Estuarine Resources Inventory:

Hard Clams in Barnegat and Little Egg Harbor Bays

By Kira Dacanay, Fisheries Biologist

In the 1980s, New Jersey Division of Fish and Wildlife's Bureau of Shellfisheries received federal funding to conduct inventories of molluscan bivalve shellfish in New Jersey's estuarine waters. Unfortunately, the funding was eliminated after 1987 and the inventory program ceased for almost two decades. Some smaller scale, grant-funded inventory work was completed during that time, but it was not as extensive as the prior work. Beginning in 2011, the Bureau reinitiated the program, kicking off the fresh start with inventory work in Little Egg Harbor Bay. Barnegat Bay was surveyed the following year and both waterbodies were investigated in a truncated survey in 2013 after Superstorm Sandy. Since then, the Administration has conducted survey work in Raritan/Sandy Hook Bays (2014), the Navesink and Shrewsbury rivers (2015), and Great Bay (2016). The Bureau intends to continue the survey work southward through the Atlantic and Cape May County estuaries in 2017, returning to Monmouth and Ocean counties thereafter.

Filter Feeder Food Chain

Bivalve shellfish are important species in estuarine and marine ecosystems. As filter feeders, they graze on planktonic microalgae, capable of filtering 4–50 gallons of water per day depending on the species of shellfish and other environmental factors. This filtering process facilitates the transfer of carbon and nitrogen to benthic food chains, as well as the rapid recycling of particulate nitrogen as ammonia via excretion. Shellfish are also sources of food for other marine animals that prey upon larvae, juveniles, and adults. Shellfish are remarkably resilient creatures, capable of persisting through storm events and living in a variety of habitats. Diverse and abundant populations of shellfish are indicative of a healthy, functioning ecosystem.

Shellfisheries staff Garrison Grant and Andrew Hassall empty the dredge contents onto the culling table for sorting and measuring.

Hard Clams and Other Bivalves

The hard clam (*Mercenaria mercenaria*) is the most abundant and widely distributed species of bivalve in New Jersey's Atlantic coastal estuaries. Consequently, the inventory is primarily focused on documenting the standing stock and relative distribution of hard clams, but other important species such as Eastern oyster (*Crassostrea virginica*), bay scallop (*Argopecten irradians*), soft clam (*Mya arenaria*), blue mussel (*Mytilus edulis*), and surf clam (*Spisula solidissima*) are documented when found. These are species of particular interest because of their ecological value as well as their importance to recreational and commercial fisheries. Clams can generally grow to about 120mm (~4.72 inches, although larger specimens have been found) and are most often described by their size (from smallest to largest) as being a littleneck, a cherrystone, or a chowder clam. Steamed littleneck clams are often served with drawn butter while cherrystone clams are popular at raw bars, and chowder clams are a staple of this famous soup!

Dredging for Clams

For the stock assessment, hard clams are collected using a hydraulic clam dredge that is towed behind the Bureau of Shellfisheries' 42-foot vessel, the R/V *Zephyrus*, that is specially designed for this type of research. The dredge is designed to retain clams are that are 30mm (~1.2 inches) or larger.

Barnegat Bay and Little Egg Harbor Bay

Prior to 2011, the last comprehensive survey in Little Egg Harbor Bay was in 2001, and prior to that, 1986-87. For Barnegat Bay, the only other survey was conducted in 1985-86. In 1986-87, the population of hard clams in Little Egg Harbor was estimated at 201.5 million clams, declining sharply to 64.8 million clams in 2001. Some recovery was documented in 2011 when the stock was estimated at 85.7 million clams, but this number was still a 57 percent decline from the baseline survey in 1986-87.

In Barnegat Bay, when the population estimate in 2012 was at 138.2 million clams, this estimate was approximately 23 percent lower than the baseline stock estimate from 1985-86. Changes in water quality and suitable habitat may be influencing the decline in hard clam numbers, but there is no single specific cause for the decline. Furthermore, it is natural for shellfish populations to expand and contract over time. Regular surveying will allow researchers to better understand changing population dynamics.

Hard Clam Recruitment

In addition to the overall hard clam population estimate, the Bureau also evaluates changes in recruitment over time. Recruitment refers to the percentage of smaller clams (those that are 30mm–37mm) found in each sample that are expected to grow large enough to be harvested in the commercial or recreational fishery in the coming year. High numbers of smaller clams are therefore desirable, as it indicates that new individuals are entering the population. In 2011, the recruitment of small clams in Little Egg Harbor Bay was significantly higher than the recruitment in 2001, a positive finding consistent with the documented increase in overall numbers of clams. However, in Barnegat Bay, there was no statistical change in recruitment when comparing the 1985-1986 and 2012 data.

