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The ECSGA informs policy makers and regulators to protect a way of life.

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The Mouth of the Bay Survival in the Time of COVID-19



Executive Director
Bob Rheault

As I write this on March 31, I have a feeling that much of it will be obsolete or out of date by the time it reaches your mailbox. The shellfish realm (like the rest of the world) has been turned upside-down by the COVID-19 pandemic. The fire hose of news spewing forth on how to respond to the crisis, and the various programs available to mitigate the financial pain, are overwhelming.

It was only two weeks ago that our national food-service establishments were shut down in an attempt to keep people apart and restrict the spread of the virus. Since few Americans know how to shuck, we estimate that 90 percent of oysters and maybe 70 percent of clams are eaten at restaurants. When we closed the restaurants, we essentially froze the shellfish markets.

Dealers and restaurants were caught holding the bag on tons of shellfish and other perishable foods that they sent to the dump because it was too costly

to send it back to the growers, and there was no cost-effective means to process it or freeze it. Some growers are trying to keep a trickle of product moving by boosting online sales or farmers-market sales, or by trying to arrange home delivery, but the quantities are nowhere near enough to make ends meet.

With everyone hunkered down at home with their families, few are in the mood to shuck oysters, if they even know how. Oysters are a “happy food” and you want to be sharing them with a bunch of friends, having a good time, preferably with an adult beverage in hand—not sheltering in place, practicing social distancing.

My job suddenly got a lot more interesting. We were supposed to have our Walk the Hill fly-in to D.C. two weeks ago, but all those plans had to be scuttled, so we pivoted and arranged for two dozen conference calls instead. The Senate and House offices we were talking to were all quite solicitous about the plight of our industry, but they were also distracted because they were on the cusp of passing the CARES Act—the \$2 trillion package of loans and grant programs designed to keep the entire economy from tumbling into the abyss. At the time everyone was madly trying to read the draft bill to see what was in it.

Nonetheless, we did manage to make some progress on a few of our top legislative priorities. We continue

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Added Value from Shellfish Breeding: Past, Present, and Future

by Stan Allen, Professor of Marine Science
Aquaculture Genetics and Breeding Technology Center,
Virginia Institute of Marine Science

Back in November I gave a talk entitled, “The Future Added Value of Shellfish Breeding,” at the Virginia Aquaculture Conference in Newport News. I’d like to expand on that presentation by providing some background on the present state of oyster breeding, as well as some context for the future. The ulterior motive of my talk at the conference was to emphasize the point that having an established breeding program is one of the best assurances for sustainability of any type of farming, including shellfish farming.

For the past 22 years Virginia has maintained an oyster breeding program through the Aquaculture Genetics and Breeding Technology Center (ABC), and I hope to make the case for why it’s imperative that it continue well into the future.

Added value is a straightforward concept: it’s the increase in value that a business creates through processing. Value is added to a product when it is processed for marketing, such as by packaging or preparing it for consumption. In a similar manner value is added to oysters through selective breeding by improving product quality, which can be measured in better survival, growth rates, uniformity and shape. Value is added because the product is more profitable to grow.

Past to Present

At the inception of ABC in 1997, the Chesapeake Bay had no oyster-culture industry to speak of, owing principally to MSX disease, which killed seed and juveniles long before oysters reached market size. Thus, the initial foray into “adding value”

for ABC was simple: it’s disease, stupid. Throughout its first decade ABC’s principle activity involved mounting an organized selective breeding effort through mass selection. I would characterize mass selection as the caveman-tool version of selective breeding, not only because cavemen actually used it to domesticate crops and animals, but because mass selection is a blunt instrument in the selective breeding toolbox. Like a club, it can be pretty effective in certain arenas where the “prey” is close at hand and slow.

In this analogy, the “prey” was resistance to MSX disease, and the club was mass selection for disease resistance. Mass selection consisted of breeding the oysters that survived MSX, which is pretty straightforward since you can’t breed the ones that died. Resistance to MSX disease was highly heritable (meaning there was a strong genetic basis for disease resistance). These selection efforts added immense value to the oysters, increasing survival from around 10 percent to around 70 percent in a decade.

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Selective Breeding

For the Chesapeake Bay region, the advent of triploids was also an important development, and together selective breeding and triploidy launched an industry in Virginia. This “added value” is depicted in Fig. 1 on the steep part of the curve marked, “disease resistance and triploidy.”

