



History of the Eastern Oyster

The eastern oyster, *Crassostrea virginica*, has held a long history as a commercially and ecologically important species in the Delaware Bay. Dating as far back as the early 1800s, the Delaware Bay oyster has been known for its unique taste and high meat quality. It was extremely popular on the oyster market, and had significant economic importance to the bayshore communities of New Jersey and Delaware. Throughout the early 1900s, annual oyster landings ranged from one to two million bushels. Today, oyster production is severely inhibited by disease. The culprit is a water-borne protozoan parasite called *Perkinsus marinus*, commonly known as Dermo. This disease is host specific and does not affect humans. Dermo was originally detected in the Delaware Bay during the mid-1950s, apparently after infected seed oysters imported from the lower Chesapeake Bay caused high mortalities. This disease was essentially undetectable after out-of-state seed imports were embargoed in the late 1950s. However, the disease, seemingly associated with abnormally high winter temperatures, resurfaced in 1990, spreading among the oyster population. Although oyster stocks have been significantly affected by disease, habitat loss, and in some cases, over-harvesting, the eastern oyster remains an integral part of the Delaware Estuary.



Eastern oysters



NOAA chart of the Delaware Bay, showing oyster seedbeds and planting grounds

Where can we find the Eastern Oyster?

The filter feeding eastern oyster is an estuarine animal with a tolerance for a wide salinity range. The optimal salinity range is believed to be about 14-28 parts per thousand. Today, the prime direct market beds in New Jersey's portion of the Delaware Bay (i.e., providing the best growing conditions) range from Ben Davis Point south to False Egg Island. Oysters will grow on almost any type of clean, hard, stable bottom.



Present day Oyster boat at work

For more information about the Delaware Estuary call 1-800-445-4935, or visit www.DelawareEstuary.org and www.delep.org. For detailed information on oysters, call the New Jersey Division of Fish and Wildlife at 1-856-785-0730, or visit www.njfishandwildlife.com.

The History of Oyster Harvesting

Native Americans
enjoying harvested
oysters



Lithograph Courtesy of Virginia Institute of Marine Science

Exploitation of the oyster resource in the Delaware Bay predates the arrival of the colonialist in the area. Undoubtedly, the earliest reapers were the Native Americans of the region who harvested oysters from the mud flats and creek beds exposed at low water. Archeological evidence indicates that oysters probably were a seasonal staple in their diet. Descriptions of the oyster beds have been found in writings dating back to 1642, demonstrating the social and economic significance of the resource to early European settlers. Thomas Campanius Holm, an early Swedish settler, wrote in 1642 that Delaware Bay oysters were “so very large that the meat alone is the size of our oysters shell and all”.

Oysters from the bay were also an important food source for early Dutch and Swedish colonists and led to the establishment of British settlements along the bayshore later in the 1600s. The growth of Philadelphia as the region’s largest city fostered the beginning of the commercial harvest. By the 1750s, fresh oysters from the Delaware Bay were being shipped to Philadelphia and New York. Pickled oysters were sent to the West Indies. The earliest oystermen were also farmers who probably gathered oysters from inshore areas using small boats and tongs. By the 1730s sloops and schooners capable of harvesting oysters from deep-water beds were being built on the Cohansey River at Greenwich. The relatively pristine resource provided many years of fruitful harvest to these early fishermen. As with many other natural resources of the New World, the oyster beds were seemingly vast and unending. Often large quantities of oysters would be thrown into fires in order to produce lime for quick lime. At the time, management of the oyster resource was of little or no concern.

Underwater photo
of a Delaware Bay
oyster seedbed

Since the inception of the oyster industry, nearly 300 years ago, New Jersey’s natural seedbeds have been the major provider for both the seed oyster and the market oyster. During the industry’s early history, oysters were harvested from the natural beds and sold directly to market. In the mid 1800s, oystermen, concerned with the scarcity of market-sized oysters occurring on the seedbeds, began to plant smaller sized oysters that they had formerly sold to areas in the lower bay. By 1856, oyster production shifted from one of direct market from the seed beds to one of replanting and growing oysters in higher salinity waters of the lower bay before being harvested for market.

