

THE SHELLFISH CORNER

OYSTER SHELLS, CULTCHING, AND OYSTER FARMING

By Michael A. Rice*

I recently read with interest an article in the Connecticut Sea Grant publication *Wrack Lines* (Spring-Summer 2016) by Tim Macklin about their effort in Fairfield, Connecticut to collect oyster shells from local restaurants.

The goal is to place the shells onto local recreational shellfishing beds in an effort to enhance the oyster set. Tim and his colleagues on the Fairfield Shellfish Commission are acting locally, but they have been following in the footsteps of a fellow Connecticut Yankee, John Volk, who was the chief of the Connecticut Bureau of Aquaculture in the state's Department of Agriculture.

Volk, like many professionals familiar with the oyster farming business, recognized that healthy setting substrate or cultch on seed beds is critical for healthy oyster settlement and seed production. And this has been known by practitioners for a very long time. For example, one of the first treatises on oyster culture available in America was the 1883 translation of University of Kiel Professor Karl Möbius's 1877 *Die Auster und de Austernwirtschaft* (The Oyster and Oyster Culture), translated and published as a 65-page appendix in the 1880 United States Commission of Fish and Fisheries — Report of the Commissioner. This treatise is remarkable in that it was the first description of what Möbius termed as 'biocenose' for the interaction of organisms on the oyster beds, or what we now more commonly know as community ecology today. Möbius clearly outlined the importance of having oyster shells as a proper setting substrate for the continued artificial propagation of oysters. But even before this scientific literature reached American shores, there

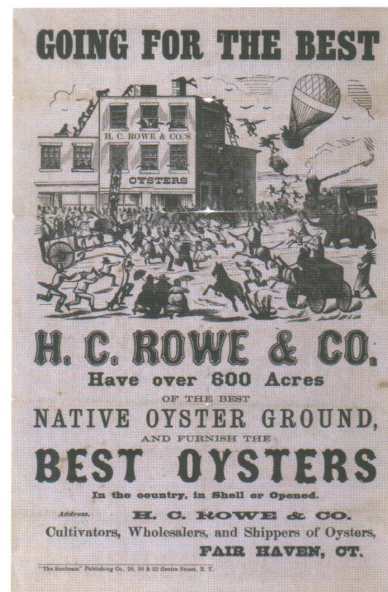
had been an appreciation for the value of oyster shells as being important for continued healthy shellfish beds. For example in my home state of Rhode Island, there was a public law passed during the January 1852 legislative session *Amendment to the Act entitled 'An Act for the Preservation of Oysters and other Shell Fish within this State'* that reads as follows:

SECTION 6. All persons taking oysters from any bed in the free and common oyster fisheries within the waters of this State, shall at the time of such taking, cull and restore to said bed all small oysters, shells, stones, and other substances valuable to said bed, retaining only such oysters that are fit for market and present use.

It is clear that with this legislative language that there was a good degree of understanding about the value of shell as somehow valuable for the continued well-being of the oyster grounds. Of course, as time has gone forward our understanding of the value of oyster shells as cultch material has become better refined. For example, this concept has been refined by Dr. Thomas M. Soniat of

the University of New Orleans and several of his co-workers to the point that oyster shell budget modeling can be used as a means for predicting sustainable oyster harvests from public beds and predicting the best areas for oyster habitat restoration projects [see *Journal of Shellfish Research* (2014) 33:381-394].

In the spring of 1986, Volk managed to find \$20,000 USD left over in the Agriculture Department's budget, and he used those funds to purchase 20,000 bushels (28.378 bu/m³) of clean oyster shells to be used as cultch or setting substrate for oysters on seed beds. Working with private aquaculture firms, they then spread the shell onto 20 acres (0.404686 ha/acre) of cleaned bottom on Long Island Sound that had a known history of good oyster sets. That experiment went well, and later that fall Volk went to the state legislature to ask for enough money to revitalize all of their 3,000 acres of state oyster seed beds in the Sound. Despite considerable skepticism by notoriously frugal legislators, Volk appealed for funds by using an argument for jobs and economic development,



Advertisement of the H.C. Rowe Oyster Company of Fair Haven, CT from the 1880s (Original in Connecticut Historical Society collections)



Starfish mop on Connecticut oyster boat 1940s
(Photo Courtesy of NOAA Fisheries)

and as a result his bureau was appropriated \$1.3 million USD. And later the next year, another \$4 million USD state bond initiative was used to buy about 5 million bushels of clean oyster shell for the project.