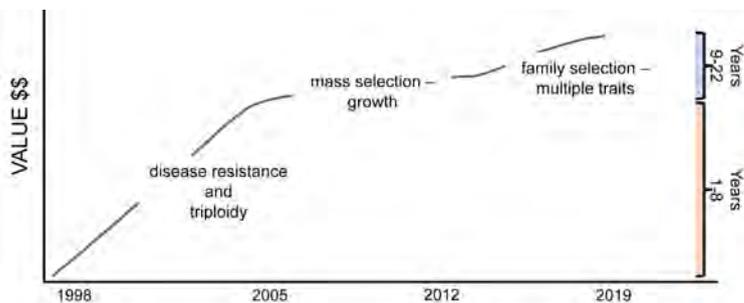


Fig. 1: Added value for phases of selective breeding at ABC showing high value in initial years due to progress with MSX-disease resistance and triploidy.

Once ABC had established a level of disease resistance, survival improved only incrementally, so we began to focus on “growth” in our mass-selection program. In this case, the cave-man club was used to pick out the biggest, best-shaped oysters. Selecting for growth through mass selection resulted in incremental gains for another 6-7 years (Fig. 1, on the part of the curve marked, “mass selection – growth”).

However, mass selection has limits on how well you can define traits and how effectively you can control inbreeding. So ABC adopted a sharper tool in the early 2000s—a scalpel as opposed to a club—in the form of family breeding. In principle, family breeding consists of many matings between one male and one female, creating families with lots of “kids.” You then pit the kids from each family against each other to see who is the best commercial prospect. The winning families get to reproduce; the losers—not so much. The main advantage of family breeding is that you can keep track of who is mated to whom (to avoid inbreeding) and you can select for multiple traits at one time.

For example, the Hatfield family might grow quickly and the McCoy family might have good meat content. Both would be candidates for the next generation. As we incorporated family breeding at ABC, value was added as we realized incremental gains (as with mass selection), but because we were focusing on multiple traits, more value was added through family selection than mass selection. (Fig. 1, on the part of the curve marked, “family selection – multiple traits”).

All told, much more value was added in the first decade than in subsequent years. Early appreciation for the meteoric improvement waned as gains became incremental, through slightly

better survival and 5–10 percent gains per generation in survival, meat quality and uniformity. Incremental gain is the norm for breeding programs.

It is not very exciting or even motivating to establish a breeding program based on only incremental gains every generation. This lack of enthusiasm is probably the main reason for procrastination in establishing a new breeding center in the Northeast. Had there been an active oyster culture industry in Virginia back in 1997, I don’t believe there would have been an ABC initiative in the first place. It was because extraordinary measures were necessary that ABC was established.

Future

So where does the future added value of a breeding program lie? There are two answers.

One source of future added value is the constant improvement of breeding itself, although you need to have a breeding program to improve it. The merit of an ongoing program that routinely improves product value over the

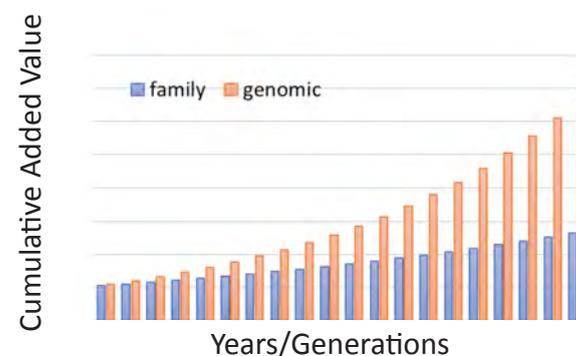


Fig. 2: “Sharpening” the approach to selective breeding can up the “compound interest rate” and thus the cumulative value of a breeding program to the industry. In this example, family breeding yields gains of 5 per cent a year, while genomic selection adds 10 percent. Because of the way family breeding operates, one generation is one year.

course of generations—while hard to appreciate from year to year—bears compound interest over time. That is, every 5 percent improvement of the product comes atop the cumulative value of the previous improvements. The science of breeding itself can be honed and sharpened (think club evolving into scalpel), such that the compound interest rate improves, say from 5 percent to 10 percent (Fig. 2). Adding traits, or measuring them more accurately, also improves gain.

Further sharpening the tool of selective breeding is what the approach to genomic selection is supposed to accomplish (scalpel evolves to laser). ABC and a number of East Coast institutions have recently embarked on projects to implement various forms of genomic selection.

The second answer to where the future added value of a breed-

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New Faces Serving the Shellfish Aquaculture Industry

Kristen Jabanoski

Science Communications Specialist, NOAA NEFSC/Integrated Statistics, Milford, Conn.

