

## A RIVER RICH WITH LIFE

During a visit to the Hudson's shores, one might see eagles soaring overhead, herons fishing along the shore, fish jumping and plants growing in the shallows. This is just a hint of the estuary's biological diversity.

### A Web of Life

A scoop of Hudson River water may contain millions of tiny, free-floating living things. Those that use sunlight to produce the food energy they need—algae, for example—are called phytoplankton. They, in turn, feed insects, crustaceans and other small creatures.

Rooted plants growing below the surface host an array of invertebrate animals, which attract wildlife and fish. The plants also help to maintain water quality by consuming excess nutrients and increasing oxygen levels in the river.

Invertebrates rank first in abundance and variety among the Hudson's creatures. Mollusks, worms, insects, crabs, shrimp and other invertebrates have important roles in the ecosystem. Many of them subsist on living plants or their decaying remains and pass the energy available from these sources on to fish and other predators.

### Fish Stories

More than 200 species of fish call the Hudson ecosystem home for some or all of their lives. Archeological evidence shows that the river's fish have fed humans for thousands of years. American shad were a popular food through 1945; shad roe remains a delicacy today.

The numbers of fish in the Hudson fluctuate naturally and in response to human activity. Loss

of habitat, overfishing and water intakes at power plants have taken a toll. Improvements in water quality have had a positive impact, as have conservation initiatives. Thanks to a fishing moratorium, Atlantic sturgeon numbers—which plunged in the 1990s due to overfishing—now seem to be stabilizing.

Managing the Hudson fishery is complicated because many of its signature fishes are migratory. American shad, striped bass and Atlantic sturgeon spend most of their lives at sea, moving along the Atlantic coast. Protecting them requires cooperation among many states. Coordinated management of striped bass fisheries led to recovery of striped bass populations along the coast and an increase in the Hudson's spawning stock in the early 1990s. Striped bass numbers remain high today. However, American shad populations—fairly robust in the 1980s—have declined to historically low levels. Development of a shad recovery plan is a priority for New York fisheries managers.

### Birds of the Estuary

Birds are a popular barometer of ecological health. Improved environmental quality has benefited a number of the Hudson's bird species over the past twenty years.

Bald eagle and peregrine falcon populations along the Hudson declined drastically in the 1950s and 1960s. Thanks to a ban on DDT use and release of young birds in suitable nesting sites, these raptors have returned to the estuary. Numbers of wintering bald eagles grew starting in the 1980s. In 1997, The New York Times announced the birth of the first bald eagle along the Hudson in a century. In 2008, 31 young eagles fledged from nests along

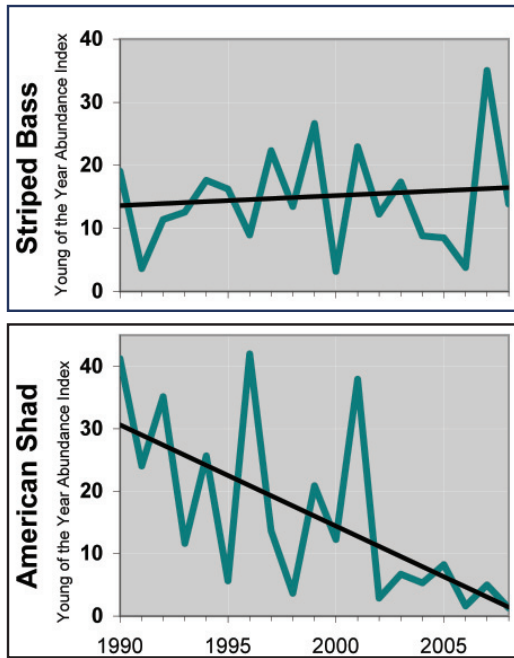
the estuary. Since 2003, peregrines have been nesting on the river's bridges from Albany south, as well as on skyscrapers and bridges in New York City.

