



Branden Rasmussen, 17, shakes young oysters out of a small bag onto a conveyor belt that will take the oysters into a tumbler, where they will be washed, separated, placed into a larger bag and then returned to the waters of Cherrystone Creek. Photo / Dave Harp

Aquaculture most likely future for Chesapeake Bay's oysters

≈ More Chesapeake shellfish reaching the market thanks to leased bottoms, triploid stock

BY RONA KOBELL

Some of the most valuable farmland in the Chesapeake Bay watershed is buried under 2 feet of water 10 miles north of Virginia's Chesapeake Bay Bridge Tunnel.

Here, in Cherrystone Inlet, C. Chadwick Ballard Sr. took several thousand acres of leased Bay bottom and began growing clams. It was 1983, and Ballard's oysters were dying of diseases; the clams were his last hope of saving his company. To run the experiment, Ballard hired Michael Peirson, a North Carolina State University Ph.D. graduate who took the job only because he couldn't find anything else.

Twenty-five years after they planted their first clam, Cherrystone Aqua Farms has become a \$15 million business, its name synonymous with clams the world over. It is one of the largest employers on Virginia's Eastern Shore, the most prosperous clam company in Virginia, and one of the most successful in the world.

That success inspired dozens of

imitators, who have flooded the market and driven down the price of the product. So four years ago, Peirson turned to Kenneth "Bubba" Frisby, a longtime employee, and handed him 100,000 baby oysters. His only instructions: Make them live.

Frisby did; that year, they sold 76,000. Today, Cherrystone grows 10 million oysters a year.

"I don't see us going out of clams, but we're spinning our wheels right now," said Peirson, who recently retired as the company's chairman. "With oysters, things are completely different now. You almost don't worry about diseases anymore."

Such a statement would have been unthinkable even a few years ago. Two diseases, MSX and Dermo, have all but wiped out the natural oyster beds in Maryland and Virginia, putting thousands of watermen out of work and relegating the Chesapeake Bay product to almost an afterthought on the national market.

What H.L. Mencken had once called the "Great Protein Factory" had become better known for producing algae blooms, jellyfish and other undesirable organisms.

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Michael Peirson, above, was a North Carolina State University Ph.D. graduate when he was hired in 1983 to resurrect dying oyster beds by planting clams on them in Cherrystone Inlet. Cherrystone is now a \$15 million business.

Four years ago, Peirson gave longtime employee Kenneth "Bubba" Frisby, right, 100,000 baby oysters with simple instructions: Make them live. Today, the company is growing 10 million oysters in Cherrystone Creek. Photos/ Dave Harp



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The situation was so dismal that state and federal officials were actively studying the idea of giving up on native oysters in favor of introducing an Asian oyster with the hope that it would be able to grow fast enough to reach market size before a disease killed it.

A future and a past

What changed? Why are Peirson and his fellow oyster entrepreneurs in Virginia optimistic on the future of the native oyster that shares a name with their state, *Crassostrea virginica*?

The oysters underneath Cherrystone Inlet are native *C. virginicas* with a twist, sterile oysters engineered to grow fast, taste good—and stay alive. Born in a state-financed lab along the York River and raised in a half-dozen private hatcheries around the state, these "super oysters" are the engine of the Old Dominion State's aquaculture business, its hope for the future.

Virginia has more than just the oyster of the future. It also has its past. The state's history of cultivating the aquaculture industry dates back 110 years to the oyster industry's first crisis. Oyster beds throughout the Chesapeake Bay had been depleted, in part because New Englanders and Long Islanders had come south to harvest the Chesapeake's

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bounty after depleting their own oyster grounds. Gear was getting more efficient. Laws were lax.

Several scientists at Johns Hopkins University, notably William R. Brooks, advised both Maryland and Virginia to adopt a system to put oyster grounds in the hands of private growers, who would lease the grounds from the state for a nominal fee. In return, they alone could harvest there. But the watermen were not interested in farming bottom; they wanted a public, commons approach to the fishery that the state would manage in their interest.

Maryland followed the watermen's desires. It stayed with a commons fishery. The state's solution to the rapid depletion of its natural oyster bars was to make the oysters harder to catch. It passed a set of byzantine laws that restricted oystermen to the waters of their own county, prohibited

companies from leasing the most fertile bottom, and forbade anyone from leasing any bottom in several Eastern Shore counties. Maryland also instituted gear restrictions, such as hand-tonging, to slow down the depletion of the Bay's oyster bars.

