and citizens in the Hudson Valley so they understand the role of biodiversity in maintaining healthy ecosystems, and use biological information for decision-making and planning. Twenty-five municipalities will adopt or update local policies, plans or procedures that contribute to biodiversity conservation [links to goals 4, 5, 6, 8 and 9].

Planned Action 1. Providing data and information: Convey biological information and technical assistance to local partners to reduce the threat of habitat loss and fragmentation and adapt to climate change.

Progress in 2010 & 2011: Municipal-specific biological information was shared with 14 communities in 2010 and 7 in 2011, including digital data, written summaries with maps, and digitized habitat maps created by volunteers.

Planned Action 2. Local conservation planning: Assist 50 local municipalities with recognizing their biodiversity resources and developing conservation plans and strategies.

Progress in 2010 & 2011: In 2010 and 2011, a total of 49 communities received technical assistance from the Estuary Program and its outreach partners, including comments on draft comprehensive plans, support of Conservation Advisory Council initiatives, and guidance on biodiversity assessment procedures for planning board reviews. In 2010, six municipalities took significant actions that contribute to biodiversity conservation. The Town of New Lebanon created a Conservation Advisory Council (CAC); the Town of Rhinebeck CAC advanced to Conservation Board status and the Town adopted a Natural Resource Inventory and open space map; the Towns of New Paltz and Ancram completed draft comprehensive plan updates; the Town of Rosendale completed a draft Natural Resources Inventory (NRI); and the Town of Millbrook prepared a draft Wetland and Watercourse Law. In 2011, five plans, policies, or procedures that contribute to biodiversity conservation were newly in place. The Towns of Rosendale, Montgomery, and Wallkill completed Natural Resource Inventories; the Town of Gallatin restarted its Conservation Advisory Council; and the City of Albany completed a final draft Comprehensive Plan that emphasized natural resource protection and sustainability. In 2012, we will be developing new methods to better measure actions taken by outreach program
participants. Also in 2012, we will be working with Goals 2, 4, 5 and 6 to provide natural resource information and technical assistance to one or more pilot municipalities using an integrated approach.

**Planned Action 3. Communicating on the Web:** 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.

**Progress in 2010 & 2011:** The Estuary Program updated its website to include information on small wetland and amphibian conservation. A key regional partner, Hudsonia, made habitat maps and plant identification guides available online. The maps were developed by local volunteers who were trained in mapping techniques with support from the Estuary Program. The identification guides help local volunteers accurately identify habitats in the field.

**Planned Action 4. Volunteer mapping:** Continue to train local leaders to recognize and map ecologically significant habitats and communicate their importance to the community.

**Progress in 2010 & 2011:** The Estuary Program continued its partnership with Hudsonia to train community volunteers and natural resource professionals in methods for mapping key habitats and developing land-use strategies to conserve important natural areas. In 2010, a three-day Biodiversity Assessment Short Course was completed by 32 participants and a similar one-day workshop was completed by 48 participants, and habitat mapping efforts were advanced by community members in the City of Kingston and Towns of Ulster, Ancram, Hyde Park, Putnam Valley, and Saugerties. In 2011, the 3-day Short Course was completed by 26 participants, and assistance was provided to volunteers in the Towns of Berne, Montgomery, Nassau, and Red Hook to advance habitat mapping projects.

**Planned Action 5. Training:** 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.

**Progress in 2010 & 2011:** In collaboration with Cornell University and other partners, the Estuary Program provided training and education for 1,181 local decision-makers on biodiversity and land-use planning topics. In 2011, 738 participants attended conservation roundtables, GIS training, programs on wetland and forest conservation, and workshops to improve local capacity for conservation-oriented planning.

**Planned Action 6. Promoting local stewardship:** Through state grant programs, continue to raise the capacity of municipalities, land trusts and non-profits to identify and assess watershed biodiversity, promote stewardship and conservation of vital habitats and create local conservation programs that maintain the valuable services provided by the Hudson River estuary watershed.

**Progress in 2010 & 2011:** Five Estuary Grant projects were completed in 2010: 1) Habitat maps for the Towns of Beekman and Hyde Park (Dutchess County); 2) Invasive plant species removal and native plant restoration in New York City; 3) Maps of a rare turtle species' habitat for six towns in Dutchess County and presentations to communities; 4) Development of a GIS database for the 2,000-acre Hayck Preserve in Albany County, and 5) Habitat inventory for the Town of Yorktown (Westchester County). Four grant projects were completed in 2011: 1) Maps and biological descriptions of remnant floodplain forests in Dutchess and Columbia Counties; 2) Habitat maps in the 156-acre Esopus Bend Nature Preserve (Ulster County); 3) A Natural Resources Inventory for the Towns of Montgomery and Wallkill (Orange County); and 4) Westchester Land Trust helped to conserve 978 acres of land in the Croton to Highlands Biodiversity Corridor (Westchester County).
Planned Action 7. Stopping invasives: Work with partners to improve public understanding of the actions needed to stop the spread of harmful invasive species in our region.

Progress in 2010 & 2011: Landowner outreach in the Hudson Highlands and Rensselaer Plateau included education on invasive plants and insects of forest habitat. Plans were implemented to monitor the effect of Emerald ash borer on streamside habitats and water quality.

Overall Status of Goal 3 Target 2:

- [ ] Done
- [x] Underway
- [ ] Not started

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

Planned Action 1. Prioritizing landscape connections: Identify and prioritize landscape connections, including those necessary for plants and animals to move northward and to higher elevations in response to climate change.

Progress in 2010 & 2011: With assistance from the Estuary Program, the NY Natural Heritage Program was able to continue a federally funded project to map important habitat corridors for wildlife migration in response to climate change. Maps of current-day habitat connectivity based on model results were developed and will be cross-referenced with monitoring field data to test their accuracy. The latest climate change model predictions were downscaled for the Hudson Valley and used to predict future habitats patterns. Models will be reported and incorporated into regional connectivity planning in 2012.

Planned Action 2. Developing tools and strategies: Develop conservation tools and strategies that assist land-use decision-makers and land managers with maintaining priority landscape connections and mitigating impacts of fragmentation and climate change.

Progress in 2010 & 2011: The Estuary Program is coordinating with Cornell University, the NY Natural Heritage Program, The Nature Conservancy’s Eastern NY Chapter, and Scenic Hudson to develop habitat connectivity tools that will inform open space protection, land-use planning, and conserved lands management. The coordination effort will contribute to the landscape integrity analysis described under Target 1 above to create tools that help planners and managers protect key habitat connections.

This year, the Estuary Program continued work with The Nature Conservancy’s Shawangunk Ridge landscape program to identify natural corridors between the Shawangunk Ridge and the Catskills. We also began a project with Scenic Hudson to model how sea-level rise will affect tidal wetland migration and habitats in order to prioritize restoration and protection.

Planned Action 3. Tracking impacts on habitat: Track the key threats of habitat loss, fragmentation and climate change, and use monitoring data to determine their impact on wildlife populations.

Progress in 2010 & 2011: Our research shows that habitats and ecosystems are affected by shifting land-use patterns in the Hudson Valley. Other studies suggest warming air and water temperatures, and changes in seasonal precipitation patterns could also have an impact. Monitoring, mapping, and research are planned to inform community adaptation strategies as
climate change continues. We are building regional collaborations that are necessary to respond effectively to such wide-ranging threats.

In 2011, we began efforts to coordinate with our regional partners to develop a draft regional habitat connectivity plan accounting for the expected impacts of climate change. This connectivity plan will ultimately incorporate the results of ongoing efforts to map wildlife migration in response to climate change and will help to prioritize natural resource conservation. The results will serve as a climate change-informed framework for habitat and biodiversity management and conservation.

In 2012, we will begin establishing terrestrial monitoring stations in the estuary watershed in order to track climate-induced changes in regional habitat and wildlife. The data collected from these monitoring stations will be used to inform and adapt regional management frameworks as the effects of climate change progress.

**Planned Action 4. Understanding trends:** Understand past trends for landscape change, and predict future implications for watershed resilience and ecosystem services for people and at-risk plants and animals.

**Progress in 2010 & 2011:** In 2011, we coordinated with the North Atlantic Landscape Conservation Cooperative and other Northeast and mid-Atlantic efforts to better integrate our monitoring and outreach programs. Our work continues within the Hudson Valley region to identify which ecosystems are of highest importance for providing benefits now and into the future.

**Planned Action 5. Determining vulnerability:** Conduct a vulnerability analysis to determine which plants, animals and ecosystems are most vulnerable to climate change.

**Progress in 2010 & 2011:** Work on a statewide analysis of species vulnerability was completed by the NY Natural Heritage Program in 2011 with federal funds. A vulnerability analysis specific to the Hudson Valley region could be conducted if sufficient funding becomes available.

**Overall Status of Goal 3 Target 3:**

- [ ] Done
- [X] Underway
- [ ] Not started
Accomplishments 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

A. Overview of Accomplishments to Date and Challenges for this Goal

In 2011 the Estuary Program developed significant new emphasis, research, and programs on highly relevant water issues in the Hudson River watershed. We expanded the reach of the program into the Mohawk River watershed to facilitate the implementation of the DEC Mohawk River Action Agenda, working with existing partners such as NYS DOS, Soil and Water Conservation Districts, and the Mighty Waters Initiative. Our successful Trees for Tribs program in the Hudson Valley has become a statewide model, and is now being adapted, with the help of our leadership, in other watersheds, including the Susquehanna and Lake Champlain watersheds.

Research is underway to regionally understand the status and locations of our important water supply and wastewater infrastructure. In particular, the program has obtained and is analyzing source water supply watersheds to initiate a future source watershed outreach program. Research on wastewater infrastructure is being completed to see if there are opportunities to optimize regional collaboration, protect water resources, and support economic development. Estuary Program staff provided facilitation support to the infrastructure work groups of the Mid-Hudson Valley Regional Economic Development Council.

The passing of tropical storms Irene and Lee over the Hudson Valley provided an unprecedented opportunity to gather data on the impacts of these storms on our manmade 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 tropical storms Irene and Lee to our roads, dams, public water supplies, wastewater treatment plants, and, where we can gather before and after pictures, our homes and communities. The information is powerful and shows a compelling picture of the impacts from major storms, events that are predicted to become more common as climate change alters our weather patterns. This information points the way for actions we can take going forward to improve our management of streams, roads and flood plains to reduce the impacts that are caused by our decision making processes.

We will continue to foster the reconnecting of streams to flood plains, conserving wetlands, reducing stream constrictions at bridges and culverts, understanding downstream impacts of upstream activities, and avoid development in floodplains to help reduce future problems. Noteworthy partnerships to achieve these objectives were initiated in 2011 through New England Interstate Water Pollution Control Commission with the Hudson River Watershed Alliance and The Nature Conservancy. Watershed protection, water quality monitoring, stormwater, and floodplain management outreach to municipalities and watershed management groups will be the emphasis of the Hudson River Watershed Alliance’s work. The Nature Conservancy launched a study of stream barriers, such as dams and culverts, which impact species of greatest conservation need.
In 2010 and 2011, Estuary Program staff and partners delivered watershed protection and restoration outreach to encourage implementation of water resource protection strategies, striving to create a synergy among projects to make them collectively stronger. This assistance includes: Trees for Tribs (streamside re-vegetation), municipal stormwater and floodplain outreach, mapping, dam removal guidance, water-quality monitoring, land-use training and grants to assist partners in meeting the following targets. Watershed planning initiatives continue in over a dozen tributaries. A new watershed planning effort was initiated in 2011 in the tidal Rondout Creek watersheds.

B. Status of progress on the specific actions planned for 2010-2014

To achieve the goal of protecting our water resources and streams using a comprehensive and sustainable watershed approach, we plan to implement specific actions for the period 2010-2014 by taking a regional watershed approach, as well as targeting at least one pilot watershed, to more meaningfully engage municipalities with watershed protection. These actions will be taken within the context of long-range targets that address the following three themes:

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

Goal 4 Long-Range Target 1 - Protecting Water Quality in Streams and Drinking Water Sources:
By 2020, maintain water quality and stream biological integrity in at least one pilot watershed by applying and evaluating a suite of best management practices aimed at reducing water pollution. Ensure that municipalities throughout the estuary watershed are aware of, and will apply where feasible, the available tools and strategies to protect water quality [links to goals 3, 8, 10 and 11]

Planned Action 1. Stream monitoring: Assess biological and chemical stream quality through stream biomonitoring methods (e.g., tiered aquatic life uses) to identify threatened high-quality streams and maintain their biological integrity, while providing monitoring opportunities for volunteer and local leaders to encourage results to be integrated into land-use decision-making.

Progress in 2010 & 2011: In 2010, the Estuary Program started the development phase of continuing a volunteer-based water quality monitoring program, as an outgrowth of the Hudson River Environmental Conditions Observing System (HRECONS.org). In 2011, we created a Quality Assurance Plan for non-DEC monitoring partners to adopt, so outside data collected from partners and volunteers can be used by DEC. Simultaneously, the Hudson River Watershed Alliance partnered with the Estuary Program to identify all non-DEC monitoring partners in the Hudson Valley to provide baseline data to continue to move forward with a volunteer based stream monitoring program. Estuary Program staff have delivered key presentations and recommendations for watershed groups and county agencies interested in volunteer programs.

Planned Action 2. Decision-making: Assess what motivates the public to assist in protecting water resources on private land and through land-use decision-making to help create unique watershed protection incentive programs at the local level that reduce impervious cover and promote river stewardship.

Progress in 2010 & 2011: In 2010, the Estuary Program partnered with Cornell University researchers to map the social dynamics of natural resource decision making and outreach in the Hudson Valley. The product will allow management professionals to better target how to get important outreach messages to the public, key audiences and land use decision makers.

We have created and launched a survey of barriers to green infrastructure in the Hudson Valley. We have partnered with organizations and industry groups to bring the online survey to as broad
an audience as possible. We’ll analyze the survey results in the winter of 2012 and use the information to create and tailor our resources and trainings to identified needs.

A related project partnership with Cornell worth noting is the development of a “Master Watershed Steward” program that will be similar to Cornell’s Master Gardener Program, in that it will raise the level of sophistication, understanding, and leadership among watershed partners statewide. This project was scoped-out in the Hudson Valley with many of our partners, and will be implemented by Cornell Cooperative Extension. A first phase of this project was a needs assessment to determine the challenges and needs of watershed partners in implementing watershed conservation and protection strategies. The needs assessment serves as the foundation for the implementation phase.

**Planned Action 3. Land use change:** Track land-cover changes in the estuary watershed, such as increases in impervious cover.

**Progress in 2010 & 2011:** We have created some simple maps of changes in impervious cover between 2001 and 2006 at the county scale using national land cover data. We have used in these maps and analyses in presentations. Additional land cover analysis is being conducted by Cornell University as described under Goal 3, Target 3.

**Planned Action 4. Assisting local watershed groups:** Provide technical assistance and resources to active, locally-led watershed groups on all significant tributaries to the Hudson estuary to support critical partners in implementing water resource protection and restoration targets through inter-municipal watershed planning and implementation.

**Progress in 2010 & 2011:** In 2010, the Estuary Program worked with 12 watershed group to identify their needs and provided limited financial support to meet priority needs. A partial list of watershed projects implemented this past year is provided below:

- **Dutchess Watershed Coalition**
  In 2010 and 2011, Cornell Cooperative Extension Dutchess County held a watershed roundtable with all watershed groups in Dutchess County to identify common challenges and solutions to those challenges. Multiple representatives from 8 watershed groups, plus academia, local government, and the public attended the roundtable. This roundtable helped make watershed protection more efficient and cooperative in Dutchess County. Through this project Dutchess County also provided training on stormwater management using green infrastructure, rain barrels, and flooding. In 2010 and 2011, the Dutchess Watershed Coalition organized Watershed Awareness Month in July to educate stakeholders on local water resource issues.