During the previous decade or two, the oystermen had discovered the rewards and advantages of transplanting smaller oysters from the seedbeds into areas of higher salinities. Transplanting small, non-marketable size oysters was a means of mitigating the effects of the declining stocks of large oysters on the natural beds. By transplanting the smaller oysters onto several grounds below the natural beds, the oystermen were able to establish inventories of several different age classes of oysters. A second advantage to the oystermen was that the transplanted oysters displayed accelerated growth rates in the higher salinity water and reached a large size faster than if they had remained on the natural seedbeds.

The Oyster Battlegrounds



Eastern oysters being shipped by train to markets across the country

Although transplanting operations proved to be a valid concept for increasing market production, it was not without problems. Oyster-bearing bottom was part of the public domain, with no individual having the privilege of controlling productive bottom. Therefore, the transplanted oysters were fair game for those who refused to respect the custom of self-control between planters. Prior to the occurrence of the diseases MSX in the late 1950s and Dermo in the 1990s, seed oysters planted in the Maurice River Cove remained on the leased grounds for a period of two to four years before being harvested for market. Today, due to high mortality rates caused by the diseases, particularly Dermo, seed planted on the grounds rarely remains there for more than 1-2 years. Today, approximately 32,000 acres are leased by oystermen. However, only a small portion of these areas is currently used for the growing of oysters.

Since the evolution of planting grounds in the Maurice River Cove area, the seedbeds have been the principle source of oysters for planting purposes. In order to protect the seedbeds from over harvesting they have been set off from the leased planting grounds. For years, the industry solicited the State of New Jersey to assist in the management of the fishery. The harvest of oysters from the seedbeds, more or less, has been directly controlled by the State since 1719. Prior to State control, many oystermen attempted to guard their grounds at any expense. There were numerous conflicts over leased ground invasions, many leading to major court cases. These court cases eventually affirmed the State's role in the management of fisheries. The cases were also critical in the support of a state's right to impose restrictions on residency requirements and other regulatory tools still employed today.



Blue crab, a minor predator of the eastern oyster

In spite of a number of rules and regulations designed to protect the oyster producing areas, satisfaction with their results was marginal. The first organized attempt at policing the resource occurred in 1825, when the participants in the fishery formed the New Jersey-Delaware Oyster Company, Inc. The oystermen were concerned with the continued violation of the natural beds by residents of neighboring states, and the Oyster Company was to provide the means for rectifying this situation. This effort failed, however, and the company was eventually dissolved.

Adequate enforcement of New Jersey's rules and regulations governing the oyster resource had been a problem since the first act for the preservation of the resource was passed in 1719. The provincial legislature passed an act for the preservation of the oyster beds for "the great benefit of the poor people and others inhabiting the province." The most significant feature of this act was the parochialization of the resource, that is, nonresidents were prohibited from harvesting oysters in New Jersey waters. In the late 1800s, the State had to take a more realistic approach to the management of the oyster industry when it adopted a number of acts enabling more law enforcement.

Through these acts, the State enlisted the aid of the vessel owners and captains as its surrogate for enforcement of the State's law and interests. The quasi-union between the State and the industry was accomplished through the creation of the Maurice River Cove and Delaware Bay Oyster Association. The captains of the vessels, who had to be residents of the State, were required to take an oath stating that the vessel and owner conformed to legal requirements for participation in the fishery.

They also swore that they would actively participate in enforcing the rules and regulations of the industry. Conservation actions were also employed, such as restricting dredging during the summer spawning months. Embodied in this legislative act were the basic concepts that have inspired the management philosophy for the oyster resource since that time. The basic concepts being preservation and enhancement of the resource, maintenance of the fishing community, and the domestication of the fishery.