Virginia, in contrast, took part of its fishery private. In the early 1900s, it offered much of the state's productive oyster bottom for lease. Lease-holders could be companies—as long as they were registered in the state. And lease-holders could sublet part of the bottom to others. The leases were cheap—today they cost \$1.50 a year per acre—and could be renewed every 10 years, as long as someone was working them. They are easy to obtain, too.

For several decades, Virginia has operated under a joint permit authority with federal and state agencies, so the Virginia Marine Resources Commission is the only agency that applicants have to contact to get their permit. Neighbors can object to a lease, but they rarely do. The process takes about three months, according to VMRC spokesman John Bull.

Today, nearly 100,000 acres of Virginia's part of the Bay is under lease, compared with only about 4,500 acres in Maryland.

Virginia still has a small public fishery, but the leased-bottom industry

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long ago eclipsed it. In 2005, Virginia oyster aquaculturists planted 6.2 million oysters. By last year, that number increased nearly fivefold, to 28.3 million. It is on pace to reach 42.4 million for 2010, according to the most recent Virginia Shellfish Aquaculture Crop Reporting Survey, which Virginia Sea Grant conducts with the Virginia Institute of Marine Science.

While Maryland is one of the last places in the world to still rely exclusively on a public commons oyster fishery, Virginia's model is in line with oyster practices on the Gulf Coast. Known as extensive aquaculture, the system allows watermen to maintain their leases, move oysters that aren't doing so well to other bars, power-dredge to remove silt, and add shells when necessary.

Outrunning death

Yet none of that maintenance changed the fact that disease was infecting the leased beds with alarming frequency. Scientists had been looking at developing disease-resistant strains of the oyster, but hadn't had much luck. Then, in 1979, a young graduate student at the University of Maine named Standish Allen genetically engineered an oyster to have three sets of chromosomes instead of two.

That oyster, known as a triploid, is sterile. Rather than put its energy into reproduction, it puts it into growth—reaching full market size in 12–18 months as opposed to the three years it takes a normal diploid oyster (one with two sets of chromosomes) in wild conditions. Because oyster diseases often strike in the animal's second year of development, one that reaches market size in a year will make it to the table.

And unlike conventional diploids, which can only be harvested in the winter, triploids can be harvested year-round.

"I realized that pretty much everywhere they want to eat oysters, they farmed them," Allen said. "And if we were going to move to farming, it was clear we needed to create a better oyster."

Allen spent the next several decades honing the triploid and developing ways to mass-produce them. In 1997, the legislature gave the Virginia Institute of Marine Science funds to recruit



*Oyster geneticist Stan Allen came to the Virginia Institute of Marine Science in 1997. He'd created the C. virginica triploid as a young graduate student. Later, the Asian oyster study money allowed him to mass produce them.
Photo / Dave Harp*



*The triploid, above, puts all of its energy into growth, resulting in a cuppier oyster that growers harvest year-round.
Photo / Dave Harp*

Allen away from the Haskin Shellfish Research Laboratory at Rutgers University in New Jersey, where he had landed after a stint on the West Coast. If Virginia was going to grow an oyster aquaculture industry, it needed an oyster geneticist to lead the way.

The intriguing exotic

About the same time, Virginia watermen and seafood processors were beginning to consider another oyster that could grow to maturity before succumbing to disease—an Asian oyster named *Crassostrea ariakensis*. Virginia hoped the species would work for aquaculture.

Maryland, while initially against introducing an exotic species, changed its tune in 2002, when it elected Republican Robert L. Ehrlich, Jr. Under Ehrlich, the state spent millions of dollars to investigate putting a reproducing population of Asian oysters into the Chesapeake.

Scientists all along the East Coast had serious concerns about such an introduction, as it was widely believed that a different Asian oyster species, *Crassostrea gigas*, was responsible for bringing MSX to Delaware Bay in the 1960s.

Allen tried to steer clear of the heated political debate over the new oyster. Whichever strategy emerged victorious, the researchers would need large batches of *C. virginica* as a control group. For the first time since he created a lone *C. virginica* triploid in a Maine lab, Allen was able to see *C. virginicas* growing in large-scale trials.

The entire Asian oyster study would end up costing \$15 million in taxpayer funds, much of it from the National Oceanic and Atmospheric Administration's Chesapeake Bay Office. The research tested how the

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oyster would perform as an aquaculture product for both the shucking house market, which is still the bulk of the trade in the Chesapeake Bay, and the white tablecloth, half-shell market, which is the more lucrative, boutique end of the spectrum.

