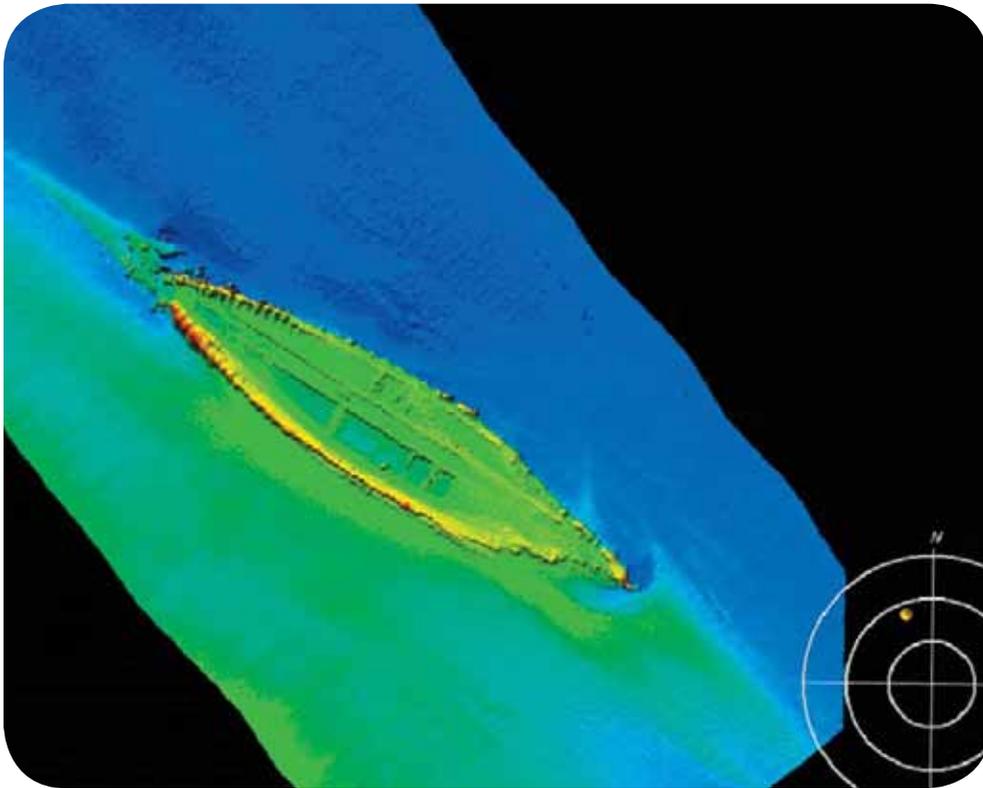


River and Shoreline Habitats

The Hudson River Estuary Program is currently taking steps to conserve our remaining native species by protecting the habitats on which they depend.

Key habitats of the Hudson ecosystem—wetlands, underwater plant beds, shoreline, and river bottom—have been drastically altered by human actions over the last 400 years. Dredging, filling, rip-rapping and bulk-heading have changed the physical characteristics of river habitats. In addition,

the arrival of new plant and animal species from places as far away as Asia can alter food webs and habitats and their ability to support living creatures. Today, maintaining the quality and quantity of remaining river habitats is crucial to the fish and wildlife of the Hudson.



Amazing new images of the river bottom developed by the Estuary Program are changing the way people look at the river. As a result, we are able to answer key questions about how the river serves as fish habitat, how the bottom changes over time and how contaminants move. This work has also helped historians. This image shows a nineteenth-century schooner. Studies by marine archaeologists suggest that this vessel may have been deliberately scuttled.



Non-native species such as the above water chestnut as well as zebra mussels and phragmites below have profoundly changed Hudson River habitats. Studies by the Estuary Program and its partners show how these species affect the ecosystem, often negatively.



Zebra mussels have caused profound changes in food webs by filtering out most phytoplankton (microscopic plants) and depriving fish of this important food source.



Volunteer kayakers help measure the size and location of aquatic vegetation beds.

Ten years ago, Hudson River habitats had not been comprehensively mapped, making it virtually impossible to protect and manage them. To correct this, we launched an effort to measure the size and location of key habitat types and study how each contributes to the river's life. Working with many partners, biologists in DEC's Division of Fish, Wildlife, and Marine Resources (DFWMR) have mapped 85 percent of the habitat on the Hudson, creating baseline measurements of deep river bottom, submerged aquatic vegetation (SAV), shoreline structure, and tidal wetlands. We have gained a

much better understanding of how and why these habitats are important to the Hudson ecosystem. With this information, we can measure change over time, guide development to less sensitive areas, and assess the potential for restoration and enhancement of certain habitats. We are now informing river users about these habitats so they can become good stewards of these vital resources. Ecosystem research and education is delivered through the Hudson River National Estuarine Research Reserve to promote the use of scientific information by coastal communities.



