Oysters and the Estuary

The American or Eastern Oyster, *Crassostria Virginica* is one of the truly native American species. Long before European settlers arrived, the once abundant shellfish provided food for the native peoples from the Gulf of Mexico to Maine. Shell mounds or "middens" left by natives of the Pemaquid area in Edgecomb Maine have been dated back 2,100 years. The largest export product of Connecticut in colonial days were oysters. There are records of the early colonists in Groton, CT bending branches into the water so as to attract "setting" oyster larvae, which then grew to edible size off the branches. Some of the earliest maritime law deals with oyster grounds and who has legal right to them. One of the oldest sets of legal records on file in the Town of Stonington is the Oyster Ground Book. Some of the early entries date back to the 1700's. They were known as "Kings Grants".

The oyster begins its life as free-floating plankton. In the summer, when water temps reach their highest, the sexually mature oysters release eggs and sperm into the water column. A single female oyster can broadcast up to 30 million eggs in a single season. An entire bed of oysters can produce trillions of eggs. The eggs and sperm mix in the warm current and quickly develop into free swimming larvae. They join with the hundreds of other immature marine organisms that together make up a vast pool of zooplankton (very small animals). This pool of plankton is vital to the estuary, as only one in a million larvae of any species will actually reach maturity. The rest become food for each other and for more mature creatures. The entire food chain from the smallest crab to largest game fish depends on this reproductive fecundity for survival. Together with pytoplankton (very small plants) they become part of the very bottom of the food chain chain.

In the days before industrialization, when the coastal population was still low, oysters were found throughout most estuary systems. Oysters are vegetarians and eat algae. As bivalve mollusks they are sedentary and feed by filtering water which passes by them. A single adult oyster can filter 30 gallons of water a day. The amount of water filtered by a bed of 3 million oysters is enormous. By filter feeding on algae, oysters keep the population of algae in check. This increases water clarity and allows light to penetrate far deeper than without them. This in turn enhances the growth of other submerged aquatic vegetation such as macro algae (seaweed) and eelgrass. This is vital in estuary systems that have excessive nutrient loading. Left unchecked, the smaller planktonic vegetation that grow in the upper layer of the water column, quickly "bloom" on the rich food supply and light. These populations explode and then crash, leaving vast amounts of plant matter to sink and decay. Today this results in conditions of hypoxia in many "unhealthy" estuary systems during the summer months all along the Atlantic seaboard.

Algae uses light, carbon dioxide and food (nitrogen and phosphorous primarily) to grow. Thus, when oysters feed on the algae, they are actually removing nitrogen from the water. This nitrogen is not released back out into the water but is changed into several different forms. Recent work done by Roger Newell of the University of Maryland has greatly advanced what we know about the connection between oysters and nitrogen. His work indicates that healthy oyster habitat can reduce total added nitrogen, through nitrification-denitrification by up to 20%. In his research he found that a whole benthic (bottom) microalgal/cyanobacterial community grew, that not only absorbed inorganic nitrogen released but also fixed free nitrogen. When so many dollars are now being spent to upgrade sewage treatment plants in Long Island Sound specifically to reduce nitrogen, the number and health of area oyster beds should be a key concern. Perhaps it is no coincidence that the problem of nitrogen loading has increased as the natural oyster population in the Sound has fallen.

In the estuary, oyster beds also provide a rich benthic habitat for a variety of marine organisms. Empty shells from dead oysters provide predator-safe “condos” for juvenile fish, shrimp, crabs and lobsters. The living oysters themselves become bio-substrate, magnets for all manner of marine life. Anglers in the Southern US are well aware of the value of oyster beds in attracting game fish and actively seek them out. The game fish are there because they in turn have been attracted to the prey species which are attracted to the oyster bed. A whole, rich mini-ecosystem develops around the oyster bed.

An oyster takes three to five years to reach market size. So while oyster growers may periodically collect mature oysters for sale the vast majority of time the beds are allowed to remain undisturbed. Even harvest methodologies play a valuable role in keeping beds healthy and vibrant. Periodic flushing and cleaning has always been part of the estuary cycle. In the seasonal “change-over months”, storms move huge volumes of bottom sediment, carrying away the fine black muds that collect over time. Spring floods in the upper estuary river systems created the same effect. Today, much of the estuary has been choked off from these natural actions. The construction of the railroad in the early 1900’s and later, I-95, caused huge sections of the Connecticut estuary to be blocked off. Hundreds of tons of rock and fill were used to create a continuous platform for the track and roadbed. Dams were built on virtually every feeder stream into the estuary. What were once hundreds of square miles of vibrant productive estuary bottom now began to silt up. A healthy, high biomass, aerobic (plenty of oxygen) habitat deteriorated into the same area of noxious, low biomass, anaerobic (little or no oxygen) bottom. The periodic harvesting of oysters from a bed (to a degree) simulate the now absent, natural flushing action. While harvesting activity cannot come close to Nature’s own for shear volume of area, in the small areas where the oyster person operates, it is a big help. Removing anaerobic silts leaves a clean health bottom. A living oyster bed can support many forms of marine life as deep as 6 to 8 inches below the bottom. The same black muddy bottom supports little of no life below the surface.

While the presence of oysters in the estuary is a huge benefit, the problem is that naturally occurring beds continue to be on the decline in New England. Past over-harvesting, declining water quality and several introduced oyster diseases are just a few of the factors that have driven the wild oyster populations to new lows. But all is not lost. A new breed of oyster-person is rising to the challenge. No longer relying on wild stock, these individuals come with a different mind set. Most are not commercial fisherman by trade but come with marine biology backgrounds. Rather than take animals from the environment they spawn their own in a hatchery. These animals then go back into the wild to supplement Nature’s own declining production. Over time, artificial oyster reefs are built and maintained. And they generate the same positive environmental effects. The modern oyster person is more farmer than fisherman. They carefully tend and manage their beds. And through their efforts, the world-renowned Connecticut oyster can still be found in your favorite restaurant and seafood market.

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