Starting in the spring of 1987, the state and the private oyster companies cleaned the seed beds in the Sound and laid down the cultch at about 1,700 bushels per acre using fire hoses

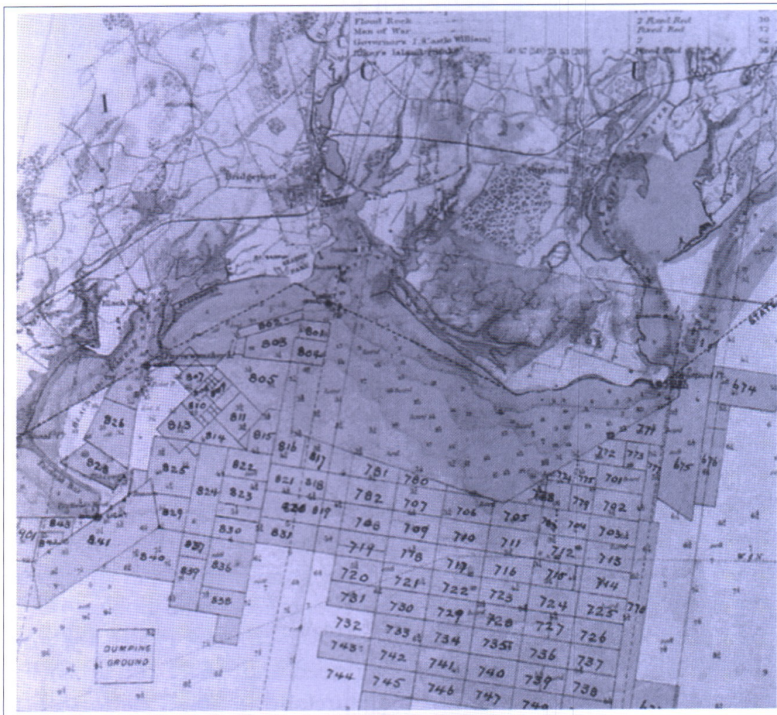
to hydraulically push out shells heaped onto barges. Luckily during that summer of 1987 the temperatures were right, and that fall a bumper crop of seed oysters were sold for transplant out to growout beds in deeper waters using Connecticut's traditional on-bottom culture methods.

The results of Volk's cultching efforts were very successful from the standpoint of economic return. The wholesale value of Connecticut's oyster harvest nearly doubled to \$9 million in 1988, and by 1991 the wholesale value of the oyster harvest reached \$33.3 million USD and subsequently \$50 million USD in 1993. The plan to make the cultch program economically sustainable was through a 10 % tax on oyster seed sales that would be directed back to the Aquaculture Bureau for continuation of this cultching program.

Unfortunately beginning in 1998 and extending into the early 2000s there were two oyster disease ('Dermo' *Perkinsus marinus* and "MSX" *Haplosporidium nelsoni*) outbreaks that severely impacted oyster harvests in Connecti-

cut and dampened the enthusiasm for the formal mechanism set in place to institutionalize the funding of cultching program on Connecticut's publicly-held seed beds. Declining oyster production was noticed by the legislature, so the 10 % tax on seed sales was eliminated in 2004 in a general effort to reduce state taxes. This is a sad example of how the long-term thinking required for investing in the growth of agricultural systems is frequently a foreign concept when the cycles of realpolitik and state budget priorities run for just two years.

The farmgate value of Connecticut's commercial oyster harvest has settled in to around \$15 million USD in recent years and the Aquaculture Bureau remains determined to educate their political leaders about long-term investments. Connecticut has a long history of success in the public-private partnership in the Long Island Sound oyster farming enterprise and there is no reason why it should not be a continued success [for more information see: Zachary, C. & M. Arnold 2015. *Against the tide Connecticut oyster, hybrid property, and survival of the commons*. Yale Law Journal 124:882-1345]. Aquaculture industry growth in coastal waters that are held in the public trust involves constant renewal, cooperation and education of the decision makers about long-term priorities, and the industry itself must be an important player in this process. 



Leased oyster grounds in Bridgeport and Stratford Connecticut in 1889 (Originals in Connecticut State Archives, courtesy of G.W. Blunt White Library, Mystic Seaport)



Michael A. Rice, PhD, is a Professor of Fisheries, Animal and Veterinary Science at the University of Rhode Island. He has published extensively in the areas of physiological ecology of mollusks, shellfishery management, molluscan aquaculture, and aquaculture in international development. He has served as Chairperson of his department at the University of Rhode Island, and as an elected member of the Rhode Island House of Representatives. rice@uri.edu