East Coast Shellfish Growers Association

The East Coast Shellfish Growers Association represents over 1,000 shellfish farmers from Maine to Florida. These proud stewards of the marine environment produce sustainable, farmed shellfish while providing thousands of jobs in rural coastal towns.

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

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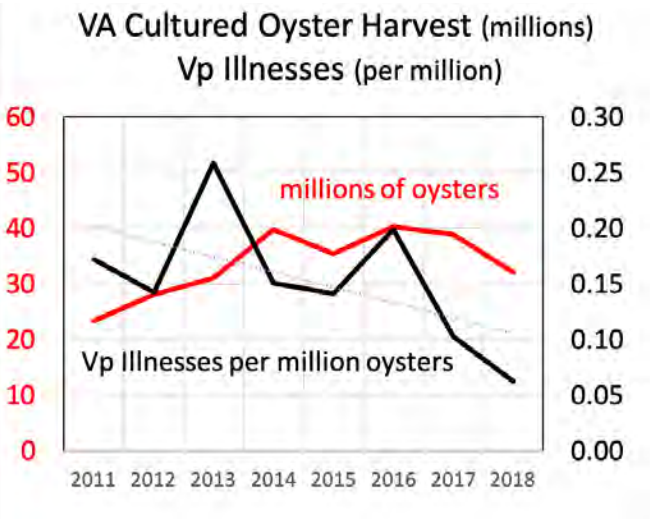
The Mouth of the Bay

Good News for Aquaculture

Executive Director Bob Rheault

We have plenty of great news to share in this edition, especially the piece on innovative culture techniques. As I write this, a team of growers is preparing to head to San Diego for the ISSC meeting, where the rules and regulations are drafted and tweaked for every aspect of our program. This year we have over 100 proposals for changes on the docket, with more than 1,000 pages to review.

We know, for example, that the Centers for Disease Control believes *Vibrio* illnesses are on the rise and that they want more harvest-area closures and recalls to deal with this perceived problem. However, we contend that huge increases in production, coupled with better detection methods may make it look as if illnesses are increasing, but when you take into account the illness rate per serving, the risk is actually trending down!



Just look at what has been happening in Virginia: cultured oyster production has almost doubled since 2011 and the number of confirmed *Vibrio parahaemolyticus* illnesses per million oysters has been cut in half. Our *Vibrio* controls are working. We believe that tracebacks are too slow to allow closures and recalls to be effective illness-prevention tools. Unless they can be improved, recalls are merely punitive.

Innovative Culture Techniques Showcased at PCSGA Annual Conference

by Robert Rheault,
ECSGA Executive Director

One of the best aspects of being a shellfish farmer is that this industry is relatively young, providing ample opportunity to invent something new, devise a better way of doing things or make the job easier. While modern agriculture seems pretty cut-and-dried, aquaculture is still in the process of being figured out. As Tonie Simmons noted in her interview (see page 2), the challenges of experimentation and discovery can keep the job fresh and make the mundane daily chores a little more tolerable.

I am writing this as I fly back from the Pacific Coast Shellfish Growers Association (PCSGA) annual conference, where I saw several examples of novel approaches to shellfish culture that were eye-opening and perhaps even mind-blowing.

Engineers design a hatchery model

First up, let me try to describe the presentation by Eric Marissal, president of Grainocean International in France. Eric comes from a family of engineers who have brought a new way of thinking to the hatchery, nursery and grow-out operations of Pacific oysters. They have not just made incremental advances, but have totally reconfigured many aspects of the process using novel gear and automation to hone the craft and produce a perfectly shaped oyster with a full meat.

WWW.FRANCENAISSAIN.COM

A view of the formidable France Naissain complex near Nantes, France. The indoor hatchery houses phytoplankton-production and oyster-spawning operations. Larvae are then sent to indoor micro-nurseries, where they set on micro-cultch. At a size of 1 mm oysters are moved to outdoor nursery ponds, where they are fed algae that is grown outside in nearby ponds. Partner operations provide for partial and full grow-out of oysters in Brittany, Normandy and Jersey.

As Eric explained, the French hatchery industry has had to reinvent itself in the face of tremendous disease and production challenges. They rebuilt and relocated their entire hatchery operation, using custom-designed, custom-built equipment that allows for incredible efficiency and vast reductions in labor. Eric spoke for nearly an hour, generously sharing slides and videos that you can view on YouTube by searching on "Grainocean," or by downloading their free Grainocean app from the App Store or Google Play. While some of the procedures for rearing larvae

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Member Profile:

Muscongus Bay Aquaculture and Dodge Cove Marine Farm

by Robert Rheault,
ECSGA Executive Director

On a recent visit with longtime ECSGA supporter Tonie Simmons of Muscongus Bay Aquaculture in Bremen, Me., I was blown away by the scale, scope and diversity of the operation that she and her team have built over the last two decades.