- **Fall Kill Watershed Committee**
  In 2011, the Fall Kill Watershed Committee began work on a green corridor plan to improve ecological restoration and recreation along the Fall Kill Creek in Poughkeepsie.

- **Catskill Creek Watershed Advisory Committee (CCWAC), Cornell Cooperative Extension Greene County**
  The CCWAC developed goals and objectives, and began to develop a preliminary Catskill Creek watershed plan. The group also started to delineate smaller subwatersheds through GIS and map stream reaches of interest. In 2011, working with Goal 3 staff, Hudsonia has begun mapping riparian buffer habitats in the 150 meter buffer on each side of the Creek. The Catskill Creek Watershed Advisory Committee (CCWAC), has started field checking the digitized maps. Data will be used to assess protection and restoration priorities based on both habitat and water quality benefits.
• **Onesquehaw Coeymans Watershed Council**
The Council developed a sampling plan to track down sources of well-observed and unexplained historic turbidity in Coeyman’s Creek, upstream of its confluence with Onesquethaw Creek. A quality assurance plan was completed, as well. Although actual sampling was supposed to occur, the field season was cut short due to weather conditions. The council will reactivate this project in the spring.

• **Croton Bay and Indian Gorge Watershed Committee**
The Committee worked with Teatown Lake Reservation to implement a priority of the Croton Bay watershed plan, by creating habitat maps for the watershed.

• **Hudson River Watershed Alliance**
Through GIS and spatial analysis, the project mapped the ability of a watershed to produce clean water for all subwatersheds in the Hudson River Estuary watershed. This analysis uses an index based on land cover in a watershed. Public outreach will be included to increase public awareness of local conditions affecting watershed health. Maps will be created and available online. Notable outreach accomplishments in 2011 include a roundtable for watershed groups focused on stream monitoring and a “Watershed Management on a Shoestring Budget” conference.

• **Quassaick Creek Watershed Alliance and Hudson Valley Regional Council**
In 2010, The Alliance held a “Follow the Waters” conference for the public and local elected officials to understand the laws that govern water from the time it lands on the ground until it is used. Follow-up workshops will be developed to continue to develop educational guidance on the regulatory framework for water resources protection in NY State and evaluation of opportunities for addressing obstacles to using green infrastructure (GI), other best practices, existing legal mechanisms that may be underutilized, and other relevant tools and resources. A GI conference was held in NYC with Estuary Program support, as well, to showcase alternative means of managing stormwater and combined sewer overflows. In 2011, efforts focused on protecting drinking water quality in Washington Lake and creating educational materials.

• **Lower Esopus Watershed Partnership – Town of Hurley**
This group has started a public outreach and education campaign to promote the lower Esopus Creek as a recreational asset and work to integrate ecosystem based management decisions into Esopus Creek management. They completed a preliminary management plan for the watershed in Fall 2011, along with an outreach publication called “A Journey through the Lower Esopus Creek.”

• **Moodna Creek Watershed Intermunicipal Council — Orange County Water Authority (OCWA)**
OCWA installed water data loggers in 5 locations in the Moodna watershed (and 3 in Wallkill), at strategic locations. These loggers collect regular instream flow and temperature the sites. Municipalities, volunteers, and a Black Rock Fish and Game Club are responsible for uploading the data on a regular basis. The project will help understand the impacts of human consumptive use on water flow.

• **Rondout Creek Watershed Council - Clearwater**
Clearwater completed the Interim Watershed Management Plan for the lower, non-tidal portion of the Rondout Creek and began to conduct stream monitoring in two sections of creek that pass through the Towns of Wawarsing and Rosendale. They also completed an implementation plan to accomplish strategies laid out in the management plan.
• **Saw Mill River Yonkers—Groundwork Hudson Valley**
  In 2011, the Saw Mill River Coalition developed a daylighting Interpretive Plan in cooperation with the City of Yonkers, integrating history, ecology, aesthetics, engineering & recreation in the new Saw Mill River Park. In December 2011, the Saw Mill River was officially daylighted.

• **Sparkill Creek Watershed Alliance**
  This new watershed group, formed in 2010, worked on Enterococcus monitoring in partnership with Riverkeeper and Lamont Doherty Earth Observatory, began working on green infrastructure initiatives, and raised awareness of their group and the Sparkill Creek in 2011.

• **Greater Stockport Creek Watershed Alliance**
  The Alliance implemented a watershed protection outreach project through the launching of a website, and initiated a watershed signage project ("Entering Greater Stockport Creek Watershed"). Although the signage project was unable to complete its goals because of new DOT regulation, headway was made on other interpretive signage efforts to inform the public about the Stockport watershed. The group is also monitoring water quality in the Stockport Creek with its “Stream Spotters” program.

• **Wallkill Watershed—Orange County Land Trust (OCLT)**
  OCLT built two Rain Gardens, one at the Middletown Community Campus and one at the Middletown campus of SUNY Orange. Interpretive signage and outreach activities were also conducted for the rain gardens.

• **Mohawk River Watershed**
  October 2011 marked the initiation of the NYS DEC Mohawk River Basin Program which will be tasked with implementing the Department’s Mohawk River Basin Action Agenda. The Mohawk River Action Agenda contains 5 goals with several targets identified for each goal. The overall program goals are: Fish and Wildlife; Water Quality; Flooding; Community Revitalization and Working Landscapes and Open Space Conservation. Initial projects include:
  a. Initiation of a Mohawk River Trees-for-Tribs program targeted for repair and stabilization of riparian areas in identified flood plains within the Mohawk River Basin. To date, activities have included project scoping and identification of partners, which include Soil and Water Conservation Districts, Municipal partners and volunteers, as well as seeking potential funding sources.
  b. Improved angler and boat access points within the Mohawk River Basin. In 2011 the program identified interested partners and initiated discussion to identify potential areas.

**Planned Action 5. Pilot watershed:** Conduct land-use, water quality and stream habitat outreach programs in a pilot watershed with inter-municipal partners.

**Progress in 2010 & 2011:** In 2010 the Estuary Program staff has provided focused technical assistance to a number of watershed groups in the Hudson Valley. In 2011, the Estuary program continues to work internally to focus outreach through many mechanisms. The watershed focus evolves annually, depending on internal priorities, partner participation, and resources. Most recently, the watershed and biodiversity teams have created an integrated outreach tool to harness the skill sets, messages and data in a pilot municipality. The natural resource data relevant to each program will be integrated into a common message and outreach effort.
Planned Action 6. Training: Working closely with the biodiversity program, deliver 15 trainings on land-use impacts to natural resources so that municipal leaders have the tools to protect water resources.

Progress in 2010 & 2011: A “Follow the Waters” workshop was held in New Windsor, in partnership with the Quassaick Creek Coalition and Cornell law students to inform over 40 municipal officials and watershed groups about the myriad of laws governing the protection of waters. The workshop reviews indicated the attendees gained much knowledge and planned to use it in their work. Additional workshops are planned in other parts of the Hudson Valley. Progress on this action is evolving to reflect the effort to provide meaningful natural resource data and information to municipalities, as described above.

Planned Action 7. Stormwater: Integrate green infrastructure and stormwater retrofits in code revisions/updates in three estuary watershed communities to reduce pollution impacts from urban stormwater sources on local water resources, implementing at least one pilot project in each community. Provide tools and technical assistance to additional watershed communities to change their codes to be more environmentally sustainable, while promoting implementation of green infrastructure practices at new developments to enhance groundwater recharge.

Progress in 2010 & 2011: The Estuary Program supported two Green Infrastructure stormwater management projects this past fall. A project with the Orange County Land Trust and Orange County Soil and Water Conservation District led to the construction of two bioretention (or rain gardens) on the Middletown Community Campus and SUNY Orange Campus. Both these bioretention systems were built in the Monhegan Brook watershed, a degraded waterway. A green infrastructure project with DEC Lands and Forests and the NY-NJ Harbor Estuary Program was initiated years ago, but is having difficulty moving forward because of funding issues.

In 2010, DEC’s Division of Water also issued new stormwater regulations requiring the use of green infrastructure practices where applicable. The Estuary Program compiled a publicly available web list of completed green infrastructure projects for stormwater management in the Hudson Valley (see http://www.dec.ny.gov/lands/58930.html). This growing inventory of more than 60 demonstration sites searchable by practice type or by location, has already been noted by watershed groups as a valuable tool to introduce and promote the implementation of future green infrastructure projects.

In 2011, the Estuary Program made five educational presentations on green infrastructure for stormwater management to approximately 150 people. These included members of watershed groups, representatives from municipalities, and homeowners. With the Lower Hudson Coalition of Conservation Districts, Cornell Cooperative Extension Dutchess County, and Dutchess County Soil and Water Conservation District, the Estuary Program also organized two green infrastructure bus tours for municipal officials. The tour visited three sites to view eight different green infrastructure practices; the tours also included information on codes and ordinances, economics, and maintenance considerations.

We have created and launched a survey of barriers to adoption of green infrastructure practices in the Hudson Valley. We have partnered with organizations and industry groups to bring the online survey to as broad an audience as possible. We’ll analyze the survey results in the winter of 2012 and use the information to create and tailor our resources and trainings to identified needs.
Overall Status of Goal 4 Target 1:
- ☑ Done
- ☑ Underway
- ☐ Not started

Goal 4 Long-Range Target 2 - Maintaining Water Availability and Stream Flows: By 2020, conserve stream flows and groundwater recharge in at least one pilot watershed through implementation and evaluation of water resource management tools. Ensure that all municipalities throughout the estuary watershed are aware of available water resource protection and restoration strategies. Through these methods, demonstrate progress in sustaining a healthy supply of freshwater in ways that provide for both human needs and natural resources [links to goals 3, 10 and 11].

Planned Action 1. Water flow and sediment movement: Characterize estuary watershed hydrology and sediment loading through such mechanisms as installing and operating stream gauges on major streams and rivers or through other mechanisms, such as investigating water use, future needs and conservation trends throughout the estuary watershed.

Progress in 2010 & 2011: Additional stage (flow) and sediment gages were deployed in 6 tributaries by USGS through modest EPA funding through the NY/NJ Harbor Estuary Program. Tributaries include the Esopus, Kinderhook, Catskill, Roeliff-Jansen, Rondout, and Normans Kill. Putting these gages in place allows for monitoring of 90% of the freshwater Hudson north of Poughkeepsie. Unfortunately, operation and maintenance of some of these gages is requiring more resources than are available and a few have gone off-line. Additional funding is needed.

In 2011, the Estuary Program began to research and describe the accomplishments to date on sediment reduction strategies identified in the NY/NJ Harbor Estuary Program Regional Sediment Management Plan. This research will provide a basis for moving forward with regional sediment management and reduction strategies.

Planned Action 2. Water transfers: Map the impact on streams resulting from hydrologic modifications and out-of-watershed transfers induced by large-scale water supply and wastewater infrastructure in the watershed and, where possible, from cumulative impacts from land development activities.

Progress in 2010 & 2011: In 2010, the Estuary Program worked with Orange County Planning to map water supply and wastewater hydrology in Orange County. Working beyond Orange County, the Estuary Program is beginning a partnership with CUNY’s Sustainable Cities Program to map hydrology movement for other counties, including Rockland. In 2011, we began mapping public water supply points and wastewater treatment plants in the region. We also began work on a water infrastructure research project with Cornell University through the New York State Water Resources Institute.

Planned Action 3. Alternative wastewater treatment: Investigate the feasibility of alternative wastewater options, such as decentralized approaches that promote groundwater recharge and water reuse.

Progress in 2010 & 2011: In 2011, the NYS Water Resources Institute at Cornell began researching the applicability, pros and cons to decentralized wastewater options in the Hudson watershed. This work is part of the research being done to suggest reasonable approaches to replacing and repairing our growing problem of aging wastewater infrastructure.
Planned Action 4. Groundwater protection: Assist communities in including aquifer characteristics and groundwater protection in watershed planning efforts, with an emphasis on recognizing the role groundwater and land use plays in stream base flow.

Progress in 2010 & 2011: In 2010, watershed plans in current development include Catskill Creek, Rondout Creek, and Quassaick Creek. Groundwater hydrology is being integrated into these reports, and the role of groundwater on stream flow is being documented.

Overall Status of Goal 4 Target 2:

☐ Done
☒ Underway
☐ Not started

Goal 4 Long-Range Target 3 - Minimizing Flood Impacts and Conserving Flood Plains and Stream Corridors: By 2020, work with watershed groups and municipalities to implement at least one new floodplain ordinance and one stream corridor conservation practice on each major tributary to help protect fish and wildlife habitat, recreational use, property, infrastructure and human life [links to goals 1, 2, 3, 10 and 11].

Planned Action 1. Flood plain guidance: Develop and deliver local government guidance that protects stream buffers and floodplain corridors to minimize future flooding impacts and protect stream habitat and water quality, and work with pilot watershed communities to implement protection ordinances.

Progress in 2010 & 2011: The focus in 2010 was the Trees for Tribs project (see below, Action 2). In 2011, we have gathered together and mapped at the watershed scale, information that graphically shows the impacts of tropical storms Irene and Lee to our roads, dams, public water supplies, wastewater treatment plants, and other data. The information is powerful and shows a compelling picture of the impacts from major storms, and will set a foundation for outreach to watersheds about watershed management including protecting floodplains. This information could become useful in future guidance to local government experiencing flooding. In addition, staff coordinated a presentation for Putnam Valley town board and interested residents on, floodplain management, permitted stream management activities, riparian buffer protection and planning in a watershed context

Planned Action 2. Trees for Tribs: Re-vegetate 15 miles of stream with native vegetation, or plant 30,000 native trees and shrubs within riparian buffers while engaging volunteers. Assist communities and landowners in identifying opportunities for streamside assessment, outreach and restoration through “Trees for Tribs” and other riparian restoration programs.

Progress in 2010 & 2011: Engaging more than 940 volunteers on 47 projects, the Estuary Program’s Trees for Tribs project planted more than 4,800 native shrubs and trees on more than 12,400 feet of streambank in spring and fall 2010. In 2011, 4,840 plants were planted on 12,900ft of stream at 41 new sites with the help of 980 volunteers. In 2011 the Estuary Program also helped facilitate the beginning and support of multiple new Trees for Tribs watershed efforts throughout the state including in the, Susquehanna, Lake Champlain, Mohawk and Upper Hudson watersheds. We helped secure the donation of $50,000 worth of plants for the Mohawk Trees for Tribs 2012 plantings.

Planned Action 3. Free-flowing streams: Working with partners, provide assistance, guidance and technical support to municipalities, landowners and other watershed partners for the restoration of free-flowing rivers, including removal of dams and other stream barriers to benefit water quality, stream habitat and aquatic connectivity.
**Progress in 2010 & 2011:** In 2010, the Estuary Program sponsored a dam removal workshop to focus on sediment management challenges with dam removal projects. DEC agency partners in Division of Water, Division of Permits, and Division of Fish, Wildlife and Marine Resources attended this workshop.

In 2011, The Nature Conservancy was awarded a competitive grant to identify, map, and field verify the 100 most important barriers to Species of Greatest Conservation Need in the Hudson River Estuary watershed. The final product will also be useful for dam removal.

**Overall Status of Goal 4 Target 3:**

- [ ] Done
- [x] Underway
- [ ] Not started
**Accomplishments Goal 5: River Scenery, Forests, Farms and Open Space**

**Goal**

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

**A. Overview of Accomplishments to Date and Challenges for this Goal**

In 2010 and 2011, the Estuary Program continued to promote planning for and conservation of open space and world-renowned scenery. The State also continues to work with the Valley’s communities and land trusts to acquire long standing projects that will protect the natural and scenic resources of the Valley. Despite the economic downturn, the state and its non-profit partners protected important open spaces and natural areas, including the Finch Pruyn project which will conserve 13% of the upper Hudson watershed in forested use (89,000 acres). The protection of nearly 1000 acres along the estuary by non-profit partners in 2010 and the protection of 3896 acres in 2011 of important farmland and habitat by the state and partners kick started our open space program after a lull of seven years. Working landscapes, agriculture and forestry, and the presence of “wild” open space have long been recognized as important aspects of the region’s sense of place and its world-renowned scenery. The Hudson itself always has been a working river leading to the development of commercial and recreational waterfronts, as well as its many historic community centers. To this day, these features maintain the character of the region so loved by Hudson Valley residents and visitors.