The Bountiful Harvest

Early in the 19th century, the oyster dredge was introduced into the Delaware Bay by northerners because they wanted a more rapid and efficient harvest method than tonging for gathering large quantities of seed. From 1880 until 1930, the annual Delaware Bay oyster production ranged between one and two million bushels. In New Jersey, the Delaware Bay harvest represented approximately 54% of the State's total production in 1880. By 1930, the Delaware Bay accounted for 90% of the State's production as the once productive areas of the Atlantic coast, especially Raritan Bay, fell into decline. After 1930, production in the Delaware Bay declined somewhat but remained steady at about one million bushels a year until 1957.

Initial Harvest Declines

Despite repeated legislation to protect the resource, over harvesting of the natural seedbeds was a chronic problem in the Delaware Bay. After World War II, sailing gear was removed from the sloops and schooners and replaced by engines.

In 1957, the oyster industry suffered its most serious obstacle. That spring, heavy mortality was discovered in oysters planted the previous year on the New Jersey leased grounds. The cause, soon discovered to be a protozoan parasite, had previously been unknown to the scientific community. It was initially given the acronym "MSX", standing for "multinucleated sphere unknown" and was later classified *Haplosporidium* (formerly *Minchinia*) *nelsoni*. By the end of 1959, 90-95% of the oysters on the planted grounds, and about half of those on the seedbeds, had died. Total harvest in the Delaware Bay fell from 711,000 bushels in 1956 to only 49,000 in 1960.

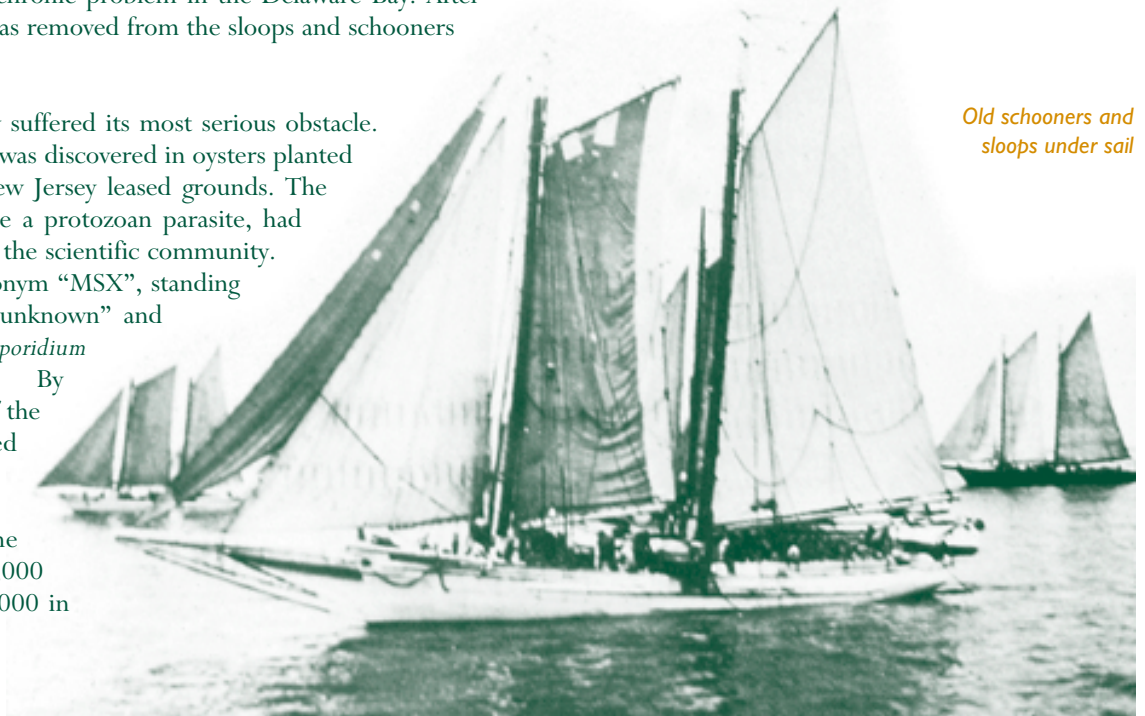
Oyster drills, a major predator of the eastern oyster