The NOAA Milford Lab is excited to welcome several new staff members. Their expertise will expand our ability to serve the shellfish aquaculture community with state-of-the-art science.

Genevieve Bernatchez

Chemistry Technician Genevieve Bernatchez brings considerable experience using and maintaining analytical instruments and running chemical and biological analyses critical to shellfish aquaculture and environmental research to her position as a chemistry technician. No stranger to Milford, she previously worked as a contractor research assistant for the Milford Lab from 2012–2014.

Most recently, Genevieve managed two laboratories at the University of California, Irvine,



GENEVIEVE BERNATCHEZ
Chemistry Technician Genevieve Bernatchez, holding a Gumboot chiton in California.

where she was responsible for lab safety and maintenance of all research equipment. There she coordinated three research projects focused on the effects of changing marine biodiversity, the impact of climate change and invasive species on marine communities, and tracking nutrient availability in the intertidal zone. She also previously worked with the Long Island Sound Study water monitoring program.

Genevieve looks forward to being the instrument guru of the Milford Lab. “I greatly value helping scientists with their research, teaching and sharing knowledge with others. I hope that my work at the Milford Laboratory will help improve our understanding of the importance of shellfish aquaculture and fisheries,” she said.

Genevieve earned a master’s degree in biology from Northeastern University, where she stud-

ied the effects of invasive green crabs on New England salt marsh ecosystems.

Katie McFarland

Research Biologist Dr. Katie McFarland joins the Milford Lab after two years as a postdoctoral research associate at the University of Maryland’s Horn Point Laboratory, which houses one of the largest oyster hatcheries on the East Coast. She has expertise in the physiological responses of oysters to stress, and using computer modeling to project the effects of environmental change on populations. At Horn Point, Katie studied the genetic selection involved in the domestication and hatchery production of oysters to improve the broodstock used for restoration. Previously, she studied Eastern oyster genetics for restoration in urban estuaries as a research associate at Cornell University.



KATIE MCFARLAND
Research Biologist
Dr. Katie McFarland

On her new role, Katie said, “I am particularly excited about working closely with industry partners to produce actionable science that benefits coastal communities.”

Katie earned her doctorate in marine biology at Université de Bretagne Occidentale, part of the European Institute of Marine Science, in Brest, France. Her dissertation focused on modeling the population dynamics of an invasive green mussel and its response to a toxic algae. She also holds a master’s degree in marine and ecological science from Florida Gulf Coast University.

Diane Kapareiko

Microbiologist Diane Kapareiko has been working at the Milford Lab as a microbiology technician for more than 35 years, but in late 2019 she took on new responsibilities as a microbiologist. She is currently advancing the Milford Laboratory’s probiotic bacterial strain OY15 to commercialization in cooperation with Prospective Research, Inc., of Beverly, Mass.

Recently, Diane was funded by the NOAA Aquaculture Office to partner with three oyster hatcheries located in critical aquaculture locations in the U.S. to conduct hatchery-scale trials to confirm the probiotic effects of OY15 on both Eastern oyster larvae and Pacific oyster larvae. If larval survival is improved by probiotic strain OY15 at hatchery scale, Prospective Research will commercialize this probiotic strain as an economical and environmentally friendly way to mitigate bacterial disease in shellfish aquaculture facilities, improve larval survival and provide seafood and financial security to the shellfish aquaculture industry.

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SHELLFISH GROWERS SINCE 1999

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ECSGA Membership Categories and Dues

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Member Type	Gross Annual Sales	Dues
Grower	\$0 to 50,000	\$100
Grower	\$50,000 to \$100,000	\$200
Grower	\$100,000 to 300,000	\$500
Grower	\$300,000 to 1 million	\$1,000
Grower	\$1 million to \$3 million	\$2,000
Grower	over \$3 million	\$3,000
Shellfish Dealers and Equipment Suppliers		\$250
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Non-voting Associate		\$50

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Member Survey Results

by Robert Rheault,
ECSGA Executive Director

Every year I survey industry members in order to take the pulse of the organization and see if we need to redirect our efforts to meet their needs. This year only about a quarter of members completed the online survey (74 percent were growers, 10 percent dealers). Half of respondents had over 10 years in the business. Only 20 percent had six or more employees, while 56 percent had three or fewer employees.

Broadly, respondents felt we should focus primarily on advocacy, especially at the Interstate Shellfish Sanitation Conference (ISSC), Army Corps of Engineers (ACOE), and National Oceanic and Atmospheric Administration (NOAA).

