

**New York State Department of Environmental Conservation
Hudson River Estuary Program, Region 3**

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Commissioner

To: Hudson River Estuary Management Advisory Committee
From: Fran Dunwell
Re: Status of Hudson River National Resource Science and Management
Date: June 6, 2007

At our last meeting the Committee asked that DEC address how our scientific work and data gathering is being used to manage the natural resources of the estuary and what gains we have produced for the ecosystem. The following is a summary of that, with an emphasis on the natural resource management goals of the programs.

Goal 1 Fisheries:

Our focus since 1987, when the estuary Program first began, has been on maintaining and restoring the anadromous species of the river-shad, sturgeon, striped bass-and the resident game fish largemouth and smallmouth (“black”) bass. Enhanced funding for the program in 1996 allowed the Hudson River Fisheries Unit (HRFU) to continue functioning at a time of agency-wide staff decline and to conduct specific studies that would allow us to better manage these fisheries. It also allowed the DEC to address the status of blue crab and American eel, species about which little was known on the Hudson.

American Shad (*Alosa sapidissima*):

From colonial times through World War II, the shad fishery was significant. Shad was the second most harvest fish species on the Atlantic coast. In the mid 1980s shad fishing began to decline on the Hudson and elsewhere. In 1998, DEC shad data showed a stock on the verge of collapse. Shad is a species that does not recover well once it goes below a certain threshold. Shad production in the Hudson and coast-wide is now precarious. Since 1996, we have been able to undertake studies of the causes, demonstrating that over-fishing reduced the number of shad reaching their spawning grounds. The evidence we produced helped convince the Atlantic States Marine Fisheries Commission (ASMFC) to order a closure of the coastal shad fishery, which took effect in 2005. However, by the time action was taken, shad stocks were quite low. Juvenile production in the river reached a record low in 2002 and has stayed low since then. In 2007, DEC is participating in a coast-wide shad assessment which compiles the data of all Atlantic coast states. It is now nearing completion and will go through peer review. Several possible causes of the continuing decline are being examined, including:

- over-fishing. This includes bycatch that occurs in various east coast fisheries such as for weakfish, bluefish, striped bass, and the emergence of a large industrial scale commercial ocean herring fishery in Maine, which may be harvesting large numbers of juvenile shad traveling in schools with ocean herring.
- Other sources of mortality may include predation of striped bass and mortality from power plants

Effective management of shad at this point requires that we further pinpoint the causes of decline and that we limit mortality from as many sources as possible.

Striped bass (*Morone saxatilis*)

In the 1970s and 1980s, through the Hudson stocks were relatively robust, coastal stocks of striped bass had dropped to low levels, prompting the development of a recovery plan by the ASMFC. Coastwide fishery restrictions were implemented including commercial harvest reductions and size and bag limits for sport fishing. These restrictions allowed east coast stocks to rebound, including the Hudson's. New size/weight records have been achieved on the river within the past three years. Recreational fishing on the Hudson has become increasingly popular every year. The Hudson River stock of striped bass reached a plateau in the late 1990s and remained stable. In the past years however, the stock has begun to show signs of decline. The state's goal is to maintain the current population level by monitoring, reducing mortality if necessary. Studies conducted by the Estuary program demonstrated a high level of loss from recreational catch and release fishing. The DEC is proposing a regulation requiring the use of circle hooks, which have been shown to reduce the number of fish that die after release. The commercial fishery for striped bass remains closed.

Atlantic sturgeon:

In 1996, the state closed its commercial sturgeon fishery after studies by the DEC's HRFU, supplemented by research funded by the Hudson River Foundation, showed that juvenile recruitment had reached exceedingly low levels. Because sturgeon take so long to mature, this would be expected to show up in the adult population a decade or more later. The Estuary Program, through the Bureau of Marine Resources, working with the US Fish and Wildlife Service, focused on developing a method to measure juvenile abundance to track recovery of the stock. Additional studies explored sturgeon habitat use by outfitting juvenile fish with sonic tags and adult fish with satellite and sonic tags to track their movement in the estuary and along the Atlantic coast. This work was greatly facilitated by the development of detailed, digital river bottom maps (see aquatic habitat below). This work will be used in updating the Significant Coastal Habitat maps of the NYS Department of State to better manage projects such as dredging to avoid times of year and locations known to be especially sensitive. These studies are underway but are already revealing some useful information. We now know that juvenile fish overwinter in the Haverstraw Bay and Tappan Zee, and they spend their summers in the Highlands. Adult sturgeon travel up and down the river extensively throughout the spring and summer after spawning. When adults leave the estuary, they sometimes go south in the summer, and north in the fall-something which was not expected. Satellite tags from our fish, which are programmed to pop off after 6 months to a year later, then transmit the electronic information to us, have been found in coastal water of Virginia and Delaware and off the coast of Long Island.