Submerged Aquatic Vegetation (SAV) provides shelter for blue crabs.



Over the past 10 years, Estuary Program studies have revealed the vital role of aquatic plants in supporting the Hudson's fish populations. Vegetation is an essential part of the Hudson ecosystem, providing oxygen needed by wildlife, sheltering small fish and offering habitat for aquatic insects and other small creatures that form the building blocks of the food web.



Water celery, a valuable native aquatic plant is also shown above right.

Websites for more information:

River bottom maps: www.benthic.info
Hudson River National Estuarine Research Reserve:
NYSDEC DFWMR Bureau of Marine Resources
www.dec.state.ny.us/website/dfwmr/marine/index.html
NYSDEC Bureau of Habitat
www.dec.state.ny.us/website/dfwmr/habitat/index.htm

To order the tidal wetland interactive map email
HREP@gw.dec.state.ny.us
DOS Division of Coastal Resources
Significant Coastal Fish and Wildlife Habitats
www.nyswaterfronts.com/waterfront_natural_resources.asp

Plants and Animals of the Hudson River Valley

The Hudson River Estuary Program is taking steps to conserve native species of the valley and the habitats on which they depend.



For more than 100 years, no bald eagles nested in the Hudson Valley. In 1997, eagles returned to the shores of the Hudson to breed and successfully fledge their young. The Estuary Program helped track the migratory patterns of Hudson River eagles and study levels of PCBs in this fish-eating bird. We have also purchased shoreline properties that protect their habitat.

The Hudson Valley is a place of great natural beauty, defined not only by its scenery but also by the fall colors of maples, dogwoods and oaks, the songs of red-winged blackbirds, warblers and wrens, and the fleeting movement of wild animals. It is also a station in the great migration pathways of birds, fish and other creatures. However, our extraordinary natural heritage is challenged by changes to the landscape that are happening at a much

faster pace than human population growth, causing habitats to be lost and wildlife variety to decline or disappear from the Hudson Valley forever. This affects the health and survival of people as well. Robust natural areas reduce the spread of disease, reduce the costs of clean drinking water, and provide checks and balances that prevent some wildlife species from becoming pests.



J. Avery/WCS/MCA

Box turtles, barred owls, bears and bobcats have one thing in common. They need large expanses of forest to survive. As woodlands become fragmented, these species decline. The Estuary Program has encouraged villages and towns to adopt local laws that conserve habitat for these species through inter-municipal approaches that help keep forest tracts intact and direct development to the most suitable sites.



Amphibians (frogs, toads, salamanders) are particularly sensitive to pollution and to habitat loss.

Agricultural landscapes like the one below support northern harrisers, bobolink, eastern meadowlark, golden-winged warbler, short-eared owl and several uncommon butterflies. NYS Department of Agriculture and Markets has purchased easements on many Hudson Valley farms to help them remain in agriculture as the region rapidly develops. The Estuary Program has also established demonstration projects for wildlife conservation on farms.



Michael Kemens/LLC

Spotted salamanders, wood frogs, spotted turtles and other species breed in vernal pools—habitats that are generally not protected under state law. Through partnerships, the Estuary Program trained hundreds of citizens to identify these habitats and conserve them locally.

How can we, the earth's human population, conserve the rich natural heritage of plants and animals in the Hudson Valley in ways that support our mutual needs? Ten years ago, the Estuary Program set out to answer that question working through DEC's Division of Fish, Wildlife and Marine Resources. The first step was to determine what is most worthy of conservation and what is most likely to be lost if no action is taken. Using the latest satellite photography and information technologies, DEC and our partners undertook the most extensive biological surveys and habitat mapping of any region of New York State. Wildlife biologists have completed inventories of

reptiles, amphibians, mammals, breeding birds, rare plants, rare animals and exemplary habitats. The second step was to reach out to people who make the decisions about how land is used. Since much of this happens at the local level, we worked with many partners to provide training and outreach to community leaders, builders and landowners to help them better assess and conserve habitats as part of their decision-making process. Protecting habitats will allow a diversity of species to survive and flourish and will support the vitality, natural beauty and environmental quality of the Hudson River Valley.

