Culturing Hard Clams with Greater Success: A Cooperative Approach

In a Sea Grant-funded project using an unprecedented cooperative approach, scientists and resource managers experimented with the timing of hard clam seeding to improve yield and bring more clams to market.

Bolstering Long Island's declining hard clam industry

Despite being an economic and ecological cornerstone of Long Island's South Shore Estuary, the hard clam, *Mercenaria mercenaria,* has witnessed a precipitous harvest drop-off since the 1970s. Hard clam landings peaked in 1976 with a record harvest of 750,000 bushels valued at $14,600,000 (1976 dollars). By 2005, landings fell to 133,738 bushels with a dock-side wholesale value of $12,655,000 (2005 dollars, based on data compiled by New York Department of Environmental Conservation).

In response to the decline in wild hard clam stock, towns across Long Island have developed shellfish management programs that include municipal shellfish hatcheries and annual hard clam "seed" planting programs. These programs were implemented to help stabilize the declining trend of the shellfish population and rebuild stocks to levels that would provide optimum yields for commercial as well as residential shellfish harvesters.

Commonly, seed is dispersed in the fall after it has been cultured in the hatchery and nursery to about 15 millimeters in shell length. Once the seed has been planted in the field, it is susceptible to predation and changing environmental factors. These two factors also influence the clam's survival into the second growing season. The larger the seed clam, the less susceptible it is to crab predation and the greater the survival of a season's plantings.

Mercenaria mercenaria seed clams.
Photo courtesy of Gregg Rivara

The condition of stored energy reserves of the animal at the onset of winter also influences survival to the second growing season. During the winter, hard clams depend on stored energy reserves accumulated during the summer and fall. Current research suggests that seed planted early in the season grow faster or are in better condition by the end of the growing season.

Improving overall harvest yields is central to the continuing support of public enhance-ment programs. If earlier plantings of smaller seed show no worse survival than later plantings of larger seed, shellfish enhancement programs could modify their practices by planting smaller seed beginning earlier in the season. This ability would prolong the time frame over which field plantings would occur and maximize the use of finite culture space in upwelling and other nursery systems. Consequently, more seed could be produced throughout the season, which would ultimately lead to an overall increase in yield of seeded product at harvest. This would be of benefit to the Long Island programs as well as commercial clam

farms and the larger hard clam enhancement community in the northeastern U.S.

A cooperative approach to find more effective seeding techniques

In an unprecedented cooperative approach, Gregg Rivara from Cornell Cooperative Extension (CCE) of Suffolk County led and coordinated research team participants from seven towns, a university and a state agency during 2002 and 2003. The research team members included: Dr. Robert Cerrato from the Marine Sciences Research Center, Stony Brook University, Debra Barnes from the New York State Department of Environmental Conservation, John Aldred from the Town of East Hampton, Thomas Carrano from the Town of Brookhaven, Craig Hassler from the Town of Town of East Hampton Shellfish Hatchery, Glen Hulse from the town of Huntington, Michael Litwa from the Town of Babylon, Kathleen McShane from the Town of Smithtown, and William Nazzaro from the Town of Southampton.

Across Long Island, this cooperative research team conducted multiple field plot and predator exclusion experiments using hatchery reared seed clams. In general, the towns involved with this project were interested in increasing survival of hatchery-reared hard clam seed once planted in the field. Overall, they looked at the survival of hatchery produced hard clam seed planted at different times through the growing season across Long Island, NY. Specifically, the team tested whether small seed planted early in the growing season would grow faster and be in better condition at the end of the growing season than large seed planted late; whether these same seed would suffer higher predation losses than larger late planted seed; and using these results develop a practical early small seed planting strategy.

Coordinated experiments yield significant practical results

Analyses of field plantings suggested that while clams planted late in the growing season (October) survived at a much higher rate than those planted early in the growing season (June and August), the surviving June-planted clams were significantly larger. Survival in field plots ranged from 1 to 32%. Survival in predator-protected boxes was very high (20 to 100%), indicating that predation was the principal source of mortality.

Seed clams from predator exclusion experiments planted in June and August survived better that those planted in October. This latter result suggests that the condition of June and August planted clams was better going into the winter than October planted clams. The better winter survival of predator-protected June and August planted clams does hold out the possibility that earlier planting is feasible.

Towns and companies growing hard clams would do best to protect clams until the first winter either by using bottom nets, protecting the seed in some sort of container, or developing better culturing techniques. This would constitute a shift away from hatchery/nursery work towards field preparation and predator reduction at planting sites. An alternative that could increase survival would be identifying sites with low predator abundances and planting on those sites.

The results were useful to those that plant hard clam seed (including commercial shellfish farmers) as it confirmed the practice of planting late in the season to minimize crab predation as compared with planting smaller clams earlier. Survival of small seed planted early in the season can be significantly increased if protected from predators and that the timing of planting in the fall may be a critical factor as temperature controls crab activity.

Cornell Cooperative Extension of Suffolk operates a shellfish hatchery and nursery system for three towns at the Suffolk County Marine Environmental Learning Center. Based on these results, in 2006, CCE used mesh-covered bottom nursery plots in a shallow, non-navigable creek in Southold. These plots were stocked with small clams early in the season in order to relieve overcrowding in other nursery systems. They were then harvested in the fall for planting along with production from the other

nurseries. The East Hampton Town Shellfish Hatchery used these findings to minimize clam seeding before the fall. Mesh bag over wintering was increased by 50% in 2005/2006; these clams would otherwise have been kicked out of the system by seeding them earlier in the season. It is anticipated that changes made by East Hampton and CCE should result in increased production of hard clams without a significant increase in cost.

Presentations

Aldred, J. 2005. Survival and Growth of Cultured Hard Clam Seed Planted in Spring, Summer and Fall in Long Island, New York Waters. 25th Milford Aquaculture Seminar, West Haven, CT. 3/1/2005.

Aldred, J. 2005. Survival and Growth of Cultured Hard Clam Seed Planted in Spring, Summer and Fall in Long Island, New York Waters. Long Island Shellfish Manager's Group, East Setauket, NY. 3/15/2005.

Rivara, G. 2004. Survival and Growth of Cultured Hard Clam Seed Planted in Spring, Summer and Fall on Long Island, New York Waters. 7th International Conference on Shellfish Restoration, Charleston, SC. 11/18/2004.