Blue crab, (*Callinectes sapidus*)

This species is relatively more abundant in the Hudson in recent years. Previously unstudied on the Hudson, we now know that most of the crabs overwinter in New York harbor. Males move north up the river in spring and can be found all the way to Troy. Females concentrate in the brackish reaches of the estuary. No new management actions have been taken yet for crab as a result of these studies. The sport and commercial fishery remain open. A state health advisory warns against eating the hepatopancreas (the “mustard”), where contaminants such as cadmium are known to concentrate.

American eel (*Anguilla rostrata*)

Coast-wide, stocks of eel are in decline. The Estuary Program, through the DEC Bureau of Marine Resources, has been studying juvenile eel numbers in the mouths of tributaries in spring when they leave the estuary to ascend the creeks. Previously unstudied, there is no baseline for studying the trends with this species. Our work, now in its fifth year, will create such a baseline.

Goal 2 Aquatic habitat:

Our work in this area has focused on developing baseline maps of river habitats, exploring their function in the river ecosystems, beginning to assess trends of change over time, and conserving habitats through measures such as educational outreach to river users, acquisition, and regulation. Through the Bureau of Marine Resources and the Hudson River National Estuarine Research Reserve, we have mapped the entire deep water sections of the river bottom from Troy to the Verrazano Narrows, and we are now developing a technique for mapping the shallow waters through a pilot project that is expected to begin in about 18 months. Submerged aquatic vegetation beds have been mapped and studied for their ecosystem benefits, which we can show are substantial in terms of providing oxygen to the river, providing structure for macroinvertebrates, and filling a niche in the food chain that has been substantially disrupted outside these beds by the arrival of zebra mussels in the river.

Information gathered about habitat locations, functions, and patterns of change are being used to inform regulatory decisions about federal and state permits, as well as management decisions about land acquisition, habitat restoration, control of invasives, and management of state land. We believe these add up to both reductions of losses and actual gains in habitat area and function. Our work on habitat will be used in updating the Significant Coastal Habitat maps of the NYS Department of State, giving greater protection to these resources. One important next step is to finish our shallow water mapping, in order to better project the impacts of sea level rise on the Hudson River ecosystem’s complement of habitats. A second important next step is to understand the functions of Hudson River shoreline habitats in order to better protect vital habitats as humans respond to sea level rise. A third important step is to better link habitats with the fauna they support: fish, crabs, and other invertebrates.

Goal 3 – Plants Animals and Habitats

The Estuary Program, through DEC Bureau of Wildlife has conducted extensive natural resource inventory at both fine scale and landscape scale to map habitat complexes of the watershed and identify significant habitats for conservation. This has included inventories of breeding birds, reptiles, amphibians and endangered species as well as satellite mapping of large landscape blocks, and field work to identify habitats in area where information is notably lacking. Through a partnership with the Natural Heritage Program, we have developed methods to identify the area of conservation need around endangered species habitat and significant habitat areas and provide that information in web-accessible formats and on maps. Partnerships with the Wildlife Conservation Society, Cornell University and Hudsonia have allowed us to build these maps and data sets and communicate the results to the public. Our scientific program forms the basis of an extensive outreach program to influence land use decisions at the local level by informing elected and appointed officials and citizens. Master plans are being updated to incorporate biological information, and ordinances are being passed to protect resources at the local level. We assist local decision-makers with conducting biological assessments of towns or watersheds that help them to conserve watershed areas that are important to the estuary. Local actors incorporate survey results into land use plans, land-use guidelines, open space acquisitions, and regulations. The Estuary Program provides technical assistance to local decision-makers to help them correctly interpret and use the scientific information. In short, our implementation strategy assists communities with creating a secure and stable watershed environment for ourselves and the organisms of the estuary. This includes an abundant and appropriate supply of food, water, air, and shelter.

The process takes time and sustained engagement. Political will and the availability of technical and financial assistance are important factors in determining whether or not communities will engage in conservation planning. Next steps are to develop and provide communities and partners with information to maintain ecological connectivity and woodland pool complexes. Continue to offer technical assistance that raises local government capacity to engage in proactive, landscape planning. Provide communities with data and information they need to manage the watershed's biological resources – this keeping the estuary ecosystem healthy for future generations. The committee can help by communicating that it is absolutely essential to conserve the biodiversity of ecosystems that stabilize the watershed and its inputs to the estuary. This is particularly important as development and climate change advance. The program needs to continue to support capacity building at the local level while pushing for enforcement of existing regulations.

