History

Pre-Colonial and Colonial Times

Oysters in the estuaries of North America have served many purposes throughout history for the inhabitants of coastal areas. Aboriginal North American Indians found oysters to be an abundant, reliable, and virtually inexhaustible source of food, supplemented with fish, other shellfish, and small game animals. They also used shells as tools, weapons, ornaments, and even currency, and traded them with other inland tribes for goods and supplies. Middens (shell and refuse heaps) found at many coastal sites attest to a longstanding reliance on oysters and other bivalves by coastal Indians.

Native Americans eating shellfish. Illustration credit: Virginia Institute of Marine Science.

When European colonists first arrived on the East Coast of North America in the 1600s, they found large quantities of oysters and consumed and preserved them in various ways. They also began using the shells to make roads, to provide ballast in schooners, to make lime for mortar and fertilizer, and even as flux in primitive iron furnaces (MacKenzie 1992).

English colonists arriving in 1607 in Chesapeake Bay found large oyster reefs that extended the entire length of the Bay and into its tributaries. These reefs were the result of about 7,000 years of accumulated shells of thousands of generations of oysters, each new generation contributing more shell to the existing structure (Hargis and Haven 1999). Because of the abundance of oysters, Chesapeake Bay would eventually become the major oyster-producing area of the United States and support a large fishery - fishermen, shucking and packing houses, retail vendors, and other related infrastructure. However, a decline in the reefs began to be noticed in the late 1800s, as oyster reef surveys indicated reduced oyster populations, along with drops in reported harvests (Hargis 1995).

As more and more settlers arrived in the Chesapeake Bay area, the demand for oysters and shells increased, along with new harvesting technologies (e.g., dredges pulled behind sailing vessels) to help meet demand. Eventually the reefs stopped accreting and began to dwindle. Sailing vessels (called schooners, or skipjacks) that had been used for towing oyster dredges were replaced with motorized vessels, which substantially increased harvests and further contributed to the diminution of the reefs. Thus, a reef system that had taken 6,000 to 7,000 years for nature to create was decimated in about 200 years by European settlers and their descendents (Hargis and Haven 1999).

This scenario was played out in many locations along the East and Gulf Coasts where oyster reefs were once abundant and productive. Other factors began to contribute to oyster mortality and general degradation of water quality in coastal waters, such as increased sedimentation (from agriculture and deforestation practices and from channel dredging), pollution (toxins, sewage, and nutrients), and invasive species (e.g., predators such as non-native oyster drills). Oyster reefs in Atlantic estuaries exist today as low-lying bars, mere remnants in the footprints of the earlier structures. Because oyster reefs are also significant ecosystems and provide habitat for many other species, their demise caused adverse changes in the diversity and abundance of these species as well.

Post-colonial development of the oyster industry

East Coast Indians probably harvested most, if not all, of their shellfish by hand in shallow waters. Oysters and clams were plentiful in the bays, and were an excellent source of protein. There would have been no need for them to expend further energy gathering bivalves from deeper waters, and harvests were negligible given the vast expanses of oysters available during pre-Colonial times.

Schooner in Chesapeake Bay. Vessels like this were used to dredge oysters from deeper water before boats became motorized. Photo credit: Galtsoff Collection (NOAA Northeast Fisheries Science Center (NEFSC) Historical Photo Archives.

Colonists also harvested oysters by hand, but increasingly used small rowboats and sailing craft to harvest in deeper waters. From the boats they used tongs (long poles with rakes on the end) in water up to about 15 feet deep, and towed dredges behind the boats in deeper water. In the 1800s, oystermen began harvesting not only large oysters for eating, but also seed oysters for transplanting to previously harvested beds to replenish them. There was a thriving market for Chesapeake Bay seed oysters along the East Coast, especially when fishermen noted these oysters grew faster than more northern populations (e.g., in Raritan Bay) (MacKenzie 1992).

As dredges became more mechanized and more boats were fitted with engines, oyster harvests increased to meet market demand. Refrigerated railroad cars allowed fresh oysters from the East Coast to be transported farther inland and even across the country, greatly expanding markets. However, as oyster reefs were being depleted, pollution was also increasing in many bays along the East Coast, as human populations continued to grow in the absence of adequate waste-treatment methods. The contamination of oysters caused by pollution eventually forced the closure of many oyster-harvesting areas, and is still a major factor affecting commercial harvests today.