In 2010, the Estuary Program, in partnership with the Hudson River Valley Greenway and 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 got underway. Together with an active advisory council, it has been decided what scenic resource information will be cataloged in the database, and several sets of data have been completely entered, such as state parks, watchable wildlife sites, and scenic byways.

A March 2010 report from the state Comptroller on the economic benefits of open space found that conservation of natural areas supported industries that generate billions of dollars annually, reduced the cost to local governments of providing services and infrastructure and supports regional economic growth. Natural areas serve a wide variety of public benefits, from providing recreational opportunities, protecting water supplies and sustaining local tourism and agricultural economies, to mitigating the impacts of flooding on communities and local infrastructure. The valley’s farms and forests provide employment, food and forest products critical to its diversified economy. We now know that in the near future, these open spaces will prove to be vital in buffering the effects of climate change in our region by providing corridors for a variety of plant and animal species, to move from south to north. Conserved river shorelines protect tidal habitats from the effects of sea level rise. However, the economics of maintaining traditional land uses and preserving views is under increasing pressure from both shoreline...
development and patterns of sprawl. As the water quality of the Hudson main stem has improved, property values have likewise increased making conservation more difficult. The need to conserve the area’s remaining natural areas has become critical. Supporting the viability of agriculture is key and requires robust federal agricultural programs, as well as substantive continuing investment in local, regional, state and federal agricultural economic development initiatives. Support for forestry programs is also crucial. Acquisition of shoreline priorities from willing sellers will conserve key scenic vistas and provide new sites for public access to the river. This remained a priority issue in 2010.

With grants from the Estuary Program and its partners, several communities were able to complete open space plans in 2010. Many Hudson River communities now recognize their remaining open spaces and visual resources as unique community assets that bolster the quality of life for residents and contribute to the region’s economy. A new partnership among local, regional and statewide lands trusts and conservation organizations in the Hudson Valley, “Saving the Land that Matters Most,” is advancing the goals of the Hudson River Estuary Plan by collaborating to conserve 65,000 acres of scenic, ecologically significant and viable agricultural lands in the Hudson River corridor. Policies and programs are being developed to help municipalities conserve priority local natural areas. In 2010, the state fiscal crisis prevented significant state land acquisition along the estuary; however non-profit land trusts were able to make progress in meeting conservation goals, as well, protecting more than 950 acres in 2010. In 2011 acquisition of habitat and farmland totaled 3700 acres.

In the coming year, integration with goals 2, 3, 4, 7, 9, and 12 will ensure that relevant sites are recorded in the searchable database.

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

B. Status of progress on the specific actions planned for 2010-2014

To achieve the goal of conserving the key elements of human, pastoral landscapes and river scenery, we plan to implement specific actions for the period 2010-2014 to achieve long-range targets that address the following three themes:

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

Goal 5 Long-Range Target 1 - Planning for Open Space: Ensure that by 2020, at least 30 percent of Hudson River Valley communities develop and implement local open space protection programs consistent with the state Open Space Conservation Plan [links to goals 2, 3, 4 and 6].

Planned Action 1. Inventory existing programs: Assess the extent of communities with existing open space protection programs, including those specifically for working landscapes, and the progress being made to implement those programs.

Progress in 2010 & 2011: A municipal survey is underway to determine which communities are making progress in local open space planning. Preliminary findings suggest there are two open space plans in Albany County and two more being drafted; three in Ulster County with three more underway; five in Orange County and one more being drafted; eight in Dutchess County with three more underway; two in Putnam County; and none in Columbia County or Greene County. The remaining counties in the watershed are still being surveyed.
Planned Action 2. Local assistance: Provide technical and financial assistance, including continuation of state grants programs to assist Hudson River Valley communities and conservation groups so that 20 percent will have developed and implemented local open space protection programs consistent with the state Open Space Conservation Plan to identify priorities for conservation of farmland, forests, aquifer, habitat and scenery, to prepare site stewardship management plans and local codes and ordinances, and to address predicted effects of climate change.

Progress in 2010 & 2011: Estuary Grants were completed in 2010 (Town of Saugerties Open Space Plan, Town of North Salem Open Space Plan). One Estuary Grant, Town of LaGrange contract was approved.

In 2011, one Estuary Grant, Town of Durham, Greene County, Town of Newburgh, Orange County, was completed for an their Open Space Inventory/Plan. Two Estuary Grants were awarded in 2011: Town of Pleasant Valley in Dutchess County for an Open Space Plan and Ulster County for an update and expansion of their Natural Resource Inventory GIS database.

Planned Action 3. New funding sources: Develop additional technical and financial resources for community open space planning, including resources for local governments.


Planned Action 4: Encourage three communities to adopt local open space funding mechanisms to empower those communities to conserve lands of local, regional and statewide importance.

Progress in 2010 & 2011: The Town of Pound Ridge re-enacted their open space tax levy in 2010 for another 10 years. The Town of New Paltz has moved forward with their open space fund, using the first of their funds to purchase an easement in partnership with the Open Space Institute.

Overall Status of Goal 5 Target 1:
☐ Done
☒ Underway
☐ Not started

Goal 5 Long-Range Target 2 - Conserving Open Space: By 2020, conserve 65,000 acres in the greater Hudson Valley, including at least 25,000 acres along or in sight of the Hudson River, working with land trusts and local governments to use a combination of fee, easement and other conservation mechanisms [links to goals 2, 3 and 4].

Planned Action 1: Working collaboratively in partnership with local government, land trusts and others conserve 30,000 new acres, including 12,500 acres along or in sight of the Hudson River, to provide connectivity between larger habitat areas, and protect river and stream corridors, intact forests, Hudson Valley farmland, aquifer recharge areas or natural Hudson River shoreline as follows:

- Retain the traditional agricultural landscape on 25,000 acres of viable agricultural land through preservation and stewardship programs, working with the State Department of Agriculture and Markets, local governments, individual farmers and land trusts.

Progress in 2010 & 2011: In 2011, as part of the campaign to Save the Land that Matters Most, Scenic Hudson announced the purchase of development rights to nearly 700 acres of farmland in Red Hook, Clermont, and Germantown, financed with funding from the USDA. Scenic Hudson
and the Town of Red Hook, plus in-kind services from the Dutchess Land Conservancy. The eight farms include: 440 acres in Red Hook, including; Northwind Farm, Three Pond Farm, Migliorelli Farm, Missing D Farm, Trezza Farm, Panorama Farm and Sturges and Karpinski farm lands. In Columbia County, the purchase of easements included the O’Neal Farm in Clermont and Diehl Farm in Germantown.

- Assist in permanently protecting 40,000 acres of ecologically important open space for wildlife-related recreation and for conservation of biodiversity using a combination of fee, easement and other conservation mechanisms.

On December 30, 2010, DEC announced a historic land agreement with The Nature Conservancy to protect 89,000 forested acres, 75,928 of which lie in the Hudson River watershed, of the former Finch Pruyn lands concentrated in the geographic heart of the Adirondacks, and support timber industry jobs, boost the State’s recreation and tourism economy. Additionally, 65,000 acres of the former Finch Pruyn lands are to be transferred over the coming years to New York State as new public lands, and 1,100 acres are to be set aside for community purposes in Newcomb, Long Lake and Indian Lake. The entire project represents approximately 13% of the Upper Hudson River watershed, the vast majority of which will remain forested in perpetuity.

In 2010, the NYS Office of Parks, Recreation and Historic Preservation conserved 767 acres in the Hudson River estuary watershed region.

In 2010 Scenic Hudson closed on 11 properties in the campaign to Save the Land that Matters Most, a total of 962 acres.

- Scenic Hudson purchased 72 acres in the Hudson Highlands, adjacent to Bear Mt. State Park, plus the 140 acre Popolopen Ridge, protecting scenic land overlooking the Hudson River, wildlife habitat. This prominent ridgeline in the Hudson Highlands abuts Bear Mountain State Park and West Point and safeguards a trail of the NY-NJ Trail Conference.
- A 119 acre addition to Shaupeneak Preserve, Town of Esopus, Ulster County
- A 296-acre estuarine and upland property immediately adjacent to the Nutten Hook State Unique Area in Stockport and Stuyvesant, Columbia County
- A conservation easement over a 74-acre property in the heart of the Olana Viewshed—a former property of the Livingston family
- A 5-year term conservation easement over the 194-acre riverfront property owned by the Dominican Sisters, Town of Saugerties, Ulster County
- 223 acres were preserved through two more acquisitions along the Black Creek in Ulster County.
- Scenic Hudson also finalized contributions to three new municipal riverfront parks along the Hudson – Bob Shepard Highland Landing Park, Town of Lloyd, Ulster County; a new waterfront park in the Village of Tivoli, Dutchess County; and a new park in the Village of Tarrytown, Westchester County, the site of a former asphalt plant.

In December, 2011, DEC announced the purchase of 1,200 acres of land on the eastern side of Belleayre Mountain, known as Big Indian. The acquisition will expand the Catskill Park Preserve within the Hudson Valley and further protect the New York City watershed. This purchase fulfills a priority project area in the state’s Open Space Conservation Plan.

Also in December, 2011, DEC acquired 595 acres along Black Creek, adjacent to the 200 acre John Burroughs sanctuary lands in Ulster County and will create the Black Creek State Forest. A network of public and private conservation lands now extends along Black Creek from its mouth on the Hudson River to Chodikee Lake, a popular fishing destination.
In 2011, the NYS Office of Parks, Recreation and Historic Preservation conserved 196 acres in the Hudson River estuary watershed region.

In 2011, Scenic Hudson has preserved 1484 acres through 13 new projects. Over half of the total acreage preserved is working farmland and will help keep farming affordable and flourishing in the Hudson Valley.

In 2011, the NY/NJ Trail Conference transferred to the state 395 acres on the Shawangunk Ridge to expand recreational trail opportunities in the region. (This was the second transfer of land to DEC this year. An earlier land transfer occurred in March, 2011, and protected the Long Path corridor in Greene County with the purchase of a 205 acre parcel. This sale to the state marked the culmination of a 10 yr cooperative effort with DEC to protect open space and a route for the Long Path in this area.

In October, 2011 the Open Space Institute purchased 119 acres on Joppenbergh Mountain, Rosendale, Ulster County, with plans to deed it to the Wallkill Valley Land Trust as part of the rail trail.

And finally, in late December 2011, the donation of 23.6 acres of fields and woods was made to the Rensselaer Land Trust by the family of John B. Staalesen in the City of Troy. This is one of the largest remaining undeveloped pieces of land in South Troy and protects lands around the Wynantskill Creek, a tributary to the Hudson River. To be named the John B. Staalsen Vanderheyden Preserve, the land will be kept unchanged and open to the public for hiking and catch and release fishing.

**Planned Action 2:** Use existing regional, state and federal forestry programs to encourage willing private forest landowners to: a) practice sustainable forestry or "forest stewardship" on 15,000 additional privately owned acres above the 2005 baseline; b) commit 10,000 new acres to forest management through the state forest tax law, forest certification and other programs, and c) provide access to hunting, birdwatching and other pursuits through voluntary agreements with private land owners.

**Progress in 2010 & 2011:** In 2010, Forest Stewardship Plans were developed for 1,200 additional acres, bringing the total additional acres since 2005 to 18,194. In 2010, 789 additional acres were enrolled in the Forest Tax Law (RPTL 480a), bringing the total since 2005 to 2,572 acres. Please note that data entry for these acreage numbers is not yet complete. Acreage numbers for 2011 are not yet available.

**Planned Action 3:** Encourage local governments to take steps within their land-use authority to conserve floodplains, wetlands, stream and river corridors that absorb storm and flood waters and provide protection to community and private property against the effects of climate change. Support programs to establish community protection funds.

**Progress in 2010 & 2011:** See goal 3, targets 2 & 3 progress reports.

**Planned Action 4:** Develop new tax incentives to encourage sustainable conservation management to enhance the environmental benefits of private lands, and encourage willing landowners to more fully use existing incentive programs.

**Progress in 2010 & 2011:** Land trusts in the Hudson Valley and the Land Trust Alliance have been working to promote the Conservation Easement Tax Credit to landowners since its enactment in 2006. DEC provides support through maintenance of a registry of conservation easements and provides owners of land encumbered by a conservation easement with a registry number, which is needed to file the tax form.
Planned Action 5: Implement stewardship management practices to conserve and enhance forest resources, water quality, wildlife habitats, agriculture biodiversity and aesthetic qualities.


Planned Action 6. Federal funding: Work to secure federal and other funding for management and acquisition programs that support ecosystem health and resiliency, including mitigation and natural resource adaptation to climate change and stewardship of public and private lands.

Progress in 2010 & 2011: In August of 2010, the federal government hosted listening sessions in New York City, Poughkeepsie and Hyde Park to discuss President Obama’s “America Great Outdoors Initiative”. At the sessions, there was broad support among commenters for the reinvigoration of the federal Land and Water Conservation Fund, which if fully funded, would provide significant new resources for local governments throughout the valley to develop new outdoor recreational opportunities and local open space conservation programs. A fully funded LWCF would also help DEC and OPRHP implement exciting new landscape level conservation initiatives in partnership with communities and land trusts in the Valley. Efforts will be made in 2011 to support this proposal in Congress.

In December 2010, the U.S. Department of Agriculture’s Forest Service designated the Rensselaer Plateau as a Forest Legacy Area, making it eligible for federal Forest Legacy Program (FLP) funding. Authorized in 1990, the federal Forest Legacy Program is a grant program designed to protect forest lands from conversion to non-forest uses. The Rensselaer Plateau is a forested, 196,000-acre plateau in eastern Rensselaer and Columbia counties. It meets the goals of the FLP, including maintaining and enhancing water quality, preventing lands from being converted to non-forest uses and protecting important wildlife habitat. The forests of the plateau also generate jobs for the local forest products industry - in the woods and in the region’s many mills and wood processing facilities. The plateau also includes several unique wetland communities and impressive mammal diversity not typical of the greater Capital Region, including black bear, fisher, otter, bobcat, and moose.

Proposals were circulated by DEC and its partners to the US Department of Interior and the President’s America’s Great Outdoors Programs. Decisions on both are pending. NYSDOS in cooperation with NYSDEC submitted successful applications for federal funding to support acquisition of 296 acres coastal lands in Stuyvesant, scheduled to take place in 2012.

Planned Action 7. State grant programs: Continue state grant programs to provide funding for open space conservation, farmland protection and local government implementation of open space and scenic preservation.

Progress in 2010 & 2011: Most state grant programs for land acquisition were suspended in 2010 due to the state fiscal crisis. One Estuary Grant for acquisition of 38 acres of wetlands along the Coxsackie Creek in Greene County was completed.

The Department of Agriculture and Markets, through its Farmland Protection Planning Grants, awards grants to counties to update county farmland protection plans if the plan is 10-years old or older or to develop plans for the first time. Municipalities can receive grants to develop a farmland protection plan. This can include review and updating of local zoning codes to insure that agriculture is not unreasonably restricted as well as updates to comprehensive plans to encourage agricultural development and expansion. As of early 2011, nine Hudson Valley towns and one, Columbia County, had been awarded grants, with several others under review.
The New York State Conservation Partnership Program, a partnership of DEC and the Land Trust Alliance funded by the Environmental Protection Fund, has provided grants to build the capacity of land trusts in New York State to conserve land since 2002. Several land trusts operating in the Hudson River Estuary Program’s service area have been recipients of these grants. In 2010, the Conservation Partnership Program provided nine grants to both catalyze land conservation and fund transaction costs for land acquisition, totaling 406.5 acres:

- **Dutchess Land Conservancy & Scenic Hudson – West Kerley Corners Road Landscape Scale Farmland Protection Project** - Two-year project will enable two accredited land trusts, in partnership with Dutchess County, Winnakee Land Trust and the Red Hook Agricultural and Open Space Committee, to launch an initiative that will result in the protection of 15 contiguous properties in the Town of Red Hook. These high-priority lands contain 1,080 acres of prime farmland and an important woodland buffer. This ambitious community-based conservation initiative could leverage $8 million in capital funds and establish a regional model for coordinated farmland protection.