Goal 4 – Tributary streams

The NYSDEC Biomonitoring Unit and Hudson Basin River Watch are assessing streams in the Hudson Estuary watershed to understand the health of freshwater streams based on benthic macro invertebrate indicators. These assessments are used to identify water quality trends as well as sources of impact to the stream based on the community composition collected at a site. This information is then used to illustrate impacts on waters and to encourage water protection actions at the local level thru the development of watershed plans. These measures are also being

incorporated into Watershed Report Cards. Developing and disseminating watershed plans and report cards are done by engaging and educating local decision makers and community leaders.

A significant component of watershed plans is collecting all existing information on watershed integrity, including biological information. They serve as reference material for future watershed conservation action. We are also working to use sediment monitoring in similar way, i.e., to illustrate impacts and encourage local actions.

Eventually, we expect to succeed in collecting baseline in-stream biological information on many streams in the Hudson Estuary watershed. We are focusing on systematically assessing watersheds at key locations to create a holistic perspective of tributary health. The intent is to use this information to protect high quality streams due to nonpoint source runoff and aging infrastructure. Overall buildout and disturbance in the watershed will lead to a continued loss in high quality streams, while costly upgrades to sewage treatment plans will improve the lowest quality streams. This will eventually lead to a “migration toward mediocrity” of stream health. Such progress is best characterized as “mixed,” but alternate outcomes are likely out of our control.

The ecosystem gain is likely be that our actions minimize future impacts to water resources, compared to greater impacts that may have resulted without our efforts. Our most optimistic outlook may be holding the line on stream degradation to a slightly impacted state, while also minimizing inputs of sediment and pollutants to the Estuary and Harbor. Given the anticipated continued growth in the basin, this would be a true success.

Next steps are to continue current outreach to watershed groups, community leaders, and other relevant stakeholders. We recently initiated a riparian buffer-program to promote the protection of riparian areas and rehabilitate/revegetate degraded riparian areas. We also need to develop and distribute tools for municipalities to integrate better site design and riparian buffer protection into their local codes.

Goal 5 & 6 – Landscape and Scenery

The data collection efforts on landscape and scenery have focused on creating a powerful GIS tool with information on protected open space, habitats, access points, trails and other geographic data. The Landscape goal is moving along well and will achieve most of its targets by 2009. There are two items for this goal that will need the support of the committee: 1) Development of the Protected Land data layer to determine where protection efforts should be focused and to track successes to data 2) Support for a statewide cost-sharing program for private forest landowners (Target 2). Our ability to meet several of the Scenery targets depends on the ability to complete a study to determine the additional scenic vistas to conserve.

Goal 7 – River Access

The Estuary Program has focused significant effort in 2006-2007 on meeting the goal of one new or improved access per community and on integrating our information on access needs with maps of sensitive natural resources to avoid conflicts. Management decisions are made on a case by case basis as opportunities arise. However our scientific information and GIS systems have made it possible to analyze potential conflicts quickly and efficiently.

Goal 8-Education

The Hudson River Estuary Program's education initiatives use data gathered through many Action Agenda projects in public presentations, interpretive signs, curriculum, website information and publications to provide up to date information to schools and the public. For example, through the DEC Bureau of Public Affairs and a partnership with Cornell University, lesson plans use science. Hudson River national Estuarine Research Reserve uses data collected at Reserve sites to inform the public of resource management issues through training programs, classroom initiatives and publications. To develop a baseline of public understanding that will help us measure the success of our educational programs, we will soon be undertaking a public of levels of understanding of the estuary its conservation needs.

Goal 9 – Waterfront Revitalization

Currently, the scientific work of the program is incorporated into waterfront planning on a case by case basis through the development Local Waterfront Revitalization Plans (LWRPs), mainly dealing with habitat and access considerations. In some places where resources are significant, outreach and training is being conducted with municipal officials and community leaders. In the coming months, the Estuary Program, through a Bureau of Marine Resources will also update the Significant Coastal Habitat maps of the NYS Department of State, which will provide more systematic integration.

Goal 10 & 11 – Water Quality

In line with the goal of achieving swimmable water quality on the Hudson we are creating a baseline data set for pathogens in the Albany pool. This will allow us to track our progress in meeting this goal. The Division of Water has identified the key trouble spots and has developed a list of priority sites for disinfection of sewage treatment plant effluent, which is the most important step to take in achieving this goal. On the Estuary, effluent is already except in the Albany Pool.

The goal of reducing contaminants in the estuary is being assisted through the Contaminant Assessment and Reduction Project through the New York New Jersey harbor program. Its phase 1 model is now complete and identifies PCB remediation as the number one action to be taken to restore water quality in the Hudson. Through many other sources of contaminants were identified, this remains the big problem and the big opportunity on the Hudson.

Goal 12 – Track and Celebrate

Our emphasis in the last year has been on developing performance measures for tracking progress on all goals. Through the Research Reserve and our participation in the Integrated Ocean Observing System program we are investigating ways to deploy real-time monitoring stations that can be used to predict storm surges, assess water quality and meet other user needs.