Tonie's initial exposure to shellfish culture came with her first job out of college in 1978, working at the Darling Center under Sam Chapman and Herb Hidu. After some time in Boston working in the biotech industry, she returned to Maine to pursue a PhD. at the University of Maine in Orono, working under Brian Beal studying larval sea-scallop nutrition. But after a few years Tonie decided the degree wasn't what she really wanted so she purchased a piece of land she calls her sanctuary on the Medomak River (historically known as the Muscongus), and lived out of her RV while contemplating her next career move.

Tonie insists that she never dreamed of starting a hatchery, but at the urging of many of her colleagues she took the plunge and started Muscongus Bay Aquaculture in 1999. Gradually she built the business, reinvesting and expanding operations, and eventually building a house so she could move out of the RV.

In 2007 she purchased Dodge Cove Marine Farm from Dick Clime and Gil Jaeger. Dodge Cove was started in 1977 and is the oldest continuously operating oyster farm in the state. Tonie says, "Dick and Gil had spent two decades crafting an elegant oyster and they were

MUSCONGUS BAY AQUACULTURE

Tonie attributes the high quality of her seed to a manic devotion to broodstock and larval nutrition. She provides a mixture of algal strains known to promote a balanced diet.

gracious enough to share the wealth of their experience when they handed over the reins to their leases in the Damariscotta River."

But three short years later, disaster struck. MSX reared its ugly head in Maine in 2010, wiping out three years of the farm's market product in about a month. Tonie recalled that, "My biggest mistake was to never envision the possibility of failure." The experience nearly broke her, but she learned that fear is a powerful motivator, and instead of giving up she pushed on.

Working with Dave Bushek and Ximing Guo at Rutgers University, Tonie invested in developing hybrid lines of disease-resistant oysters. The hybrid of her selected Maine lines and the resistant Haskin lines proved to be both vigorous and MSX-tolerant. She continues to perfect four lines of oysters, seeking broodstock with deep cups, an aesthetically pleasing shape, a rock-hard fluted shell and a perfect hinge.

Tonie has a sterling reputation in the industry. Many growers call her a wizard because it seems there is nothing she can't spawn. She will often do custom spawns for customers and has worked with several species, including bay scallops, surf clams, hard clams and soft shells. Claiming never to have failed in fulfilling an order, Tonie prides herself on customer satisfaction. "We have a symbiotic relationship with our customers. We succeed when our customers succeed."

BOB RHEAULT

Tonie Simmons showing off one of her high-performance selected strains of oysters being grown in three nursery sites using her custom-designed FLUPSYs.

One of the keys to Tonie's success is her emphasis on broodstock and larval nutrition. "Well fed oysters produce high-quality gametes, and well fed larvae become strong seed," she observes. The other key to success is her focus on hiring talented staff whom she describes as fearless, intuitive, intelligent, thoughtful and hard-working. As we toured the facilities she stopped to check in with each of them, inquiring about family and weekend plans.

Multi-talented General Manager Jean MacKenzie also designed the fabrication barn, and is working on patenting a device she

— *Continued on page 3*

— *Continued from page 2*

Muscongus Bay

designed that I predict growers everywhere will soon be rushing to buy. Farm Manger Eben Court brings an easy smile and a wealth of experience to his task of managing seven leases with four brands of oysters. Molly Bangs, Muscongus Bay's hatchery manager, was out on the lease sorting oysters with the rest of the hatchery crew after the that operation had been all buttoned up for the season. Cindy Blust manages the packing and shipping operations, juggling orders and harvests, and shipping products across the country through a network of wholesalers. I didn't get to meet Facilities Manager Simon Tomko, Operations Manager Nellie Brylewski, or Nursery Manager Maddi Cox, but I expect they share the same air of quiet professionalism that everyone on the team seems to possess.

They all have a lot to be proud of. The Muscongus Bay family consists of 24 full-time and four seasonal employees. In addition to the hatchery that cranks out about a billion seed (and tens of millions of larvae) for customers up and down the East Coast each season, they run nursery operations in both the Damariscotta River and the New Meadows River in Brunswick. Tonie also collaborates with Rod Taylor, who manages a small fleet of FLUPSYs (Floating Upweller Systems) in Bourne, Mass.

Talking about her biggest fear, Tonie pointed to the recent influx of new growers in Maine. While these are all potential new customers, the crush of new farms could thwart the natural expansion of established farms, and there are concerns about adherence to biosecurity measures.

But what she likes most about shellfish farming are the many opportunities to innovate, to invent something and to improve or refine the process. Tonie has surrounded herself with a cadre of capable managers and given them the freedom to experiment. It is clearly working. Muscongus Bay relies totally on word-of-mouth and does not spend a penny on advertising or marketing campaigns. Their reputation for quality and for customer satisfaction is more than enough to do the trick.

My last question for Tonie was why she has been such a longstanding and generous supporter of the ECSGA, and she did not hesitate for a moment, noting that she is happy to know that the association has her back. "I can keep my head down and focus on the business, secure in the knowledge that the ECSGA is out there protecting the industry and giving growers a voice on all the issues that I don't have time get involved with."