In descending order of importance members ranked: political action, public education, research, grower education. As with every previous survey, marketing came in dead last on the list of members' priorities.

When it comes to political action, only 18 percent had attended one of our Walk the Hill events in D.C., and yet all of the respondents placed a high value on maintaining relationships with our legislators and educating them about our issues. However, hiring a lobbyist to help with that did not receive a lot of support.

Members ranked those issues affecting the industry, in descending order of importance: relief from the need for Jones Act insurance; need for better crop insurance and more aquaculture research; support for Sea Grant, the Milford Lab and genetics research; resuming trade with the EU; ocean acidification research; and support for the Shellfish Growers Climate Coalition.

Roughly one-fifth of respondents reported going to at least one ISSC conference, and 55 percent felt that our participation in that process was a "top priority." Personally, I am quite proud of the work we do at the ISSC on behalf of our members. We study hundreds of pages of material, prioritize our responses, organize our members and do a good job of pushing back when the FDA offers frivolous new regulations that have little or no public health benefits.

As with nearly every survey over the years, overall support for marketing was weak, and few showed any love for events like Romancing the Clam or the Milford Oyster Festival. Preferences for specific research priorities seem to be remarkably consistent year over year.

Over 85 percent felt it was important to develop better tools to detect pathogenic *Vibrios*, and to come up with post-harvest processes that reduce the risk of *Vibrio* illnesses, but that still leave us with a live, fresh product. A substantial 69 percent valued our efforts to improve selective breeding for disease resistance and performance, and 68 percent said they support ocean acidification research.

When it comes to education, 90 percent of respondents valued the fact that the executive director is available to field calls from the media and convey accurate information, while 80 percent thought it was important that the executive director review dozens of federal documents and submit comments. Over 80 percent felt the Listserv is very important or a top priority. Slightly fewer valued the website (75 percent) and newsletter (71 percent), while 69 percent felt our social media presence is important.

When asked, "What is the best way for us to reach you?" the Listserv scored the highest, followed by the online newsletter, the paper newsletter, the website and social media. Judging from the comments that respondents offered it was pretty clear that each vehicle has its own ardent fans!

I know everyone suffers from questionnaire fatigue, and many feel they are too busy to respond. But this is the best tool we have to get a handle on what you think is important. So next time an invitation to participate lands in your inbox, please take a few minutes to respond.



New N.C. Board Rep



We welcome Chris Matteo as the new North Carolina representative on the ECSGA board of directors. Chris began farming oysters full time in 2013 when he started Chadwick Creek Oysters and Seed Nursery in Pamlico County, N.C.

In 2019, he founded Siren's Cove Shellfish, an oyster farm and shellfish dealership in Carteret County. Chadwick Creek's seed nursery has supported the growth of the state's booming shellfish industry from about eight growers in 2013 to more than 70 today.

In 2018, he took the reins of the N.C. Shellfish Growers Association and has reorganized it. When Hurricane Florence devastated the state's shellfish industry, Chris led the effort to get meaningful hurricane relief for North Carolina's oyster growers from the state Department of Agriculture. He was also the industry voice for North Carolina's Shellfish Aquaculture Bill, which was signed into law in 2019. He serves on the Shellfish Cultivation Lease Review Committee, which hears appeals of the Marine Fisheries Commission's decisions regarding shellfish leases.

Before oyster farming, Chris worked in the hedge-fund and technology industries. He graduated from the University of Pennsylvania with a B.A. in International Relations. Chris grew up on a small farm in upstate New York, and from an early age has loved shellfish and spending time on the water.

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Mouth of the Bay

to educate congressional offices and take steps towards resolving our challenges with the Jones Act, and the need for many farms to carry both workers compensation and Jones Act insurance for their employees. We are cautiously optimistic that our appropriations request for additional USDA Agricultural Research Service funds will be well received, allowing us to fully develop our Shellfish Breeding Center and to accelerate our efforts in selectively breeding disease-resistant animals. But as with everything else, the consideration of appropriations bills is likely to be delayed until after the election, so I hate to get my hopes up.

Since our virtual Walk the Hill, I have been trying to decipher hundreds of pages of legalese so we can provide solid advice to growers and dealers on how best to take advantage of the various stimulus packages that are being offered. In many cases it is becoming clear that the authors were working in haste and they themselves didn't fully appreciate how to implement some of the programs they were designing.