- **Hudson Highlands Land Trust – Hudson Highlands Land Trust Regional River of Words Project** - Two-year project will assist HHLT, in partnership with DEC and Garrison’s public schools, to develop a Hudson Highlands version of the River of Words curriculum, an acclaimed program that is connecting children and communities around the world to their local watersheds. The project complements education goals in the NYS Open Space Plan and will enhance HHLT’s presence in the Hudson Highlands.

- **New York-New Jersey Trail Conference – West Hudson Community Trail Program** - Two-year project will enhance public access and promote community support for open space protection by expanding trail networks and improving links between public parks and preserves in Rockland, Orange, Sullivan, Ulster, and Greene counties. Funding will enable NY-NJTC to provide assistance to local municipalities and private landowners in DEC Regions 3 & 4, bringing thousands of New Yorkers closer to trailheads and local protected areas.

- **Orange County Land Trust – Community Gardens in the Cities of Orange County** - Two-year project will help OCLT establish community gardens in low-to-moderate income neighborhoods in the cities of Middletown and Port Jervis and make improvements at OCLT’s Peoples Garden in the city of Newburgh. This project will deepen OCLT’s constituency and increase urban green space and local food production in Orange County, the fastest growing suburb in New York City’s metropolitan area, providing residents new opportunities to engage in community conservation and stewardship.

- **Orange County Land Trust – Kezialain Farm Property - conservation easement (166 acres)**. Project will help OCLT, in partnership with the NYS Department of Agriculture & Markets and Orange County, to facilitate the purchase of development rights on a family farm in the Town of Minisink. The working farm has been in the Lain family since 1775 and is now one of the few producers of USDA certified organic grass-fed beef in the greater Hudson Valley region.

- **Westchester Land Trust – Connecting with Nature Through Questing** - Two-year project will help WLT, in partnership with North Salem Open Land Foundation, develop a new Quest program on four public access nature preserves. The Quests will attract new visitors and connect children and adults to these special places using an innovative educational game that highlights the area’s natural and human history. This project could serve as a model for other land trusts, state agencies, and
municipalities interested in engaging local communities in local parks and preserves through discovery and experiential nature education.

- Mohonk Preserve – Giant's Ledges - fee acquisition (175 acres) - Project will facilitate a partnership involving Mohonk Preserve and the Open Space Institute to acquire and manage two properties at the extreme northern end of the Shawangunk Mountain range. The project will protect some of the last stands of healthy hemlocks on the Shawangunk Ridge and habitat for rare plant and animal species.

- The Trust for Public Land, Mid-Atlantic Regional Office – Milton Riverfront Park Project - fee acquisition (14.5 acres). Project will help TPL, in partnership with the Town of Marlborough, Scenic Hudson, and the NYS Office of Parks, Recreation and Historic Preservation, to acquire the Milton-Agway property and create a natural public recreation area, establishing the community's first direct public access to the Hudson River.

- Wallkill Valley Land Trust – Old Ford Farm Project - conservation easement (51 acres). Project will enable WVLT to put a conservation easement on property containing quality agricultural soils and wetlands along the Wallkill River, a NYS Open Space Plan priority area. The parcel is contiguous to the first property conserved by WVLT in 1989 and is the site of a recently established farm that grows locally grown food for the New Paltz community.

In 2011, the Conservation Partnership Program provided grants to help fund three land acquisition projects in the Hudson Valley for a total of 276 acres conserved (see Planned Action 1 for details):

- Dutchess Land Conservancy- Pierson Farm - conservation easement (174 acres) - Project will help Dutchess Land Conservancy facilitate the purchase of development rights on a historic family farm in the Town of LaGrange. The land has been in the Pierson family for over 100 years and is currently being used to farm hay for local farmers.

- Rensselaer Land Trust - Robert Ingalls Preserve - fee acquisition (30 acres) - Project will assist RLT in developing a management plan and public access for an important parcel that provides many opportunities for community enjoyment including fishing, hiking, snowshoeing, skiing, and birding.

- Teatown Lake Reservation - Croft Acquisition Project - fee acquisition (72 acres) - Project will enable Teatown Lake Reservation to permanently protect a priority parcel in the Croton-on-Hudson biodiversity area with scenic, recreational, and ecological value. Located adjacent to Teatown's existing 834-acre preserve, this critical parcel will link to existing trails, expanding access for public use.

In 2011, Regional Economic Development Council grants funded an OPRHP grant award to the Olana Partnership to implement a major aspect of Olana’s Landscape Restoration Plan, restoration of the historic North Meadow. Designed by Hudson River School artist Frederic Church, this 25 acre landscape project will restore the historic meadows and reopen views that have been lost over the last 100 years to second and third growth forest.

**Planned Action 8. Database for the public:** Assure that the conserved-lands database, a dataset that identifies lands permanently secured against conversion to development held by state, federal, county, municipal governments and land trusts in the Hudson River Valley, is available for public use and is kept current. Identify and map parcels that provide connectivity between larger habitat areas, protect river and stream corridors, intact forests, Hudson Valley farmland, aquifer recharge areas and natural Hudson River shoreline. Adjust priorities for land protection and acreage goals based on changes recorded in this database.
Progress in 2010 & 2011: The New York State Natural Heritage Program is working to develop a database of protected lands that will include identification of publicly accessible lands as well as identification of the level of protection of each parcel. Public release of the database is anticipated for late March 2012. In 2010, land cover maps from previous years were analyzed and revealed shifting landscape patterns of forest, urban, and agricultural cover over the past decades that are influencing wildlife populations and habitat connectivity. Additional study of land cover change will be completed using 2010 satellite images when they become available. The results will be reported to regional planners through our outreach programs. Also, see Goal 3 target 1.

Overall Status of Goal 5 Target 2

- [ ] Done
- ☒ Underway
- [ ] Not started

Goal 5 Long-Range Target 3 - Conserving World-Renowned Scenery: By 2020, designate, conserve and interpret: 1) the key viewsheds from publicly accessible parks and historic sites; 2) 25 Hudson Valley vistas painted by Hudson River School painters, and 3) 30 locally significant vistas [links to goals 7, 8 and 9].

Planned Action 1. Vista inventory: Through partnership with the Hudson River Valley National Heritage Area, develop an inventory of the key Hudson Valley vistas painted by Hudson River School painters and viewsheds associated with public recreational and historic sites, and develop a program for their conservation.

Progress in 2010 & 2011: In 2010, the Estuary Program, in partnership with the Hudson River Valley Greenway and National Heritage Area embarked on a project to inventory and map significant vistas. These vistas are now being documented and added to a geographic information system (GIS) and database through the partnership project.

In 2011, a strong foundation was set for a searchable catalog of the Hudson Valley's important scenic resources. A draft scenic resource database has been created and we are working to add in beautiful and important areas of the Hudson Valley that have been previously identified, from Hudson River School of Art locales, National Historic Districts and conserved tidal wetlands. When the project is complete, it will be possible to search the database for scenic resources and create a map of the chosen locations of interest.

The Hudson River Valley Greenway continues to work with partners, particularly the Thomas Cole National Historic Site (TCNHS), to expand the Hudson River School Art Trail. The expanded trail network will include eight additional sites painted by Hudson River School artists that will initially be interpreted on hudsonrivervalley.com. Concurrently, they are working with the TCNHS to develop a new website interface and smartphone application.

Planned Action 2. Designated scenic areas: Encourage and assist local government to review designated Scenic Areas of Statewide Significance (SASS) within their communities to better inform local land-use decision-making, and encourage the passage of local laws which protect the resources highlighted in the SASS.


Planned Action 3. Assist local vista conservation: Provide state technical, financial and training assistance to 15 municipalities to inventory, designate and protect important local river vistas and showcase this accomplishment.

Overall Status of Goal 5 Target 3:

- Done
- Underway
- Not started

Goal 5 Long-Range Target 4 - Coordinating Land Stewardship: By 2020, work with landowning state agencies to coordinate stewardship objectives of all state-owned property on or in sight of the Hudson so that habitat and recreational needs are met. Invite other interested land-holding entities such as non-profits, municipalities and industries to voluntarily participate in coordinated land stewardship of their properties [links to goals 2, 3, 4, 6, 7 and 9].

Planned Action 1. Pilot a coordinated land-management effort in the upper reaches of the tidal Hudson by creating an estuary preserve where coordinated land management can be demonstrated.

Progress in 2010 & 2011: In 2010, baseline information on habitat was collected from historical documents. Three parcels have been recently transferred from Office of General Services (OGS) to DEC to improve natural resource stewardship of the Hudson River Estuary:

- **December 2009** – Fordham Point was transferred from OGS: 165 acres to DEC and 94 acres to OPRHP, 259 acres total.
- **October 2010** – Priming Hook was transferred from OGS to DEC: 44 acres.
- **March 2011** – Seward Island (AKA Round Island) parcel from OGS to DEC: 72 acres, of which only 41 acres are "vegetated upland".

Overall Status of Goal 5 Target 4:

- Done
- Underway
- Not started
Accomplishments Goal 6: Climate Change

Goal

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

A. Overview of Accomplishments to Date and Challenges for this Goal

In 2011, the Estuary Program provided important assistance to state and local planning efforts to address climate change in New York and in the Hudson Valley. Our work builds upon studies by more than 3,700 scientific experts from 130 countries (including the U.S.) who 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 will continue in coming decades. Heavy precipitation events are expected to increase, leading to more frequent local flooding. Summer days are expected to become hotter, increasing evaporation of soil moisture and leading to drier periods between rain events. Warmer winters are projected to reduce 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.

In December 2010, the NYS Sea Level Rise Task Force completed the final draft of its report to the state legislature on the projected impacts of sea level rise in New York State with recommended strategies to respond. The report and recommendations will be a solid foundation for the development of the policy guidance needed to make cost effective long term shoreline decisions along the estuary. Municipal officials from shoreline communities in NYS have been deeply engaged in the development of the recommendations from this report. A focus group on sea level rise and the state response was held specifically for shoreline municipal officials in the Hudson estuary in the summer of 2010. The recently released ClimAID statewide climate impact assessment and interim report of the Governor’s Climate Action Council will also provide the basis for new guidance.

In 2011, collection began for the first-ever 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 sea level rise in 1 foot increments. The processed data is expected to be delivered in 2012. The collection of this data is critical to the development of maps of areas the Hudson estuary shoreline which are vulnerable to sea level rise and storm surge.

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. As of December 2011, 45 communities in the Hudson Valley
have adopted the Climate Smart Communities Pledge as a result of our outreach, and many are implementing key mitigation projects.

In addition, the state must help communities respond to increasing vulnerability, especially from extreme events, without increasing the overall long-term risks and costs to valley communities as a whole. 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. An interagency effort involving DEC, NYSERDA, DOS, DOT, DOH and the State Office of Emergency Management is now working on the development of informational tools and guidance for communities to undertake vulnerability assessments and adaptation planning. The guidance will emphasize the integration of adaptation planning processes into state hazard mitigation and local waterfront revitalization planning. In 2011, staff organized a workshop in partnership with the Regional Planning Association, the NYC Mayor’s Office of Long-Term Planning and Sustainability, and the Department of State to identify opportunities for increasing coastal resilience in New York State’s urban areas. The city and the state agreed to collaborate on several key actions for the implementation of the recommendations of the Sea Level Rise Task Force and work on these projects is underway. In addition, a partnership effort with Scenic Hudson and the Hudson River National Estuarine Research Reserve has led to a series of waterfront planning forums that examine the challenges of balancing economic development along our waterways with increasing vulnerability from flooding.

Working with the DEC Office of Climate Change, state agencies and local governments can pool their resources, learn from one another and make the Hudson Valley a model for responding to climate change in the state and in the nation.

B. Status of progress on the specific actions planned for 2010-2014

To achieve the goal of addressing the causes of climate change and to help prepare for projected impacts throughout in the Hudson Valley, we plan to implement specific actions for the period 2010-2014 to achieve long-range targets that address the following two themes:

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

Goal 6 Long-Range Target 1 - Helping Waterfront Communities Prepare for Flooding from Sea-Level Rise and Strong Storms: By 2020, all waterfront communities will be aware of projected impact areas for local flooding associated with sea-level rise and stronger storms, and 75 percent will be taking steps to prepare [links to goals 3, 4, 5 and 9].

Planned Action 1. Sea level rise mapping: Map estuary shoreline elevation using LIDAR (light detection and ranging) technology, model projected sea-level rise and storm surge in the estuary, and provide communities with maps and information on areas of greatest risk of shoreline inundation due to climate change.

Progress in 2010 & 2011: New LIDAR data was collected in eastern Greene County. The DEC, NYSERDA and the NYS Office of Cybersecurity also partnered to organize a LIDAR collection for the Hudson River shoreline and for all of Rockland County in the Hudson estuary watershed. Finally, DEC, with stakeholder support and technical assistance from the NYS Office of Cybersecurity, has secured the first-ever 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 sea level rise in 1 foot increments. This last collection was procured through the NOAA Coastal Services Center. The collection of this data is critical to the development of maps of areas the Hudson estuary shoreline vulnerable to sea level rise and storm surge.
Planned Action 2. Mapping vulnerable areas: Identify and map vulnerable natural systems and infrastructure (water and sewer intakes/outfalls, rail lines, roads, transportation, utilities, brownfields) along the Hudson River estuary shoreline and its tributaries, and outline potential impacts to each sector.

Progress in 2010 & 2011: In 2010, the Estuary Program completed research project with Cornell Dept of Civil Engineering to generate a one dimensional model of the estuary to determine the relative impact of sea level rise, storm surge, and large rainfall events on water levels. In 2011, completed planning for a forum on hydrodynamic modeling in January 2012 in partnership with NYSERDA and the Hudson River National Estuarine Research Reserve. This forum will convene key stakeholders to develop priorities for modeling sea level rise and the combined impacts of riverine inputs and coastal surge inputs in order to generate future maps of vulnerability for the Hudson estuary.

Staff from Scenic Hudson and DEC have scoped out a project to use the best existing data to map natural and human resources (infrastructure and community resources) at risk of sea level rise and storm surge along the estuary shoreline to identify potential long term planning issues and conflicts. This effort includes a partner project with Scenic Hudson to model tidal wetland migration using the Sea Level Rise Affecting Marshes model (SLAMM). Both of these efforts will be greatly aided by the coastal LIDAR collection through the NOAA Coastal Services Center.

Planned Action 3. Assisting local government Develop guidance for local governments on shoreline adaptation strategies to respond to sea-level rise and shoreline inundation in the Hudson estuary and its tributaries. Outline a process to assist shoreline communities making critical decisions in shoreline areas, including:

- Upgrading existing or siting new critical infrastructure.
- Determining which shoreline areas are suitable for shoreline protection and which areas may require a planned retreat.
- Formulating adaptive management strategies that consider the design life of infrastructure projects and allow project design and management to be flexible over time to respond to changing conditions.