MUSCONGUS BAY AQUACULTURE

Nearly a billion early post-set seed pass through these upweller silos in the hatchery, where they are fed a rich, mixed-algal diet.

BOB RHEAULT

After the hatchery closes for the season, Hatchery Manager Molly Bangs (l) and Nursery Manager Maddi Cox help out in the field, sorting oysters.

BOB RHEAULT

After they've been sorted and counted, oysters are delivered to these holding cages, where they are allowed to spit sediment to prepare for packaging and delivery.

BOB RHEAULT

On the shaded work platform a large crew sorts and counts oysters dredged from one of the seven bottom leases in Damariscotta Bay.

Save Money: Take Care of Your Vinyl Mesh

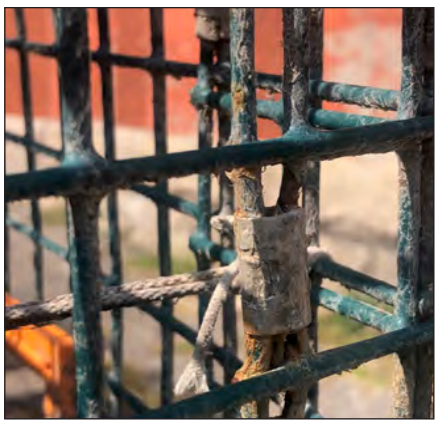
by Bob Ketcham, Ketcham Supply, New Bedford, Mass.

You're a pro grower and it's highly probable that a big chunk of your hard-earned dough is going to be plunked down on some type of vinyl-coated wire gear. Knowing how a quality marine-grade mesh is designed and put together will give you some insight into maximizing the service lifecycle of this stuff. Marine-grade mesh is a very different product from the green-coated fencing stuff sold in the big-box joints.

Understanding the selection, care and feeding of your vinyl mesh is going to keep money in your pocket longer. Having a general understanding of the construction and how it survives in the water will help you run your farm in a way to maximize the service life of your equipment.

The theory is pretty simple: stop the electrical activity. This is what turns our base material, iron, (the element Fe in the periodic table), into iron oxides and iron hydroxides, our nemesis, Mr. Rust. Be aware that your steel is only a dressed-up version of iron.

To protect the steel components on your boat, you clamp a chunk of zinc to the props, rudders and outboard so the zinc corrodes away, taking the bullet, as it were, for the steel. Zinc is an anode, a less noble sacrificial metal for the steel. For wire, we do something similar: we galvanize it, by dunking the mesh



HEATHER KETCHAM

Marine -grade wire construction involves first galvanizing the steel in molten zinc; then vinyl is bonded to the metal to prevent seawater from getting under the vinyl and corroding the metal. Rough handling of cages can damage the vinyl coating and zinc layer, reducing the life of your gear.

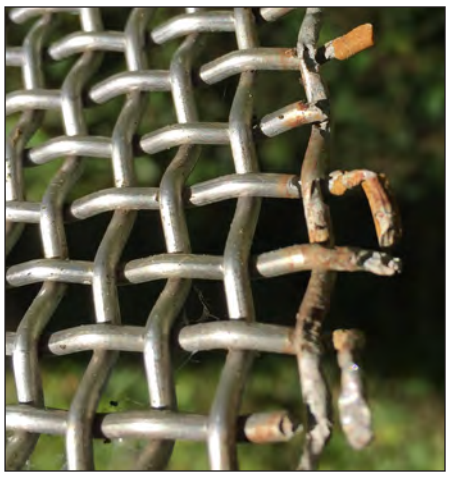
in a kettle of molten zinc and dragging it through. This process, known as hot-dip galvanizing, has become the desired method for treating marine-grade wire. The rest of the process is designed to make the zinc last longer. Happy zinc, happy steel.

Just putting vinyl over the now-galvanized wire makes good fencing, but really lousy marine wire. The vinyl does encapsulate the mesh, but it's loose-fitting, like bell bottoms, and allows the salt water to get between the two, cranking up the electrical activity.

The intermediate process before applying the vinyl is the application of a bonding agent that in essence super-glues the vinyl to the galvanized mesh. This prevents seawater from penetrating under the vinyl, insulating the steel from electrolytic corrosion. The original vinyl wire mesh in the 70s did not go through this bonding process, and as a result its service life was around half of what we can get with modern-day products.

Okay, so that's what you're buying. Lobstermen have been building traps out of it for over 40 years. It is proven to work in the marine environment, but how long does it last? That question is both pretty simple and just about impossible to answer.

An arrow doesn't find the bullseye, it takes the skill of the archer to get it there. In the lobster industry the lifespan of mesh varies hugely in different operations. For example, we have seen that owner-operated vessels usually get a much longer service life from their traps than boats with absentee owners using hired crews. Crews



BOB RHEAULT

If you think stainless steel mesh can survive in seawater, think again. This expensive stainless upweller mesh was eaten away in just a few seasons.

have no investment in the operation and just want to get through the trip and get home. Wham bam, pay me. Smart owners have established a bottom-line bonus system, a profit-sharing model, if you will, to incentivize the crews to treat the lobster traps and other equipment with more care. Train your newbies and have your team leaders enforce a work ethic that does not tolerate the wham-bam business model.