Websites for more information:

NYS DEC DFWMR
www.dec.state.ny.us/website/dfwmr/index.html

Conservation Guides for sensitive species & habitats:
www.acris.nynhp.org/

DOS Division of Coastal Resources
 Significant Coastal Fish and Wildlife Habitats
www.nyswaterfronts.com/waterfront_natural_resources.asp

NYS Breeding Bird Atlas:
www.dec.state.ny.us/website/dfwmr/wildlife/bba/

NYS Amphibian and Reptile Atlas:
www.dec.state.ny.us/website/dfwmr/wildlife/herp/

NY Natural Heritage Program:
www.nynhp.org

Streams and Tributaries of the Hudson River Estuary Watershed

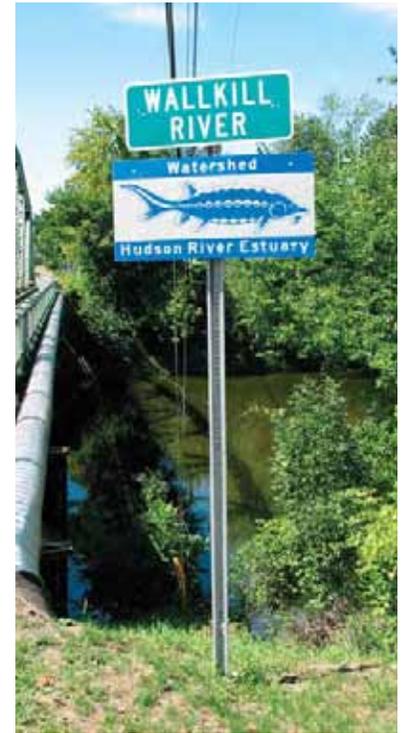
The health of the river is closely linked to the quality of the tributary streams that feed it. The Estuary Program fosters development of local watershed management groups and provides technical assistance.



A stream surrounded by a healthy buffer of trees supports many kinds of fish, birds, salamanders, turtles, crayfish and sometimes river otters. One goal of our stream conservation plans is to maintain or restore forested edges along streams.

Much of the pollution that enters the Hudson today stems from human actions on land, often from far away, that reaches the river through streams. For example, oil and grease from parking lots, fertilizers and pesticides from lawns and fields, and chemicals from landfills all make their way into the Hudson. Pollution isn't the only problem. Paved surfaces keep snow and rain from recharging groundwater. Also, when

it rains, stormwater surges into tributaries, destroying stream banks and habitats. People are affected as well. A heavy rain can destroy houses in flood-prone areas or overwhelm a sewage treatment plant, sending raw waste into a stream or the Hudson. Tax increases for water management improvements and property damage are a frequent result of improper management of water.



Appearing where highways cross tributaries, the likeness of the Hudson River's sturgeon has become the emblem of our conservation efforts. The signs, developed in 1998, remind drivers that protecting water quality in these tributaries is key to preserving the Hudson, its habitats, and its unique fish and wildlife species.



Flooding caused by too much pavement and improper stormwater management can be dangerous and costly to municipalities. These factors also prevent rain from recharging groundwater, affecting drinking water supplies, trees, wetlands and streams. We work with builders, engineers, and municipalities to improve management of stormwater runoff and to adopt local laws that promote conservation.

Five years ago, the Estuary Program created a new watershed outreach initiative working through DEC's Division of Water. The aim has been to promote conservation of streams and tributaries and to reduce the impacts of land use on our water resources. County agencies, universities and local community groups joined in this effort. Now, many municipalities are working with their neighbors in the Hudson Valley to develop watershed management and

stream conservation plans, using strategies to protect and restore water resources. Several towns and cities are also reviewing local laws to better align them with water resource management needs and reduce the effects of stormwater. As public awareness and understanding of the challenges facing our water resources grows, so does the interest and will of citizens, government, non-profits, and academia to preserve those resources.



For seven years, the Estuary Program has partnered with schools and citizens' groups to measure the water quality and biological health of their streams — and to note signs of change.

Websites for more information:

DEC Stormwater Information site:
www.dec.state.ny.us/website/dow/mainpage.htm
 NYS Water Resources Institute
www.wri.eas.cornell.edu
 DEC's Watershed Stewardship site
www.dec.state.ny.us/website/dow/stewop.html

EPA's Menu of Best Management Practices for Stormwater Phase II
www.cfpub.epa.gov/npdes/stormwater/menu-ofbmps/menu.cfm
 EPA's Watershed Website
www.epa.gov/owow/watershed
 DOS Division of Coastal Resources
www.nyswaterfronts.com/waterfront_natural_water-quality.asp