Progress in 2010 & 2011: In December 2010, the NYS Sea Level Rise Task Force completed its report to the state legislature on the projected impacts of sea level rise in New York State and recommended strategies to respond. The report and recommendations will be a solid foundation for the development of the policy guidance needed to make cost effective long term shoreline decisions along the estuary. In particular, Task Force Recommendation Five outlines a planning process communities may undertake to facilitate the decisions listed in this Action. DOS is working on a guidance document for coastal communities that incorporate many of the planning principles outlined in the Sea Level Rise Task Force recommendations. Municipal officials from shoreline communities in NYS have been deeply engaged in the development of the recommendations from this report. A focus group on sea level rise and the state response was held specifically for shoreline municipal officials in the Hudson estuary in summer 2010. The recently released ClimAID statewide climate impact assessment and interim report of the Governor’s Climate Action Council will also provide the basis for new guidance.

In 2011 staff organized a workshop in October in partnership with the Regional Planning Association, the NYC Mayor’s Office of Long-Term Planning and Sustainability, and the Department of State to identify opportunities for increasing coastal resilience in New York State’s urban areas. Attendees to the event included Federal, New York City and NYS agencies as well as NGOs and academic partners. The city and the state agreed to collaborate on several key actions.
for the implementation of the recommendations of the Sea Level Rise Task Force and work on these projects is underway.

Overall Status of Goal 6 Target 1:

- □ Done
- ✗ Underway
- □ Not started

Goal 6 Long-Range Target 2 - Adopting and Implementing the ClimateSmart Communities Pledge: By 2020, 50 percent of Hudson Valley communities will have adopted and begun implementing the New York State “ClimateSmart Communities Pledge,” which outlines the most important energy conservation and climate adaptation strategies to be undertaken by municipalities. By 2030, 75 percent of Hudson Valley communities will have adopted and begun implementing the pledge [links to goals 3, 4, 5 and 9].

Planned Action 1. Engage Climate Smart Communities: Ten pilot communities in the Hudson Valley will adopt and begin to implement the New York State “ClimateSmart Communities Pledge”

Progress in 2010 & 2011: As of December 2010, over 35 municipalities in the Hudson Valley had adopted the Climate Smart Communities Pledge, and many are implementing key mitigation projects. With Department of State funding, the City of Albany is beginning a plan for climate change adaptation, the first of its kind in the Hudson Valley. As of December 2011, 45 municipalities in the Hudson Valley have adopted the Pledge.

Planned Action 2. Assist communities: Annually, through technical assistance and state grants programs, support local efforts to reduce greenhouse gas emissions and develop and implement local adaptation strategies.

Progress in 2010 & 2011: The DOS and NYSERDA are both offering grants programs that address climate change. Estuary Program staff are providing technical assistance and are assisting in soliciting applicants for these partner programs. Estuary staff continue to distribute information on state, federal and private sources of funding, encourage organizations and municipalities to apply and provide technical assistance to applicants.

Planned Action 3. Develop guidance: Develop guidance for communities in the estuary watershed to undertake a vulnerability analysis and develop a local adaptation plan.

Progress in 2010 & 2011: In 2010, in partnership with Pace University Land Use Law Center and the Hudson River National Estuarine Research Reserve we organized a Land Use Leadership Alliance training on sea level rise adaptation. Development of informational tools and guidance for communities to undertake vulnerability assessments and adaptation planning was also begun through an interagency workgroup involving DEC, NYSERDA, DOS, and the State Office of Emergency Management. In 2011, the DOH and DOT joined this group. The focus of the group has been primarily agency and local government response to coastal hazards associated with sea level rise and storm surge. The guidance, which will be consistent with the recommendations of the recently released state climate adaptation report and coordinated with the findings of the Sustainable Shorelines project (Goal 2) will emphasize the integration of adaptation planning processes into state hazard mitigation and local waterfront revitalization planning processes. In addition, in 2011 staff assisted with the planning for the first meetings of the DEC Climate Action Team, consisting of representatives from each of DEC’s programs, regions and offices. The Team is charged with incorporating mitigation and adaptation into all relevant decision making at DEC.
In fall 2011 staff partnered with Scenic Hudson and the Hudson River National Estuarine Research Reserve to organize a workshop for the citizens of Beacon to raise awareness of the need to incorporate planning for increased vulnerability from flooding into long term plans to revitalize waterfront including the work of the Sustainable Shorelines project. Planning for similar workshops in Kingston and Hudson in 2012 is underway.

**Planned Action 4. Hazard mitigation plans:** Align state agency policies to support inclusion of climate information and low-impact and natural resource-based climate adaptation strategies into county, village or town hazard mitigation plans.

**Progress in 2010 & 2011 (Actions 3 & 4):** The interagency adaptation work group (see Action 3 above) has begun work investigating and compiling information on agency programs designed to address disaster response and recovery from Tropical Storms Irene and Lee. The group plans to make this project a priority in 2012.

**Planned Action 5. Public awareness:** Through public presentations and outreach materials, continue to raise awareness of the most current information on the causes and impacts of climate change, actions needed to adapt and resources available.

**Progress in 2010 & 2011:** Outreach continues through presentations to elected officials and local organizations. Ten presentations were given to non-DEC audiences in 2011. See examples of specific events under other actions.

**Planned Action 6. Climate Change Network** Annually, coordinate efforts of the Hudson Valley Climate Change Network to address the impacts of climate change at the regional level and facilitate communication between climate research and outreach partners.

**Progress in 2010 & 2011:** The Hudson Valley Climate Change Network met twice in 2010 to discuss recently developed regional scale climate projections (the results of the ClimAID project) and the findings and recommendations of the Sea Level Rise Task Force. In 2011, the Network also met twice to discuss the overall results of the state’s Climate Action Plan Interim Report and the results of the transportation sector of this report. Communication via email of new funding, job and partnership opportunities continued through 2011.

**Overall Status of Goal 6 Target 2:**
- [ ] Done
- [x] Underway
- [ ] Not started
Accomplishments Goal 7: Public Access

Goal

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

A. Overview of Accomplishments to Date and Challenges for this Goal

In 2011, a variety of access opportunities were realized up and down the river. With support from the Estuary Program and NYS Department Of State, wheelchair accessible fishing access was developed in the City of Newburgh (Orange County). An Estuary grant in the Town of Bethlehem (Albany County) allowed an accessible fishing platform to be installed at Henry Hudson Park. The Estuary Program also completed Estuary Grants for Downtown Boathouse kayak sites in NYC and on Governor’s Island. While these sites have been in use for several years, funding for them was completed this year.

The Hudson River Estuary Program announced seven estuary grants for access projects in 2011. Contracts have been approved for three of these projects. In 2011, A Hudson River Estuary Grant for $100,000 was awarded to the Town of Lloyd for an Environmental Education Center at Bob Shepard Highland Landing Park. Created through repair and restoration of an existing building on the site, the center will house exhibits on river ecology and waterfront history as well as host workshops and lectures. The facility will fill a gap in a 25 mile stretch of the river’s west bank with no public access for education.

In September, 2011, the Hudson River Valley Greenway, in collaboration with partners, including the Estuary Program celebrated the 12th Annual Hudson River Valley Ramble. This celebration offered nearly 200 guided walks, hikes, paddles, biking tours and other events featuring the scenic, natural, cultural and historic riches and resources of the River and Valley. While over 30 events had to be canceled due to Hurricane Irene and Tropical storm Lee, over 120,000 people participated in Ramble events. Follow up surveys revealed that Ramble participants highly value the region's scenic quality. Nearly 40 events focused on the estuary as the main feature including a 3-day paddling and camping trip along the main stem of the river, seining for fish and singing with the Sloop Clearwater educators, and hiking in recently preserved natural areas such as the Esopus Bend Nature Preserve.

The NYS DOS completed Eco-docks at Watervliet, Beacon and Athens in 2011. In 2011, an on-road trail system from New York City to Albany on both sides of the River has been identified as part of the development of the Cycling the Hudson River Valley Guidebook. The Guidebook, developed in partnership with Parks & Trials NY includes an on-road network that can be used to fill in gaps in the off road Greenway Trail. In 2011, the Village of Ossining completed preliminary design work and plan for River Walk in the village. This project will add to the great Westchester RiverWalk trail, a planned 46.6 mile pathway paralleling the Hudson, linking village centers, historic sites, parks and river access points via trails, esplanades and boardwalks in Westchester County’s river communities.

Many partners came together to see Scenic Hudson’s RiverWalk Park at Tarrytown open in 2011. This Park stretches along 3,200 feet of the village’s Hudson waterfront and links to the village’s Pierson Park and a 25 acre brownfield that is slated for redevelopment. This river access project is an important segment of the Westchester County RiverWalk, a vision to connect all riverfront towns along the Hudson.
from Yonkers to Peekskill with walkways, bike paths and parks. An Estuary Grant as well as many other state grant programs contributed to this project.

Another major access site which opened to the public in 2011 was Scenic Hudson’s Long Dock Park, Beacon, (Dutchess County). Realization of this project involved many partners including an Estuary Grant for the renovation of the Red Barn for environmental education activities as well as over $2.7 million in DOS funding for public amenities to the park, including the construction of to construct a kayak deck at Long Dock Beacon as part of the kayak center. This project turned a former industrial site into a riverfront attraction and community resource. The 15 acre site features rehabilitated wetlands, a kayak/canoe beach and storage pavilion, waterside trails, an environmental education center, picnic areas and a fishing pier.

Scenic Hudson, working in collaboration with the Dominican Sisters of Sparkill and the Esopus Creek Conservancy cut the ribbon on the Falling Waters Preserve, a 168 acre preserve protecting land along the Hudson River in Town of Saugerties. This unique access opportunity offers the public access to an additional one mile of Hudson River shoreline, streams, meadows wetlands, vistas of the river the Catskill Mountains, and newly developed trails on the lands of the Dominican Sisters of Sparkill.

In 2010, the Walkway over the Hudson, marked its first year of operation with over 750,000 visits recorded. Completed in 2009 by NYSOPRHP with major assistance from private donors, it demonstrated how such connections can create health benefits and economic returns. This will be the model for future connections that link river access sites, trails, restaurants, museums, and neighborhoods to create great destinations. The Walkway continues to be a major attraction for walkers and bikers throughout the year. Trail linkages to the Franny Reese Park and the rail trail into the heart of Highland increase the recreational opportunities offered by the Walkway. A recent survey of visitors to the park found that close to 500,000 people walk the Walkway annually with half of them coming from outside the Dutchess/Ulster county area, and 28% coming from outside New York State. A study by Camoin Associates found that that the Walkway has generated $24 million in spending, $779,000 in county tax revenue and had resulted in 383 new jobs in Dutchess and Ulster Counties, paying $9.4 million in wages.

**B. Status of progress on the specific 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 for the period 2010-2014 to achieve long-range targets that address the following eight themes:

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

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

**Goal 7 Long-Range Target 1 - Building and Renovating Community Docks:** By 2020, renovate and build river docks and piers that support multiple uses, including fishing, tourism, transportation, educational and research purposes as identified in approved state and local plans [links to goal 9].

**Planned Action 1. Ferry docks:** Work with the state Department of Transportation (DOT) to develop access opportunities at commuter ferry docks.
Progress in 2010 & 2011: Rhinecliff installed a floating dock, which is being used as a landing for a small ferry boat taking passengers from Kingston (west shore) to Rhinecliff (east shore). Passengers can board a trolley in Rhinecliff that will take them to Rhinebeck.

Planned Action 2. Dock renovation: Support renovation of 10 docks or piers for public access, as well as transportation uses along the Hudson River, East River, Harlem River and Kill Van Kull.

Progress in 2010 & 2011: In 2010 the NYS DOS made the following grant Eco-Dock awards:

Albany County: $45,000 to enable the City of Watervliet to provide utilities to a proposed boathouse/storage facility at the south end of Hudson Shores Park to complement its newly constructed non-motorized boat dock. This project was completed in 2011.

Columbia County: $38,542 to enable the City of Hudson to construct a canoe/kayak launch at the southern end of Henry Hudson Riverfront Park. In addition, a secure storage rack for canoes/kayaks will be provided.

Dutchess County: $150,000 to enable the City of Beacon, in partnership with Scenic Hudson, to construct a kayak deck at Long Dock Beacon as part of a kayak center. This project was completed in 2011.

Greene County: $22,500 to enable the Village of Athens to construct a dockage system for non-motorized boaters to complete its Fourth Street Boat Launch. This project was completed in 2011.

New York County: $90,000 to enable the NYC Department of Education, in partnership with the Urban Assembly New York Harbor School, to enhance the recently built dock along the northern tip of Governors Island for use by non-motorized boaters.

Westchester County: $8,625 to enable the Village of Irvington to construct a rubberized docking system adjacent to the existing kayak and canoe ramp located at the southern end of Scenic Hudson Park.

Overall Status of Goal 7 Target 1:

- [ ] Done
- [x] Underway
- [ ] Not started

Goal 7 Long-Range Target 2 - Providing Facilities for Underserved Communities: By 2020, improve river access for people with disabilities and for people living in environmental justice neighborhoods in each of the river cities and villages, including the five boroughs of New York [links to goal 9].

Planned Action 1. Needs assessment: Conduct a user survey to assess use, identify locations where additional access is needed for persons with disabilities and develop a plan to meet these needs. Through state and federal grant programs, fund access improvements to meet these needs.

Progress in 2010 & 2011: With DEC support, an ADA accessible fishing access dock was opened in the fall of 2010 in the Town of Ulster at Robert Post Park. Another was built at Turkey Point.

Planned Action 2. ADA design: Develop an Americans with Disabilities Act (ADA) handbook for river access design, and conduct outreach and training on how to address these needs.

Planned Action 3. Environmental Justice: Identify underserved environmental justice (EJ) neighborhoods that lack access opportunities, and develop a plan to improve river access. Through state and federal grant programs, fund access improvements to meet these needs.

Progress in 2010 & 2011: Planning is underway for a project in 2012.

Planned Action 4. Planning: Encourage incorporation of ADA and EJ goals in LWRPs, comprehensive plans, project site plans and designs for waterfront structures and parks.

Progress in 2010 & 2011: Ongoing

Overall Status of Goal 7 Target 2:

☐ Done
☒ Underway
☐ Not started

Goal 7 Long-Range Target 3 - Preserving and Enhancing Recreational Boating Access: By 2020, build or upgrade boating access sites on the Hudson identified in approved state and local plans, completing new access sites in five or more communities. Insure continued access through existing boat launch sites, yacht clubs and marinas by working to address siltation and dredging issues [links to goal 9].

Planned Action 1. Pursuant to approved Local Waterfront Revitalization Programs and approval of all necessary permits, construct or renovate four boat launches on the Hudson.

Progress in 2010 & 2011: Two boat launches, Coeymans (DFWMR funded) and Village of Catskill (Estuary Grant funded) were upgraded with DEC support in 2010.

In 2010 the NYS DOS made to following Eco-dock grant awards:

- Rensselaer County: $43,762 to enable the City of Troy to construct a non-motorized boat launch at the foot of Madison Street.
- Rockland County: $150,000 to enable the Village of Nyack to design and construct a ramp and dock at the Nyack Marina.

Planned Action 2. Support community boating needs for non-motorized craft, such as floating docks in New York City and rowing facilities for crew, using grants and municipal agreements. Enhance and construct eco-dock infrastructure for non-motorized boats.

Progress in 2010 & 2011: The Village of Athens, 4th Street kayak launch, was completed in 2010, with support from multiple agencies.

In 2010, funding for estuary grants for Downtown Boathouse kayak sites in NYC and on Governor’s Island was completed. These projects have been in use for several years and serve thousands of boaters annually.

In 2011, seven estuary grants were announced: Quiet Cove Riverfront Park, Dutchess County; Albany Rowing Center, Albany County; Town of Rhinebeck, Dutchess County; Harlem Community Rowing, Bronx; Metropolitan Waterfront Alliance, New York; Going Coastal, Brooklyn; and Save Esopus Lighthouse, Ulster County. To date, contracts have been approved for four of these projects: Albany Rowing Center, Harlem Community Rowing, Metropolitan Waterfront Alliance, and Going Coastal.

*Progress in 2010 & 2011:* No action in 2010-2011.