Because every nick, cut and scrape in the coating accelerates the degradation of the galvanizing as more area is exposed to the conductivity of the saltwater, it's important to watch for better ways to handle and deploy gear in order to maintain the electrical integrity of your vinyl coated mesh. If you take some care with the wire, you can add years to its service life, just like in the captain-owned lobster boats.

Here at Ketcham's we have seen new growers dragging cages across our asphalt parking lot to their trailer, grinding down the vinyl and zinc to the bare steel. That one act probably cost a year or two from the service life of that gear. We try to give those guys a quick lesson in metallurgy and amortization of capital equipment. Most of the folks get it instantly, while others, unfortunately, not so much.

It has been said that nothing lasts forever in saltwater, and it is certain that not all growers will survive. But even though you may not be able to make your gear last forever, it doesn't hurt for you to try like hell.

Virginia Aquaculture Conference
Marriott at City Center,
Newport News, Va.
November 15-16, 2019

Sessions include: grower panel on being a good neighbor and avoiding user conflicts, "ask a regulator" panel, research and extension updates, strategy for shellfish industry expansion with legal/policy implications, student research presentations.

The featured guest speaker will be Jim Perdue, chairman and advertising spokesman of Perdue Farms.

An aquaculture reception is included, featuring a taste of Virginia's finest farm-raised seafood products: clams, mountain trout, tilapia, hybrid striped bass, catfish, and oysters paired with local wines.

For more info visit www.vaaquacultureconference.com

40th Milford Aquaculture Seminar
Courtyard by Marriott, Shelton, Conn.
January 13–15, 2020

The seminar opens on Monday, January 13 with a poster session and welcoming event, followed by two days of technical sessions mostly focused on shellfish aquaculture.

Please consider submitting an abstract for either a poster or oral presentation—anything from novel growing techniques or gear to scientific discoveries to hatchery techniques, social constraints, or anything related to shellfish aquaculture. **Abstract deadline is November 1, 2019.**

Early registration rate ($150 per person, $85 per student) ends December 6. Early room reservation discount rate of $119 ends December 14.

For more info visit www.fisheries.noaa.gov/aquaculture/milford-aquaculture-seminar or contact Lisa Milke, lisa.milke@noaa.gov

Don't Flirt with Disaster: Secure Your Gear with Nelco Zip Ties

by Heather Ketcham,
Ketcham Supply, New Bedford, Mass.

Some things we just take for granted.

Zippers are cool—and so is their space-age cousin, Velcro. Zippers were invented way back in 1851 by Elias Howe (trivia answer) and most people still don't have a handle on how they work. We should just be glad we don't have to fumble with medieval drawstrings all the time. Consider the horrors of the infamous modern ladies-room line sans zippers! So many everyday items are super useful, especially to those MacGyver–type folks who always seem to find inventive new applications for mundane everyday gizmos.

Zip ties are one of those miraculous gizmos too. We all pretty much get how the mechanism works, but nevertheless they are a marvel of plastics and molding technology. They were invented in 1958 by a company called Thomas & Betts for (no big surprise here) binding electrical wire bundles into neat, orderly packages. But humans, being the resourceful creatures that we are, have found many more useful purposes for these things.

You know that aquaculture is a lot of work. You have invested in bags, cages and floats, and your livelihood depends on this stuff holding together, through all kinds of weather. Something as simple as a zip tie can make or break a day's efforts and (recalling the "for want of a nail" proverb), can even impact an entire harvest. A high-quality zip tie can be that important. Given how important these clever, functional devices are, and how reasonably priced high-quality zip ties are, why would anyone skimp on cheapo zip ties? Why would you use one that is not built specifically for aquaculture applications?

Nobody makes zip ties better than Nelco, an employee-owned company with 31 dedicated workers that was founded in 1984. Their products are sturdy and reliable, available in many sizes and colors. They also have innovative, plastic hot-stamped tags and stainless-steel round tags for marking gear—crucial to recovery if it gets washed away in a storm. In addition to being the sensible thing to do, tagging gear is becoming a regulatory requirement in more and more locations.

Smaller zip ties are often used to close grow-out bags, and colored zip ties can help keep track of different batches of shellfish. Farms often use color-coded zip ties to track a crop's age, size, type or originating hatchery.

Zip ties are also an easy-to-use solution for securing plastic or foam floats to shellfish bags or small, wire-mesh cages. They can even provide some inexpensive insurance for keeping the doors closed on plastic grow-out tumblers. The folks at Nelco also make custom-printed zip ties, a great way to both secure and tag your oysters with a single product.

Another recent application involves tying larger zip ties to the floats on cages, with several extra inches of plastic sticking straight up off the float. The pointed ends of the zip ties sticking up in the air discourage birds from landing and pooping right onto your product.