Lessons learned prompt a boom

It was the work with the Asian oyster that led Allen and other researchers to conclude that the native oyster was not “toast,” as some politicians reportedly had said, but actually an excellent product that could go the distance—literally. The Asian oyster shells tended to gape open, so meat would spoil if it wasn’t shucked and shipped right away. But the native oyster stayed closed, making it an ideal product for both shucking houses and the half-shell market. Also, because they put all of their energy into growth, Allen’s triploids were plump, or “cup-pier,” as the growers call them.

By 2006, word had spread that Virginia had a promising oyster available to growers. But to make the best use of the product, growers had to move away from the more passive, garden-tending extensive aquaculture and into a more intensive kind. Oysters grown on the bottom are vulnerable to diseases and, unless they’re in protective cages, to voracious cow-nose rays. The bottom-cultured oysters come from spat-on-shell plantings and largely go to the shucking houses. But oysters for the half-shell restaurant market need to be separate from one another. They grow in cages or floats off the bottom, and they need to be washed, tumbled, culled and monitored frequently.

Over the next four years, more than a dozen oyster businesses popped up in Virginia, including four new private hatcheries and one company that specialized in making oyster cages. Some of them, such as Bevans Oyster Company and Cowart Seafood Corp., are large-scale companies with a long history, a strong hatchery infrastructure and the ability to employ dozens of people in towns where few other industries exist. They have long relied on truckloads of oysters coming in from the Gulf of Mexico, and they have learned the hard way that such a business model is unsustainable.

But most of the aquaculture entrepreneurs run small companies,

growing and selling between 100,000 and a million oysters a year for the half-shell market.

“Private industry is just great for innovation,” said Jim Wesson, the head of conservation and replenishment for the Virginia Marine Resources

he sells 1,000–2,000 oysters a week.

“We need to transition from the waterman, the hunter-gatherer, gold-rush mentality, in both states,” Leggett said as he steered the A/V *Velager* over his lease. “And we’ve got a big jump on that in Virginia.”



Tommy Leggett, checks on his oyster farm in the York River. These are almost large enough to market. He sells about 70,000 oysters a year to area businesses, including two high-end restaurants. Below, 2-and-a-half-month-old oysters at the Cherrystone Aqua Farms are offloaded from their original bags and put into new bags in smaller quantities to leave room for growth. Within a year, they will be approximately 3 inches and marketable. Photos / Dave Harp



Commission. “Since it’s your own dollar, you’re going to make sure that it works. All you have to do is have the profits change a little teeny bit to motivate you.”

Tommy Leggett operates one of the smaller oyster operations. A lifelong waterman, he now runs an oyster farm for the Chesapeake Bay Foundation in Sarah Creek along the York River. He also tends his own oyster farm, from which

A stumbling start in Maryland

Until just a few years ago, oyster aquaculture was almost unheard of in Maryland. By 2000, Only Richard Pelz, a transplant from the Midwest who set up shop in St. Mary’s County, and David Chamberlain, a former New York shop teacher, were growing oysters in Maryland. Pelz had been able to get his business open after waiting three years for six different permits. Chamberlain had to wait five years for all of his permits to grow oysters in Chincoteague Bay east of Snow Hill.

For Maryland authorities, aquaculture was a foreign concept. Five counties—Dorchester, Queen Anne’s, Talbot, Somerset and Kent—banned leasing altogether. Even where it was allowed, oyster growers had

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The beginning:

Workers at Cowart Seafood in Virginia's Northern Neck, right, stand in a tank, loading spat on shell into bags to place on oyster leases. The spat on shell will grow into oysters, which Cowart will shuck and ship around the country.

Photo / Dave Harp



signed off.

"It was terrible," Nichols recalled. "I said, 'I'm a process guy. Explain the process.' The DNR guy said, 'There is none.'"

Similarly, Jon Farrington, a former aerospace engineer, had to wait nearly two years to get an Army Corps of Engineers permit to grow oysters in an upweller in his backyard in Calvert County. The upweller was about the size of a large bathtub.

"The hard part is all the red tape," said Farrington, whose company, JohnnyOysterseed, is focused on selling seed and equipment. "Growing

the oysters, that's the easy part."

Oystermen could protest if anyone wanted to lease productive bottom. They did, and they usually won.

"The bottom of the Bay belongs as much to a Rockville businessman or a Havre De Grace housewife as it does to a waterman who has worked it for 100 years," said Don Webster, a University of Maryland extension agent. "And there was good bottom. And shell. But whenever people would try to lease it, the watermen would protest and block it."

