

Contracted workers use a water cannon to blast 8,000 bushels of sea clam shell from a barge onto the one acre oyster restoration site off Good Luck Point, in Barnegat Bay, to improve shellfish habitat.

Shellfish Enhancement in Barnegat Bay

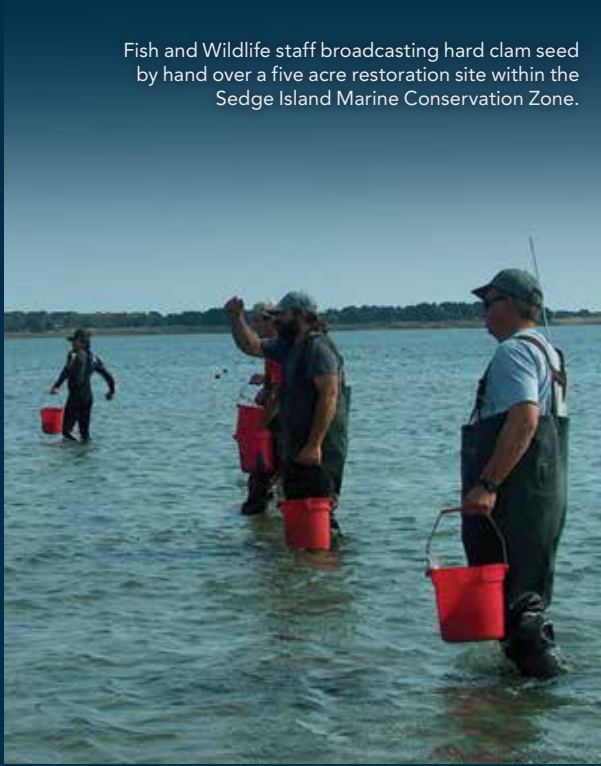
By Dr. Gustavo W. Calvo, Principal Fisheries Biologist

Oysters — A historical perspective

Eastern oysters (*Crassostrea virginica*) and hard clams (*Mercenaria mercenaria*) have been important natural resources in Barnegat Bay since pre-colonial times when Native Americans gathered shellfish for nourishment. Their importance continued when baymen began harvesting shellfish for sale and associated industries developed. At the peak of the oyster industry, from 1870 to 1930, the Barnegat Bay-Cape May area produced 20 percent of all market oysters harvested in New Jersey. By 1930 this figure declined to less than 10 percent.

Oyster harvest declined for various reasons including overharvest, disease and changes to the bay's salinity regime. According to Melbourne Carriker (1961) and Ford (1997), oyster habitat was lost due increased salinity and sedimentation resulting from alteration of Beach Haven Inlet by the storm of 1919, and by the construction of the Point Pleasant Canal in 1925. High salinity favored oyster predators and parasites, and sedimentation smothered oysters. Hard clams, which thrive in high salinity and live in the sediment, populated lost oyster habitat. The effects of severe storms on the bay's ecology gain even greater significance today in the aftermath of Hurricane Sandy.

Prominent historic oyster beds, such as the Cedar Creek grounds, extended along the western side of the bay between Cedar Creek and the town of Barnegat. According to Ernest Ingersoll (1882), these very productive grounds — which once served as a source of seed (young shellfish raised beyond the larval stage) for industry in both northern New Jersey and New York — were already being depleted in the late 1800s. In the 1960s, oyster seedbeds were delineated at the mouth of many tributaries and coves along the western side of Barnegat and Little Egg Harbor bays. The seedbed at the mouth of Toms River and off of Good Luck Point was particularly extensive.



Fish and Wildlife staff broadcasting hard clam seed by hand over a five acre restoration site within the Sedge Island Marine Conservation Zone.

Hard Clams

Hard clams are widely distributed over the bottom of New Jersey's coastal bays where water salinity approaches ocean values of 25-32 parts per thousand. In Barnegat and Little Egg Harbor bays, hard clam beds extend baywide from the area off of Cedar Creek to the Little Egg Harbor Inlet.

New Jersey hard clam harvest declined from a maximum of nearly 600,000 bushels around 1900 to a minimum of approximately 100,000 during the 1920s and from the 1970s to the 1990s, according to a 1997 publication by Susan Ford. At the peak of production between the late 1880s to the early 1900s, about one third of the statewide harvest came from southern coastal bays (Barnegat Bay and bays south to Cape May), with most coming from the area of Barnegat Inlet.

