Eastern Oysters of the Delaware Bay

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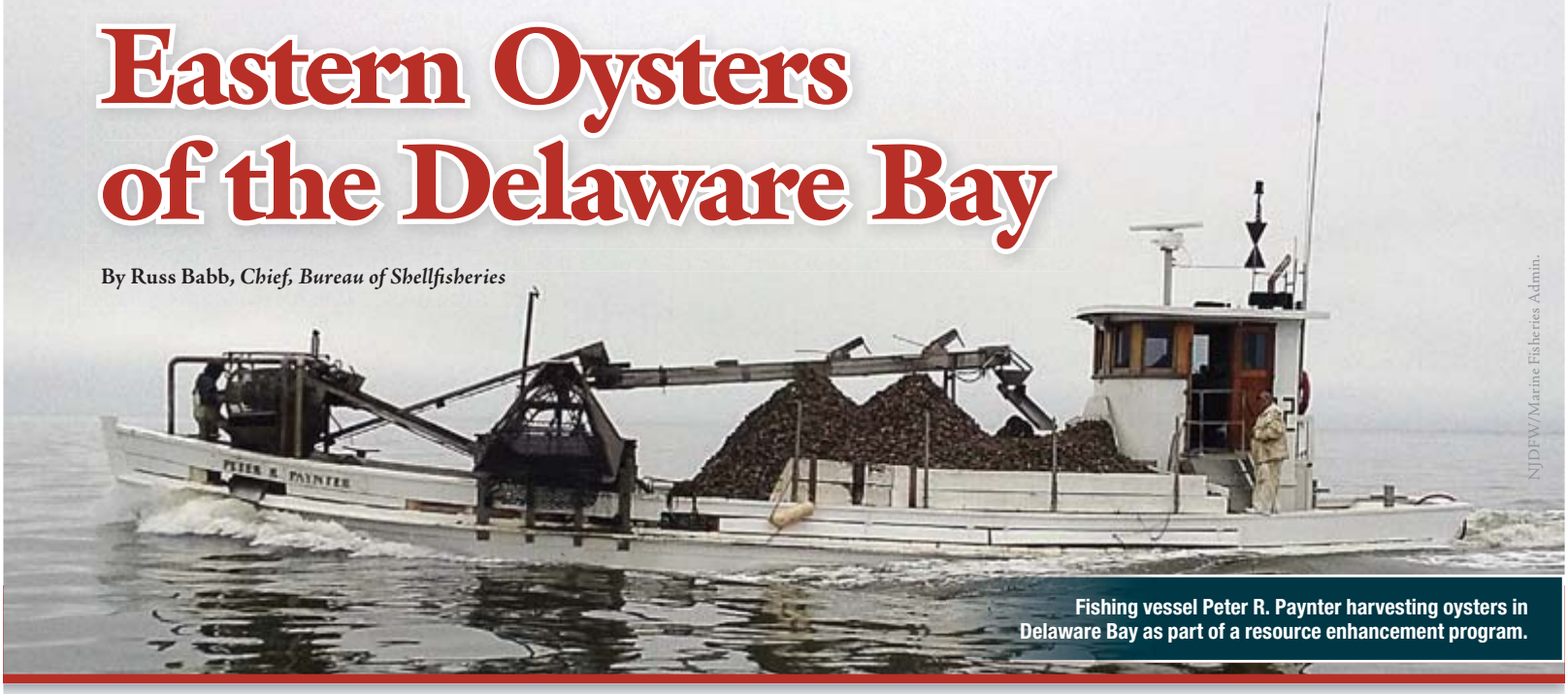

NJDFW/Marine Fisheries Admin.

Fishing vessel Peter R. Paynter harvesting oysters in Delaware Bay as part of a resource enhancement program.

Introduction

The Eastern oyster, *Crassostrea virginica*, has a long history as a commercially and ecologically important species in the Delaware Bay. Dating back as far as the early 1800s, the Delaware Bay oyster has been known for its unique flavor and high-quality meat, making it extremely popular in the seafood market. Oyster commerce contributed significantly to the bayshore communities of New Jersey and Delaware.

Throughout the early 1900s, oyster landings ranged from one to two million bushels annually. Today, oyster production is severely inhibited by a serious disease: a water-borne protozoan parasite called *Perkinsus marinus*, commonly known as Dermo. Oyster lovers have no fear—the Dermo parasite poses no health concern to human consumers. Dermo was originally detected in the Delaware Bay during the mid-1950s and was associated with imports of the seed oysters from southern states. The disease was essentially undetectable shortly after the cessation of the importing practice.

Unfortunately, this disease—associated with abnormally high winter temperatures—resurfaced in 1990, spreading throughout the oyster population in most of the bay. Although oyster stocks have been significantly impacted by disease, habitat loss and in some cases over-harvesting, the Eastern oyster still remains an integral part of the ecosystem of the Delaware Estuary and the basis of a viable industry.

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 Delaware Bay oyster typically exists in salinities as low as four or five parts per thousand (ppt) and as high as 28 ppt. (Sea water is normally 35 ppt.) However, the optimal salinity range is believed to be about 14–28 ppt.