During the late 1970s, long absent colonies of herons, egrets and ibises appeared on small abandoned islands in New York Harbor. In 1991, New York City established the Harbor Herons Wildlife Refuge to protect and manage these sites. More than 1,800 nests were counted in 2007.

*Adult Atlantic sturgeon live in the ocean but return to the estuary to spawn. The river's sturgeon were harvested for centuries until steep population declines led to a fishing moratorium in 1996. Since then, biologists have tagged and tracked sturgeon to learn more about their life history and to find spawning areas.*

*Amanda Higgs*





Fish numbers can fluctuate greatly from year to year, but long term trends are apparent. In recent decades, the trend in young striped bass numbers shows overall stability. Numbers of young shad show a declining trend, and since 2002, have not exhibited the significant rebounds typical of healthy populations. Overfishing, predation and habitat degradation are possible factors in the decline.

## Alien Invaders

Walking the Hudson's shores, beachcombers commonly find the four-pointed black seed pods of the water chestnut. Introduced from Eurasia in the late 1800s, it altered the ecology of the Hudson's freshwater shallows, reducing oxygen levels and shading out submerged plants such as the native water celery.

The water chestnut is an example of an alien species imported by people. The Hudson and its tributaries now host more than 100 alien species. The zebra mussel, invasive common reed, rusty crayfish and Chinese mitten crab were all accidentally introduced here through commercial shipping and the bait trade. Largemouth bass, common carp and water chestnut were deliberately released, sometimes with unintended results.

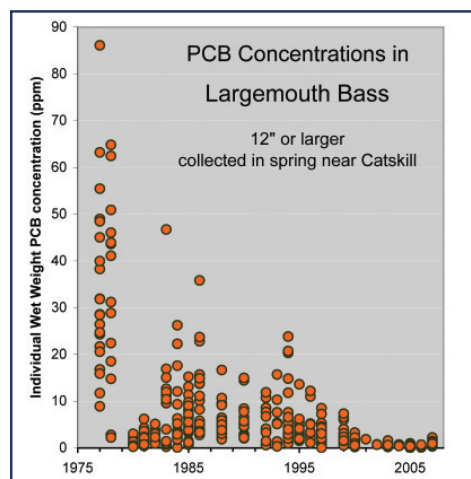
Some alien species become "invasive," causing undesirable ecological or economic impacts. Zebra mussels feed by filtering river water. In the process, they have reduced phytoplankton populations by 80 percent in the freshwater portion of the estuary. The Hudson's native pearly mussels are being starved out, unable to filter water as ef-

ficiently as these invaders. Zebra mussels also clog water intakes; they have caused hundreds of millions of dollars in economic damage to industrial operations and boating since their arrival in North America in 1985.

We can expect more alien invaders in coming years. Studies show that about seven new species arrive in the freshwater Hudson per decade, of which one is likely to have damaging ecological impacts.

## Conserving Species in Coming Years

Conserving fish and wildlife requires plans for individual species like the American shad, but broader measures can help too. For example, we must protect habitat like the wetlands where New York Harbor herons find food for their young. Maintaining water quality and addressing toxic contamination are also necessary. It is expected that PCB cleanup will reduce levels of these chemicals in wildlife, especially raptors and fish-eating mammals like mink, and in anglers who take river fish home to eat. Because invasives are difficult and expensive to control once established, preventing their arrival is key. Education and regulatory measures for that purpose need to be strengthened.



This graph shows PCB concentrations in individual largemouth bass. [Note: dots sometimes overlap.] After major PCB discharges ended in 1977, these concentrations decreased dramatically. More recently, PCB concentrations have stopped falling. Contamination persists at levels high enough to cause concern. The Department of Health recommends no consumption of largemouth bass caught in the estuary north of Catskill and only one per month caught in the estuary south of Catskill.

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



*Some fish-eating birds have responded dramatically to environmental improvements. Snowy egrets are among several heron species that have returned to nest on islands around New York harbor. Improving water quality has increased the availability of fish and other food that egrets need to raise their young.*