WWW.NELCOPRODUCTS.COM

Nelco makes zip ties in many shapes, sizes and colors, including custom-printed ones to secure and tag your shellfish with just one product.

I encourage you to get to know Andy Moss, Nelco's senior account executive. He's a great guy who enjoys interacting directly with shellfish growers and helping to innovate products that are in the company's wheelhouse. As Andy puts it, "we are problem solvers."

For more info, visit www.nelcoproducts.com or contact Andy at amoss@nelcoproducts.com.

Swap Meet

Are you an ECSGA member looking for a job? Want to buy or sell seed or gear?

ECSGA-SWAPMEET is the LIST for you!

To subscribe visit

ecsga.org/join-ecsga

— *Continued from page 1*

Innovative Culture Techniques

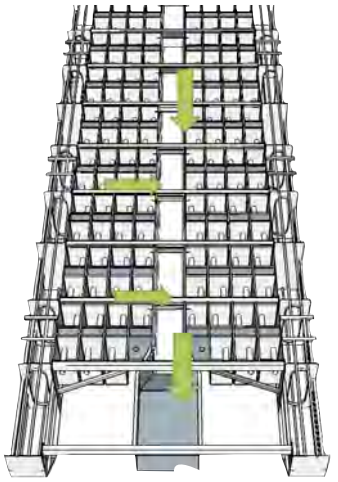
and seed seem familiar, the scale of production and the tiny workforce employed are like nothing I've ever seen. Imagine draining down and grading a room-sized stainless steel larval tank with one person, or growing enough live algae in self-cleaning reactors to feed four such tanks with only one person. Their land-based upweller nurseries seem pretty normal until you look at all the thought that went into the design to facilitate stocking, grading and restocking so that hundreds of millions of animals can be maintained with a tiny crew.

At 4 mm seed is sent out to a field nursery featuring giant, custom lantern nets that get rotated by tide-driven impellers, creating perfectly rounded, single 10-mm seed. That seed is sold to growers or shipped off to their own grow-out sites, where they have custom-built flip trays that pump out perfectly rounded oysters with full meats in a matter of months. I encourage you all to find a French-speaking friend and spend some time checking out what the future of oyster farming looks like. The PCSGA board should be commended for setting up the *John Lentz Profiles in Innovation Speaker Series* to bring these innovative engineers "across the pond" to share their inventions.

WWW.FRANCENAISSAIN.COM

Designed by engineers, the France Naissain complex allows for efficient handling of millions of Pacific oyster seed by a relatively small crew.

FLUPSYs on steroids



I was also wowed by a novel approach to FLUPSY (Floating Upweller System) design shared by Eric Wyatt of Blue Starr Oyster Company in Tokeen Cove, Alaska. His all-aluminum, paddlewheel upweller features a catamaran design with pontoons that can be filled or emptied to raise the entire rig for ease of towing or to adjust for the load on deck. He showed how his friction-fit silos drop into place, their screened outflows aligning with matching 6-inch diameter pipe sections that lead to the side troughs and then out to the main outflow trough. There is very little loss of flow around the friction fit between the bin outflow and the outflow channels. This arrangement allows for quick hoisting up of bins and quick deployment of bins by simply dropping them into their slots.

FlipFarm

The folks down under have done it again. Aaron Pannell, of Marlborough Oysters in New Zealand, has patented a design combining mechanization with Hexcyl Pro Series baskets and floats on longlines, eliminating the need to drive stakes into shallow bottom. The design adds a hollow "axle" to the bottom of the Hexcyl basket and a large-volume float to the top, allowing for a rope to be threaded through the axle, creating a line of baskets that float on the surface. Each basket can independently rotate to fill and empty, and the whole line can be quickly and easily flipped up for drying. Pannell says, "the automation has resulted in a 300 percent reduction in time and effort to work the gear," allowing him to grow around 20 million oysters a year with only four employees.

Since the baskets stay on the line permanently, the attachment can be made to withstand extreme weather. The developers are now working on a submersible rigid float that allows for very fast sinking and raising of the baskets to avoid ice and storms.

Watching their video makes shellfish farming look easy (search for "flipfarm" on YouTube).

For more info visit www.flipfarm.co.nz or email Aaron at aaron@flipfarm.co.nz.

BLUESTARROYSTERS.WORDPRESS.COM

Left, the massive FLUPSY design has screened outflows aligning with 6-in. pipes leading to side troughs and then to the main outflow trough. Above, the friction-fit silos easily drop into their slots.

WWW.FLIPFARM.CO.NZ

Check out FlipFarm's video to be wowed by the modified Hexcyl Pro series baskets that allow a crew of four to produce 20 million oysters a year.

WWW.FLIPFARM.CO.NZ

Mechanization is key to maximizing efficiencies at FlipFarm's operation.

