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Oysters

icon of the Chesapeake

Whether you call them Eastern oysters, American oysters, Rappahannock oysters, or simply “white gold,” the iconic shellfish plucked from the Chesapeake Bay are a salty delicacy that some think is best served with a dash of horseradish and a squirt of lemon juice. Sadly, it’s a delicacy that is not as abundant as it once was. The Chesapeake once harbored oyster beds so rich and bountiful that they formed reefs. That was the case in 1608 when Capt. John Smith explored the bay and found oysters so thick that ships could run aground on them. The **Chesapeake Bay Gateways Network**, administered by the National Park System, was established in 2006 to help preserve the rich cultural and natural history of the Bay, including its oystering heritage.

Today, Chesapeake Bay’s oyster population is estimated to be less than one percent of what it was in the 1800s. Although natural oyster beds can still be found in the Chesapeake, their dramatic decline over the years due to pollution, over-harvesting, and disease has had a far-reaching effect on the



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overall health of Chesapeake Bay. Oysters filter water, feeding on algae and removing pollutants, sediments, and excess nutrients from the water column. Fewer oysters means less water-cleansing by these miniature filtration systems. Once there were enough oysters in the Chesapeake Bay, whose overall watershed represents the country's largest estuary, to filter all the bay water in as little as a week; these days it takes the resident oysters a year to accomplish the same task.

And now climate change has been added to the stresses affecting the oysters. Warming bay waters associated with climate change, particularly in winter months, are responsible for the survival and virulence of a parasite that is killing the oysters.

Compounding the impact of this parasite, *Perkinsus marinus* (also known as Dermo), have been wide swings in annual precipitation believed to be tied to climate change. And these swings in precipitation have become more lethal as the Chesapeake watershed has become more urbanized.

Between 1990 and 2000 there was a 60 percent increase in urbanization of the Chesapeake watershed as agricultural and forested lands were transformed into residential areas. This urbanization directly affected the amounts of phosphorous and nitrogen — usually stemming from the use of fertilizers, but also from vehicle emissions, treated wastewaters, manure, and even septic systems — flowing into the

Chesapeake. Although residential neighborhoods contribute lower flows of nutrients than agricultural lands, they contribute higher levels of nutrients than previously forested land. This nutrient flush is a prime factor in the bay's troublesome water quality. Higher nutrient levels spur booms in algal growth, which in turn can reduce the bay's oxygen levels through the buildup of decaying organic matter on the seabed.

Precipitation plays a role in determining the flow of nitrogen and phosphorus into the Chesapeake's waters. During dry years, much of the nitrogen and phosphorus is cached on shore, something that presumably would benefit the bay's waters. However, when powerful storms return they can flush these large caches of nutrients into the Chesapeake. The particularly wet year of 2003, for example, produced one of the worst instances of nutrient-loading in the bay, leading to oxygen deprivation for oysters and other sea life.

Heavy storms, which many believe are being spurred by climate change, do more than flush nutrients into the bay. Fresh water from the storms also kills oysters. When Tropical Storm Agnes swept the area in 1972, its rainfall killed an estimated 2 million bushels of marketable oysters, as well as most oyster larvae in the Chesapeake. In addition to killing oysters, fresh water runoff from storms typically doesn't blend well with salt water, so it can inhibit mixing that normally would cycle oxygen into deeper waters. This can result in low oxygen levels (hypoxia) on the bay bottom.

Oxygen levels in the bay are also affected as water temperatures warm due to climate change. Warm water holds less dissolved oxygen than colder waters and also leads to higher rates of plant decay that contribute to hypoxia.

SOLUTIONS

What's to be done? If we stop contributing to climate change we may be able to keep temperatures in the Chesapeake Bay from warming to an even greater extent, further supporting the spread of oyster-killing parasites. Keeping global warming in check might also prevent storms from growing even stronger and increasing the flow of the harmful sediments into the Bay.

We must also work to preserve remaining wetlands, marshes, and forests — they naturally filter excess nitrogen, phosphorus, and sediment from stormwater, and protect community streams and rivers, and ultimately the Chesapeake. More accurate information from EPA about the Bay's condition will help leaders at all levels of government identify key habitats to restore and preserve, and make other management decisions that benefit healthy oyster populations.

On top of preserving habitat, communities must make choices to reduce the flow of these pollutants into neighborhood streams. We can choose clean water by reducing fertilizer use throughout the watershed, replacing failing septic tanks, and ensuring all existing septic tanks can withstand sea level rise. We can take measures to slow runoff during storms. If individuals, business owners, and officials at every level of government from Cooperstown, New York to Virginia Beach choose clean water, our local streams will be healthy, and the Chesapeake Bay will once again support an abundant population of this iconic native inhabitant.

We Can Safeguard the Chesapeake Bay and its Oysters from Climate Change

Stop contributing to climate change

The ecological health of the Chesapeake Bay and its oyster populations could decline even further if we fail to reduce carbon dioxide pollution and global warming that is warming the water, aiding the spread of deadly parasites, and contributing to the runoff of harmful pollutants.

Reduce and eliminate existing harms that make oysters more vulnerable to climate change

By better controlling polluted runoff from farms and towns, and by restoring and preserving wildlife habitat surrounding the Chesapeake Bay, we can reduce existing stresses on the Bay's oyster populations, which could help them cope with changes wrought by global warming.

Adopt "climate smart" management practices

By factoring climate change into existing plans to restore the Chesapeake Bay, resource managers for the Park Service, EPA, and state and local agencies can develop and implement strategies that attempt to minimize the damaging effects of climate change on oysters, including heavier than usual floods.