Bags of eastern oysters at the docks during the bountiful harvest years



Early 1900s oyster shucking house



Old schooners and sloops under sail

Recovery

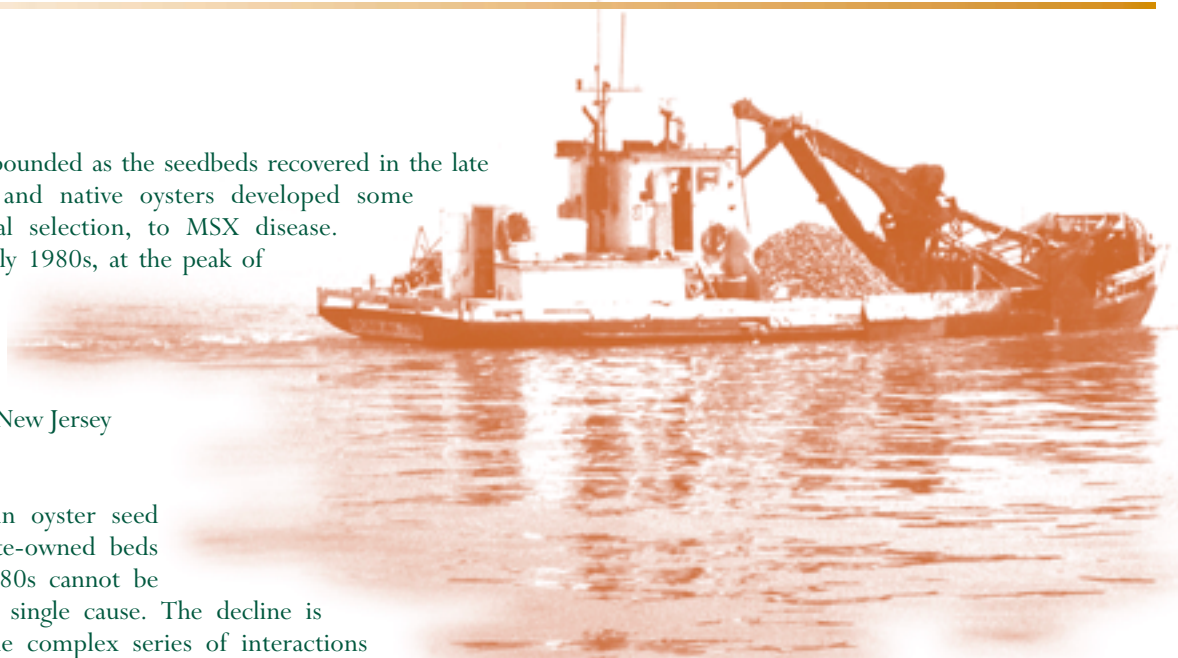
Gradually, the industry rebounded as the seedbeds recovered in the late 1960s and early 1970s and native oysters developed some resistance, due to natural selection, to MSX disease. During the 1970s and early 1980s, at the peak of the post-MSX recovery, 50-100 large oyster vessels with an average weight of 31-34 gross tons, were licensed each year in New Jersey for dredging seed oysters.

The substantial decline in oyster seed production from the State-owned beds during the 1970s and 1980s cannot be directly attributed to any single cause. The decline is probably the result of the complex series of interactions between man's activities, environmental conditions, and biological relationships. Factors known to effect oyster production are harvesting pressure, predation, disease, salinity and temperature regimes, food supply, and abundance of suitable attachment substrate.

In 1985, after 15 years of modest prosperity, the oyster industry in the Delaware Bay suffered another setback: a resurgence of MSX disease accompanied a period of severe drought. High mortalities affected planted and seed oysters until 1987, when the conditions on the beds began to modestly improve. After several years of being closed to harvest, the New Jersey beds were reopened for a two-week period in 1990. During that harvest season, 160,000 bushels of seed oysters were transplanted. The following year, the beds produced 290,000 bushels in three weeks, the best yield in a decade.

Not Out of the Woods Yet!

