Oyster Shell Recycling Program

SEATUCK
Conserving Long Island Wildlife

Seatuck Environmental Association

Purpose:

We at Seatuck have initiateed a pilot program to collect waste Oyster shells from local restaurants and to use those shells to enhance the bottom sediment of the Great South Bay to allow for the reintroduction of native eastern oyster (Crassostrea virginica) populations.

Background:

In the mid-1890's Long Islands South Shore was known as the "oyster capital" of the world. Blue Point Oysters were considered of the finest quality and were in the highest demand by consumers. However, by 1920's they were decimated, mostly due to water pollution and over harvesting, efforts to restore the wild populations were dashed after the 1938 hurricane covered the living reefs with silt and sand and introduced the predatory, oyster drill. With historical oyster reefs silted over, juvenile oyster spat were left without a hard bottom or substrate, for settlement, so they perished. A resurgence of the oyster culture industry in the 1990's was plagued with setbacks from disease (MSX). Today, the oyster industry is returning to the Bay. A number of oyster aquaculture businesses have recently opened. In towns such as Islip, the number of lease agreements, to small, local aquaculture operations, has been rising to include an increasingly larger portion of bay bottom.

Although the recent dramatic increase in oyster aquaculture has benefitted the oyster farmer it has not helped the lost native oyster populations. Unlike farmed oysters which are harvested at a young age, native oysters are allowed to grow to full maturity and may live as long as 30 years. In this way, wild populations develop disease resistance and create massive underwater reefs. Wild oysters are available for harvest through recreational fishing. They also contain a unique genetic makeup available for future restocking.

When supplied with the proper substrate, native, wild oysters will thrive. The best and most natural way to supply substrate is to return oyster shells, a natural resource, to the Bay. In this way we can restore the world famous oyster populations and the vital ecosystem we all depend on. The benefits and ecosystem services this project provides are listed below:

1) ***Provide Enhanced Water Quality and Clarity*** – It is well know that Oysters consume microscopic algae called phytoplankton and thus have a clarifying effect on seawater. Improved water clarity promotes eelgrass growth. In addition, the removal of harmful phytoplankton decreases the likelihood of harmful algal blooms, such as Brown and Rust Tides.
2) ***Provide Habitat for Wild Oyster Restoration*** – In the Great South Bay and other South Shore bays, wild oysters are limited by the existence of the available hard bottom substrate they require for attachment. Enhancing wild oyster stock is as basic as providing them with oyster shells, the hard substrate they would naturally find in their environment. When

oysters are raised in aquaculture the shells are removed from the ecosystem at harvest. Wild oysters are important for the natural resistance to disease and genetic diversity they possess.

3) ***Regulating Nitrogen Pollution*** – Oysters grow very well in nitrogen rich, eutrophic waters. They remove nitrogen from seawater by consuming phytoplankton that have the ability to incorporate nitrate. At harvest time, the farmed oysters are removed from the environment. The consumption of wild oysters by transient wildlife also serves to rid the local environment of excess nitrogen, albeit at a smaller scale than aquaculture.
4) ***Reduce Landfill*** – Recycling oysters shells reduces the amount of costly waste delivered to the landfill.
5) ***Shoreline Stabilization*** – Oyster shells may be used alone to stabilize eroding shorelines in salt marshes (such as Seatuck NWR) or in a reef building process in conjunction with a reintroduction of live oysters. Oyster reefs mitigate the damaging wave effects of severe storms and hurricanes. As sea level rises at an ever-accelerating rate, we must facilitate the survival of our shoreline.
6) ***Mitigate Coastal Acidification*** – In addition to ocean acidification, Coastal acidification is occurring here in our bays and presents a significant threat to this environment. Ocean acidification, caused by a higher concentration of CO2 gas in the atmosphere becoming dissolved on to the ocean. The addition of CO2 alters the water chemistry and decreases the pH of the ocean water. Coastal regions experience an additional decrease in pH, which occurs when bacteria in the sediments decompose excessive algae growth. The bacteria use oxygen and produce CO2 as they respire. This coastal increased CO2 lowers the pH further, exacerbating the problem. The calcium carbonate of dead, recycled oyster shells allows for a buffering effect of coastal acidification (Waldbusser et.al,1 2013). Shells act like an antacid as they partially dissolve. If allowed to increase, coastal acidification will make an inhospitable environment for all shellfish. Young oysters are especially sensitive to slight pH changes. Coastal acidification is a serious problem that must be addressed.
7) ***Provide Mesohabitat*** – Although oyster aquaculture structures provide habitat for small fish, shrimp and juvenile crustaceans, that habitat is ephemeral and is removed at harvest time. Wild oyster reefs, in contrast, provide a long time, mesohabitat for these creatures.
8) ***Carbon sink*** – Shells are made of calcium carbonate and if burned in a landfill, emit carbon to the atmosphere however when bound together in an oyster reef serve as a carbon sink.
9) ***Community Involvement and Education*** – This project relies heavily on active volunteers willing to pick up shell buckets from participating restaurants. In the process it also educates volunteers and the general public regarding the fragile nature of the ecosystem. Previously, other states have used the spat-on-shell rearing process as an education tool, allowing school groups , 4-H groups and Citizen Science to raise oysters in classroom tanks.
10) ***Tourism and Cultural History*** – Tourism is vital to the economic growth of the region. Fresh oysters are a delicacy and prized commodity that provide economic enrichment. The South Shore of Long Island is rich in maritime culture; an attribute that attracts tourists and increases our quality of life. As we experience a renaissance of the oyster industry we must be aware of the many ways these shellfish provide for us. This time, we get to give back to the Bays that provide us with so much

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[1] Waldbusser, G.G., E.N. Powell, and R. Mann. 2013. Ecosystem effects of shell aggregations and cycling in coastal waters: An example of Chesapeake Bay oyster reefs. *Ecology* 94:895–903, http://dx.doi.org/10.1890/12-1179.1.