

## **Eastern Oyster** (*Crassostrea virginica*)

Imagine yourself on the streets of Manhattan, hungry but short of time and money. You see a pushcart, place your order and are served a quick lunch of.....oysters!

That's right, oysters.



Throughout the 19<sup>th</sup> and early 20<sup>th</sup> Centuries, New York City was an oyster-eating town with oyster barges lining the waterfront and oysters served and sold on the streets. The abundance of these tasty bivalves was a welcome food source for the Dutch and English colonists and oysters, exported back to Europe, quickly became a source of economic wealth. So many oysters were sold that paths and extended shorelines were built in New York City on crushed shells.

Oysters have been a prominent species in the New York/New Jersey Harbor Estuary since the end of the Ice Age. They have been documented as a food source in the Estuary for as long as 8,000 years, based on evidence from Native American midden (trash) piles. Later, many of the Harbor Estuary's shoreline communities developed and thrived on the oyster trade until it collapsed in the mid-1920s, although minor oyster fisheries survived at the Harbor Estuary's Jamaica Bay fringes where the East River meets Long Island Sound until the late 1930s or later. In the 1880's it was estimated that oysters covered about 350 square miles or 250,000 acres of the Harbor Estuary's bottom. They were found in mid-to lower salinity areas including the tidal rivers in New Jersey's Monmouth County, Raritan Bay, up the lower Raritan River, throughout the Arthur Kill, Newark Bay, the lower Rahway, Passaic, and Hackensack Rivers, the Kill Van Kull, up both sides of the Hudson River into Haverstraw Bay, around New York City in the Harlem and East Rivers and in many smaller tributaries and Jamaica Bay. Ellis and Liberty Islands were originally oyster shoals and reefs.

Mostly human-induced factors and disturbances, including overharvesting, loss of suitable habitat, poor water quality, increased boat traffic and raw sewerage caused the Eastern Oyster's decline, closing the industry down by the mid 1920s. Since then, harvesting of oysters has been rare. In the 1950's a set of seed (juvenile oysters) were placed in Haverstraw Bay and were harvested and transplanted, with reports of random occasional minor sets since then. Restored commercial activity with oysters in the Harbor Estuary is environmentally possible though, as the Lower Estuary still supports a thriving hard clam fishery.

In other estuaries, such as Chesapeake Bay, the oyster has a key role in maintaining a healthy ecosystem. But almost nothing has been documented on its former ecological role in the Harbor Estuary aside from random anecdotal notes from long-gone shellfishermen. When present at natural levels of abundance, it can be a keystone species or a species whose loss from an ecosystem causes a greater than average change in diversity or abundance of other species, community structure, and/or ecosystem processes.

Oysters build a special estuarine habitat type, the oyster reef. The oyster reef habitat is considered to have a number of ecological functions that could benefit the health of the Harbor Estuary. Oyster reefs have a major influence on suspended particles, including phytoplankton, in an estuary. The reef habitat also can support epifaunal suspension feeders, such as sponges, that increase the particle filter-feeder activity of the oyster. The rough, craggy exterior of the reef itself provides shelter for small estuarine animals and other marine animals in their early life stages. The reef surface armors the underlying sediment from erosion; larger reefs can change bathymetry and water flow patterns. The reef is both a source of minerals (calcium and carbon from shell) and water cleaner through its processing of suspended particles as food. It can enhance the bottom surface near it via the quantity of feces and pseudofeces the oysters' release, thus effectively moving suspended food particles to benthic dwellers.

Healthy, mature oysters (more than 1 ½ years old) spawn in the mid to late summer. The larvae drift in the water column for a few days, seeking adult oyster shells or other relatively clean surfaces to set upon. The newly set oysters, called spat, must survive a number of predators and other factors until they reach about 40 mm across at which point they become less vulnerable to predators, such as crabs. The Eastern Oyster is a filter feeder, taking in water and feeding on a wide size range of suspended food particles (living and detrital) in that water, although the larvae are more size selective. They can tolerate a range of natural environmental conditions, although prolonged poor conditions at the fringe or beyond their tolerance range can impair or kill them. They prefer areas with good water flow and do best in areas that have water circulation patterns that bring both adequate food but also keep the larvae near the parent reef or a nearby reef. Their major predators are starfish, crabs and certain fish, such as drums and rays, but they are also eaten by certain snails and flatworms. Competition for food and space with mussels and other similar species can be a problem.

The Eastern Oyster is found in the western Atlantic from the southern Gulf of Mexico to the Gulf of St. Lawrence in Canada. It occurs at depths between 0.5 and 6.0 m, prefers temperatures between 2.0-36.0C (although larvae like the warmer end of that range), and in salinities above 5 ppt, and with good water flow. The larvae needs a clean hard surface to set upon, and adults can grow on any firm sediment or substrate that allows them access to water and food and siltation that is not excessive. They can tolerate low oxygen situations for several days or a week or more. The larvae and adults have some sensitivity to toxic chemicals. Natural oyster reefs tend to occur along or perpendicular to channels, as per evidence from fossil oyster reefs recently discovered in the Havestraw Bay area, although smaller reefs or clusters can exist wherever conditions are suitable.

At present Eastern Oysters are only found as scattered individuals or clusters in the Harbor Estuary, but efforts are ongoing to grow the species in several areas, including Raritan Bay, not for consumption but for thier water quality improvement benefits.



This entry was researched and written by Claire Antonucci, Rosemary Higgins and Cathy Yuhas of the New Jersey Marine Sciences Consortium/New Jersey Sea Grant Extension Program. It is part of a larger project, "The Key Species of New York/New Jersey Harbor Estuary" produced with funding from the New York/New Jersey Harbor Estuary Program.