Trade Show

The PCSGA trade show drew a bunch of familiar equipment suppliers who were eager to share their newest developments and innovations, including Reed Mariculture, Hoopers Island Aquaculture, SEAPA, Thunderbird Plastics, SmartOysters and Oyster Tracker. Several new faces were there, showing off space-age algal bioreactors, sorters, and insurance and labor-management solutions.

Perhaps the best part of attending these conferences is catching up with old friends and hearing what's new in other parts of the world. It may be challenging to break away from the responsibilities of your farm or business for a few days to attend one of these meetings, but I guarantee that if you do manage to make the trip, you won't come away thinking it was a waste of time.

ECSGA Membership Categories and Dues

Growers, dealers and equipment suppliers enjoy full voting rights. (If you are both a grower and a dealer simply ask yourself where most of your revenue comes from.) If you don't fall into one of these industry categories please consider joining as a non-voting associate member.

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 3 million	$1,000
Grower	Over $3 million	$1,500
Shellfish Dealers and Equipment Suppliers		$250
Restaurant Ally		$100
Non-voting Associate		$50

Because ECSGA is a 501(c)(6) non-profit trade organization, a portion of your membership dues may be tax deductible as a business expense; please contact us for details.

You can pay online using PayPal or your credit card on our website www.ECSGA.org or mail this form with your check to:

ECSGA, 1623 Whitesville Rd, Toms River, NJ 08755.

Name _____

Company _____

Street Address _____

City, State, Zip _____

Email _____

Phone _____

Member Type and Level*_____

* Rest assured your sales information will be closely guarded and will not be shared!

The Truth About Flesh-Eating Bacteria

by Robert Rheault,
ECSGA Executive Director

If you read the news this summer you probably noticed a flood of articles about "flesh-eating bacteria." This is just the sort of click-bait headline guaranteed to attract attention and boost ad revenue. Unfortunately, the lazy journalists who are posting these articles are also scaring people away from shellfish consumption and marine-related recreational activities. I spent much of the summer trying to respond to these reports and to persuade multiple authors to retract or amend their articles to reflect the facts. But good news is boring and as the saying goes, "If it bleeds, it leads."

So why are we seeing this explosion of deceptive news coverage? One answer can be traced to a report published this spring in the Annals of Internal Medicine[1] documenting a handful of *Vibrio vulnificus* wound infections that were traced to Delaware Bay. The author repeated the popular theme that *Vibrios* are spreading because of climate change. Graphic descriptions of disfiguring skin blisters, amputations and life-threatening illnesses were enough to get dozens of news outlets to pick up the story and run with it.

In doing so journalists have sown confusion and caused significant harm to those who make their living from seafood and the businesses surrounding marine recreation. One New Jersey business owner who rents boats and gear for folks to fish for blue crabs claimed that his business was off by over 50 percent this summer due to fears driven by reports of flesh-eating bacteria. Resource managers in the mid-Atlantic complain that they are being deluged with questions about whether it is safe to go in the water or to eat crabs.

What are the facts about *Vibrio vulnificus*?

Vibrio vulnificus (Vv) is a naturally occurring bacteria that is ubiquitous in warm, brackish waters. We find it pretty much everywhere on the East and Gulf Coasts when waters are warm, but it has no relation to water pollution. Thankfully Vv illnesses are extremely rare. The Centers for Disease Control (CDC) reported a total of 119 cases of Vv in the U.S. in 2014 (the most recent data available)[2], meaning that most doctors will never see a case in their entire career. The CDC reports that 60 percent of cases are related to wound infections, while 16 percent are related to eating raw or undercooked seafood[2] (most often oysters).

WWW.CDC.GOV

Many species of *Vibrio* bacteria can cause illness, but thankfully the number of cases resulting in the most severe symptoms and death are extremely rare.

Most of the infections occur in the immune-compromised population (such as people with liver damage; or who are taking medications that suppress their immune response to treat HIV or cancer, or to prevent transplant rejection). For these individuals the infections can quickly invade the blood (sepsis), and the mortality rate can be as high as 20–40 percent.

To be accurate, Vv is rarely described by the medical community as "flesh-eating." True flesh-eating wound infections are mostly associated with Type A *Streptococcus* or *Staphylococcus aureus* bacteria. Although septic Vv infections can cause disfiguring skin blisters requiring surgery or amputation, it is not accurate to lump Vv in with the much more common staph and strep bacterial infections.

If the articles stopped there it might not be so bad. Most people would see the low rates of infection and conclude that their own risk is minuscule. Hopefully, the immune-compromised population would take appropriate precautions by protecting wounds and scrapes from brackish water and by avoiding raw shellfish, while healthy folks would go about their lives with little to fear. Unfortunately, these irresponsible journalists do not stop there. Without putting in the clutch, they shift gears and report that the CDC estimates there are 80,000 cases of Vibriosis a year across the country, effectively lumping a very rare and potentially life-threatening disease in with all the other types of *Vibrios* that are more common, but far less dangerous.

What is Vibriosis?