I have been having regular conference calls with the other associations as we all try to navigate

these uncharted waters, trying to interpret the programs that in some cases are still being designed on the fly. Along with the Pacific Coast Shellfish Growers Association, the National Aquaculture Association and Oyster South, we are doing our best to keep our members informed. If you are not on the ECSGA Listserv you are definitely missing out on some crucial information. We are posting as much as we can to our website, either on the blog (in the [What's New](#) widget on the homepage and the [What's New](#) tab on the main menu) or under the *Grower Resources* tab on the main menu ([All Resources](#) and [COVID-19 Resources](#) on the pull-down menu).

The [Paycheck Protection Program](#) is designed to pump \$347 billion in forgivable loans into small businesses so they can keep their employees working. If you rehire laid-off employees for two months you can get a loan for up to \$100K to pay yourself and your employees (as well as benefits packages, mortgage fees and certain taxes) and most of the loan will become a grant. Visit the Small Business Administration website ([SBA.gov](#)) or talk to your local SBA lender. In addition, aquaculture was also named as a beneficiary for \$300 million in Fisheries Disaster Assistance, and NOAA is deciding how those funds will be distributed. This is just the tip of the iceberg, and Congress is already drafting a phase-4 COVID-19 package, so stay tuned.

These are trying times to be sure. At least shellfish farmers have been recognized as a critical industry, allowing farmers, dealers, drivers and distributors to continue to go to work and tend their crops, even if they can't sell them. The FDA and the ISSC are trying to figure out how they can carry out the requirements of the National Shellfish Sanitation Program if they are not allowed to go inspect dealer shops. Most states are vowing to continue sampling harvest area waters so they can keep harvest areas open, but that too is in jeopardy right now.

The big question on everyone's mind is, *How long is this going to last?* If this is merely a pause in sales for a few months, I imagine it will be similar to the sales interruption we experienced back in 2001 after the 9/11 terrorist

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attacks. I remember that the markets locked up then, but since I didn't lose any inventory it was more of a cash-flow issue than anything else. By the end of the year my balance sheet was where it needed to be. What I do remember from that experience was trying to boost sales by dropping my price 20 percent. It had no effect on sales volume, but it did take me two years to get back to the price I had been charging before the crisis.

So again, the big question is: *How long will this last?* Spring usually

brings a really strong market for shellfish because supplies are typically tight and demand starts to amp up around Valentines Day and during Lent. This is also the season for buying seed and planning to put new gear in the water. Instead, many of us are seeing that our dealers are not paying their bills because they are uncertain if their customers are going to survive. Growers are cancelling seed orders and either delaying or cutting back on orders for gear. If this goes on for much longer and growers don't plant seed this spring, then the damage to our industry could well continue for years to come.

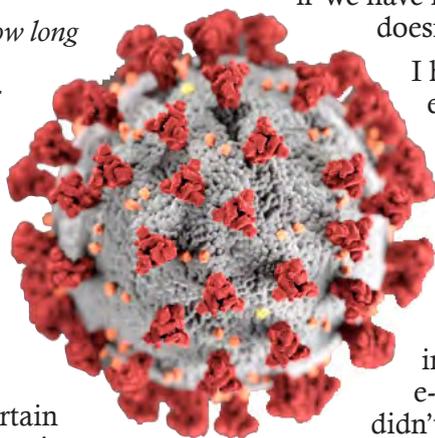
In the middle of the night I find myself worrying about the entire future of our industry if the mandates on social distancing cannot be relaxed soon. By mid-summer there will be a glut of oysters waiting to hit the market when it re-opens. Growers will be anxious to make up for lost sales, but restaurant sales are likely to be tepid at first. A collapse of the market price is seemingly almost inevitable. I have real fears about how many of our members could remain profitable if we were to see a substantial decline in market prices. When clam prices collapsed a few decades ago we saw about half of the producers throw in the towel.

Then there are the growers' associations. With so much uncertainty in the markets, no one is rushing to pay dues. The ECSGA balance sheet (which was bleeding red ink last year) is looking pretty abysmal. Of course, it is hard to generate too much sympathy for shellfish associations when health experts are predicting the potential for hundreds of thousands of deaths, so it does put things in perspective.

With all the bad news, many folks are getting creative. Online shucking videos teaching home cooks how to open our products are everywhere. States are pushing local sales, home delivery options and farmers' markets, as well as air-freight options. Some dealers

are looking to donate product to soup kitchens, while some growers are even talking about dumping product on oyster reef restoration projects.