In the New Jersey portion of the Delaware Bay, oysters are established in areas of suitable habitat extending along the axis of the estuary from Cape May Point to Artificial Island, and in the brackish or lower portions of many tributaries leading into the Bay. The most productive beds in the Delaware Bay (i.e., currently providing the best recruitment and survival) range from the Cohansey River south to Nantuxent Cove.

Oysters will grow on almost any type of stable bottom available such as hard or sandy mud, clay, gravel and preferably—other oysters. Oysters do not survive well on sandy bottoms that are inclined to be unstable. Likewise, areas adjacent to shifting mud, sand or organic debris are also generally unsuitable as the oysters may become smothered during storm events.

Oysters grow from the intertidal zone to a depth of 30 or more feet. The most productive areas on New Jersey's natural oyster seedbeds and leased grounds range in depth from 6 to 25 feet.

NJDFW/Marine Fisheries Admin.

Water cannons deposit clean oyster shell on oyster seed bed in Delaware Bay as part of the annual shell planting program.

The Mating Ritual

The Eastern oyster is a protandric alternate species as explained by following its path to sexual maturity. When oysters first develop gonads (a reproductive organ that produces sex cells and hormones), the majority are functionally male. As individuals grow larger, many will sexually morph into females. Oysters develop mature gametes and spawn in response to temperature. The first spawning typically occurs in Delaware Bay waters when the temperature reaches 77°F (25°C). Subsequent spawns commonly occur throughout the summer until early-September.

Survival of the Fittest

There is a two-week phase for the free-swimming larvae. During most of this period the larvae are passively transported by tidal and wind driven currents. In a stroke of evolutionary brilliance, during their last few days of larval life, they exhibit a tendency to descend in the water column on slack water, remain on the bottom during ebb tide and return to the water column on flood tides.

In this manner, while late-stage larvae do experience a net movement toward the headwaters of the estuary, they remain in the estuary—not in the ocean where they cannot survive. When they are ready to set, larvae seek a hard, clean surface upon which to attach. Many oyster experts speculate that approximately 95 percent of larvae are lost to predation and other causes of mortality prior to final settlement and attachment. Once a larval oyster finds a substrate upon which to attach, it cements itself to that surface. It will remain there for life unless removed by some external force.

The availability of clean substrate or cultch—preferably oyster shell—is critical for the successful setting of juvenile oysters, at which point they become sessile (permanently attached to the cultch) and are referred to as "spat."

The NJ Marine Fisheries Administration has a significant shell planting and reef enhancement program. Each July, hundreds of thousands of bushels are planted strategically across the oyster seed beds in an effort to increase recruitment.

If an oyster were lucky to be in the five percent that managed to set, the battle to survive is far from over. Following final settlement and attachment, the newly set oyster has other hazards to face. It is now vulnerable to many new predator threats. A gastropod known as the oyster drill, mud crabs, blue crabs, a flatworm called Stylochus, black drum, starfish, skates and rays all take a toll on oysters.

The principal predator in Delaware Bay is the oyster drill, *Urosalpinx cinerea* and *Eupleura caudata*. The abundance of these drills on the downbay market beds can have a significant effect on whether juvenile oysters survive to reproductive maturity. Drills are normally present on the lower beds below Ben Davis Point (higher salinity) and often have a major impact on the productivity of those beds, particularly during periods of drought. Drills have migrated to the upper seed beds of the Bay during prolonged periods of higher-than-normal salinity.

Oyster drills earn their name. These small snails prey on oysters by secreting sulfuric acid that slowly softens the shell. Next, using an organ called a radula, they drill a small hole in the shell, feasting on the soft oyster parts inside. High numbers of drills can decimate healthy oyster beds quickly.

At the peak of the droughts during the 1960s, oyster drills were quite common on the Cohansey and Ship John seed beds which are typically free of these pests due to lower salinities during the egg laying season for drills. The point: it is hard to live the life of an oyster.

Keystone Species

Many marine organisms—bryozoans, hydroids, sponges, barnacles, ascidians, tube-building worms and other bivalves—attach to oysters and the associated structure of their reefs. These fouling organisms, in turn, attract various crustaceans and small fish. This furnishes, as many anglers know, a concentrated food source for a variety of recreationally sought fish such as the weakfish, striped bass, croaker and black drum. Beyond that, numerous animals seek food and shelter in the interstices of oyster reefs, utilizing the oyster community for refuge, foraging and spawning habitat.

In short, oysters and oyster reefs play a critical ecological role in our estuaries and are the basis of a vast community of organisms. Management efforts by coastal states to bolster the oyster resource not only provide major economic benefits for harvesters and local communities, but add to the overall ecology of our estuaries. Healthy oyster reefs increase habitat and faunal diversity and in some cases, at the required scale and location, can even potentially improve water quality by reducing particulates and shifting nutrient dynamics.

A reference list of article resources is available from the Division of Fish and Wildlife by calling (609) 748-2040.