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to have the Maryland Department of the Environment test their water for 24 months to make sure it was not infested with bacteria. They also needed a Tidal Wetlands License from the Department of the Environment and the Army Corps of Engineers, and a tidal wetlands permit from the Board of Public Works. The wetland license also applied to those who wanted to build piers and marinas, and required long waiting periods. The Corps also needed to determine the business would not present a hazard to navigation, even if it were on a tiny, out-of-the-way creek. The Department of Natural Resources and Coast Guard also had to sign off. It was enough to turn off many potential investors.

Ernie Nichols learned that after he retired from developing business processes at Intelsat, a satellite communication company, and moved to Marion Station with his wife. Nichols had been growing oysters as part of a Chesapeake Bay Foundation project; by 2004, he was ready to turn his restoration project into a business.

The Department of Environment had been testing Nichols' water for two years. He figured there wasn't much more to do: he Googled Maryland aquaculture and downloaded an application.

Three months went by and he heard nothing. Finally, a Department of Natural Resources official said he

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—Jon Farrington, JohnnyOysterseed

had the application, but couldn't do anything with it until the Department of Environment, the Army Corps of Engineers, the U.S. Coast Guard and the State Department of Public Works

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The end: Workers at Bevans Oyster Co., below, which has a partnership with Cowart, bring in oysters that grew from spat-on-shell plantings on leased bottom. The oysters live up to the name of one of the boats used to plant the Cowart/Bevans crop: Fat Spat. Photo / Dave Harp

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Perhaps more than anyone else in the state, Webster has been trying to create an aquaculture industry in Maryland. He began in earnest in 1979, with an aquaculture conference. Forty people were expected; 160 arrived. At that time, Webster said, “the whole lease-holding list was on 4x6 index cards.” The interest was there, Webster said, but the watermen would not be moved.

“Almost every generation, there was a new commission or task force. Almost all of them would come out with new recommendations on leasing. And then it wouldn’t happen,” Webster recalls.

In the mid-1970s, the Horn Point hatchery came online and scientists there began trying remote-setting. They set down shell in tanks, spawned oysters, and let the baby larvae set themselves on a shell. Once that happened, they were ready to plant. A “spatmobile” provided growers with a setting system so growers could set larvae on shell.

But with disease in full force by the 1980s, pressure mounted from watermen to re-seed more of the Bay. The Maryland Department of Natural Resources obliged, moving oysters from saltwater to freshwater when disease attacked. It was thought that Dermo and MSX wouldn’t attack in freshwater.

But drought struck, salinities rose, and the disease flourished in the brackish water just as it had in the southern Bay. Slowly, the 58 shucking operations in Maryland began closing their doors. Only nine remain today.

A new approach in new laws

In 2003, a year after Maryland elected Ehrlich, state officials once again called for an aquaculture task force. Chairing it would be State Sen. Kathy Klausmeier, a Baltimore County Democrat, and Anthony J. O’Donnell, a Southern Maryland Republican who had spent his career at the Calvert Cliffs Nuclear Plant. Neither one knew much about aquaculture.

And yet the task force came up with recommendations that became the foundation for a strong new law. They concluded that, if aquaculture was to succeed in Maryland, the state needed a streamlined permit process. It needed incentives for watermen to get into the business. It needed to cultivate entrepreneurs, not drive them away.

In 2005, legislation was passed to



Marinetics, which markets its oysters as Choptank Sweets, set up shop in the Choptank River about 10 years ago. They are now the largest oyster company in Maryland, using floats to grow 6 million to 8 million oysters a year. Photo / Dave Harp

create the Aquaculture Coordinating Council. Its goal was to make it easier for Maryland aquaculture businesses to acquire permits. The job of coordinating all of the paperwork needs of each agency fell to Karl Roscher, who had a

marine science degree and a long career as an aquatic animal health inspector.

Hard-working and no-nonsense, Roscher has been able to streamline the

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paperwork. Both Nichols and Farrington were able to open their businesses. Now, there are eight oyster aquaculture businesses open in Maryland; the largest and most successful is Marinetics, based in Cambridge. None of them are run by watermen, who are still cool to the aquaculture concept.

Last year, the Maryland General Assembly quietly passed the most significant aquaculture law in more than 100 years. The law eliminated the moratoriums on leasing in Shore counties, dropped the prohibition on corporations leasing bottom, required lease-holders to work their bottom instead of just holding it to prevent others from using it and created aquaculture enterprise zones, where one general permit can cover many different entrepreneurs in a designated area.

On Sept. 7, the DNR opened its doors to new business. Nine people filed paperwork to lease bottom. Four more mailed in their applications. Johnny Oysterseed's Farrington was first in line, looking for more bottom to lease.

