

READING ONE: Where do oysters live? What kind of water do they need?

An *estuary* is a partly enclosed body of water where salt and freshwater meet and mix. This water is called *brackish* water. Estuaries are among the most productive of earth's ecosystems. Many diverse habitats can be found in an estuary, including open waters, freshwater and saltwater marshes, sandy beaches, mud and sand flats, rocky shores, **oyster reefs**, sea grass, wooded swamps, and adjacent upland habitats such as forests and grasslands. Since they are partly protected by land they are ideal breeding grounds for fish and shellfish (oysters).

New York Bay/Harbor is an estuary and therefore is ideal as an oyster habitat. Oysters require hard bottom areas because if placed on soft bottom areas they will become buried and die. They also love to live at the edge of channels due to the good water flow, which will bring them more food. They thrive in brackish water from 2-26 feet deep.

Salinity (the amount of salt dissolved in water) will vary in estuaries. Water closer to the mouth of the freshwater source will have a lower salinity, whereas water located nearer to the ocean will have a greater salinity. Salinity is measured as ppt (parts per thousand). Water having 10 parts salt to 1000 parts water is considered 10ppt. Below 12 ppt is considered low salinity, 12-20 ppt is medium and over 20 is high salinity. Oysters can survive in water that contains 5-35 ppt. Oysters thrive in salinity that ranges from 14-28 ppt.

The optimum water temperature for oysters to survive is between 68-90 degrees Fahrenheit, but adult oysters can tolerate water as cold as 38 degrees and as hot as 120 degrees for short periods of time.

Dissolved oxygen is oxygen that is present in water and available for organisms. Oysters can tolerate lower levels of dissolved oxygen than some marine life. They can survive above 20% saturation whereas most marine life requires at least 30% saturation.

Oysters require a certain level of health in their habitat for survival and especially to thrive and maintain the balance of the biodiversity of the ecosystem.

Sources:

- <https://www.epa.gov/nep/basic-information-about-estuaries>
- <https://chesapeakebay.noaa.gov/fish-facts/oysters>
- <https://chesapeakebay.noaa.gov/oysters/oyster-reefs>
- https://www.sms.si.edu/irlspec/Crassostrea_virginica.htm

READING TWO: What animals eat oysters? What do the oysters do for ecosystem?

The main predators on oyster larvae are other filter feeders like comb jellies. The main predators on adults are oyster drills, crabs, and boring sponges.

Oysters are filter feeders, which means they eat by pumping large volumes of water through their bodies. Oysters eat a type of microscopic plankton called phytoplankton, which they filter into their bodies using their gills. Water is pumped over an oyster's gills where plankton, algae, and other particles become trapped. An oyster can filter up to 50 gallons of water a day.

Over the years nitrogen levels have built up in our bodies of water and waterways. A certain level of nitrogen is good – humans, oysters, and other living creatures require a certain level of nitrogen. But too much can be harmful. Too much nitrogen in the water can suck out all of the oxygen and create dead zones where nothing can grow. As oysters filter the water through their bodies, they also bring in the nitrogen in the water. Oysters can incorporate some of that nitrogen into their bodies. But, they also get rid of a portion of that nitrogen in what is known as pseudofeces (fake poop). This pseudofeces is really particles that the oyster cannot incorporate into itself covered in oyster mucus (snot) and then released from the oyster. This oyster poop, or *biodeposits*, settle at the bottom of the water and get buried. Scientists are still discovering whether or not oysters can help with our nitrogen problem. Will they remove more nitrogen from the water than they put back into the water?

Oyster reefs also function as natural living breakwaters during storms. It became apparent during storms in 2011 and 2012 how detrimental storm surge can be to our shoreline and to communities. Reefs can absorb wave energy and protect shorelines from erosion. Shorelines are among the most degraded and threatened habitats in the coastal zone because of their sensitivity to rising sea levels, to storms and to increased use by humans.

Sources:

- <http://www.harborestuary.org/pdf/teachersguide.pdf>
- <https://chesapeakebay.noaa.gov/fish-facts/oysters>
- <https://www.billionoysterproject.org/oysters-and-nitrogen-removal-from-the-water-column/>
- <https://stormrecovery.ny.gov/learn-more-about-living-breakwaters-project>