NOAA CHESAPEAKE BAY OFFICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Oyster Reefs

At one time, oysters were so abundant in the Chesapeake Bay that their reefs defined the major river channels. The reefs extended to near the water surface; to stray out of the center channel often posed a navigational hazard to ships sailing up the Bay. Now, after decades of damage to reefs from harvest, increased disease, falling salinity due to the increased runoff that accompanies increased impervious surface, and increased sedimentation from runoff, a significant amount of hard bottom habitat has been lost. The oyster population in the Bay is less than 1% of what it once was.

Degrading water quality is both a cause and an effect of the oyster decline, because fewer oysters means less filtration capacity. But oysters, as hardy as they are, can be killed by prolonged periods of low dissolved oxygen at the Bay's bottom.

Federal and state agencies, industry, academic institutions, and nonprofit groups are working together to restore the native oyster population to levels that will once again provide significant ecological and economic services.

The option to supplement native oysters with a non-native oyster in the Chesapeake Bay was considered, but it was decided not to pursue that option. NOAA and its partners conduct oyster restoration mapping that promotes oyster restoration by mapping areas with hard bottom suitable for planting oysters or shell.

Range and Life History

In the United States, oysters are found on the East Coast, Gulf Coast, and West Coast. The Eastern oyster's (*Crassostrea virginica*) range encompasses the East Coast of North America from the Gulf of St. Lawrence in Canada to Key Biscayne, Florida, and south through the Caribbean to the Yucatan Peninsula of Mexico and to Venezuela. Oyster reefs on the West Coast have the exotic Pacific or Japanese oyster, *C. gigas*, and the native Olympia oyster, *Ostreola conchaphila.* The Chesapeake Bay provides good environmental conditions for the Eastern oyster; however, oyster productivity varies within the Bay system, depending on salinity, water quality, habitat conditions, and disease.

Stimulated by increases in water temperature to 64-68°F (18-20°C), oysters generally spawn (release eggs and sperm) from May through September in the Chesapeake Bay. Fertilized eggs hatch into free-swimming larvae that settle to the bottom two to three weeks after hatching. They attach (set) to hard surfaces such as the shells of other oysters. The newly attached oysters—called spat—begin to grow at the rate of about an inch per year. Growth rates can be affected by temperature, food quantity, salinity, and disease. Shell growth usually occurs in the spring and soft body tissue growth occurs after spawning. Oysters usually reach market size (3 inches in Maryland and Virginia) three to five years after spat settlement.

Ecosystem Roles

Oysters are filter feeders, consuming phytoplankton (free-swimming algae) and improving water quality while they filter their food from the water. As generations of oysters settle on top of each other and grow, they form reefs that provide structured habitat for many fish species and crabs. The Chesapeake Bay was once known for its abundance of oysters. Much of their recent decline was due to decades of overharvest and habitat destruction. More recently, two parasitic diseases, MSX and Dermo, have devastated the remaining oyster populations in most areas of the Bay and its tributaries.

It has been estimated that oysters were once able to filter all the water in the Bay in about a week. The sharp decrease in the number of oysters means that it now takes the current oyster population about a year to filter the same amount of water. Because the oyster serves such an important function as a filter feeder, it has been hypothesized that their decrease has contributed to an apparent shift in the food web in the Bay, and an increase in zooplankton (which also eat phytoplankton) and their predators (ctenophores and jellyfish).

ORES Research Updates

- 2019 ORES Research Update
- 2018 ORES Research Update
- 2017 ORES Research Update
- 2016 ORES Research Update
- 2015 ORES Research Update

Restoration Updates

Most recent updates

- 2018 Virginia Oyster Restoration Update
- 2018 Maryland Oyster Restoration Update

Previous years' updates

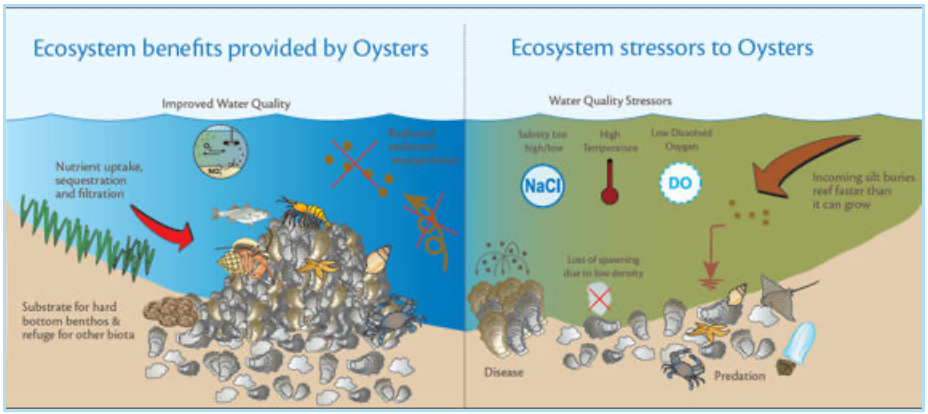
- 2017 Maryland Oyster Restoration Update
- 2017 Virginia Oyster Restoration Update
- 2016 Virginia Oyster Restoration Update
- 2016 Maryland Oyster Restoration Update
- 2015 Maryland Oyster Restoration Update
- 2014 Maryland Oyster Restoration Update
- 2013 Maryland Oyster Restoration Update
- 2012 Maryland Oyster Restoration Update

Related NOAA Resources

Two recent field studies in the Chesapeake Bay, one involving restored oysters and the other involving a small, naturally occurring bivalve, demonstrated the potential for filter feeders to improve water quality. A study partially funded by NOAA and done by the Maryland Department of Natural Resources restored a small oyster reef in the South River on Maryland's Western Shore and did intensive water-quality measurements to look for improvements near the oysters. The results showed improvements in both chlorophyll and turbidity levels near the oysters when tidal flow was occurring, as expected, although the improvements were less than those predicted by models.

The other study, done by the NOAA Chesapeake Bay Office, documented improvements in water quality in the Magothy River in 2004 when it had many millions of dark false mussels (*Mytilopsis leucophaeata*), a small bivalve (native to the Gulf of Mexico but naturalized in Chesapeake Bay) that is usually a fairly rare fouling species on oyster bars. This poster from a conference on bioextraction showed that in one creek with 400 million mussels in 2004, water clarity and dissolved oxygen both improved that year but then declined as the mussels disappeared in 2005.

Ecological impacts of oysters—how they benefit the ecosystem, and how elements of the ecosystem can provide stresses to oysters—are summarized in the diagram below (click on it for a larger image). A related diagram shows the effects of human activities on oysters.



Oyster Restoration

Oyster Restoration Mapping

Non-native Oysters

NOAA Restoration Center

NOAA Restoration Atlas

Also of Interest

U.S. Army Corps of Engineers Baltimore District

Maryland Department of Natural Resources

Virginia Marine Resources Commission

Oyster Recovery Partnership

Native Oyster Restoration Monitoring Program (NORM)

Chesapeake Bay Oyster Population Estimation Program (CBOPE)