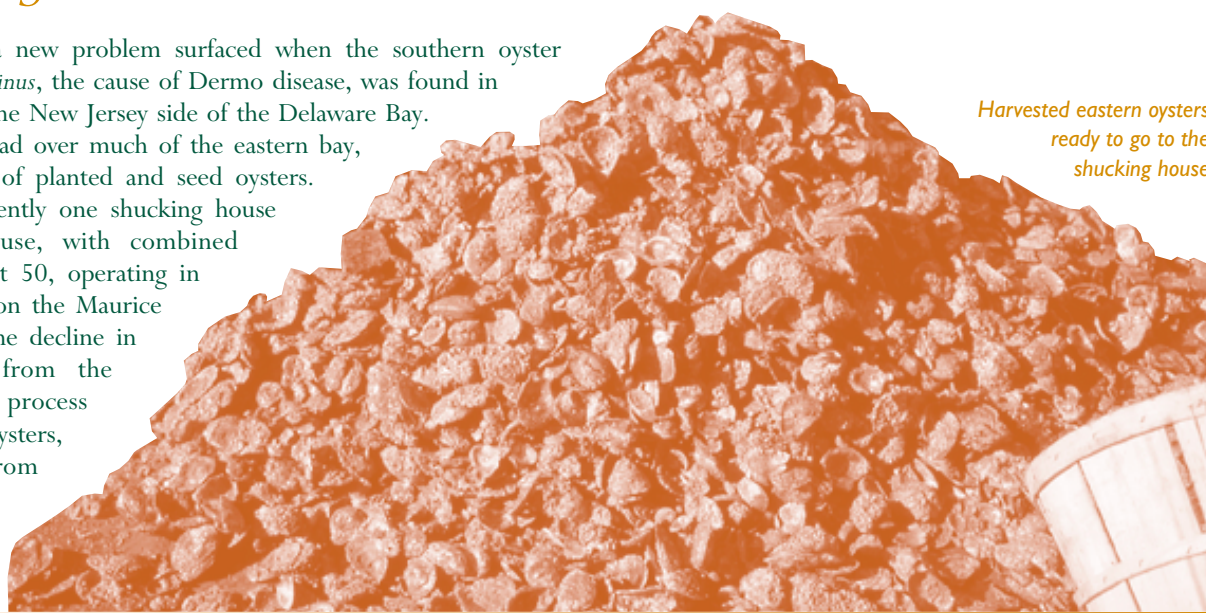
In 1990, however, a new problem surfaced when the southern oyster parasite, *Perkinsus marinus*, the cause of Dermo disease, was found in several locations on the New Jersey side of the Delaware Bay. By 1991, it had spread over much of the eastern bay, causing heavy losses of planted and seed oysters. Today, there is currently one shucking house and one packinghouse, with combined employment of about 50, operating in the town of Bivalve on the Maurice River. Because of the decline in oyster production from the Delaware Bay, they process mostly out-of-state oysters, especially those from Connecticut.