Storm Resilience

After Superstorm Sandy, the Bureau conducted a truncated survey in both Barnegat and Little Egg Harbor bays to check for any signs of major changes to the clam population that would warrant repeating a full, comprehensive survey and more in-depth pre- and post-Sandy analysis. Based on the data collected, there was no evidence to suggest that hard clams experienced a significant adverse impact from the storm, as the abundance and relative distribution of clams remained generally the same before and after the storm. This was not a surprising outcome as hard clams are a very resilient species and are capable of moving vertically and horizontally through the substrate in order to reach the substrate-water column interface for feeding. They can also "clam up," with their shells remaining closed until favorable conditions return.

Fisheries biologist Kira Dacanay sorts the hard clams collected from the dredge.

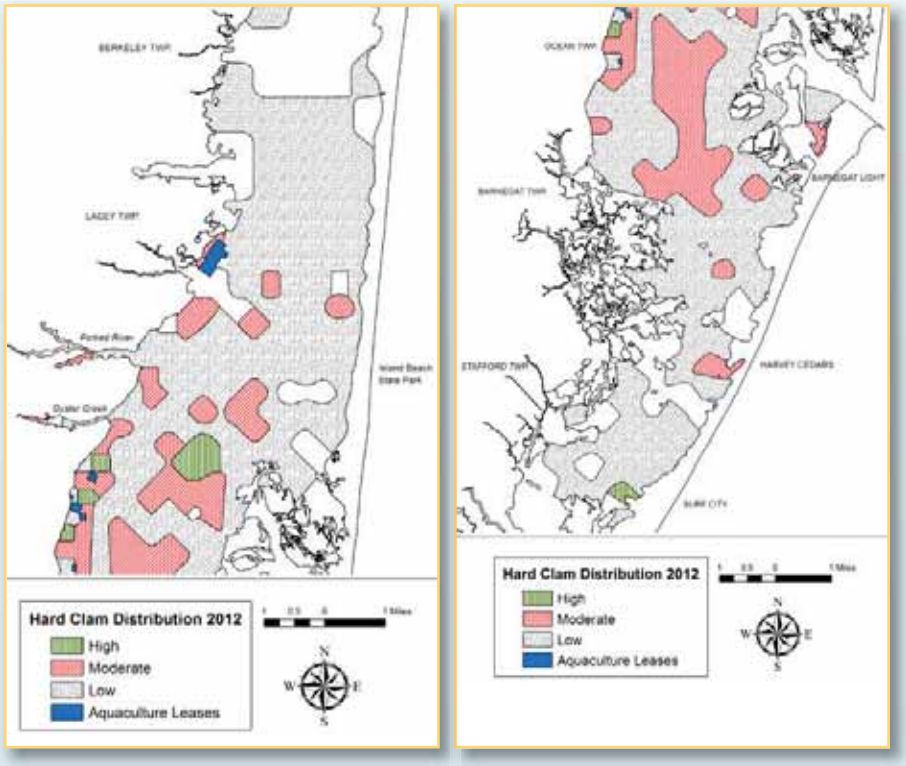
Abundance and Distribution

The Bureau publishes a final report that provides more in-depth analysis than what is found in this article, along with figures that document the relative abundance and distribution of hard clams throughout the entire waterway, plus the visualization of trends in recruitment, natural mortality, and size-age characteristics.

Bureau personnel use survey information to implement fishery and habitat management strategies, including a focus on the best areas for shellfish restoration and enhancement activities. All reports dated 2000 and later are available on the Division of Fish and Wildlife website at www.NJFishandWildlife.com/shelhome.htm9#scinvent.

Assessing Populations Can Reveal Trends

New Jersey Division of Fish and Wildlife's Bureau of Shellfisheries plans to revisit the Barnegat-Little Egg Harbor estuary every few years on a rotational basis to continue hard clam population assessments. Having multiple time series of data is critical to understanding any natural system. Researchers can document changes over time and understand trends in natural cycles. As demonstrated by the Little Egg Harbor Bay surveys, although the 2001 population was drastically lower than in 1986-87, the encouraging 2011 survey showed an increasing population. Hopefully, the next survey will show continued population growth of the hard clam population, back to baseline levels or even exceeding them!



Charts show the relative distribution of hard clams in central (left) and lower (right) Barnegat Bay. Areas without shading or coloring are read as "None." The full report and charts are available at www.NJFishandWildlife.com.