Planned Action 4. Promote and support the Clean Marina Program, which encourages environmentally responsible boating facility operations. Identify marinas and boat clubs that do not currently provide pumpout facilities, and encourage them to seek grants from the Clean Vessel Act Pumpout Program to provide such facilities.

*Progress in 2010 & 2011:* DEC staff is working with the Hudson Valley Marine Trades Association and others to seek funding for a Clean Marina Program for the Hudson River. Efforts to date have not been successful.

New pumpout stations and improvements to existing pumpouts continue with Clean Vessel Act Funding.

Planned Action 5. Encourage marinas and boat clubs to pursue beneficial-use opportunities for dredged materials to facilitate continued operations.

*Progress in 2010 & 2011:* Dredged material placement continues to be a major problem in New York State for major public projects and private facilities alike. During 2010 the use of dredge material at a DEC in-water remediation site was considered but not implemented due to contaminate levels in the material. However, DEC will continue to consider this option at future remediation sites. Staff continues to work with the Army Corps of Engineers, private sector scientists and Columbia University to identify innovative dredged material treatment and management solutions.

Overall Status of Goal 7 Target 3:

- [ ] Done
- [x] Underway
- [ ] Not started

**Goal 7 Long-Range Target 4 - Providing Increased Fishing Access:** By 2020, establish at least one public fishing access site per river community where feasible [links to goals 1, 2, 5 and 9].

Planned Action 1. Identify opportunities to expand public fishing access and support local projects through grant programs. Provide updated access information on DEC’s website.

*Progress in 2010 & 2011:* With DEC support, an ADA accessible fishing access dock was opened in the fall of 2010 in the Town of Ulster at Robert Post Park. Another was built at Turkey Point.

- In 2011: Town of Bethlehem complete a project for an ADA accessible fishing platform at Henry Hudson Park as well as a study on shoreline stabilization options at the park, both funded by Estuary Grants

- The City of Newburgh constructed a fishing and observation pier, funded by an Estuary Grant and with DOS EPF funding as well.

Planned Action 2. Continue to educate the public about safe fishing practices, including fish consumption health advisories. To promote health advisories on 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 boat and outdoor
shows, at county fairs and through local food pantries. The Project collaborated with environmental education and nutrition programs, displayed an ad on Rockland County buses, and worked with landowners to post signs.

**Progress in 2010 & 2011:** DOH and DEC advisory information continues to be provided.

**Overall Status of Goal 7 Target 4:**
- [ ] Done
- [x] Underway
- [ ] Not started

**Goal 7 Long-Range Target 5 - Creating Safe Places for Swimming:** By 2020, establish increased opportunities for the public to safely swim in the Hudson [links to goal 10].

**Planned Action 1.** Improve existing swim-beach facilities, and support the development of new swimming beaches, floating pools and bath houses where practical by providing assistance through grants to interested parties.

**Progress in 2010 & 2011:** No action in 2010 and 2011.

**Planned Action 2.** Continue to improve water quality in impaired areas.

**Progress in 2010 & 2011:** Stormwater programs and pollution discharge permits administered by DEC continue to aid in improving water quality by reducing untreated stormwater and pathogen discharges. (See also Goal 10, Water Quality)

**Overall Status of Goal 7 Target 5:**
- [ ] Done
- [ ] Underway
- [ ] Not started

**Goal 7 Long-Range Target 6 - Creating a Network of Education Sites Linked with River Access and Waterfront Destinations:** By 2020, create a network of education facilities linked with river access and waterfront destinations in each river city [links to goal 8].

**Planned Action 1.** Through state grant programs, provide assistance to partners to create new linked opportunities for education and river access along the shoreline.

**Progress in 2010 & 2011:** In September, 2011, The Hudson River Valley Greenway, in collaboration with partners, including the Estuary Program celebrated the 12th Annual Hudson River Valley Ramble. This celebration offered nearly 200 guided walks, hikes, paddles, biking tours and other events featuring the scenic, natural, cultural and historic riches and resources of the River and Valley. While over 30 events had to be canceled due to Hurricane Irene and Tropical Storm Lee, over 120,000 people participated in Ramble events. Follow up surveys revealed that Ramble participants highly value the region's scenic quality. Nearly 40 events focused on the estuary as the main feature including a 3-day paddling and camping trip along the main stem of the river, seining for fish and singing with the Sloop Clearwater educators, and hiking in recently preserved natural areas such as the Esopus Bend Nature Preserve.
In 2011, A Hudson River Estuary Grant for $100,000 was awarded to the Town of Lloyd for an Environmental Education Center at Bob Shepard Highland Landing Park. Created through repair and restoration of an existing building on the site, the center will house exhibits on river ecology and waterfront history as well as host workshops and lectures. The facility will fill a gap in a 25 mile stretch of the river’s west bank with no public access for education.

Over all Status of Goal 7 Target 6:
☐ Done
☐ Underway
☒ Not started

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

Planned Action 1. The Hudson River Greenway Water Trail will include at least one access point (launches and take-outs) every 10 miles or less along both shores of the river.

Progress in 2010 & 2011: In 2011, a grant was awarded to pave with stone dust the access road to the Schodack Creek kayak launch in Schodack Islands State Park. This project was needed to prevent erosion of the roadbed.

Planned Action 2. The Greenway will create a feasibility study to transition all on-road segments of the riverfront Greenway Trail to off road.

Progress in 2010 & 2011: In 2011, an on-road trail system from New York City to Albany on both sides of the River has been identified as part of the development of the Cycling the Hudson River Valley Guidebook. The Guidebook, developed in partnership with Parks & Trials NY includes an on-road network that can be used to fill in gaps in the off road Greenway Trail.

Overall Status of Goal 7 Target 7:
☐ Done
☒ Underway
☐ Not started

Goal 7 Long-Range Target 8 - All Access Sites and Facilities—Building Connections for Richer and More Diverse Experiences: By 2020, develop connections among river parks, education centers, cultural sites, scenic vistas, unique habitats and restoration sites to provide residents and visitors with richer and more diverse river experiences. Post information about access points on DEC’s website [links to goals 5, 8 and 9].

Planned Action 1. Survey and map current public-access points along the river and tidal portions of the tributaries. Make this information available to the public on DEC’s website, and update it on a regular basis.

Progress in 2010 & 2011: In 2011, the Village of Ossining completed preliminary design work and plan for River Walk in the village. This project will add to the great Westchester RiverWalk trail, a planned 46.6 mile pathway paralleling the Hudson, linking village centers, historic sites,
parks and river access points via trails, esplanades and boardwalks in Westchester County’s river communities.

Many partners came together to see Scenic Hudson’s RiverWalk Park at Tarrytown open in 2011. This Park stretches along 3,200 feet of the village’s Hudson waterfront and links to the village’s Pierson Park and a 25 acre brownfield that is slated for redevelopment. This river access project is an important segment of the Westchester County RiverWalk, a vision to connect all riverfront towns along the Hudson from Yonkers to Peekskill with walkways, bike paths and parks. An Estuary Grant contributed to this project.

Another major access site opened to the public in 2011 was Scenic Hudson’s Long Dock Park, Beacon, (Dutchess County). Realization of this project involved many partners including an Estuary Grant for the renovation of the Red Barn for environmental education activities as well as over $2.7 million in DOS funding for public amenities to the park, including the construction of a kayak deck at Long Dock Beacon as part of the kayak center. This project turned a former industrial site into a riverfront attraction and community resource. The 15 acre site features rehabilitated wetlands, a kayak/canoe beach and storage pavilion, waterside trails, an environmental education center, picnic areas and a fishing pier.

Scenic Hudson, working in collaboration with the Dominican Sisters of Sparkill and the Esopus Creek Conservancy cut the ribbon on the Falling Waters Preserve, a 168 acre preserve protecting land along the Hudson River in Town of Saugerties. This unique access opportunity offers the public access to an additional one mile of Hudson River shoreline, streams, meadows wetlands, vistas of the river the Catskill Mountains, and newly developed trails on the lands of the Dominican Sisters of Sparkill.

**Planned Action 2.** Fund five demonstration projects that create connections to link diverse river experiences

**Progress in 2010 & 2011:** The Walkway Over the Hudson, now connected to the Franny Reese State Park and rail trail into the Village of Highland, demonstrates the power of these linkages.

**Overall Status of Goal 7 Target 8:**

- [ ] Done
- [ ] Underway
- [x] Not started
Accomplishments 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.

A. Overview of Accomplishments to Date and Challenges for this Goal

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. Our educators focus mainly on the following priorities:

1. Training teachers: 28 training workshops served 487 educators in 2011, ranging from pre-service teachers at College of St. Rose in Albany to practicing classroom teachers in New York City. In 2010, we offered 26 workshops served 690 people.

2. Developing lesson plans and other resource materials: Hudson River lesson plans available on DEC’s website were downloaded hundreds of times weekly in 2010-2011.

3. Building networks to support Hudson River study by classroom teachers: A Day in the Life of the Hudson River in October brought nearly 3,500 students and teachers to more than 60 sites on the estuary from Canarsie Pier in Jamaica Bay to the head of tide in Green Island. Training workshops preceded the event, and followup lessons using data collected by students during the day were made available to teachers. In 2010, we reached similar numbers of schools and students.

4. Promoting stewardship and citizen participation in 2010-2011: Our citizen science glass eel migration study involved 320 students and community volunteers working on ten tributaries to gather data useful in the management of the American eel.

5. Technical assistance to museums, nature centers and government agencies: These efforts ranged from providing text and graphics for interpretive signage to preparing an estuary climate change scenario used as the basis for oral presentations by contestants in the 2011 Envirothon at both regional and state levels in New York.

All told, Estuary Program and Hudson River Research Reserve education programs directly served 17,000 people (including over 10,000 students) in 2011. Looking at quality as well as quantity, among 90 respondents to our online lesson plan survey were 23 who had who had used the lessons posted; 17 of these 23 reported that the lessons accomplished their objectives “very well,” and 5 reported “well.” Of the other 57 respondents, all but one reported that they were likely to use the lessons in the future; the one who didn’t cited the lack of lessons for her very young children, a gap that has since been filled. In 2010 these programs reached 15,942 participants, including 10,510 students.

In another sign of the education program’s excellence, the State of the Hudson 2009 Report received one of two 2010 Notable New York Document Awards from the New York Library Association/Government Information Round Table. In 2011 it was recognized nationally by the American Library Association’s Government Documents Roundtable as one of eleven Notable Documents produced by state governments.

In all these efforts, the 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.

B. Status of progress on the specific actions planned for 2010-2014

To achieve the goal of promoting public understanding of the Hudson River, we plan to implement
specific actions for the period 2010-2014 to achieve long-range targets that address the following themes:

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

Goal 8. Long-Range Target 1 - Creating a Network of Places to Go to Learn about the River: By
2020, establish and publicize a coordinated network of gateway sites for education and information about
the Hudson River, its natural and human history and its future needs. Ensure that there is at least one
gateway facility in each county along the estuary [links to goals 9 and 12].

Planned Action 1. School field programs: 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.

Progress in 2010 & 2011: In 2010, offered field trips for classes from 30 school districts
bordering the Hudson from Troy to Manhattan – 59% of the 51 such districts. In 2011, field trips
were offered for classes from 34 such school districts. Over these two years, classes from 35
school districts – 69% of the total bordering the Hudson - have gone on Hudson River field trips.

A Hudson River Estuary Grant for $100,000 was awarded to the Town of Lloyd for an
Environmental Education Center at Bob Shepard Highland Landing Park. Created through
repair and restoration of an existing building on the site, the center will house exhibits and host
workshops and lectures. This facility will fill a gap in a 25 mile stretch of the river’s west bank
with no public access for education. (also achieves Goal 7)

Restoration work funded in part by a 2007 Estuary Grant culminated in the opening this year of
the historic Red Barn as Scenic Hudson's River Center for arts and environmental-education
activities at Long Dock in Beacon. It was immediately put into use for teacher workshops
including a Day in the Life training. (also achieves Goal 7)

Overall Status of Goal 8 Target 1:
☐ Done
☒ Underway
☐ Not started

Goal 8. Long-Range Target 2 - Providing Enhanced Access to River Information for the Public: By
2020, expand public recognition and reliance on the Hudson River Estuary Program and the Hudson
River Research Reserve as key sources of accurate and current information about the river’s resources
and opportunities for stewardship [links to goal 12].

Planned Action 1. Web-based information: Make creative use of the Estuary Program web pages
to attract visitors and disseminate information about the river, doubling visits to these pages.
Progress in 2010 & 2011: A Google search for “Hudson estuary” or “Hudson River estuary” returns the Hudson River Estuary Program and our page describing the estuary as the first two hits. A search for “Hudson River” returns our “River that flows both ways” description as hit #35. A search for “Hudson River lesson plans” returns our lesson plans page as the first hit. During 2011, staff completed a review of our webpages and communications strategies, resulting in redesigns of several sections of the site and creation of RiverNet, a Hudson River Estuary Program electronic newsletter.

For calendar year 2009, the Hudson River Estuary Program page averaged 232 visits per week. In calendar year 2010, that page averaged 279 visits weekly – in 2011, 246 visits weekly. While this is a decline, both dedicated users of the webpages and those arriving at our pages via search engine links are increasingly going directly to specific pages of interest rather than navigating through this main page. For example, from January to June of this year, an average of 25 visitors landed directly on the page describing our lesson plans each week; from September into December, an average of 68 visitors came directly to that page each week.


Progress in 2010 & 2011: No action is planned until 2014.

Planned Action 3. A trusted source of information: Conduct a public survey to measure baseline recognition of HREP and HRRR as key sources of information about the river.

Progress in 2010 & 2011: A planned market analysis and needs survey of K-12 teachers by the Hudson River Research Reserve and the Estuary Program will be done in 2012.

Overall Status of Goal 8 Target 2:

- √ Done
- X Underway
- □ Not started

Goal 8. Long-Range Target 3 - Enhancing School Programs for Place-Based River Learning: By 2020, expand study of the estuary in Hudson Valley school districts as teachers incorporate lesson plans and field experiences produced by the Hudson River Estuary Program and its partners into classroom curricula [links to goal 12].

Planned Action 1. School curriculum: Work with education partners to make available more field-tested, interdisciplinary standards-based and place-based Hudson River curriculum materials for all grade levels. These materials will be used in 60 percent of Hudson Valley school districts.

Progress in 2010 & 2011: Hudson River education pages on the DEC website are regularly updated. For calendar year 2009, the Hudson River lesson plans landing page averaged 90 visits per week. For calendar year 2010, this page averaged 104 visits per week; in 2011, the average was 97 visits weekly. Use of our lesson plans follows a seasonal pattern corresponding to the school calendar. During school year 2009-2010, the weekly average was 116 visits. In school year 2010-2011 the weekly average dropped to 94, perhaps due to a fall off in interest after the Quadricentennial year; however, in the first half of the 2011-2012 school year the weekly average went back up to 115 visits.

In 2010, lesson plans developed by the Estuary Program reached 17 of the 51 school districts bordering the Hudson (33%). Adding in school districts in the Lower Hudson watershed that are not on the river, they reached 29 of 119 districts (24%). In 2011, our lessons reached 19 riverside districts (37%). Six of these were new ones, so the cumulative total to date is 23 districts - 43% of
those along the river. Looking at all districts in the Lower Hudson watershed, the cumulative total at the end of 2011 reached 45 (38%).

**Planned Action 2. Teacher training:** Work with education partners to provide teacher training opportunities that reach classroom teachers from 75% of school districts in the Hudson Valley.

**Progress in 2010 & 2011:** In 2010, Estuary Program educators offered 14 workshops serving classroom teachers; in 2011 we offered 11 (in both years other trainings were offered to pre-service teachers and non-formal educators). Participants in the workshops over these two years represented 28 of the 51 districts bordering the Hudson (55%).