As mentioned in the Biology section, diseases in oyster populations along the East and Gulf Coasts, and particularly in Chesapeake Bay, further contributed to the decline of the oyster industry. While some diseases may have been introduced via plantings of non-native species in experimental plots, others may have already existed in oyster populations but remained unnoticed until they were "discovered" by oyster biologists (Ford and Tripp 1996).

On the West Coast, overharvesting of the native oyster (*Ostreola conchaphila* or *Ostrea lurida*) in the late 1800s occasioned the introduction of both Crassostrea virginica from the East Coast and *Crassostrea gigas* from Japan in an effort to sustain a viable oyster industry. The Eastern oyster proved mostly unsuited for West Coast waters, but the Pacific or Japanese oyster eventually became the mainstay of the oyster industry, especially in Washington State, where it is actively cultivated on private leases and is the basis of a large mariculture industry.

Catch statistics provide some insights into the rise and decline of the oyster industry in the United States. Total U.S. harvests for the Eastern oyster from 1880 to 2001 show that production dropped precipitously in the early 1900s (from approximately 154 million pounds in 1880 and to less than half that amount by

1920). The marked decline in the late 1950s reflects the mass mortalities in Chesapeake Bay and other East Coast areas caused by MSX disease. Before the 1950s, Chesapeake Bay accounted for approximately 40 to 50 percent of total landings; today it yields only about 2 percent.

Oyster landings in the Gulf of Mexico (Texas, Louisiana, Mississippi, Alabama, and western Florida) have fluctuated - sometimes wildly - over the years. However, the Gulf States are now the leading producers of Eastern oysters, and many shucking houses and oyster bars on the East Coast are opening and selling Gulf oysters because of the depleted oyster stocks in Chesapeake Bay.

Louisiana is the top producer of Eastern oysters in the United States; since 1990 it has contributed an average of about 42 percent of the total annual harvest. The greatest landings in Louisiana in recent years occurred in 1985 (14.3 million pounds). Louisiana's continued success is due primarily to management of private oyster leases.

On the West Coast, Washington State has made great strides in aquaculture techniques and hatchery seed production of the non-native Pacific oyster. In recent years, Washington has frequently been second only to Louisiana in total U.S. oyster production. Most Washington oysters are produced in Willapa Bay, but many are also grown in Puget Sound. In addition to on-bottom culture, growers may use a variety of culture techniques, including suspending oysters from rafts and attaching them to stakes.

Regional Production Considerations

Oyster cultivation and harvest techniques differ from one region to another and sometimes from state to state. For example, some East and Gulf Coast oyster fisheries rely heavily on public oyster grounds, which are controlled and managed by individual states (i.e., "put-and-take" fisheries). In this scenario, fishermen tong or dredge oysters from approved or designated areas, and there may or not be a mixture of privately owned or leased oyster grounds with the public oyster reefs. Some states lease oyster grounds to individuals and corporations for oyster cultivation, and lessees either spread shell (cultch) to which oyster larvae may attach, or they put out cultch with small oysters, or spat, already attached to it. On the West Coast, cultch is often obtained from a hatchery that spawns the oysters, rears the resulting larvae to setting-size, and then introduces cultch material into a large tank with setting-size larvae.

Fisherman tonging oysters. Photo credit: Galtsoff Collection (NOAA Northeast Fisheries Science Center (NEFSC) Historical Photo Archives.

In Louisiana, natural spat set is usually abundant, and seed oysters are often moved from public oyster seed grounds with high set density to private leases, which are better suited for growing. Some growers use rafts or plastic trays to grow their oysters; this technique reduces predation and siltation and may increase growth and survival.

In almost all states, the availability of clean oyster shell to use as cultch material is a limiting factor in both mariculture and restoration efforts. Most oyster-producing states lack laws requiring oyster shells to be returned to the water, and the resource is still removed for other purposes such as chicken grit

(ground-up shells fed to chickens to help their gizzards digest food and to provide calcium for egg shells), natural water filters and buffers, calcium carbonate food supplements, and even as mulch for growing lavender plants.

Advances in oyster production in some states do not make up for the losses of oyster reefs and declines in production in other states due to pollution, disease, overharvesting, and removal of shell resources. This is why restoration of oyster reefs and growing areas is so vital now, especially in Chesapeake Bay. The NOAA Restoration Center is working to involve citizens and scientists in projects to restore these valuable resources and to understand more about the ecology of oyster reefs and their functions in estuarine systems.