If all of those applications come to fruition, Maryland will have increased its leased bottom by 57 percent in a matter of

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**Tom O'Connell
DNR Fisheries Director**

one day, said DNR Fisheries Director Tom O'Connell. He called the new law "just instrumental" in creating the industry.

"For over a century, the industry was trying to protect the bottom for a public fishery," O'Connell said. "It took several decades for the collapsing industry to realize that it needed to look for alternatives."

Since 1994, DNR estimates, Maryland has spent more than \$40 million in state and federal funds on restoring the oyster populations. With state funds

running low, it can't afford to do that anymore, especially if private industry will do the job more effectively.

Martin O'Malley, the Democrat who succeeded Ehrlich in 2006, continues to support aquaculture. He has proposed setting aside choice oyster bottom as sanctuaries where oysters can grow and reproduce protected from harvest, prompting an outcry from the few hundred remaining oystermen.

Looking to the future

Maryland isn't the only state where watermen have helped to cool the appetite for aquaculture. Rhode Island and North Carolina don't have much aquaculture, either, because the watermen there don't want it, Cherrystone's Peirson said.

"When you look at who is controlling the industry, they're saying 'we want our traditional way of life.' Well, those days are gone," Peirson said. "And once you have that mindset, it's very hard to change."

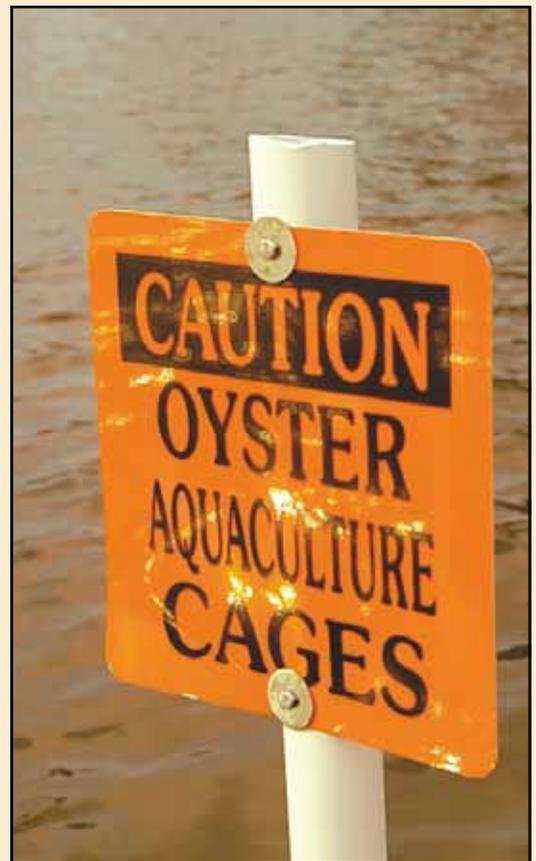
But the watermen's opposition in Maryland and the more streamlined

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SIGNS OF THE TIMES



For more than a century, a debate about how to manage oysters has simmered around the Bay. As the wild oysters stocks declined, scientists repeatedly suggested aquaculture was the industry's best way forward. Maryland watermen preferred a public commons fishery, where they could tong for oysters like these watermen are doing in the Nanticoke River, above. Now Maryland is looking toward aquaculture. At right, a sign in a Virginia waterway points to the way the business is heading on both sides of the Chesapeake. Photos / Dave Harp



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permit process in Virginia are not the only reasons Virginia is far ahead of Maryland. Virginia has saltier waters, so oysters can grow even faster there—a triploid can reach market size in a year in Virginia’s Chincoteague Bay compared with about 18 months in Maryland’s Choptank River.

Unlike Virginia, Maryland has only one, small, private hatchery. Its state-run facility, Horn Point, which can produce about a billion oysters a year, grows oysters for restoration and for a harvest in the public fishery.

Maryland officials acknowledge the lack of private hatcheries is an issue and envision building private hatcheries in the future.

As he plies a small boat over hundreds of oyster racks in Cherrystone Creek, Frisby said the company is counting its blessings. Since the initial experiment with Peirson, Frisby reports that nearly 80 percent of the oysters he plants survive. Their longevity not only saved jobs at Cherrystone, but helped prove to the world that the Chesapeake Bay is, once again, in the oyster business, and in it in a big way.

“How many oysters can we grow?” Frisby asked. “The answer is, if we ever hit that wall, we’ll let you know.”



Cherrystone’s oysters get tumbled to clean off the muck before they go back into the water to grow. The oysters are “finished” in Chincoteague Bay, where they take on their salty flavor. In addition, the tumbler helps give the shells that round shape that the half shell market likes. Photo / Dave Harp



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