**Overall Status of Goal 8 Target 3:**
- ☐ Done
- ☒ Underway
- ☐ Not started

**Goal 8. Long-Range Target 4 - Improving the Effectiveness of Programs Serving Educators and Citizens Concerned about the River:** By 2020, working with education partners, expand the overall quality and quantity of river education programs, creating models for interdisciplinary environmental education that can be adopted nationally and internationally [links to goal 12].

**Planned Action 1. Public engagement:** Enhance annual programs, such as the *Hudson River Almanac*, HRECOS stories (see Goal 12) and the “Day in the Life of the Hudson River” sampling event to increase public understanding of and involvement in the natural environment of the river. Double *Hudson River Almanac* circulation to 4,000.

**Progress in 2010 & 2011:** At the close of 2011 *Hudson River Almanac* circulation was 2,848, compared to 2,591 at the end of 2010 and 2,419 at the end of 2009. In 2010, 11 HRECOS stories were published on [www.hrecos.org](http://www.hrecos.org) and sent to 96 recipients. This year, the “Day in the Life of the Hudson River Estuary” reached nearly 3500 participants at 64 sites from Canarsie Pier in Jamaica Bay to the head of tide at Green Island, compared to about 3300 participants at 58 sites in 2010 and 3,000 at 60 sites in 2009. The glass eel migration study in Hudson River tributaries, involving students and citizens in collecting data necessary to manage the American eel, is becoming a model for similar work elsewhere. In 2010, it expanded to nine monitoring sites in six counties, involving approximately 320 volunteers. Results have been presented at national, regional, and statewide conferences, including the American Fisheries Society and North American Association of Environmental Education in 2010, and staff consulted with educators in other regions, including Delaware Bay and the Canadian maritime provinces (Parks Canada), about establishing similar efforts.

**Planned Action 2. Technical assistance:** On an ongoing basis, provide technical assistance to enhance school and public programming offered by individuals and organizations that teach about the Hudson. Identify ways that the Estuary Program, the Hudson River Research Reserve and DEC’s Division of Public Affairs and Education can add value to the efforts of their Hudson River education partners and implement as many of them as possible.

**Progress in 2010 & 2011:** Among many examples of technical assistance provided to education partners are the following:
- Developed internal DEC vision statement for marine research and education facility on Pier 26 in Manhattan; met with CUNY officials about their possible role in the project (2010-2011);
- Advised OPRHP on text and images for interpretive signs at Schodack Island State Park and Village of Piermont consultants on content of interpretive signs for the Piermont Pier (2010);
Participated in planning and conducting the Teaching the Hudson Valley summer teacher institutes 2010-2011. Of the 25% of 2010 attendees who filled out the THV evaluation form, 87.5% said their desire for “new information” and “new ideas, skills, or strategies” were satisfied “very well” with the remainder saying “moderately well.” 80% said their desire for “new resources or contacts” was satisfied “very well” and 18% said “moderately well.” Results for 2011 were similar.

An estuary climate change scenario drafted in 2010 was used as the basis for oral presentations by contestants in the 2011 Envirothon at the regional and state levels in New York.

Staff contributed to the text of environmental literacy principles to be included in the Metropolitan Waterfront Alliance’s action plan for New York Harbor (2011).

Overall Status of Goal 8 Target 4:

☑️ Done
☒ Underway
☐ Not started
Accomplishments 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.

A. Overview of Accomplishments to Date and Challenges for this Goal

In 2010-2011 NYSDOS waterfront and downtown planning efforts continue to be advanced by the Local Waterfront Revitalization Program (LWRP). Design and construction of park and downtown amenities has begun in many of the communities. A guidebook on waterfront planning, prepared by Scenic Hudson in partnership with the DOS, was completed and is available on Scenic Hudson’s website.

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

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

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

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

**B. Status of progress on the specific 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 for the period 2010-2014 to achieve long-range targets that address the following three themes:

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

**Goal 9 Long-Range Target 1 - Revitalizing Local Waterfronts**: By 2020, advance and foster the preparation and implementation of Local Waterfront Revitalization Programs (LWRP) and other pertinent waterfront and downtown planning documents in all riverfront communities [links to goals 2, 3, 4, 5, 6, 7 and 11].

**Planned Action 1. Waterfront planning**: Complete the waterfront and downtown planning efforts, including LWRPs and LWRP amendments, in the cities of Albany, Beacon, Hudson, Kingston, Newburgh, Peekskill, Poughkeepsie, Rensselaer, Troy and Watervliet; the villages of Briarcliff Manor, Cold Spring, Dobbs Ferry, Hastings-on-Hudson, Ossining, Tarrytown, Tivoli and Wappingers Falls and the towns of Bethlehem, Coeymans, Cortlandt and Lloyd, and Ulster County. The state Department of State (DOS) will continue to work in partnership with local governments to prepare Local Waterfront Revitalization Programs and other planning documents that define a local vision for the waterfront and downtown areas. The LWRP is a voluntary partnership that establishes a vision and consensus between a community and the state on actions needed to revitalize and protect natural and economic resources. Through its LWRP Environmental Protection Fund grant program, DOS provides funding for both planning and implementation efforts.

**Progress in 2010 & 2011**: In 2011, DOS waterfront and downtown planning efforts continue to be advanced by the communities noted above. The City of Hudson adopted its Local Waterfront Revitalization Program (LWRP) and the Village of Ossining’s draft LWRP amendment was adopted by the Village and approved by the Secretary of State.

**Planned Action 2. Climate action plan** Complete a climate action and adaptation plan for the City of Albany.

**Progress in 2010 & 2011**: The City of Albany held a number of initial meetings to get their climate action and adaptation plan started.

**Planned Action 3. Construct new public park or downtown amenities in the cities of Albany, Beacon, Hudson, Irvington, Kingston, Peekskill, Rensselaer and Troy; in the villages of Athens, Catskill, Dobbs Ferry, Haverstraw, Nyack, Ossining, Piermont and Tarrytown, and in the towns of Lloyd and Poughkeepsie.**

**Progress in 2010 & 2011**: Design and construction of park and downtown amenities has progressed in many of the communities listed above.
Planned Action 4. Guidebook: 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.

Progress in 2010 & 2011: A guidebook on waterfront planning, prepared by Scenic Hudson in partnership with the DOS was completed and is available on Scenic Hudson’s website.

Overall Status of Goal 9 Target 1:

☐ Done
☒ Underway
☐ Not started

Goal 9 Long-Range Target 2 - Cleaning up Brownfields: By 2020, plan for and promote cleanup and reuse of brownfield sites, including contaminated, former industrial areas in riverfront communities [links to goal 11]

Planned Action 1. Brownfield clean-up: Promote cleanup and reuse of six or more additional brownfield sites affecting the Hudson estuary.


Planned Action 2. Voluntary clean up: Continue to encourage participation of municipalities in the voluntary cleanup and restoration of contaminated urban waterfront sites.


Planned Action 3 Investigations: Provide technical and financial support to preliminary investigations and cleanups.


Planned Action 4. BOA program: Through the Brownfield Opportunity Areas Program, develop plans for the redevelopment of former industrial and commercial waterfronts in 11 communities.


Overall Status of Goal 9 Target 2:

☐ Done
☒ Underway
☐ Not started

Goal 9 Long-Range Target 3 - Improving Urban Environmental Conditions: By 2020, adopt urban-greening and smart-growth programs that improve both the environmental quality and infrastructure of river cities and environmental conditions for disadvantaged populations, maritime industries and urban neighborhoods, focusing on projects that address water quantity, water quality, maritime needs and sea level rise [links to goals 4, 6, 10 and 11].


Progress in 2010 & 2011: The Hudson Valley Regional Council is implementing a regional green infrastructure planning project with ARRA funding through the NYS DEC. This project
includes development of green infrastructure plans for sites in seven communities, including five river cities, to manage stormwater and restore water quality.

**Planned Action 2. Planning:** Develop a plan to address needs in all river cities and villages.

*Progress in 2010 & 2011:* See above.

**Planned Action 3. Green buildings:** Encourage green building and adaptive reuse of historic structures, both commercial and residential, along waterfronts.

*Progress in 2010 & 2011:* Job training is underway to advance green jobs associated with energy efficiency in buildings.

**Planned Action 4. Neighborhood connections:** Connect neighborhoods to the water.

*Progress in 2010 & 2011:* The Walkway over the Hudson is expanding connections to neighborhoods in Poughkeepsie and Highland.

**Planned Action 5. Maritime uses:** Identify maritime needs.

*Progress in 2010 & 2011:* The Metropolitan Waterfront Alliance is advancing this goal in New York Harbor.

**Overall Status of Goal 9 Target 3:**

- [ ] Done
- [x] Underway
- [ ] Not started
Accomplishments Goal 10: Water Quality

Goal

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

A. Overview of Accomplishments to Date and Challenges for this Goal

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

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

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

To make the river suitable for swimming will benefit eager bathers on hot summer days and will also promote other recreational and economic activities associated with a healthy water resource. The Estuary Program, through DEC’s Division of Water, is focusing on four primary strategies: 1) seasonal disinfection of municipal wastewater discharges; 2) reduction of combined sewer overflow (CSO) impacts; 3) local implementation and compliance with the Phase II Stormwater Permit Program to reduce runoff impacts, and 4) continued support for vessel waste pump-out facilities to maintain the No Discharge Zone status of the Hudson. While these strategies will be applied to the entire length of the river and its tributaries, initial efforts will focus on the Capital District area. Wastewater, stormwater and combined sewer overflows from a number of municipalities along both sides of the river continue to discharge elevated levels of pollutants into the stretch known as the “Albany pool,” making those waters unsuitable for swimming despite the growing popularity of the area for spontaneous swimming from rocky shores or from boats. SPDES Permits for all municipal dischargers to the Hudson are being revised to require dry weather seasonal disinfection. As of 2010, 43 of 44 permits have been issued, and one is
undergoing technical review. To date, 11 communities have received a total of $4.2 million for disinfection at 12 sewage treatment plants.

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. In 2010, DEC updated the New York Stormwater Management Design Manual to require the use of a green infrastructure approach for projects seeking coverage under the SPDES General Permit for Stormwater Associated with Construction Activities (GP-0-10-001). This update requires runoff reduction and evaluation of green infrastructure techniques. In 2011, DEC conducted 17 outreach and training sessions in the Hudson River Watershed and trained over 1000 design professionals and municipal officials on green infrastructure requirements. Watershed management and planning, where protecting forests, wetlands, and streamsides is a priority, is underway in many waterways in the HRE watershed. Some of the watersheds where outreach on these strategies is ongoing exists in the Onesquethaw-Coeymans, Stockport, Lower Esopus, Fall Kill, Casperkill, Wappinger, Fishkill, Moodna, Rondout, Ramapo, and Sparkill. Mini-grants were awarded to a number of these efforts to implement the community-led watershed plans and protect water quality. The NYS Department of Health Source Water Assessment Program (SWAP) has completed assessments and identified threats to be addressed. In 2011, the Estuary Program is currently reviewing the SWAP documents to inform a more focused source water outreach program in the near future.

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

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 EPA 2012 Clean Watersheds Needs Survey (CWNS) and Report to Congress will run throughout the 2012 calendar year, with states entering information for EPA review. EPA is expected to deliver the Final CWNS Report to Congress late in 2012.

B. Status of progress on the specific 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 for the period 2010-2014 to achieve long-range targets that address the following three themes:

1. Achieving swimmable water quality
2. Providing water and sewer infrastructure for community growth and revitalization
3. Managing water quality for human benefits and for the watershed’s ecosystem
**Goal 10 Long-Range Target 1 - Achieving Swimmable Water Quality:** By 2020, achieve swimmable water quality along the entire main stem of the river, except following storms. All forms of outdoor recreation on the estuary, including swimming, will be considered routine and popular summertime activities, with new beaches and floating swimming pools drawing more and more New Yorkers to the waterfront each year [links to goals 1, 4, 6, 7 and 11].

**Planned Action 1. Pathogens:** 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.

**Progress in 2010 & 2011:** SPDES Permits for all municipal dischargers to the Hudson are being revised to require dry weather seasonal disinfection. As of 2010, 43 of 44 permits have been issued, and one is undergoing technical review. To date, 11 communities have received a total of $4.2 million for disinfection at 12 sewage treatment plants.

**Planned Action 2. Sewer overflows:** Address impacts from combined sewer overflows (CSOs) through implementation of Long-Term Control Plans and best management practices adopted for Hudson River municipalities.

**Progress in 2010 & 2011:** Long-Term Control Plans for CSOs are being developed for all municipalities with CSO discharges to the Hudson. As of 2010, four of the municipalities (Yonkers, Poughkeepsie, Catskill, Hudson) have adopted/approved Long Term Control Plans. Plans have been prepared and are now being evaluated for Newburgh, Kingston, Waterford and the six (6) Albany Pool communities – Albany, Rensselaer, Troy, East Greenbush, Bethlehem and Watervliet. CSO controls for Cosxackie and the North River CSOs in New York City are being addressed thru Consent Orders.

**Planned Action 3. Stormwater:** Fully implement and ensure continued compliance with Phase II stormwater permits for Hudson River municipalities.

**Progress in 2010 & 2011:** The administration of Phase II Stormwater program is the responsibility of DEC, with strong reliance on a broad partnership of local agencies and programs to support education and implementation of the best management practices. In 2010, DEC provided outreach materials, training programs, and direct technical assistance to over 75 municipalities.

**Planned Action 4. Green infrastructure:** Promote green infrastructure techniques, such as rain gardens, green streets and other low-cost approaches throughout the Hudson River watershed to help support efforts to control CSOs and stormwater runoff and promote groundwater recharge.

**Progress in 2010 & 2011:** In 2010, DEC updated the New York Stormwater Management Design Manual to require the use of a green infrastructure approach for projects seeking coverage under the SPDES General Permit for Stormwater Associated with Construction Activities (GP-0-10-001). This update requires runoff reduction and evaluation of green infrastructure techniques. In 2011, DEC conducted 17 outreach and training sessions in the Hudson River Watershed and trained over 1000 design professionals and municipal officials on green infrastructure requirements.

**Planned Action 5. Vessel waste:** Continue to promote compliance with the vessel waste No Discharge Zone designation in the Hudson River estuary by supporting the establishment of additional pump-out facilities.
Progress in 2010 & 2011: NYS EFC administers the Clean Vessel Assistance Program (CVAP) to provide funding for the construction, upgrade and maintenance of vessel pumpout facilities. Funding is available and applications are being continuously accepted for eligible projects.

Overall Status of Goal 10 Target 1:
- [ ] Done
- ☒ Underway
- [ ] Not started

Goal 10 Long-Range Target 2 - Providing Water and Sewer Infrastructure for Community Growth and Revitalization:
By 2020, have funding and contracts in place to support construction of water and sewer facilities in river communities to assure that these are quality places to live, work and play [links to goal 9].

Planned Action 1. Planning: Develop and maintain programs and plans to meet the 2020 target.

Progress in 2010 & 2011: The Environmental Facilities Corporation (EFC) has a list of facilities who are seeking funding called the Intended Use Plan Projects funded by EFC are listed on the EFC website. In 2010, federal economic stimulus funds allowed a number of Hudson River projects to be approved for implementation. In addition, a December 2010 conference on Water Resources and the Regional Economy drew economic development and environmental constituencies together to address the linkages between water and sewer infrastructure needs and economic growth potential of the valley. This dialogue will continue in 2011.

Planned Action 2. Needs assessment: Complete a needs assessment for Hudson River shoreline communities, including cost estimates for long-term infrastructure needed to revitalize these population centers.

Progress in 2010 & 2011: 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 EPA 2012 Clean Watersheds Needs Survey (CWNS) and Report to Congress will run throughout the 2012 calendar year, with states entering information for EPA review. EPA is expected to deliver the Final CWNS Report to Congress late in 2012.

Planned Action 3. Pilot projects: Undertake pilot projects in areas of highest need.