The broad category of Vibriosis includes illnesses caused by dozens of pathogenic *Vibrio* species, such as *V. cholera* and *V. parahaemolyticus*. The CDC collects data on all lab-confirmed *Vibrio* illnesses. In 2014 a total of 1,252 lab-confirmed cases occurred nationwide, but because of under-reporting and misdiagnosis the CDC applied a multiplier and estimated that 80,000 Vibriosis cases occur annually.

What about *Vibrio parahaemolyticus*?

The most common of these pathogens is *V. parahaemolyticus* (Vp), which causes an

— *Continued on page 14*

1. annals.org/aim/article-abstract/2736101/vibrio-vulnificus-infections-from-previously-nonendemic-area
2. www.cdc.gov/nationalsurveillance/pdfs/covis-annual-summary-2014-508c.pdf
3. www.cdc.gov/foodborneburden/pdfs/scallan-estimated-hospitalizations-deaths-foodborne-pathogens.pdf
4. www.cdc.gov/foodborneburden/pdfs/scallan-estimated-illnesses-foodborne-pathogens.pdf

Breeding Consortium wins $4.4 Million Grant to Advance Selective Breeding of Oysters

by Robert Rheault,
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About a decade ago the ECSGA began pushing for significant funding to support selective breeding efforts for shellfish, enlisting the help of top shellfish geneticists to form the East Coast Shellfish Breeding Consortium to scope this effort. With support from a half-dozen influential senators we managed to get significant funding entered into the FY2010 budget through the USDA's Agricultural Research Service (ARS).

Unfortunately, Congress never passed that budget, as that was the first year of the sequester. Nevertheless, by working with Rhode Island Sen. Jack Reed I was able to get one ARS position funded, resulting in the 2013 hiring of Dina Proestou, who works at the University of Rhode Island, but is technically associated with the ARS's National Cold Water Marine Aquaculture Center in Maine.

Fast-forward to last year, when we became aware of a NOAA funding opportunity to support shellfish genetics. We got the gang back together and brainstormed how best to advance the state of the art. By that time our consortium had grown to 14 shellfish geneticists from 10 East Coast universities and two government agencies.

All that persistence has finally paid off, and we are now proud to announce that the Atlantic States Marine Fisheries Commission (ASMFC) has awarded the East Coast Shellfish Breeding Consortium a five-year grant for $4.4 million to develop new tools to accelerate selective breeding efforts in support of oyster aquaculture.

Leveraging the successful DNA sequencing of the Eastern oyster genome and using novel genetic tools, consortium geneticists expect to accelerate the pace of selective breeding by identifying specific genes responsible for various desirable traits (such as disease tolerance), allowing us to more precisely select superior oysters for breeding. In the past we had chosen brood oysters based on survival or growth, but we could never be sure that their progeny survived or grew better because of their genetics, as opposed to sheer dumb luck. By tying traits to genes we hope to eliminate some of that uncertainty. Importantly, the tools we develop can be directly applied to breeding across the entire range of the species. Our work should enable the development of regionally adapted, high-performance lines for deployment to commercial hatcheries.

Why conduct this research?

Farming of the Eastern oyster, *Crassostrea virginica*, is a rapidly expanding $90 million enterprise along the East Coast, supporting thousands of jobs. We know that selective breeding can result in huge improvements in production. For instance, over many generations, researchers at Rutgers University and the Virginia Institute of Marine Science have developed varieties of oysters that are now quite tolerant of MSX, the parasite that essentially wiped out much of the oyster harvest in the mid-Atlantic.

Other traits, such as faster growth rates and bigger meats, have also been substantially improved. But we know there is still plenty of room for improvement, and that enhancing traits for the Eastern oyster is a regional endeavor. With a native range from Atlantic Canada through the Gulf of Mexico, Eastern oysters display clear physiological differences from region to region, with populations adapting to local environmental conditions. One goal of the project is to develop genetic strains that are uniquely adapted to each region.

How will we do it?

Because of the sequencing information from the Eastern oyster genome, new tools are available to make direct associations between the genetic code and desirable traits. The team will rely on an "SNP chip"—a tool that can detect thousands of small segments of DNA from samples of oyster tissue. By evaluating hundreds of oysters for these SNPs we can associate genes with traits in order to speed the selection process.

While disease resistance is arguably the most important trait, the team expects to use the same techniques to select for other desirable traits, such as shell shape, fast growth, and meatiness. Other aspects of the project will evaluate the usefulness of genomic selection to address emerging issues such as resistance to ocean acidification or tolerance to hypoxia.

The consortium expects that genomic selection will bring oyster breeding into the 21st century, greatly accelerating the pace of selective breeding. Genomic selection is increasingly being relied on to enhance agricultural yields, and its use with oysters will be pioneering for aquaculture species.

The Eastern Oyster Breeding Consortium comprises 14 research scientists from 11 institutions located along the U.S. East Coast. The team includes the top oyster genetics researchers from Rutgers University; the Virginia Institute of Marine Science; the University of Rhode Island; the University of Maryland Center for Environmental Science; Northeastern University Marine Science Center; Stony Brook University; Cornell University; Morgan State University; the University of North Carolina, Wilmington; NOAA's Northeast Fisheries Science Center; and the USDA's Agricultural Research Service.