I continue to search for a silver lining in this catastrophe, and there are lots of positive things we can point to. The government seems intent on avoiding a collapse of the economy and has taken many steps to try and ensure that our worst fears don't materialize. Government agencies are regularly polling industry leaders to see what we recommend and asking if we have ideas to ensure that everything doesn't go down the drain.



I have had a ton of teleconferences and Zoom meetings, and I have to admit that these are a great way to get things done. I can work from home and save a bundle on travel. If participants turn on their cameras, I can even see if they are engaged and listening, or if they are checking their e-mail. As an added bonus I

didn't need to put on a suit and walk miles in uncomfortable dress shoes rushing from meeting to meeting in D.C. this year. I can see how we might be more effective advocating for our issues via teleconference than we are when we all troop down to Washington.

But if there's one thing I do know, it's that shellfish farmers are resilient optimists. We expect that we will be able to weather this storm, because we have already survived worse. So hang in there and keep your chin up. We are all pulling for you!



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Welcome, Gulf Coast Growers!

The ECSGA is pleased to announce that growers hailing from the Gulf Coast are now joining our association. They are being represented on the board by Bill Walton, the director of the Auburn University Shellfish Lab located on Dauphin Island, on Alabama's Gulf Coast.

Bill is also an associate professor in Auburn's School of Fisheries, Aquaculture and Aquatic Sciences, and is a marine extension specialist for the Alabama Cooperative Extension System. He conducts

applied research with local shellfish farmers, shellfishermen (commercial and recreational), and national and local organizations.



Before moving to the Gulf, Bill did similar work along the coast of Massachusetts. His interests include all aspects of marine invertebrate fisheries, restoration and aquaculture. Bill has a B.S. in Biology from Tufts

University, an M.S. in Ecology from Rutgers University, and a Ph.D. in Fisheries Science from the University of Maryland.

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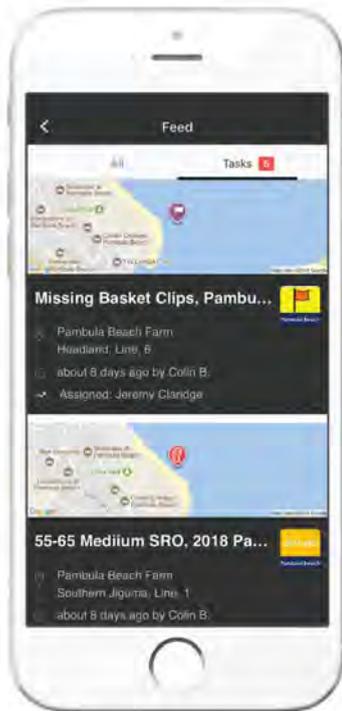
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Shell Shape and Color in the Eastern Oyster

by Michael Whiteside, Rutgers University, Haskin Shellfish Research Laboratory

As the popularity of raw bars and the demand for shellfish continue to grow, using selection for shell attributes in breeding programs may become increasingly desirable for both growers and consumers. By manipulating aesthetic shell traits for the half-shell market, growers can further differentiate their brands and market their products more successfully. At Rutgers University's Haskin Shellfish Research Laboratory scientists have crossed Eastern oysters, *Crassostrea virginica*, in order to characterize the shape and color of shells, discovering that both traits appear to be highly heritable.



Shell shape

The ideal shape of an oyster resembles a teardrop and has a depth-to-length ratio of 1:3. Extreme deviations from this shape can lead to extra work on farms and even look unappealing to consumers, resulting in decreased sales. The curlback hinge-shell abnormality is characterized by a sharp, downward curvature of the plane of commissure (where the two valves meet) close to the hinge. This streamlined shape is likely an adaptation to high-energy reefs, preventing cemented oysters from becoming

dislodged by reducing the tidal force on the shell. The trait was brought to the attention of breeders soon after it was found to be widespread at low levels along the Atlantic coast in stocks and batches of hatchery-produced seed. Oysters with this deformity are hard to shuck and have smaller meats due to the smaller cup size.

To determine whether this abnormality is heritable, crosses were made using broodstock oysters of wild origin. Oysters were sorted into two groups based on whether or not they exhibited the curl-back hinge trait, and then crossed among each other. The progeny from each of the crosses were grown out separately in a common garden experiment, and in the following year, crosses were repeated using selected F1s (the first generation of crosses), resulting in two generations of selection. Comparisons of measurements of right and left valves of selected and control F2s (the second generation of crosses) established that the curl-back trait has a genetic component.