Progress in 2010 & 2011: The cities in the Albany Capital region are evaluating priority CSO abatement projects. When implemented this Long Term Control Plan can be expected to produce water quality improvements that benefit the cities of the region economically.

Planned Action 4. Environmental justice: Improve infrastructure in disadvantaged neighborhoods as part of a revitalization strategy.

Progress in 2010 & 2011: Environmental justice is a criterion in the rating system for water quality improvement projects. In 2010, a project to “daylight” the Saw Mill River in Yonkers received a $2 million grant from DEC. The Mayor has identified this project as a major economic stimulus for distressed neighborhoods in this city.

Planned Action 5. Funding partnerships: Secure federal funding partnerships to address the cost of infrastructure upgrades.
Progress in 2010 & 2011: In 2010, federal economic stimulus funds allowed a number of Hudson River projects to be approved for implementation. In 2010, federal economic stimulus funds allowed a number of Hudson River projects to be approved in Hudson (C), Middletown (C), Catskill (T) and Counties of Rockland and Westchester.


Progress in 2010 & 2011: The 2010 Sea Level Rise Task Force Report has addressed infrastructure impacts from Sea Level Rise and has identified the need to get location-specific information as a next step.

Overall Status of Goal 10 Target 2:
☐ Done
☒ Underway
☐ Not started

Goal 10 Long-Range Target 3 - Managing Water Quality for Human Benefits and for the Watershed’s Ecosystem: By 2020, have policies in place to protect those natural systems that provide clean and abundant water [links to goals 3, 4 and 5].

Planned Action 1. Aquifers & watersheds Map municipal reservoir watersheds and aquifer recharge areas that provide clean and abundant water

Progress in 2010 & 2011: Reservoir watersheds have been largely mapped through NYSDOW Source Water Assessment Program (SWAP); aquifer mapping projects are underway in collaboration with USGS.

Planned Action 2. Pilot projects: Identify and assist communities willing to pilot conservation measures to protect forests, wetlands and tributary shorelines to protect water resources in the Hudson Valley

Progress in 2010 & 2011: Watershed management and planning, where protecting forests, wetlands, and streamside is a priority, is underway in many waterways in the HRE watershed. Some of the watersheds where outreach on these strategies is ongoing exists in the Onesquethaw-Coeymans, Stockport, Lower Esopus, Fall Kill, Casperkill, Wappinger, Fishkill, Moodna, Rondout, Ramapo, and Sparkill. Mini-grants were awarded to a number of these efforts to implement the community-led watershed plans and protect water quality.

Planned Action 3. Policies: Develop state and local policies for watershed and aquifer protection

Progress in 2010 & 2011:

Planned Action 4. Source water protection: Where feasible, implement watershed and aquifer protection plans to protect drinking water sources

Progress in 2010 & 2011: The NYS Department of Health Source Water Assessment Program (SWAP) has completed assessments and identified threats to be addressed. In 2011, the Estuary Program is currently reviewing the SWAP documents to inform a more focused source water outreach program in the near future.
Planned Action 5. Stream condition: Improve methods of assessing and monitoring the biological condition of streams

Progress in 2010 & 2011: Biological sampling is key component of the NYSDEC statewide monitoring and assessment program. The Rotating Intensive Basin Studies (RIBS) program will return to the Lower Hudson Basin in 2012.

Overall Status of Goal 10 Target 3:

☐ Done
☒ Underway
☐ Not started
Accomplishments Goal 11: Contaminant Reduction

Goal

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

A. Overview of Accomplishments to Date and Challenges for this Goal

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

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

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

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

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

B. Status of progress on the specific actions planned for 2010-2014

To achieve the goal of reducing contaminants and removing or remediating river sediments, we plan to implement specific actions for the period 2010-2014 to achieve long-range targets that address the
following two themes:
1. Managing contaminants through continued monitoring, modeling and tracking down hotspots
2. Managing sediment with improved design and practices

Goal 11 Long-Range Target 1 - Reducing Contaminant Concentrations: By 2020, projects to reduce dioxins and legacy PCBs will be completed, and new contaminant sources will be targeted for reduction [links to goals 4 and 10].

Planned Action 1. Vulnerable brownfields: Identify contaminant sources that may be affected by increases in sea level and storm events.

**Progress in 2010 & 2011:** The NYS Sea Level Rise Task Force Final Report (released December 2010) includes recommendations for taking sea level rise impacts into consideration in determinations of threat significance under the NYS Inactive Hazardous Waste Disposal Site Program, determinations of eligibility under the brownfield programs, and remedial decisions under these and the state’s other cleanup programs (e.g., oil spills and cleanup measures undertaken as part of the implementation of the Environmental Quality Bond Act).

Planned Action 2. CARP model: Use the 2007 Contaminant Assessment and Reduction Project (CARP) model to identify practical targets for contaminant reduction in the estuary. Refresh the CARP model with periodic monitoring to check for progress. Conduct recommended scientific investigations to strengthen the model. Define a work plan to attain appropriate contaminant concentrations by 2020, and set targets for reducing contaminant levels in sediment sources.

**Progress in 2010 & 2011:** No action in 2011.

Planned Action 3. Track-down: 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.

**Progress in 2010 & 2011:** No action in 2011.

Planned Action 4. New chemicals: Review other chemicals that may become targets for future resolution.

**Progress in 2010 & 2011:** Draft Division of Water guidance has been prepared to include a large number of new/revised ambient water quality guidance values to protect human health and aquatic life. In 2011, it is undergoing internal review. Work is progressing on the next federally-mandated Triennial Review of the state’s water quality standards as well.

Planned Action 5. PCBs: Work with the EPA as it implements the PCB dredging project in the upper Hudson.

**Progress in 2010 & 2011:** The DEC Division of Water Sediment Assessment Unit and Hudson River Estuary Program coordinates with DEC Division of Environmental Remediation and EPA 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 EPA throughout 2010 to help plan Phase 2 and was able to bring about important improvements in the standards for Phase 2. 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 PCB’s by reducing the number of times a Certification Unit (CU) was dredged. Most of the CU’s 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. The in-water PCB concentration remained low and the dredging project remained on target to achieve the 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 EPA guidance. Combined with previous years, a total of 650,000 tons has been dredged from 125 acres of the upper Hudson.

Overall of Status Goal 11 Target 1:

- [ ] Done
- [x] Underway
- [ ] Not started

**Goal 11 Long-Range Target 2 - Managing Sediment:** By 2020, the quantity of sediments entering the estuary system will be managed to support both the navigational activities and the ecological health of the estuary, including shallow water habitats such as oyster reefs [links to goals 2, 5 and 9].

**Planned Action 1. Sediment management plan:** In cooperation with the NY-NJ Harbor Estuary Program (HEP), complete a sediment management plan that addresses both navigational and ecological concerns. Maintain a monitoring program to characterize sediment sources to the estuary and sediment movement.

**Progress in 2010 & 2011:** The NY/NJ HEP has adopted a sediment management plan which needs to be expanded to the rest of the estuary. No action was taken on this in 2010.

**Planned Action 2. Sediment management practices:** Develop regional sediment management tools, and implement programs needed to promote soil and water management practices throughout the estuary.

**Progress in 2010 & 2011:** In 2020, local implementation of recent stormwater regulations will yield soil erosion prevention actions in affected communities. Plans are underway to develop a sediment management plan for the Hudson River Estuary watershed at Cornell.

**Planned Action 3. Beneficial re-use:** Reuse dredged sediments where such use is determined to be protective of the public health and the environment.

**Progress in 2010 & 2011:** This continues to be studied.

**Planned Action 4. Research and objective setting:** Establish the research capacity to inform a sediment management plan to be implemented through Goal 11 targets. In concert with Goal 2, set sediment objectives for the Hudson to assure that impacts on navigation, benefits to wetlands, concerns about sea-level rise and impacts from storm events associated with climate change and erosion are understood and properly addressed.
Progress in 2010 & 2011: With support from the NY/NJ Harbor Estuary Program, sediment stations collected data in 2010 from stations on the upper estuary that will provide some of the information needed for this research.

Overall Status of Goal 11 Target 2:

☐ Done
☒ Underway
☐ Not started
Accomplishments Goal 12: Celebrate Progress and Partnerships

Goal

Track our progress, and celebrate our successes!

A. Overview of Accomplishments to Date and Challenges for this Goal

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

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

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

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

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

In 2010-2011, 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 (HRECONS). We have also expanded our environmental baseline in the Hudson Valley to understand changes in land use, and we have improved our baseline understanding of fish habitat, and sediment transport from the tributaries.
B. Status of progress on the specific actions planned for 2010-2014

To achieve the goal of tracking our progress and celebrating our successes, we plan to implement specific actions for the period 2010-2014 to achieve long-range targets that address the following four themes:

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

Goal 12 Long-Range Target 1 - Monitoring Ecosystem Condition and Tracking Program

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

Planned Action 1. Baseline conditions: Document and consolidate data on baseline ecological conditions, and, where lacking, collect needed baseline information

Progress in 2010 & 2011: See HRECOS (below).

Planned Action 2. Indicators: Select a set of key environmental indicators for the watershed ecosystem that will monitor environmental conditions as well as the outcomes of our efforts.

Progress in 2010: Project will begin in 2012.

Planned Action 3 Tracking progress: Enhance existing monitoring programs, and streamline performance reporting to improve our tracking against baselines.

Progress in 2010 & 2011: This report constitutes our progress on performance reporting. In addition, enhanced monitoring since 2010 has included the continued build-out of HRECOS (see below) development of citizen monitoring methods for species of conservation concern (see Goal 3) and improved methods for measuring fish use of habitat.

Planned Action 4: Promote knowledge of the current condition of the Hudson River ecosystem through the Hudson River Environmental Conditions Observing System (HRECOS)

- Provide high-frequency, real-time data of defined quality in formats accessible by scientists, managers and recreational users on water quality, weather conditions and other variables, describing environmental responses to cyclic and episodic events.
- Improve the capacity of governmental and research entities to understand the ecosystem by providing timely monitoring data sets and products applicable for research, modeling, decision-making, education and future technological innovation.
- Complete the implementation of HRECOS by extending the network into the Mohawk River, upper Hudson and elsewhere in the state by installing webcams and by installing pumping stations that will allow investigators to obtain water samples at any time.

Progress in 2010 & 2011:

Governance and Partnerships:

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 and offer promising opportunities for collaboration in 2012.

Quality Assurance:

Quality assurance quality control documents were completed in 2010 for the collection of HRECOS data. Three of these documents have been approved by the EPA. It is our goal that all HRECOS quality control documents receive EPA approval.

The HRECOS database was modified in 2010 to enable the quality assurance protocols described above. This effort was the result of collaboration between the Hudson River Estuary Program and the Stevens Institute of Technology.

In 2011, HRECOS completed its first year collecting data following newly adopted quality assurance quality control guidelines. Some partners followed these quality guidelines more closely than others, and measures are being taken to ensure the quality of future data collection. These guidelines will be updated in 2012 to reflect what we learned in our first year.

User Engagement:

Thirteen presentations were prepared and delivered in 2010 to specific user communities including Hudson River Pilots, Emergency Managers, Habitat Managers, Regulators, Academics, and Educators. These relationships were continued through 2011 through smaller less formal interactions. The dialog from these discussions helped to guide the HRECOS Management Team in the development of the HRECOS Project Plan.

Network Expansions:

HRECOS expansion in 2010:
- A mobile station was added to the beautiful sloop Clearwater.
- The sediment monitoring stations in 6 major tributaries to the Hudson Estuary were partially funded allowing for preliminary data collection from these previously dormant sites.
- A new hydrologic and meteorological HRECOS station was constructed in the Port of Albany.
- A pump station was designed for the Marist Campus.
- Three outdoor educational displays were funded for the Norrie Point Environmental Center, the Walkway Over the Hudson, and the Piermont Pier.

HRECOS expansion in 2011:
- Elevation datums were established at five of the nine HRECOS stations enabling water level comparisons between these sites.
- Construction began at the Poughkeepsie Pump Station with the final approval of the city of Poughkeepsie.
- A new hydrologic HRECOS station was installed in the Mohawk at Lock 8 to provide flood alarms during ice jams to the Schenectady County Office of Emergency Management.
Sediment Monitoring:

The HRECOS sediment monitoring network completed its first year of data collection in 2011. Preliminary data will be 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.

Funding Sources:

In 2010 and 2011, HRECOS received funding from the following sources: EPA's Harbor Estuary Program, NOAA’s National Estuarine Research Reserve System, NYS DEC Divison of Water, NYS DEC Hudson River Estuary Program, and NYS DEC Environmental Benefit Funds.

These funds were applied to the above expansion projects as well as basic maintenance and operation of the HRECOS network. Currently, the operation of this network is still very dependent on partner contributions of supplies and staff time.

Planned Action 5. Reporting change: Gather and analyze information on baselines and indicators of change with time in the Hudson River watershed, and use the information to update the State of the Hudson 2009 report. Additional economic and social indicators related to the use of natural resources by people and communities will be developed and measured.


Progress in 2010 & 2011: Done, posted to the web.

Planned Action 7. Reporting program progress: Efficiently track progress on all goals, and allow the public to follow our efforts.

Progress in 2010 & 2011: This progress report, which is posted to the web, fulfills that objective.

Overall Status of Goal 12 Target 1:

☐ Done
☒ Underway
☐ Not started

Goal 12 Long-Range Target 2 - Building Partnerships: By 2020, enlist 1,000 partners (municipalities, businesses, non-profits) in implementing this Action Agenda [links to all goals].

Planned Action 1. 500 partners: Enlist 500 partners (municipalities, businesses, non-profits) in implementing this Action Agenda.

Progress in 2010 & 2011: Over 500 partners are currently participating in implementing the program. The possibility of a formal partner sign-up project will be explored in future years.

In December 2011, the NY NJ Harbor Estuary Program Policy Group voted to expand its geographic footprint to include the entire Hudson estuary up to the Troy dam as well as the entire Raritan River watershed. Previously the group had focused its attention on the upper and lower harbor, extending north to Piermont, NY. The rationale for making this change was to better address the watershed ecosystem. The group also voted to change its name to the NY-NJ Harbor & Estuary Program, keeping its acronym unchanged (NY-NJ HEP). It is expected that
this will facilitate even better coordination of the state and federal programs than already occurs.

Overall Status of Goal 12 Target 2:
- Done
- Underway
- Not started

Goal 12 Long-Range Target 3 - Building Accessible Databases: By 2020, ensure that Hudson River watershed databases, maps and reports are available to partners and the public through web-based interactive applications [links to goals 2, 3, 4, 5 and 6].

Planned Action 1: Ensure that key databases, maps and reports generated by Estuary Program projects since 1996 are readily available to our partners and the public.

Progress in 2010 & 2011: In 2010, an archive system was implemented. River bottom maps were made more web accessible, and information on small wetland and amphibian conservation was posted to the web. The Estuary Program web site is regularly enhanced with current documents, reports and maps. GIS databases continue to be developed for information sharing for the public, including a new project underway on scenic resources.

Planned Action 2: Continue to provide maps, training, documents and resources to support all goals of the Action Agenda.


Overall Status of Goal 12 Target 3:
- Done
- Underway
- Not started

Goal 12 Long-Range Target 4 - Celebrating Progress: By 2020, progress on the estuary will be recognized through regional celebrations and events [links to goal 8].

Planned Action 1: Annually celebrate National Estuaries Day (the fourth Saturday in September).

Progress in 2010 & 2011: Hudson River National Estuarine Research Reserve annually hosts a Science on the River event for National Estuaries Day. In addition, the annual Hudson River Valley Ramble includes river-based events in honor of Estuaries Day.

Planned Action 2: Publish stories about what we have learned, and make them accessible to the public on the web and through other media. See Goal 8, Target 4.

Progress in 2010 & 2011: Posted to the web.

Planned Action 3: Encourage artists and writers to include river issues in their work.


Overall Status of Goal 12 Target 4:
- Done
- Underway
- Not started