The decline in hard clam harvest has been attributed to various factors including loss of habitat due to waterfront development, closure of harvest areas due to poor water quality, increased mortality due to brown tide blooms and over-harvesting. Approximately 250 shellfishermen harvested hard clams by tonging, raking and treading in Barnegat Bay and Little Egg Harbor bays during the summer in the 1950s. The number of clam harvesters declined to only eight when hard clams were scarce between 1998 and 2002, according to McKenzie (2003). In 1985-86, there were 156 million clams in Barnegat Bay, according to a report by the New Jersey Division of Fish and Wildlife. An additional Fish and Wildlife 2001 survey of Little Egg Harbor Bay, showed a decline from 200 million clams in the 1980s to 65 million in 2001. Most recent information on hard clam abundance in Little Egg Harbor and Barnegat bays will be available shortly from Fish and Wildlife surveys respectively conducted in 2012 and 2011.

Shellfish Enhancement

Core shellfish enhancement activities involve planting seed to supplement existing stocks and planting shell to improve shellfish habitat. Shell provides a firm base for planting seed and serves as substrate upon which oyster larvae can set. Shell also enhances habitat complexity which provides refuge from predators and serves as nursery areas for shellfish and other marine species.

Shellfish enhancement activities were initiated as part of the Barnegat Bay Shellfish Restoration Program a collaborative endeavor of Fish and Wildlife along with Rutgers Cooperative Extension of Ocean County and the volunteer organization ReClam the Bay. Shellfish enhancement activities serve as a vehicle for raising environmental awareness and providing hands-on educational opportunities for students and volunteers.

Oyster enhancement activities started in the area off of Good Luck Point, at the mouth of Toms River in Berkeley Township, Ocean County. The selection criteria included knowledge of the area's

historical oyster habitat and that this location is sited within waters approved for shellfish harvesting. Provided that shell would be planted to improve bottom firmness, the area had more potential for restoration than other candidate locations which exhibited softer bottoms.

Sea clam shell was utilized to firm up the base of oyster habitat within a one-acre site. Eight thousand bushels of shell were initially placed in December 2008 and again in June 2011. Oyster seed from various sources — including wild seed collected on shell bags plus seed produced by Rutgers University or commercial hatcheries — was planted following the base shell placement. Hatchery seed was grown on nursery systems operated by the Barnegat Bay Shellfish Restoration Program and ReClam the Bay volunteers or commercial growers. Large seed, such as those grown in nursery systems, is less prone to predation than small seed directly procured from hatcheries. In 2011 nearly one million large oyster seed were planted in New Jersey's shellplanted areas.

Hard Clam Enhancement

The Sedge Island Marine Conservation Zone in Barnegat Bay was identified as the first area to commence hard clam enhancement efforts. The area is within shellfish habitat of recreational value and the water is classified as approved for shellfish harvest. Before enhancement efforts started, clam abundance was found to be low and clams were mostly chowder-sized clams, which are older clams larger than 76 mm in size. Clam seed, in the size range of 15–25 mm, was procured from commercial hatcheries and broadcasted by hand over two to five acre parcels within the area. Large-scale plantings of seed in the size range of 15–25 mm have been demonstrated to assist in the recovery and subsequent stabilization of depleted stocks in Great South Bay, New York (Monica Bricelj, 2009). Since 2006, Fish and Wildlife staff planted a total of 3.2 million seed over an area of 37 acres. The seed grew and survived well; use by recreational harvesters has been high. Holders of recreational shellfish harvest licenses are allowed to take 150 shellfish per day. New Jersey's minimum hard clam harvest size is 1.5 inches.

To expand hard clam enhancement efforts beyond the Sedge Island Marine Conservation Zone, 340,000 seed were planted over an area of 9.2 acres located off of Gulf Point in Barnegat Township in October 2012. The site was located in an area where experimental plots (John Kraeuter, 2003) with shell planted in 1990 exhibited increased hard clam abundance after 10 years relative to adjacent plots with no shell that were examined during the same time. The area was selected after Fish and Wildlife solicited recommendations from commercial and recreational clammers for good candidate locations to target enhancement efforts. The plan is to expand enhancement efforts to new areas and increase seed planting over the next five years.