Shell color

Although shell pigmentation has been well studied in Pacific and pearl oysters, not much is known about the nature and mode of inheritance of this trait in the Eastern oyster. Shells of Eastern oysters can vary in the amount of pigmentation, and can be striped or not striped. In addition, pigments in shells can produce at



least two colors—black and red/brown—which can be found on both the left and right valves.

As a step towards understanding coloration in the Eastern oyster, researchers described four color-morphs and crossed them among each other. Overall, the proportions of color-morphs in the progeny strongly suggest that color and pattern are under genetic control. Preliminary results from crosses also provide evidence that pigmentation is an additive trait and that dark central stripes exhibit a general dominant inheritance pattern, while light central stripes are dominant over non-striped morphs.



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New SC Board Rep



The ECSGA board welcomes Trey McMillan as the new South Carolina representative. He is the owner and president

of Lowcountry Oyster Co. and vice-president of the S.C. Shellfish Growers Association. Trey was born and raised on a working waterfront in Charleston, where he grew up fishing, shrimping and crabbing. His oyster farm is located about 34 miles south of Charleston in the ACE Basin National Wildlife Refuge, and uses a sustainable, floating-cage system to raise Lowcountry Cups from 4-mm seed to 3-inch single selects.

Before farming oysters, Trey spent over 15 years as a professional sport-fishing captain. His fishing exploits took him up and down the East Coast and throughout Central America and the Caribbean, where he brought his signature fishing style (and beard) to billfish tournaments at every stop. Despite all the travel, Trey has always managed to keep one eye on his hometown of Charleston.

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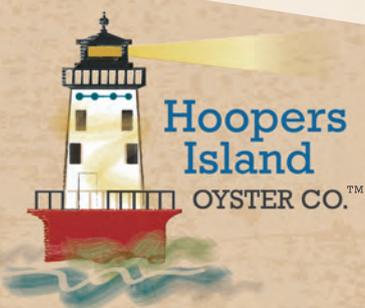
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Oyster South 2020 in Wilmington, North Carolina



ED LALLO/LALLO PHOTOGRAPHY

Oyster South attendees listen to Dr. Ami Wilbur as she leads a tour of the University of North Carolina, Wilmington, Shellfish Research Hatchery.



ED LALLO/LALLO PHOTOGRAPHY

Braving the unseasonable cold, conference goers managed to have a good time out of the rain and under the tent at the "Shuck and Tell" oyster tasting held at the Wrightsville Beach Brewery.



ED LALLO/LALLO PHOTOGRAPHY

The symposium, which has grown by leaps and bounds every year since its debut in 2017, had 290 attendees this year, along with 17 vendors displaying their wares at the trade show.

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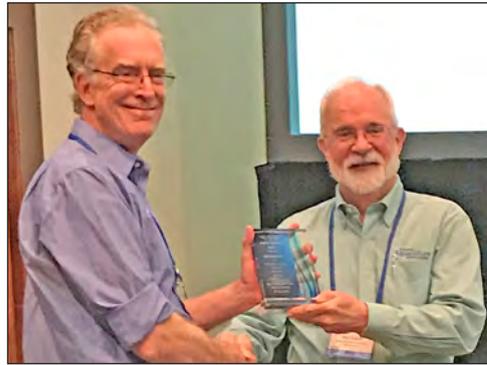
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ANN RHEAULT

National Aquaculture Association Executive Director Paul Zajicek (r) presents the Joseph P. McCraren Award for outstanding contributions in promoting the growth of aquaculture to ECSGA Executive Director Bob Rheault.



BOB RHEAULT

Sebastian Belle, Executive Director of the Maine Aquaculture Association, getting ready for the NAA Auction.

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— Continued from page 2

Selective Breeding

ing program lies is provided by a real-world example from down-under. Coincidentally, Australia started its Pacific oyster selective breeding program in the same year as ABC, in 1997. The Australian program began as a mass-selection program, but got off to a rough start—the upshot of breeding for fast growth was long skinny oysters. In fact, arguably, value was lost (Fig. 3, on the part of the curve marked, “inadequate breeding plan”). In 2000, the breeding program reorganized under an industry-owned program called Australian Seafood Industries (ASI), and through collaboration with the Australian research organization, CSIRO, began a family-based breeding program.

The ASI program successfully added incremental value over the course of the next decade or so (Fig. 3, on the part of the curve marked, “family selection – multiple traits”). But then in 2013, the oyster *Herpes* virus known as OsHV1- μ var, which had caused so much devastation in the French oyster industry, became active in the major oyster growing area known as the Hawkesbury River, north of Sydney. (The Australians named the disease Pacific Oyster Mortality Syndrome, POMS, to spare the world from having to associate “*Herpes*” with “oyster.”) Soon, POMS had spread to Tasmania, another major growing area and home to the majority of hatchery production for the country. The result was devastating to the industry, but it could have been very much worse were it not for the existence of the ASI breeding program.