News Flash

The Senate Agriculture Committee has approved funding for two additional ARS geneticist positions in the 2020 budget. We are cautiously optimistic that it will survive the budget process.

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Truth AboutFlesh-Eating Bacteria

average of 130[3] to 287[4] confirmed cases each year. The CDC estimates that for every confirmed case 142 cases go unreported or misdiagnosed, bringing the total estimate to 44,950 Vp cases[3] annually (about 34,664 of these are foodborne).

Vp prefers seawater (while Vv is more common in brackish water), but again Vp is ubiquitous in warm marine waters around the globe. Hundreds of strains (that we know of) are benign, but several strains have caused significant outbreaks, often sickening dozens at a time. Most Vp illnesses are associated with the consumption of raw or undercooked seafood.

Since many *Vibrios* are chitinolytic (they consume the shells of crabs, shrimp, lobster and copepods) we see many Vp illnesses from handling or consuming raw or undercooked crustaceans. But most cases are associated with the consumption of raw shellfish, with oysters being the chief culprit, because they filter the water quite efficiently and can concentrate bacteria as they feed, and also because raw oysters are a popular consumer choice.

Most Vp illnesses cause nasty skin infections or gastroenteritis, but again, for the immune-compromised population Vp can result in life-threatening septic infections. The CDC estimates that Vp illnesses have a 0.9 percent mortality rate (~4 mortalities from foodborne Vp annually nationwide)[3].

3. www.cdc.gov/foodborneburden/pdfs/scallan-estimated-hospitalizations-deaths-foodborne-pathogens.pdf

5. www.cdc.gov/vibrio/faq.html

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How should we interpret CDC's numbers?

First of all, we need to recognize that estimating the number of illnesses is not an exact science. The Cholera and Other Vibrio Illness Surveillance (COVIS) system was started by the CDC, Food and Drug Administration (FDA), and four Gulf Coast states as a national database for Vibrio in 1989[5]. Most states were voluntarily reporting *Vibrio* cases in the early 2000s; in 2007 the CDC mandated that all states report Vibriosis illnesses.

Vibrios are not easy to culture from fecal samples, so many cases go undiagnosed, and most people don't bother to go to the hospital for a mild case of gastroenteritis.

Is the incidence of Vibriosis increasing?

The CDC believes the prevalence of Vibriosis has been increasing over the past decade, and so is pushing for tighter regulations. With most foodborne illness on the decline, what could be the cause of this perceived increase? Several explanations are possible:

1. States are clearly getting better at complying with reporting requirements that have been mandated for only the past 12 years;

2. Recently we have seen widespread adoption by hospitals of a new diagnostic tool called Culture Independent Diagnostic Testing (CIDT), a PCR device that detects snippets of DNA or RNA from the most common pathogens in fecal samples. It's inexpensive and generates results in hours instead of days, meaning that detection is far more common than it was just a few years ago. It is safe to say that the multiplier used by the CDC to estimate total cases based on lab-confirmed cases should be revised downward to reflect this new reality;

3. In New England we know that the frequency of Vibriosis cases shot up after the introduction of a new hyper-virulent strain of Vp in 2012. But we have also seen a doubling of oyster production in the past five years, leading to the likelihood that more raw oysters are being consumed, and more often in summer, than ever before.

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Truth About Flesh-Eating Bacteria

Unfortunately, harvest data is pretty thin so it is tough to make this case; and

4. Many reporters are linking the spread of Vibriosis to climate change. Certainly, warming will increase the pathogen's range and lengthen the season, but the modest amount of warming we have seen in the past decade hardly explains the CDC's numbers. If temperature were the main driver it would be hard to explain why there are more Vp illnesses in Massachusetts than in Virginia.

And so the question remains: *Is Vibriosis becoming more common, or are we just getting better at detection and reporting?* With the advent of CIDT there is little doubt that detection is improving. Unfortunately, we have no way of determining whether illness rates per meal are increasing or decreasing. One thing is certain: since the CDC believes illnesses are on the rise, and our industry lies squarely in the cross-hairs, we will see a slew of proposals to tighten regulations at the ISSC meeting this month.

What should we do?

❑ **Keep 'em cold**. *Vibrios* love heat, so the single most important thing we can do is to promptly cool down harvests to stop bacterial growth. We can't eliminate *Vibrios* in live shellfish, but if we can keep our shellfish below 50° F we can keep safe shellfish from becoming unsafe.

❑ **Fight back with facts.** When you see one of those click-bait articles in the press, push back with facts in the comment section. I can't do this all by myself!

❑ **Educate the immune-compromised population** about the risk of consuming raw shellfish. They should enjoy their shellfish well cooked!

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❑ **Support your state and regional shellfish associations**. They are coordinating the industry response to the CDC's regulatory push at this year's ISSC meeting, and they need your support.

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