Above and Below: Two of New Jersey's many oyster boats



Harvested eastern oysters ready to go to the shucking house



Present

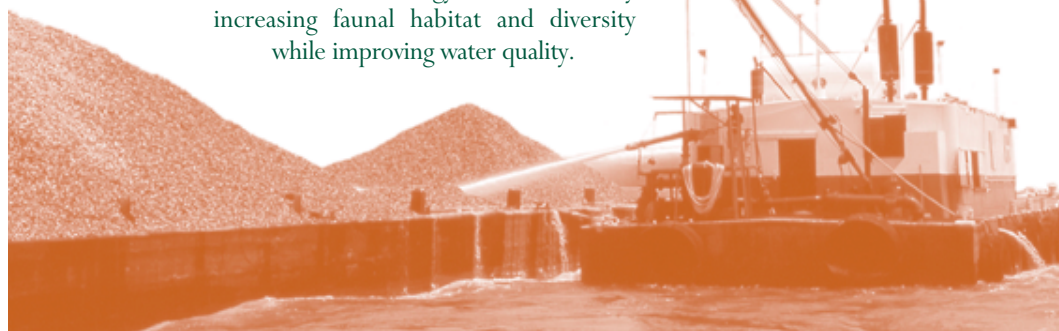
In the mid 1990s, the Delaware Bay oyster industry faced an uncertain future. The lack of large quantities of marketable oysters during the 1980s had resulted in the loss of skilled shuckers; a deterioration of boats, wharves, and buildings; and a diminished market for local oysters. The presence of two oyster diseases, particularly Dermo, made the transplanting of oysters in the lower bay very risky. In 1995, an old strategy was revisited for the first time in 150 years in New Jersey – direct marketing from the State’s natural seedbeds in the spring and the fall. This concept was initiated by the New Jersey Division of Fish and Wildlife and supported by the oyster industry. This has been the predominant method of oystering since the program’s reincarnation. Industry participants have received quotas of roughly 1,000 – 3,000 bushels per season and harvesters are charged a \$1.25 to \$1.75 per bushel fee. These landing fees are deposited in the “Oyster Resource Development Account”. The Account is typically used by the State and industry to fund two key management components: the transplanting of oysters from underutilized seedbeds to the downbay seedbeds, which are primarily utilized for the direct market program; and, for the purchase and planting of clean shell on selected areas of the seedbeds to enhance the setting of oyster larvae. Clean cultch material provides an ideal surface to which young oysters attach.

From the spring of 1996 through the spring of 1997, approximately 88,000 bushels, worth approximately \$1.8 million, were direct marketed. The oyster industry has also benefited from the sharp increase in prices over the last few years and the increased market demand during the summer months. Since 1999, approximately 40 oyster dredge boats have participated in the direct market program each year, with an annual harvest worth \$1.5 million. Since its inception, the direct market program has clearly been a better utilization of the resource, given the prevailing disease conditions. In addition, since direct market began in 1995, the per bushel price of oysters has risen from approximately \$18 to \$27 dollars per bushel. This increase clearly demonstrates the stable market demand for the very high quality Delaware Bay oyster.

It has been a decade since the first significant Dermo outbreak and there appears to be light at the end of the tunnel. The native Delaware Bay oyster, over a period of time and through natural selection, has apparently developed a resistance to MSX. Today, oystermen, managers, and scientists are hopeful that the oysters are again on their way to recovery. There is consensus that the biological potential for oyster production in the Delaware Bay remains quite high. It will, however, take a consistent and expanded effort in enhancement activities such as shellplanting, transplanting, and oyster bed restoration projects.

Over the last decade, the notion that oyster beds are valued habitat, for both oysters and the ecological responsibilities they provide, has been widely accepted among resource managers and academia. Many marine organisms – bryozoans, hydroids, sponges, barnacles, ascidians, tube-building worms and other bivalves – live upon oysters and the affiliated structure of the reefs they create. These, in turn, attract various crustaceans and small fishes. This furnishes, as many fishermen know, a concentrated food source for many recreationally and commercially sought fishes includes weakfish, croaker, and black drum. Various gastropods and fishes, many of which have commercial and recreational value, utilize the oyster community for foraging and spawning habitat.

Continued management efforts by coastal states to bolster the oyster resource will not only provide major economic benefits for harvesters and local communities, but will add to the overall ecology of estuaries by increasing faunal habitat and diversity while improving water quality.



Barge planting mined Chesapeake oyster shell on New Jersey’s natural seedbeds



Various aspects of shell planting

Sources for this brochure include:

NJ Dept. of Environmental Protection. 2001. *Historical Summary of NJ’s Delaware Bay Oyster Fishery*, prepared by the Bureau of Shellfisheries, Division of Fish and Wildlife. Trenton, NJ.

Ford, S.E. 1997. *History and present status of molluscan shellfisheries from Barnegat Bay to Delaware Bay*. In: *The History, Present Condition, and Future of the Molluscan Fisheries of North and Central America and Europe*. Vol 1, North America (Mackenzie, C.L., et al) pp 119-140. USDOC, NOAA Tech. Report NMFS, Seattle, WA, 1997.