The complete story of the phoenix-like rise of the Australian oyster industry from the ashes of the POMS outbreak is beyond the scope of this report, but at this time ASI is on its sixth generation of selection for POMS resistance, with survival rates of up to 80–90 percent for some elite families. To quote a breeder on the front lines of this battle, “Tasmania has come from devastation when POMS first hit in summer 2016, with businesses facing insolvency, to record production in summer of 2020 solely due to breeding. And businesses would not have been given bridging finance without the existence of the breeding program.”

In other words, without a breeding program in place, the fate of the industry after POMS would have been sealed. The takeaway here is: an established breeding program is one of the best assurances for the sustainability of shellfish farming.

Summing up the Australian story, routine operation of the breeding program provided incremental added value (Fig. 3, on the part of the curve marked, “Routine”), while the

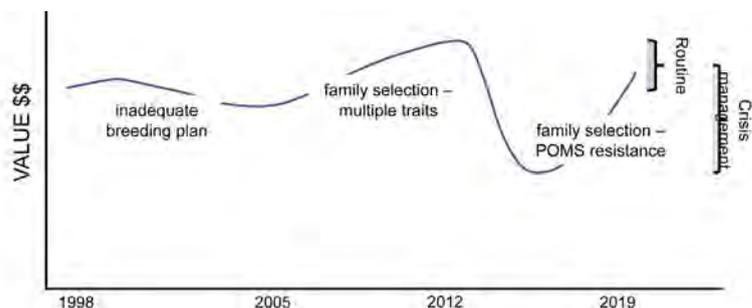


Fig. 3: Added value for phases of selective breeding at Australia’s ASI rose incrementally until POMS struck in 2013. Being able to react to POMS subsequently conferred extraordinary added value to the industry.

reaction to the POMS crisis provided immense added value (Fig. 3, on the part of the curve marked, “Crisis Management”). Interestingly, this is completely opposite from what happened with ABC. No one knows what the next POMS will be for the oyster industry. We can only guess the extent of disruption that climate change might impose on grow-out, or what form future biological challenges will take. But no matter what lies ahead, it is possible to envision a proactive response through selective breeding. And that represents significant future added value to our industry.

The logo for 4Cs Breeding Technologies, Inc. features a stylized blue '4' inside a green oval. Below the oval, the text '4Cs Breeding Technologies, Inc.' is written in blue. Underneath the entire logo, the tagline 'Triploid Technology for the Oyster Industry' is written in black.

— Continued from page 4

New Faces at Milford Lab

Diane began her career in federal service by participating in a cooperative internship semester at the Milford Laboratory while she earned her Bachelor of Science degree from the University of Bridgeport.



GEORGE SENNEFELDER/NOAA FISHERIES

Microbiologist Diane Kapareiko

In addition to these three new scientists, a candidate for Veterinary Medical Officer is currently awaiting government security clearance.

The Veterinary Medical Officer will play an important role in managing shellfish health and preventing disease. In addition, a job announcement for Ocean Engineer, a position that will focus on improving aquaculture gear and reducing the risk of interaction with protected species, will be advertised shortly via [USAJobs](https://www.usajobs.gov).

An advertisement for Oyster Tracker. It features the text 'CONTROL YOUR LEASE. SELL MORE OYSTERS.' in large, bold, orange and white letters. Below this is the 'OYSTER TRACKER' logo, which includes a red circular icon with a white 'O'. At the bottom right, the phone number '781.570.9406' and website 'www.oystertracker.com' are listed.

An advertisement for Netminder. At the top, the word 'NETMINDER' is written in large, bold, blue and green letters, with a blue net icon to the left. Below this is the text 'Photoactive Release Coating for Biofouling Control'. The advertisement lists several benefits: 'FLUPSY' (Greater yield & faster growth, No need for weekly scraping, Healthier growing conditions) and 'GROW OUT BAGS/CAGES' (1.5X Growth Rates!, Clean Gear = Healthier Shellfish, Improved Efficiencies). Two images show a 'TREATED BAG' (clean) and an 'UNTREATED' bag (covered in biofouling). At the bottom left is the 'epaint' logo, and at the bottom center is the phone number '800-258-5998' and website 'netminder.us'.

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